American Society of Ophthalmic Plastic and Reconstructive Surgery

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SYLLABUS

GENERAL INFORMATION

Continuing Medical Education

ASOPRS is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor the Continuing Medical Education (CME) for physicians. The American Society of Ophthalmic Plastic and Reconstructive Surgery designates this live activity for a maximum of ***15 AMA PRA Category 1 Credits™***. Physicians should claim only the credit commensurate with the extent of their participation in the activity. Self-assessment CME credit may be claimed if the physician completes the self-assessment questionnaire at the end of the online meeting evaluation.

Continuing Medical Education Mission Statement

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All other individuals in control of content have declared that they had no financial relationships with ineligible companies in the last 24 months.

7:01 – 7:05 am

From One Head to Another - Foreskin Use to Reconstruct the Upper Eyelid

Elise Steinberger[1], Rupin Parikh[1], Tammy Yanovitch[1], Adam Rensing[2], Jeremy Tan[1]
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Introduction: We describe a pediatric patient who underwent reconstruction of the right upper eyelid using foreskin, following excision of a capillary hemangioma. Full-thickness foreskin has successfully been used as donor tissue for burn reconstruction and to replace skin defects on the hands, feet and eyelids[1,2,3,4]. Keratinocytes suspensions derived from foreskin are also of interest as a possible avenue for accelerating wound healing in burn victims[5].

Methods: Retrospective case report

Results: A two-year-old male with history of full-term birth, presented with capillary hemangioma of the right eyelid since the age of 1 month. Cycloplegic refraction showed hypermetropia and asymmetric astigmatism with likely significant contribution from the lesion. The lesion measured approximately 14 x 8mm (Figure 1) and caused ptosis that did not obscure the central visual axis. Visual acuity was initially symmetric and appropriate for age bilaterally.

The patient was treated with oral propranolol for 9 months and topical beta blocker with no improvement (Figure 2A). The patient often scratched the lesion and was poorly tolerant of glasses, partly due to the lesion catching on the glasses frame. The lesion decreased in size by 50% after intralesional triamcinolone and betamethasone (Figure 2B).

Given the persistence of the lesion and mechanical entropion after multiple intralesional steroid injections, the family opted for surgical excision. The resulting anterior lamellar right upper lid defect of 15 x 10 mm was reconstructed using a full thickness foreskin autograft (Figure 3A, 3B) with resulting symmetric upper eyelid position (Figure 4A, 4B).

Conclusions: Due to inherent elasticity, lack of hair and thickness, foreskin represents a viable donor tissue for eyelid defects[4]. Donor site morbidity is the literature is minimal and graft sites often do well, with reports of slight hyperpigmentation[3].

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Figure 1

Figure 2

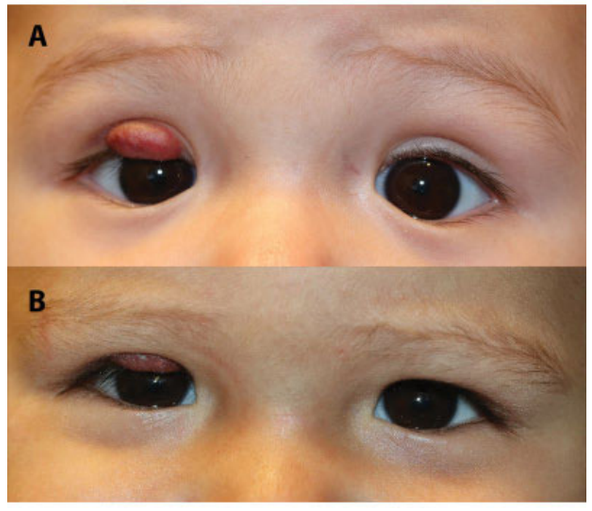


Figure 3

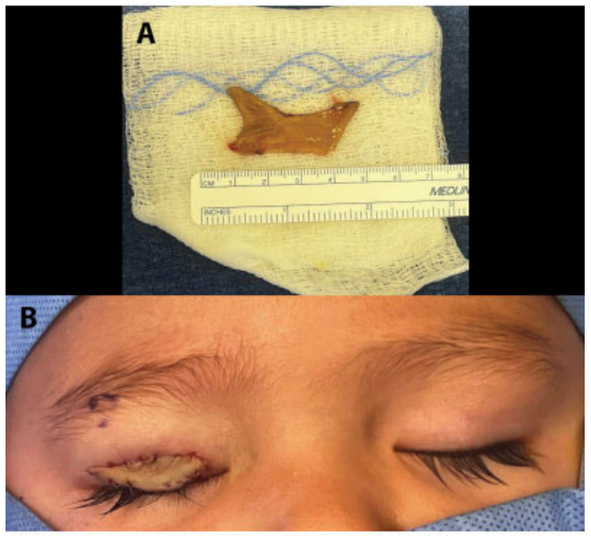
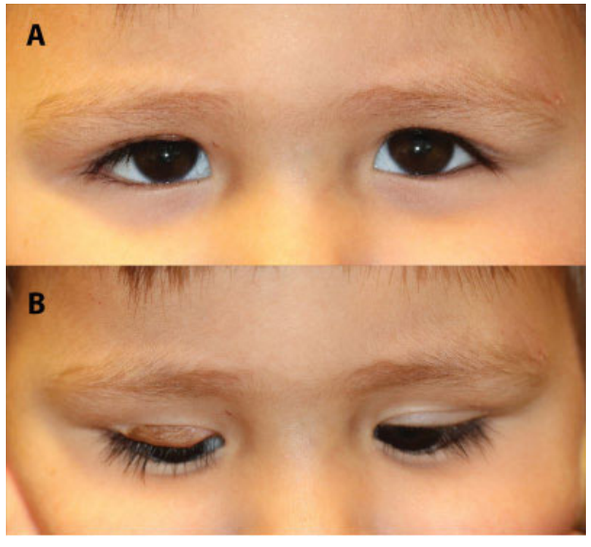


Figure 4



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7:05 – 7:09 am

Bacteriostatic Saline as a Local Anesthetic Agent in Minor Eyelid Procedures: A Randomized Controlled Trial

Meleha Ahmad, Elana Meer, Seanna Grob, Bryan Winn, M. Reza Vagefi, Robert Kersten
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Introduction: Benzoyl alcohol is used in healthcare primarily as an antibacterial preservative agent in bacteriostatic saline. It has been shown to have anesthetic properties, and has been demonstrated to cause less pain with infusion compared to lidocaine,[1] while maintaining adequate pain relief for procedures such as intravenous catheter insertion[2,3], cervical anesthesia[4], hip injection,[5] and minor dermatologic procedures.[6] It has been shown to have greater cost effectiveness compared to lidocaine.[7] The use of bacteriostatic saline alone as an anesthetic agent for incisional procedures in the periocular area has not yet been studied.[8]

Methods: We conducted a double-blind, randomized control trial comparing bacteriostatic saline and 1% lidocaine with 1:100,000 epinephrine as local anesthetics for minor eyelid procedures. We included all patients undergoing in-clinic procedures at two clinical sites of a large academic medical center by a single oculoplastic surgeon over a 7-month period. Patient demographics and lesion details were recorded. Patients were randomized to receive one of the two local anesthetics. Patient-reported pain of injection and pain of procedure, conducted 5 minutes after local anesthetic, were recorded on a 0-10 scale. Reinjection with the same agent was offered once if pain relief was inadequate; if pain persisted patients were defaulted to lidocaine with epinephrine. Bleeding during the procedure was recorded as mild, moderate or severe. Pain levels were compared between the two groups using chi square test for categorical variables.

Results: We included 95 patients with 110 eyelid lesions. The average age was 60.2 years (21 to 89 years), and 70.5% were female. Of the 110 lesions, 59/110 (53.6%) patients received bacteriostatic saline and 51/110 (46.4%) received lidocaine with epinephrine. A large percentage of patients in the bacteriostatic saline group required reinjection after 5 minutes (55.9% vs. 9.8%, $p<0.01$). A significant proportion of patients receiving bacteriostatic saline local anesthesia had a pain level of 1 or less compared to lidocaine with epinephrine (33.9% vs. 17.6%, $p=0.05$). However, patients receiving bacteriostatic saline tended to have greater pain during the procedure, with more patients receiving bacteriostatic saline having a pain level of 7 or more (24% vs. 6%, $p<0.01$). These differences persisted when analysis excluded lesions larger than 1 mm in diameter or lesions requiring greater manipulation such as chalazia. Four patients in the bacteriostatic saline group had “severe” bleeding (compared to zero in the lidocaine with epinephrine group), however only one these patients required thermal cautery and only two defaulted to lidocaine with epinephrine.

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Conclusions: Bacteriostatic saline may be less painful to inject compared with lidocaine with epinephrine for periocular procedures, and can be utilized for minor eyelid procedures without significant bleeding risk. However, it is unlikely to provide adequate pain relief alone in this setting. Injection of bacteriostatic saline prior to administration of traditional local anesthesia is a proposed method to reduce the pain of local anesthesia in periocular procedures. Given the high rate of need for reinjection, the peak onset of action of bacteriostatic saline is likely to be less than 5 minutes, which should be factored into its use.

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7:09 – 7:13 am

Lower Eyelid Retraction and Acquired Epiblepharon in Pediatric Thyroid Eye Disease: A Clinical And Demographic Study from a Tertiary Care Center in Southeast Asia

Emmanuel Lee Boniao, Alexander Gungab, Blanche Lim, Gangadhara Sundar
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Introduction: Pediatric thyroid eye disease(pTED) is a condition that has received little attention in the literature. As a result, many clinicians assume that its presentation is similar to adult TED. However, children are not "mini-adults" and the differences in facial anatomy and reduced patient complaints may have implications on its presentation and management. If not recognized adequately, pediatric TED can still have lifelong medical, esthetic and psychologic consequences.

Methods: A retrospective cohort study was done to analyze cases of pediatric TED in patients aged 18 or younger who were seen at a multidisciplinary Thyroid Eye Disease clinic of the Department of Ophthalmology at the National University Hospital of Singapore between the years 2008 to 2022.

Results: A total of 35 cases of pediatric TED were seen, the majority of which occurred in females (n=27,77%) with a mean age of 12.7 years. Most patients were hyperthyroid (n=30,86%) at presentation, with thyroid receptor antibody(TRAB) positive (n=27,77%) in most patients. Clinical findings included eyelid retraction (n=33,94%) with scleral show (lower>upper), acquired epiblepharon (n=24,69%), while others presented with conjunctival injection (n=19,54%) and proptosis (n=9,26%). Principal component analysis on the findings were made which demonstrated that positive and higher TRAB levels correlated with the presence of lower eyelid retraction and acquired epiblepharon, suggesting possible relationship. Eventually some patients underwent surgical thyroidectomy (n=2,6%) and RAI (n=2,6%) for poorly controlled hyperthyroidism, while 2 patients (6%) needed surgical decompression of the orbit for sight threatening thyroid eye disease.

Conclusions: To our knowledge, this is the largest single institution series of pediatric TED for Asia. Though often described as mild in literature, most of them will still present with signs of TED. However, unlike adult TED, lower eyelid retraction is much more common in pediatric TED. This may be related to immature facial bones in pediatric patients. Furthermore, the study showed that in TRAB positive patients, most will present with lower eyelid retraction and acquired epiblepharon.

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7:13 – 7:17 am

Enhancing Image-Based Periorbital Measurements: A Comparison Between Manual, Semi-Automated, and Fully Automated Approaches

Jeffrey Peterson[1], George R. Nahass[2], Deanna C. Bradley[2], Claudia Lasalle[2], Alvin Nguyen[2], Akriti Choudhary[2], Kevin Heinze[1], Pete Setabutr[1], Chad A. Purnell[3], Ann Tran[1]
[1]Department of Ophthalmology, Illinois Eye and Ear Infirmary, Chicago, United States, [2]University of Illinois at Chicago, Chicago, Illinois, United States, [3]Department of Plastic Surgery, University of Illinois at Chicago, Chicago, Illinois, United States

Introduction: Previously published artificial intelligence (AI) algorithms focus on databases of typical patients.1-3 The goal of this study was to streamline periorbital measurements and improve research output analyzing facial image datasets with AI applied to craniofacial syndromic patients. We developed an AI automated algorithm, *OrbitMap* and a semi-automated, user-operated ImageJ tool, *OrbitJ*.

Methods: The AI tool *OrbitMap* was developed with Google *MediaPipe Facemesh* (Python)[1] and *MediaPipe Iris* (C++)[2] models for measurement of 468 3D facial landmarks and iris tracking respectively. Image scale is set with 11.7mm iris diameter.[3] These landmarks are used to calculate 32 periorbital measurements using front-facing photographs (Figure 1 & 2).

An accompanying ImageJ-based macro script tool, *OrbitJ,* was also developed for semi-automated, user-generated measurements using 15 user steps, and generating 42 measurement outputs/photo (Figure 3). First, the image is rotated using a vertical reference line. Both irises are measured for image scale. The user bilaterally measures 15 points along the superior brow, inferior brow, lid crease, upper lid margin, and lower lid margin. Curvature is calculated with 4th-degree polynomial best-fit curves.[4] These features are used to output desired periorbital measures.

These tools were compared against manual periorbital measures using front-facing syndromic patient photographs (n=25) from our craniofacial center. Two graders conducted facial measurements manually and on the semi-automated *OrbitJ*, which were compared to the automated *OrbitMap*. Seven output measurements were compared: margin reflex distances (MRD1, MRD2), medial intercanthal distance (ICD), inferior and superior scleral show (ISS, SSS), vertical dystopia (VD), and medial brow height (MBH). Intraclass correlation coefficients (ICC) were calculated in SPSS 28.

Results: Analysis succeeded in all photos regardless of image size/lighting. MRD1 MRD2, MBH, ICD, and ISS demonstrated reliability: ICC values ranged from 0.441–0.678 (p<0.001) between all modalities. More variation existed for VD and SSS, with ICCs of 0.3833 (p=0.083) and 0.285 (p=0.121) respectively. Comparing only *OrbitJ* to *OrbitMap*, MRD1, MRD2, and MBH had high reliability with ICC values from 0.51–

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0.676 ($p \leq 0.006$). Reliability was lower for SSS, ISS, VD, and ICD: ICC ranged from -0.21–0.295 ($p=0.57–0.48$). Average processing time/image was significantly faster with more automation: 34.9min for manual measurements, 3.2min for semi-automated *OrbitJ,* and 2.3s for the automated *OrbitMap* ($p<0.001$).

Conclusions: There was significant reliability between the measurements of the MRD1, MRD2 and MBH using semi-automated and automated AI algorithms in syndromic craniofacial patients. Future algorithm improvements may allow for increased facial measurement accuracy in patients with oculofacial pathology. These streamlined approaches offer significant time savings for researchers with facial image datasets.

Figure 1

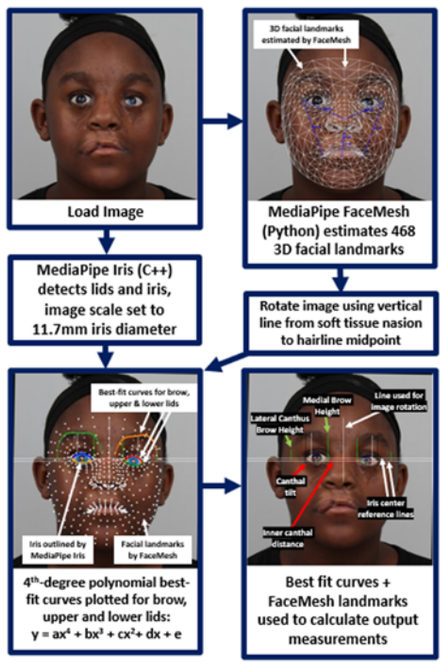

Figure 1. Flowchart outlining the automated *OrbitMap* script algorithm. The image is loaded and processed MediaPipe Iris (C++) to detect lids and iris, which helps define facial measurements, as well as sets the image scale to a standard 11.7mm iris diameter. The original image is then loaded and processed by MediaPipe FaceMesh (Python), which estimates 486 distinct 3D facial landmarks. The facial landmarks representing the soft tissue nasion and hairline midpoint are used to rotate the image vertically. The points estimated for eyebrows, upper and lower lids by both algorithms are fit to 4th-degree polynomial best-fit lines. These estimated features are then used to calculate and output periorbital measures of interest.

Figure 2

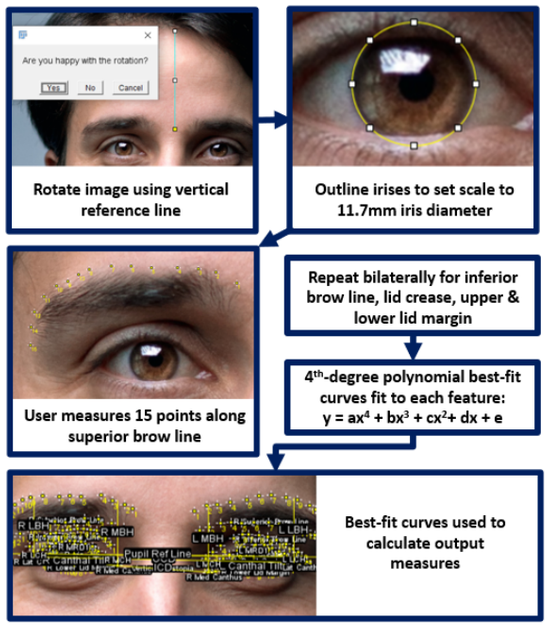

Figure 2. Flowchart outlining the semi-automated *OrbitJ* script algorithm. The user loads the image into ImageJ and is then prompted to rotate the image by drawing a vertical line from soft tissue nasion to hairline midpoint. The user then outlines both irises, which provides both a standard 11.7mm iris diameter scale to the image as well as iris landmarks which define later output measures. The user then measures 15 points along the superior and inferior brow lines, lid crease, and upper and lower lid margins, for right then left side of the face. Fourth-degree polynomial best fit lines are then fit to these features. The now defined features are then used to generate the output measures.

Figure 3

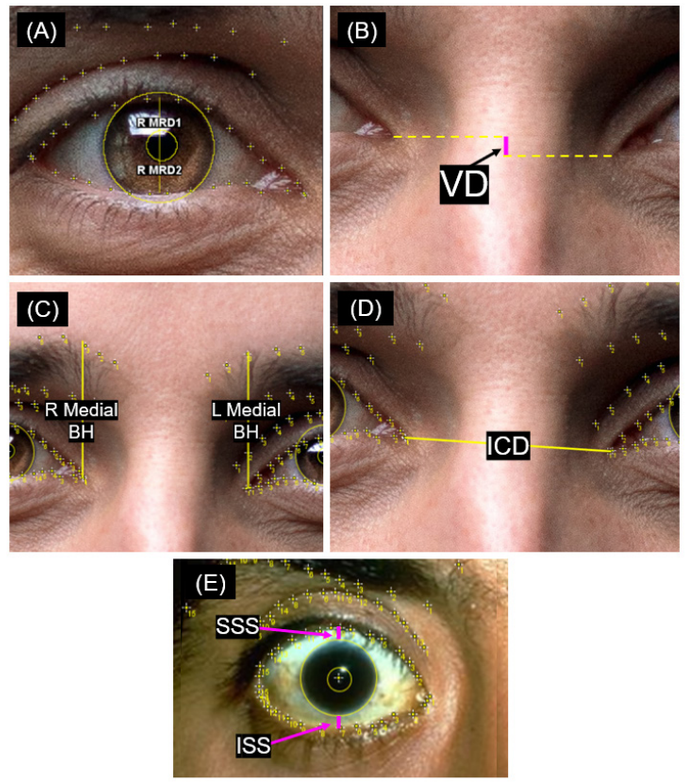

Figure 3. Visual of measurements with the semi-automated *OrbitJ* macro-script. (A) Lid height expressed as MRD1/2, (B) Vertical dystopia (VD), (C) Left and right medial brow height, (D) Inner canthal distances (ICD). (E) Superior and inferior scleral show (SSS, ISS).

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7:17 – 7:21 am

The Lid Crease to Brow Measurement: A Useful Metric in Evaluating Dermatochalasis and Brow Ptosis

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Introduction: To introduce a novel metric, the lid crease to brow (LCB) measurement as a standardized quantitative measure of dermatochalasis and brow ptosis and to discuss the role of supraorbital rim projection in browplasty and blepharoplasty.

Methods: A retrospective chart review was performed on patients presenting to the Augusta University Eye Clinic from January 1, 2007, to January 1, 2022, with complaints of ptosis, who underwent either a blepharoplasty, browplasty, or both. Patients under 18 years, those with previous eyelid surgery, orbital trauma, levator manipulation, or thyroid eye disease were excluded. Patients were followed for 16 weeks. Data collected included patient sex, age, pre-operative and post-operative MRD1, lid crease height, LCB, presence of hooding, and presence of supraorbital bossing. LCB is defined as the distance (in mm) from the lid crease to the central inferior brow hairs, measured with the patient in downgaze and the brow elevated.

Statistical analysis was performed using SAS 9.4, and significance was based on an alpha level of 0.05. An analysis was performed on the entire data set and then 3 subgroups: high LCB group (>22 mm), intermediate group (18-22 mm), and low group (<18 mm). This study was IRB exempt through Augusta University.

Results:
Entire Data Set: 189 eyes were included. The majority were females (63%) with a mean age of 67 years. The mean LCB for the entire data set was 21.58 mm. Females had a larger LCB than males ($p=0.0048$). Race and hooding were not associated with LCB ($p=0.2761$, $p=0.0876$). Supraorbital bossing was associated with a lower LCB ($p=0.0017$). There was a significant increase in MRD1 from the preoperative visit to first and second post-operative visit ($p<0.0001$).

Subgroups: The mean LCB for the high (>22), intermediate (18-22), and low (<18) groups were 25.64, 20.02, 15.4, respectively. LCB and pre-operative MRD1 were not associated in the low (<18) or intermediate (18-22) group. LCB and pre-operative MRD1 were associated in the high group with a negative correlation ($p=0.0410$). In the intermediate group, combination blepharoplasty-browplasty resulted in a significantly greater improvement in post-operative MRD1 compared to blepharoplasty alone ($p<0.0001$). In the high group (>22) females and hooding were associated with a higher LCB ($p=0.007$, 0.0036).
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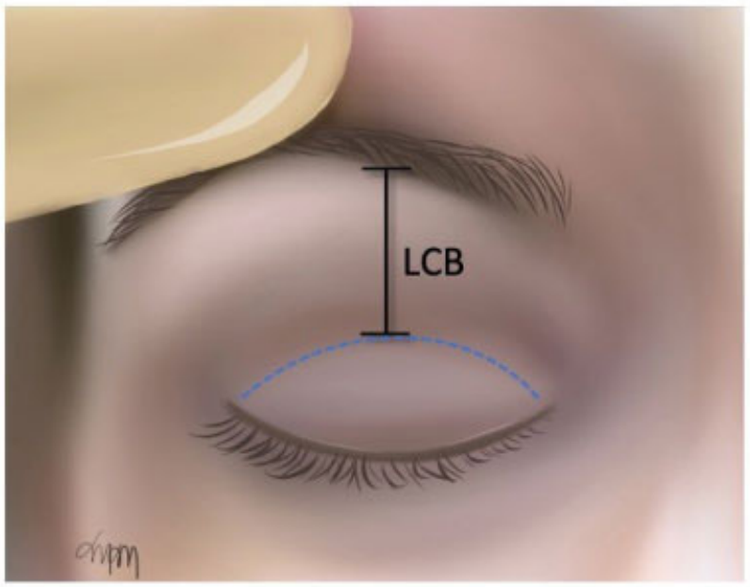
Conclusions: LCB can be a useful, objective, quantitative lid measurement to aid in the pre-operative assessment of dermatochalasis and brow ptosis. A high LCB suggests dermatochalasis while a low to intermediate LCB suggests contributive brow ptosis, for which a browlift should be considered. The identification and awareness of the effect of supraorbital bossing on the brow-lid position should be considered in surgical planning.

Figure 1



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7:30 – 7:34 am

Ocular and Orbital Outcomes after the Treatment of Orbital Rhabdomyosarcoma

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Introduction: Orbital rhabdomyosarcoma (RMS) is the most common primary orbital malignancy diagnosed in pediatric patients and warrants urgent referral to an oncologist. Treatment of early disease has high efficacy and can prevent metastatic progression, involving a combination of biopsy/debulking, chemotherapy, and radiation. These treatments all additionally have side effects that may lead to significant ophthalmic symptomatology including ptosis, cataract, radiation retinopathy, uveitis and keratitis. The goal of this study is to identify the rate of such complications.

Methods: Retrospective chart review was conducted of all cases of orbital rhabdomyosarcoma initially diagnosed and treated by a single surgeon at the Children's Hospital of Philadelphia between 2005 and 2022. Data were gathered regarding presenting symptoms, ophthalmic examination, surgical biopsy/debulking and oncologic treatment. Sequelae of disease progression and side effects of oncologic treatment were investigated.

Results: Eleven patients with orbital rhabdomyosarcoma were identified. All 11 patients underwent biopsy for pathologic diagnosis and were promptly referred to the oncology service for additional staging and initiation of treatment with chemotherapy (11/11, 100%) and radiation (11/11, 100%). Relapse of disease occurred in 2 of 11 (18%) patients and 1 of 11 (9%) patients had distant spread of disease despite initial local therapy. The most common presenting symptoms were exophthalmos, ocular deviation, and eyelid or conjunctival abnormalities visible on exam. Pain was notably absent in 9 of 11 (82%) patients, the other 2 patients (18%) described mild pain. The ocular and orbital outcomes after treatment for RMS following the Intergroup Rhabdomyosarcoma Study Group (IRSG) guidelines included ptosis (10 of 11, 91%), cataract (7 of 11, 64%), radiation retinopathy (1 of 11, 9%), lacrimal system stenosis (1 of 11, 9%) and keratoconjunctivitis (4 of 11, 36%). Five of 10 (50%) patients required surgical intervention for ptosis. All of the patients with ptosis underwent conjunctival-Mullerectomy surgery with a good cosmetic and functional outcome noted in 9 of 10 (90%) pateints. 1 patient required a ptosis re-operation with a frontalis sling. 6 of 7 patients underwent cataract surgery, and the single patient with lacrimal stenosis underwent stenting for epiphora. Radiation can lead to severe ocular surface disease, and 1 patient underwent amniotic membrane grafting while 2 other patients ultimately required evisceration due to ongoing surface breakdown and chronic keratouveitis.

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Conclusions: Orbital rhabdomyosarcoma is a rare disease with high rates of ocular morbidity and potential mortality if not promptly diagnosed and treated. In this study, ptosis and cataract were the most common complications of disease treatment. Mullerectomy ptosis repair was an effective surgical technique in treating the ptosis in this series. The devastating complication of keratouveitis unfortunately occurred in roughly one quarter of the patients. The impact of tumor size after biopsy, surgical management and strategies for debulking prior to chemotherapy and radiation remain controversial and require more dedicated investigation in larger cohorts.

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7:34 – 7:38 am

Immune Populations and Inferred Crosstalk in Ocular Adnexal Sebaceous Carcinoma: Implications for Immunotherapy

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Introduction: Ocular adnexal sebaceous carcinoma (OaSC) is an aggressive malignancy with a high propensity for pagetoid spread yet no standardized pharmacological treatments currently exist. Patients often require exenteration to prevent metastasis. Here, using single-cell RNA sequencing (scRNA-seq), we provide insight to OaSC tumor evolution and immune crosstalk with significant implications for downstream drug discovery.

Methods: Three primary SC tumor specimens, two pagetoid spread specimens, and one normal control specimen were dissociated into single cell suspension and 10,000 cells were targeted for capture for each sample using a single cell RNA library kit 3v3.1' chemistry (Figure 1). Cellranger was used to align sequencing data to the human genome hg38. Clustering and cell type identification was performed using Seurat. Differential gene expression and pathway analysis was performed with sebocytes and tumor cells for characterizing OaSC tumor evolution. Intercellular crosstalk between cell types was inferred using CellChat.

Results: Integrated analysis of OaSC across three stages of disease progression revealed a heterogeneous microenvironment with a high degree of immune tumor infiltration (~70% of captured population). Gene ontology analysis identified pathways underlying tumor progression, such as decreased lipid biosynthesis pathways and increased mitotic nuclear division, oxidative phosphorylation pathways, and epithelial tissue migration signaling ($p < 0.05$). We also identified increased autocrine signaling and intercellular signaling from sebocytes and tumor cells, as inferred by CellChat (Figure 2). We focused on signaling mechanisms associated with cancer immunotherapies, such as PD1 and CTLA4 inhibition. PDL1 expression was weak (identified in 2.2% of sebocytes and tumor cells), falling below the threshold for predicting intercellular crosstalk. However, CD86 expression was strong (62.5% of dendritic cells) and predicted to target CD4 T-cells, including regulatory T-cells (Tregs) ($p < 0.05$) (Figure 3).

Conclusions: OaSC is an aggressive tumor with a strong clinical need for therapeutic discovery. Here, not only have we identified key pathways underlying its tumor progression, but we also discovered intercellular crosstalk between dendritic cells and Tregs via CD86-CTLA4, a targetable interaction with existing FDA-approved drugs. Inhibiting this signal has been known to expand and enhance immune response against tumor cells[1,2], highlighting the potential for anti-CTLA4 immunotherapies for treating OaSC and warranting

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further preclinical investigations. Ultimately, our scRNAseq atlas provides invaluable molecular insight on OaSC and will continue to be a powerful tool for future drug discovery.

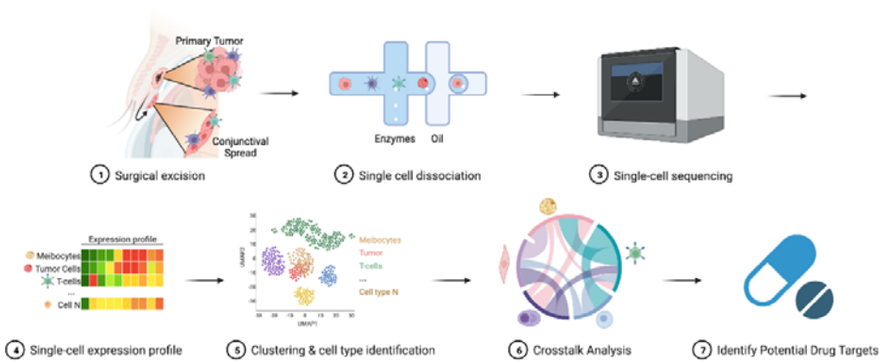

Figure 1. Schematic of methods. Primary tumor, conjunctival spread, and normal specimens were surgically excised and dissociated into single cell suspension for single cell RNA sequencing. Expression profile for each cell was used for clustering and cell type identification. Intercellular signaling was predicted for the identification of targetable interactions useful in drug discovery.

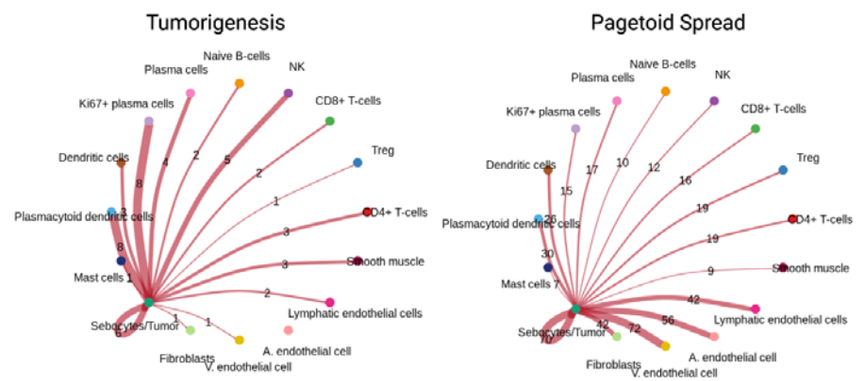

Figure 2. Intercellular signaling between sebocytes and tumor cells and targeted cells within the tumor microenvironment. 50 signals were predicted to increase with tumorigenesis and 462 signals were predicted to increase with pagetoid spread.

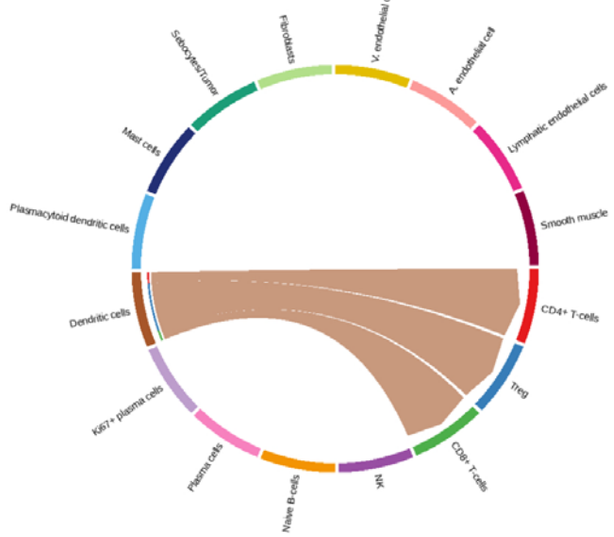

Figure 3. CD86 signaling from dendritic cells target is predicted to target CD4 T cells, including Tregs ($p < 0.05$). A representative chord plot depicts this signaling in pagetoid spread OaSC, suggesting its potential for enhancing immune response against tumor cells even in advanced disease state.

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7:38 – 7:42 am

Resection of the Frontal Nerve with Perineural Spread: Analysis of Resectability from Surgical Margins and Imaging

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Introduction: When cutaneous malignancy invades the orbit via perineural spread (PNS), the implication changes from a condition with morbidity to one with mortality due to potential spread into the intracranial space. Thus, successful resection of the involved nerve (in addition to superficial source control) can assume a life-saving role. The maximal extent of frontal nerve resection via an orbitotomy remains unclear, making it difficult to determine the radiographic boundaries within which this procedure could be beneficial. Herein, we describe five patients with cutaneous squamous cell carcinoma (cSCC) with PNS of the frontal nerve who underwent resection. We correlate the operative outcomes with their radiographic data to provide a clearer understanding of the role and limitations of frontal nerve resection.

Methods: Case series of five cSCC patients with frontal nerve PNS. Extent of excision was made based on the pre-operative imaging showing the length of radiographically involved nerve. Radiographic measurements by an attending neuro-radiologist were performed by reviewing MRI orbit coronal T1-weighted images pre- and post-gadolinium +/- fat suppression sequences. The frontal nerve length from the supraorbital notch/rim to the orbital apex and to its most distal abnormal segment were measured by multiplying the number of applicable slices by the slice thickness and gap of the acquired sequence. This was compared to surgical resection lengths.

Results: Five cSCC patient with radiographic PNS of the FN underwent resection via an orbital approach by one surgeon (MKY) (Figure 1). Preoperatively the course of the intraorbital FN from the supraorbital notch/foramen to the orbital apex ranged from 48-60 mm, and the length of the radiographically affected nerve ranged from 24-36 mm (Table 1). The length of the nerve resected proximal to the supraorbital notch/foramen via an orbitotomy ranged from 27-44 mm, with a percentage of 49-80% of nerve resected (Table 1). Patients 1, 3, 4, and 5 had a negative proximal margin. Patient 2 had a positive proximal margin despite the specimen length being 9 mm longer than the radiographically measured affected nerve. Three out of five patients had subsequent chemotherapy and/or radiation. One patient had chemotherapy prior to resection but no additional treatment after surgery. All patients with a negative margin have not had any radiographic recurrence along the expected course of V1.

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Conclusions: Surgical resection can play a crucial role in preventing intracranial extension of tumor cells in PNS of the frontal nerve. If PNS is believed to be confined to the intraorbital frontal nerve (and not yet intracranial), an orbitotomy for resection could be considered. Based on our experience, up to 80% (44 mm) of the length of the distal intraorbital frontal nerve can be safely resected, although the absolute length excised may differ due to anatomical variations. Patient 2 had a positive proximal margin despite having a longer resected segment than was measured to be radiographically involved. This may suggest that a maximal excision of the frontal nerve should be considered as the microscopic margin may extend beyond the radiographic "margin."

Table 1

Table 1.

	Laterality	Imaging Intraorbital FN Length*	Imaging Involved FN Length*	Resected FN Length	% Intraorbital FN Resected**	Pathology Proximal Margin	History
Patient 1	Right	48mm	33 mm	35 mm	73%	Negative	right forehead cSCC - FN resection, Mohs with distal SON/STN PNI, reconstruction with advancement flap, radiation; POM 18 MRI without V1 recurrence
Patient 2	Left	55 mm	35mm	44 mm	80%	Positive	left brow/eyelid/orbit cSCC - Mohs, FN resection (margin positive), cemiplimab; considering exenteration and intracranial FN radiation
Patient 3	Left	60 mm	24 mm	36 mm	60%	Negative	recurrent left brow cSCC - FN resection, cemiplimab, Mohs, radiation, currently on cisplatin; POM1 MRI without V1 recurrence
Patient 4	Left	53 mm	36 mm	37 mm	70%	Negative	recurrent left temple cSCC - Mohs, radiation, cisplatin, PBR, pembrolizumab, tumor and FN resection; surveillance, POM 37 MRI without V1 recurrence
Patient 5	Left	55 mm	26 mm	27 mm	49%	Negative	recurrent left medial brow cSCC - tumor and FN resection, paclitaxel, radiation; POM 32 MRI without V1 recurrence

*Radiographic measurement from distal to proximal based on MRI images.
**Value obtained by dividing Resected FN Length by Imaging Intraorbital FN Length.

Figure 1

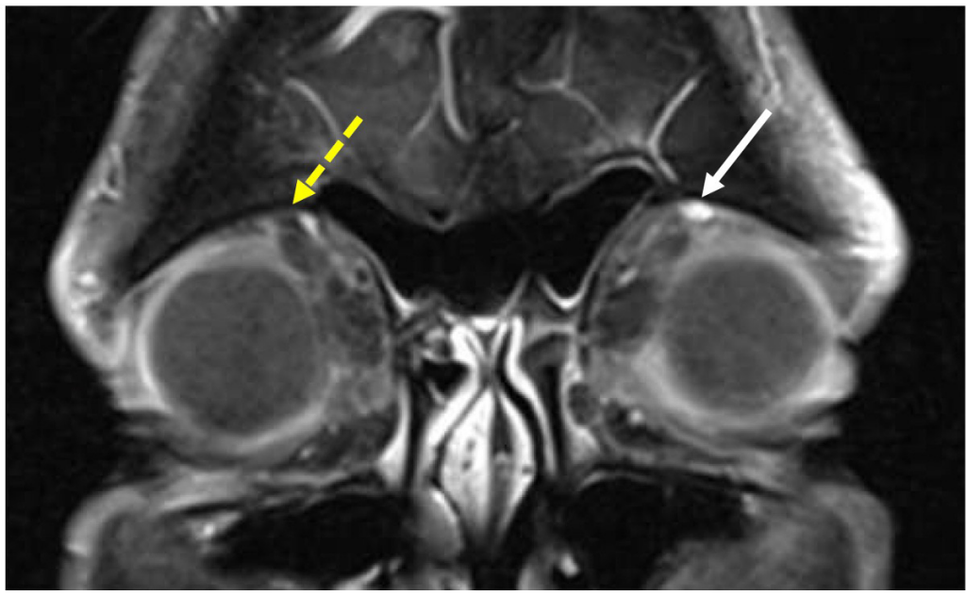

Figure 1. Coronal MRI T1-weighted post-contrast with fat suppression for Patient 3 demonstrating a normal right frontal nerve without enhancement (yellow dashed arrow) and abnormal enhancing and thickened left frontal nerve (white solid arrow).

7:42 – 7:46 am

Inferior Ophthalmic Vein-Dominant Carotid Cavernous Fistula Embolization via Combined Orbitotomy and Percutaneous Cannulation: A Case Report and Literature Review

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Introduction: Carotid cavernous fistulas (CCF) rarely drain into a dilated inferior ophthalmic vein (IOV) rather than the more typical superior ophthalmic vein (SOV).[1–4] When transfemoral embolization fails, orbitotomy with IOV cutdown or percutaneous puncture may provide access.[1–4] We present the first combined orbitotomy with percutaneous IOV puncture for effective management of a challenging case.

Methods: The clinical and surgical course of a patient with an IOV-dominant CCF is presented. A literature review was conducted via PubMed using search terms “inferior ophthalmic vein” and “carotid cavernous fistula.”

Results: A 51-year-old man with congenital renal agenesis and hypertrophic obstructive cardiomyopathy, initially treated elsewhere for presumed idiopathic orbital inflammation, developed acutely exacerbated left proptosis, vision loss, and pulsatile tinnitus upon starting oral corticosteroids. On arrival to our center, an ophthalmic exam demonstrated left visual acuity (VA) of 20/100, intraocular pressure (IOP) 38mmHg, a mid-dilated pupil with a relative afferent pupillary defect, exophthalmos, tortuous episcleral vessels, microcystic corneal edema, and retinal hemorrhages (Figure 1A). Laboratory studies for thyroid, inflammatory, and autoimmune etiologies returned normal. MRI orbits (Figure 1B-C) and CT orbits with 3D reconstruction (Figure 1D) showed marked left IOV dilation, diffuse orbital congestion, and extraocular muscle enlargement. Cerebral angiogram confirmed a type D indirect CCF (Figure 1E).

Transfemoral endovascular access failed due to inferior petrosal sinus thrombosis and no connection to the fistula. A left inferior orbitotomy was performed via a swinging-eyelid approach, however the anterior IOV segment was collapsed, and the posterior segment could not be safely isolated due to concern for sheath disruption and bleeding with posterior dissection. Using 3D roadmap fluoroscopic guidance, the IOV was then accessed via percutaneous direct puncture, and the CCF was embolized resulting in angiographic cure (Figure 2A-C). Afterward, direct visualization via the orbitotomy granted safe catheter removal and immediate

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hemostasis. Follow-up angiography demonstrated fistula occlusion. Two weeks later there was significant clinical improvement with VA 20/30, IOP 14mmHg, and reduced proptosis and congestion (Figure 2D).

All previous reports of IOV-dominant CCFs failed transfemoral access and were embolized via IOV cutdown (2 cases) or direct trans-orbital puncture (2 cases) (Table 1).[1–4] Failed SOV cutdowns have been managed via craniotomy, deeper orbital dissection, conversion to percutaneous SOV puncture, or aborting embolization entirely.[5,6]

Conclusions: This case illustrates an IOV-dominant CCF embolized via combined orbitotomy and percutaneous puncture. When IOV cutdown is precluded by a fragile, collapsed, or deep nature of the vessel, and the surgeon deems that deeper orbital dissection is high risk, conversion to percutaneous IOV puncture offers a safe and effective approach and mitigates the risks of direct puncture alone.

Figure 1

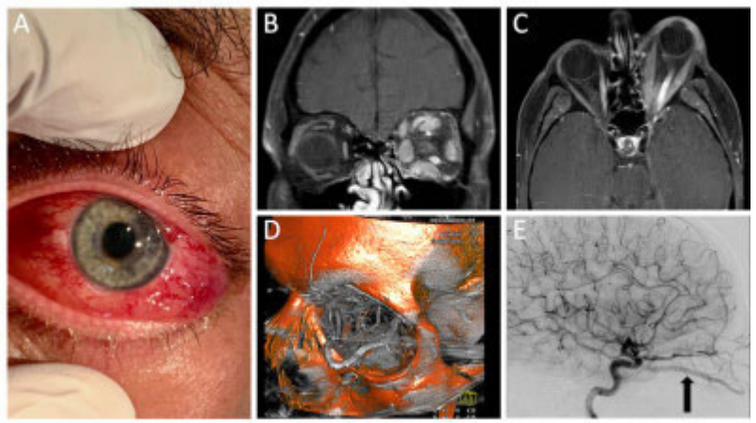

Figure 2

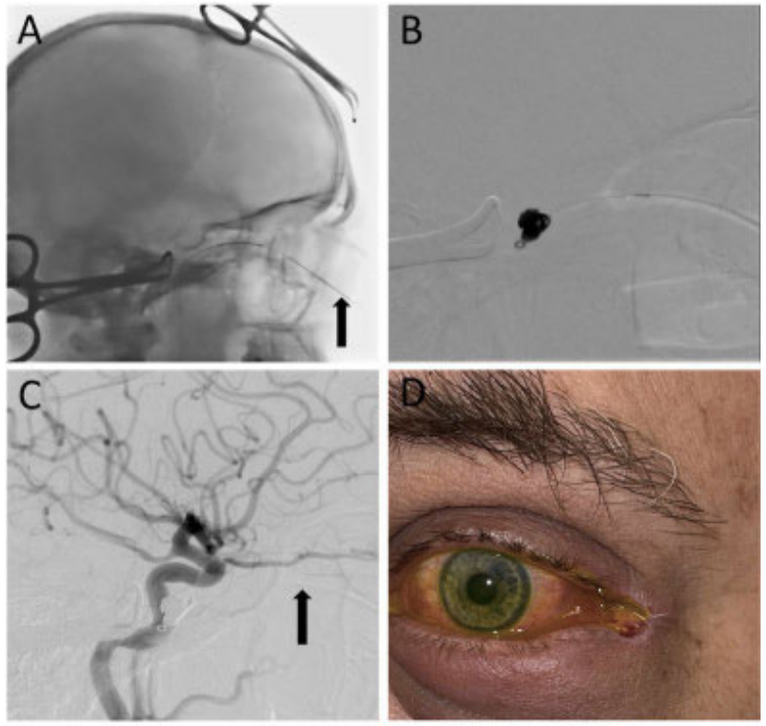

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Table 1

Table 1. Previous cases of inferior ophthalmic vein-dominant carotid cavernous fistulas.

Patient	Age & Sex	Fistula Flow	Treatment	Study
1	52M	Indirect bilateral CCF type D embolized via bilateral ECAs. Recurrence 2 months later, with marked enlargement of the right IOV and SOV. SOV was tortuous and partly stenotic.	Failed attempts via ECA and IPS. IOV cutdown for CCF embolization.	Oono et al. (1998)[1]
2	76F	Indirect CCF supplied by R MMA. Majority of flow through enlarged IOV, while SOV was small, tortuous, and partially thrombosed. Occluded IPS.	IOV cutdown for CCF embolization.	Michels et al. (2007)[2]
3	81F	Indirect CCF supplied by branches of ICA. Venous drainage via cavernous portion of ICA, and slow venous egress though IOV. Occluded IPS/poor visualization.	Failed transfemoral. Direct percutaneous puncture (did not specify if punctured IOV or CCF directly).	White et al. (2007)[3]
4	61M	Indirect CCF type D. Majority of flow through dilated IOV, while SOV was also dilated but partially thrombosed.	Failed transfemoral. Direct percutaneous IOV puncture.	Cecchini et al. (2012)[4]

CCF = carotid cavernous fistula; MMA = middle meningeal artery; IOV = inferior ophthalmic vein; SOV = superior ophthalmic vein; IPS = inferior petrosal sinus; ECA = external carotid artery

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7:46 – 7:50 am

Comparison of Adult and Pediatric Orbital Rhabdomyosarcoma: A Single Institution Experience

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Introduction: Rhabdomyosarcoma (RMS) compromises 4% of all pediatric malignancies, with 10% of these cases occurring in the orbit. In contrast, adult orbital RMS is extremely uncommon, with fewer than 20 cases reported from 1965-2012.1 Most previous cases have been published through case reports or rarely case series.[1,2] In one large institutional study, only 2 of 32 patients with orbital rhabdomyosarcoma were older than 18 years.[3] This retrospective review aims to evaluate and compare clinical manifestations, radiographic features, management, and outcomes in both adult and pediatric patients with orbital RMS.

Methods: A retrospective chart review of medical records from 2000-2023 at a single institution was conducted. Patients between 0 and 100 years old with orbital RMS confirmed by histopathology were included. Medical records were reviewed for demographics, clinical and radiographic features, histopathology, management, and outcomes. Statistical analysis was conducted with Student's t-test and chi-squared testing.

Results: Twenty-three patients were identified, 14 pediatric (<18 years old) and 9 adult patients. The mean age of the pediatric group was 6.9±4.1 years (range 2.2-16.3) and the adult was 35.7±12.4 years (range 19.9-58.1). There was no significant difference in gender and race between groups (Table 1). The majority of patients in both groups presented with eyelid edema followed by proptosis. Other reported symptoms included ptosis, eye pain, diplopia, and decreased vision. Orbital disease rapidly developed in both groups (pediatric symptom duration 1.9±3.1 months vs adults 2.6±2.8 months, p =0.58). Most lesions were located medially and inferiorly in both groups. The adult group demonstrated significantly more frequent radiographic bony involvement, extraocular muscle involvement, intracranial involvement, and sinus involvement (p=0.002, p=0.02, p=0.02, p<0.0001, respectively, Table 2). Additionally, significantly more adult patients were found to have metastatic disease at presentation of their orbital disease compared to the pediatric group (33.3% vs. 0, p=0.02). In the pediatric group, 13 (92.9%) patients had histopathology consistent with embryonal disease, whereas the majority of the adult patients had the alveolar subtype (Table 3). The majority of patients in both groups received both orbital radiation and chemotherapy (Table 4). Two pediatric patients underwent exenteration due to extensive recurrent disease and 1 adult patient underwent lesion excision. Patients demonstrated similar rates of local recurrence (21.4% vs. 33.3% in the pediatric vs. adult group respectively, p=0.53), survival outcomes (p=0.35), and ophthalmologic sequelae (p=0.35), including keratitis, radiation retinopathy, and cataract, although the follow-up duration was significantly longer for the pediatric group.

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Conclusions: While pediatric and adult rhabdomyosarcoma may present similarly clinically, our study demonstrates that adult disease is more often associated with more aggressive disease, including alveolar subtype and bone, extraocular muscle, intracranial, and sinus involvement compared to pediatric patients. To our knowledge, this study is the largest report of adult orbital RMS from a single institution and highlights key comparisons in clinical, radiographic, and features and outcomes between adult and pediatric RMS.

Table 1

Table 1. Baseline characteristics and clinical features of Pediatric and Adult Rhabdomyosarcoma

	Pediatric (n=14)	Adult (n=9)	p-value
Mean age at presentation of orbital symptoms (years)	6.9 ± 4.1	35.7 ± 12.4	**p <0.0001**
Gender (female)	5 (35.7%)	6 (66.7%)	p = 0.15
Race			p = 0.89
White	7 (50%)	4 (44.4%)	
Black	2 (14.3%)	2 (22.2%)	
Other	4 (28.6%)	3 (33.3%)	
Presenting orbital symptoms			
Eyelid Edema	9 (64.2%)	6 (66.7%)	p = 0.91
Proptosis	6 (42.8%)	5 (55.6%)	p = 0.55
Diplopia	1 (7.1%)	2 (22.2%)	p = 0.29
Vision changes	1 (7.1%)	3 (33.3%)	p = 0.11
Pain	2 (14.3%)	3 (33.3%)	p = 0.28
Ptosis	5 (35.7%)	1 (11.1%)	p = 0.19
Duration of symptoms (months)	1.9 ± 3.1	2.6 ± 2.8	p = 0.58

Table 2

Table 2. Radiographic Features of Pediatric and Adult Rhabdomyosarcoma

Lesion Characteristics	Pediatric (n=14)	Adult (n=9)	p-value
Laterality (Right)	6 (42.9%)	6 (66.7%)	p = 0.26
Principal Quadrant			NA
Superior	2 (14.3%)	0	
Inferior	4 (28.6%)	2 (22.2%)	
Medial	4 (28.6%)	5 (55.5%)	
Lateral	0	0	
Superolateral	1 (7.1%)	0	
Superomedial	1 (7.1%)	1 (11.1%)	
Inferolateral	0	0	
Inferomedial	0	1 (11.1%)	
NS	2 (14.3%)	0	
Bony involvement	3 (21.4%)	8 (88.9%)	**p = 0.002**
Extraocular muscle involvement	4 (28.6%)	7 (77.8%)	**p = 0.02**
Lacrimal gland involvement	3 (21.4%)	0	p = 0.14
Intracranial involvement	0	3 (33.3%)	**p = 0.02**
Sinus involvement	0	7 (77.8%)	**p < 0.0001**
Metastasis present at presentation	0	3 (33.3%)	**p = 0.02**

Table 3

Table 3. Immunohistochemical features of patients with orbital rhabdomyosarcoma

	Pediatric (n=14)	Adult (n=9)	p-value
Lesion type			**p = 0.0001**
Embryonal	13 (92.9%)	0	
Alveolar	1 (7l.1%)	7 (77.8%)	
Pleomorphic	0	1 (11.1%)	
NS	0	1 (11.1%)	
Genetic testing			
Performed	8 (57.1%)	4 (44.4%)	p = 0.42
FOXO1 translocation if tested	1 (12.5%)	4 (100%)	**p = 0.003**

Table 4

Table 4. Treatment and outcomes for patients with orbital rhabdomyosarcoma

	Pediatric (n=14)	Adult (n=9)	p-value
Treatment			
Orbital chemotherapy alone	2 (14.3%)	3 (33.3%)	p = 0.48
Orbital radiation and chemotherapy	10 (71.4%)	5 (55.5%)	p = 0.44
Orbital radiation + chemotherapy + further surgery	2 (14.3%)	1 (11.1%)	p = 0.83
Recurrence			
Local recurrence	3 (21.4%)	3 (33.3%)	p = 0.53
Distant recurrence	0	2 (22.2%)	p = 0.06
Survival outcomes			p = 0.35
Alive at last follow-up disease-free	9 (64.3%)	3 (33.3%)	
Alive at last follow-up with disease	4 (28.6%)	5 (55.5%)	
Tumor-related death	1 (7.1%)	1 (11.1%)	
Mean follow-up duration (months)	65.9 ± 50.4	22.8 ± 17.5	**p = 0.009**
Ophthalmologic sequelae (total)	9 (64.3%)	4 (44.4%)	p = 0.35
Cataract	5 (35.7%)	0	
Radiation retinopathy	0	1 (11.1%)	
Radiation keratitis	2 (14.3%)	1 (11.1%)	
Other	2 (14.3%)	2 (22.2%)	

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8:04 – 8:10 am

Outcomes of Modified Frontalis Muscle Advancement Flap in Comparison to Frontalis Sling Suspension with Silicon Rod in Correction of Severe Congenital Ptosis

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Introduction: To analyse the functional and aesthetic outcomes of modified frontalis muscle flap advancement (FMAF) and compare it with frontalis sling suspension with silicon rod (FSSSR) for severe congenital ptosis

Methods: A prospective pilot study on 20 eyelids of 12 patients with severe congenital ptosis and poor levator action of less than 4mm was recruited, and based on inclusion criteria as per the prefixed proforma, FMAF surgery was performed. The FMAF technique, modified in terms of the orientation of the flap, is fashioned tangential to the direction of action of the frontalis muscle with an increased horizontal width of 2 cm. The results were compared with an age-matched group of patients, comprising 30 eyelids from 18 patients who underwent FSSSR for the same indications. The primary outcome measure was functional improvement of marginal reflex distance (MRD1), and secondary outcome measures were aesthetic outcomes (lagophthalmos, lid symmetry, lid lift of the globe, eyelid peaking, and visible forehead scarring). In both groups, all the parameters were assessed at 1 month, 6 months, and 2 years of follow-up.

Results: The mean age was 6 years ±2.8 years. The male-to-female ratio was 2:1, and follow-up ranged from 2 to 4 years. The success rate in terms of the primary outcome measure (MRD1) was 100% in both groups until 6 months of follow-up. However, at 2 years of follow-up, it has reduced to 90% (18/20 eyelids) in the FMAF group and 66.66% (20/30) in the FSSSR group ($p < 0.05$). Among secondary outcomes, lagophthalmos in the first postoperative week was seen in 6/20 eyelids of FMAF, whereas it was found in all 30 eyelids of the FSSSR group. At the end of one-month follow-up visit, the lagophthalmos in the FMAF group were absent and resolved in all the eyelids. Additionally, lid lift off the globe (8/30), visible forehead scarring (30/30), and eyelid peaking (14/30) were noted as significant aesthetic complications in the FSSSR group in comparison to the FMAF group. None of the cases had lid lift off the globe or forehead scars in the FMAF group. Lid asymmetry was seen in 2 patients in the FMAF group as compared to 8 patients in the FSSSR group at one-year postoperative follow-up. All cases of FMAF had a stable correction of ptosis in the follow-up period.

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Conclusions: In comparison to the FSSSR group, the FMFA group yielded a superior success rate in terms of both functional and aesthetic outcomes. The technique of FMFA is appropriate for correcting severe ptosis in different indications with stable surgical outcomes.

Figure 1

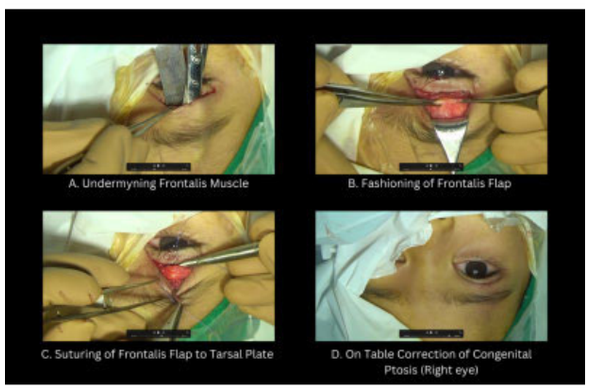

Figure 2

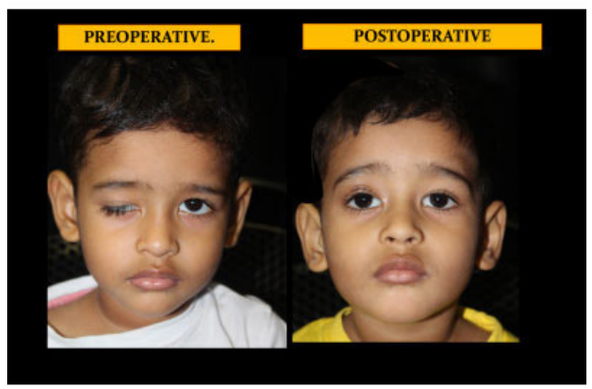

Figure 3

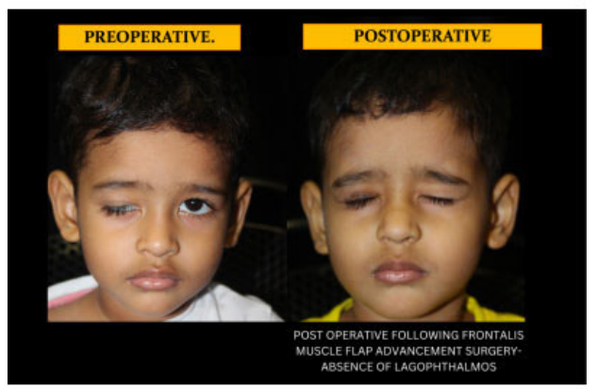

Figure 4

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8:10 – 8:16 am

Single Central Suture Mueller Muscle Conjunctival Resection without Phenylephrine Test: 6-Year Experience

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Introduction: The decision to pursue Mueller muscle conjunctival resection (MMCR) for the management of involutional ptosis has classically depended on preoperative phenylephrine testing. However, many reports question the universal use of phenylephrine testing; some patients with poor phenylephrine response still benefit from MMCR. Recently, single-suture MMCR techniques have been described in patients with positive phenylephrine testing and resulted in similar outcomes as traditional MMCR. In this study, we assess the outcomes of a revised single central suture MMCR (csMMCR) in patients without preoperative phenylephrine testing.

Methods: This is a retrospective review of consecutive patients with involutional ptosis who underwent csMMCR without preoperative phenylephrine testing by a single surgeon (RS) between February 2017 and February 2023. Excluded were patients who had follow-up <3 months, prior eyelid trauma/surgery, levator function <12 mm, moderate/severe dry eye, poor/fair Bell phenomenon and orbicularis tone, lagophthalmos, and patients who had adjunctive tarsectomies or multiple simultaneous procedures (e.g blepharoplasty). All patients were checked for Hering's response and had MRD1 recorded preoperatively. Surgeries were performed in an office-based procedure room with local anesthesia. An algorithm of 4mm resection for every 1 mm of desired lid lift was used, with 10mm being the maximal resection. In asymmetric cases and those with Hering's response, the resection length was adjusted accordingly. Key surgical steps included injection of 1ml of local anesthetic, lid eversion with a Desmarres retractor, marking the desired resection medially and laterally from superior tarsal border (Fig 1A), imbrication of Mueller muscle conjunctiva complex at these 2 points with toothed forceps (Fig 1B), placement of Putterman ptosis clamp (Fig 1C), placement of a single central 6-0 plain gut horizontal mattress suture 1 mm from clamp and externalized at central lid crease and tied (Fig 1, D-K), and excision of tissues within the clamp with a #15 blade (Fig 1L). Patients were started on erythromycin ointment three times daily for 1 week. Patients were seen at post-operative week 1, month 1, and month 3 with photographs taken at each visit. The primary outcome measure was MRD1 at post-operative month 3. Secondary outcomes included change in MRD1, lid symmetry within 1mm, and requirement for reoperation. Bilateral cases were compared separately. Postoperative complications were noted.

Results: 597 patients, with 964 ptotic lids, were included. 382 (64%) were women, with a mean age of 66 years (range 18-102). 388 (65%) patients had bilateral repair. All patients demonstrated an improved lid position with a mean increase in MRD1 at POM3 of 2.72 mm

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(range 1-3.5). 568 (95.1%) patients showed lid symmetry within 1 mm at POM3 ($p<0.001$, Fig 2). 14 lids required reoperation for residual ptosis. There were no cases of postoperative lagophthalmos, corneal abrasions, unexpected Hering's response or suture breakage. The mean follow-up was 5.3 months (range 3-13).

Conclusions: csMMCR is an effective method for involutional ptosis repair in patients without the need for preoperative phenylephrine testing. Strengths of this revised technique include speed of surgery (typically <5 minutes), quick learning curve, low complication rate, and high patient satisfaction rate.

Figure 1

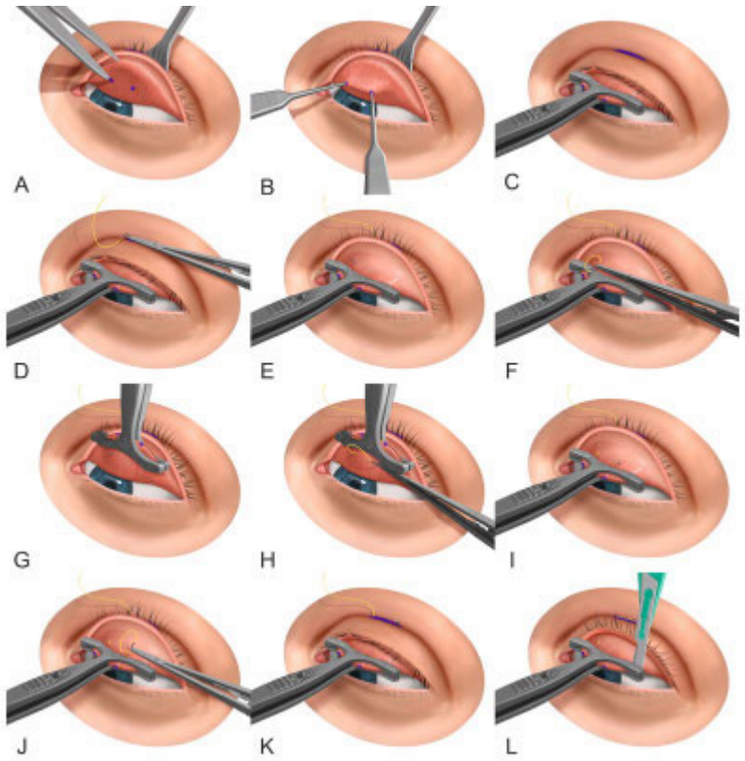
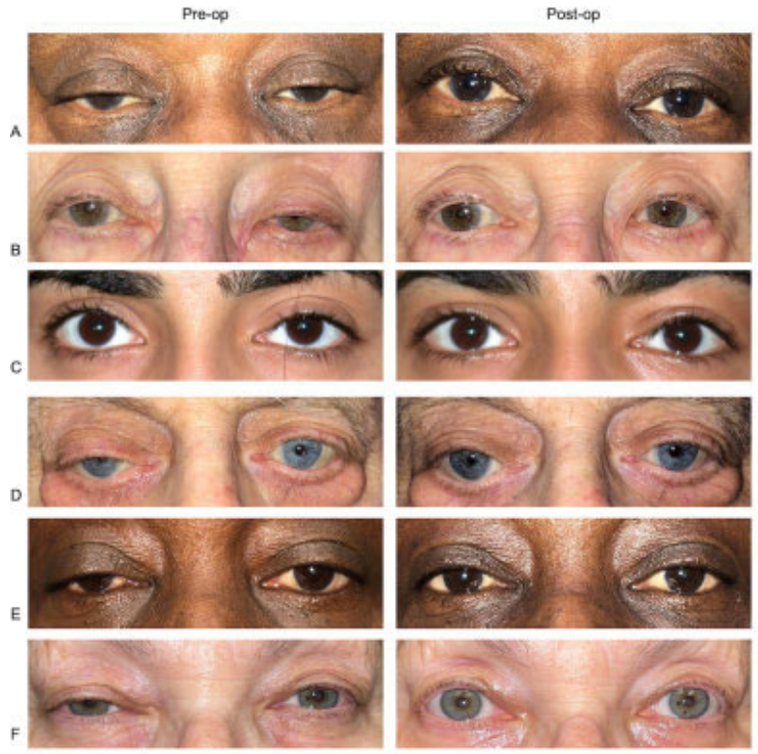


Figure 2



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8:16 – 8:22 am

Müller Muscle-Conjunctival Resection: Effect on Meibomian Gland Function and Dry Eye Symptoms

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Introduction: To analyze the effect of Müller muscle-conjunctival resection on dry eye symptoms and meibomian gland function

Methods: An IRB-approved retrospective review was conducted of 238 patients who underwent oculofacial plastic surgery between January 2019 to January 2023 at the Iowa City Veterans Affairs Hospital. Standard Patient Evaluation of Eye Dryness Questionnaire (SPEED) scores were collected with a standard grading scale from 0 to 28 (≤5 corresponding to asymptomatic, between 6 to 14 as mild to moderate, and ≥15 as severe symptoms). Ocular surface interferometer imaging was obtained and analyzed for meibomian gland dropout as well as tear film lipid layer thickness. Meibomian gland dropout was graded on a scale of 0 to 3, with grade 0 indicating no dropout, grade 1 indicating 67% dropout.

Results: After exclusions for insufficient data and confounding ocular co-morbidities, the charts of 68 patients were included. 47 underwent Müller muscle-conjunctival resection (MMCR) (average age 71.7 years, 95.6% male) and 21 underwent blepharoplasty and/or brow ptosis repair (average age 72.0 years, 90.5% male). Of the MMCR group, 25 had postoperative (3 to 40 months) SPEED scores and 11 had postoperative (3 to 8 months) scores.

Comparison of pre- and postoperative SPEED scores showed that there was a statistically significant decrease in SPEED score in the MMCR group (preoperative 9.30, postoperative 7.08, p = 0.0007, n=25), but not for the blepharoplasty and/or browplasty group (preoperative 4.25, postoperative 4.83, p=0.86, n=10). In patients who underwent MMCR, 65.22% of patients experienced no change in dry eye symptom severity, 34.78% had an improvement in symptom severity, and 4.34% had worsening of symptoms. Notably, there was the greatest proportion of subjective symptom improvement in patients with severe baseline symptoms (77.78%, n=9) compared to those with mild to moderate baseline symptoms (28.57%, n=7).

Comparison of pre- and postoperative meibography imaging in patients who underwent MMCR showed no significant change in meibomian gland dropout following surgery (average preoperative grade 1.46, average postoperative grade 1.55, p=0.80, n=11).

Finally, 3 of the 4 patients who had pre- and postoperative tear film lipid layer interferometry imaging (one MMCR and two blepharoplasty patients) showed no significant change in their LLT. One patient who underwent bilateral MMCR did have an increase in LLT from 68 nm to 90 nm at postoperative month 5 with concurrent decrease in SPEED score from 16 preoperatively to 0 postoperatively.

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Conclusions: Although severe dry eye symptoms are considered a contraindication to ptosis repair, this study showed that MMCR was associated with decreased subjective symptoms of mild to moderate dry eye disease as far as 40 months following surgery. Furthermore, MMCR repair was not associated with increased meibomian dropout, and, in one case, there was a significant improvement in tear film lipid layer thickness. Further studies are needed, but this study suggests that some patients with preoperative dry eye symptoms and ptosis may benefit from MMCR.

Figure 1

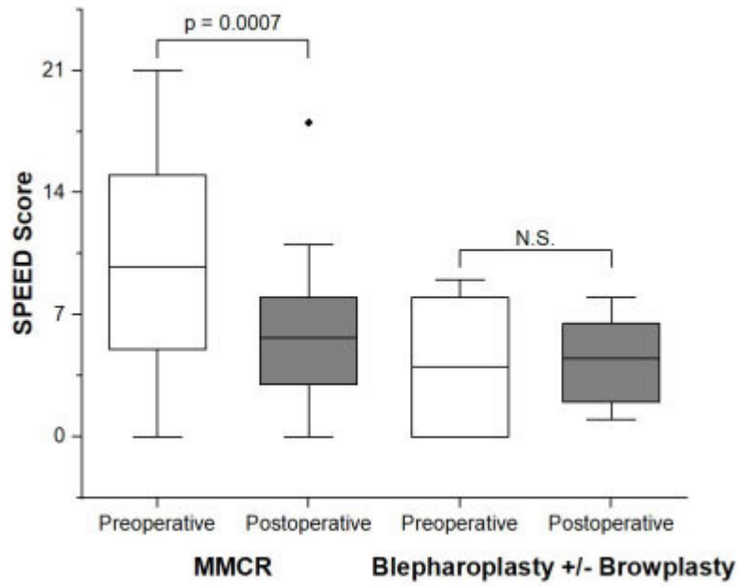
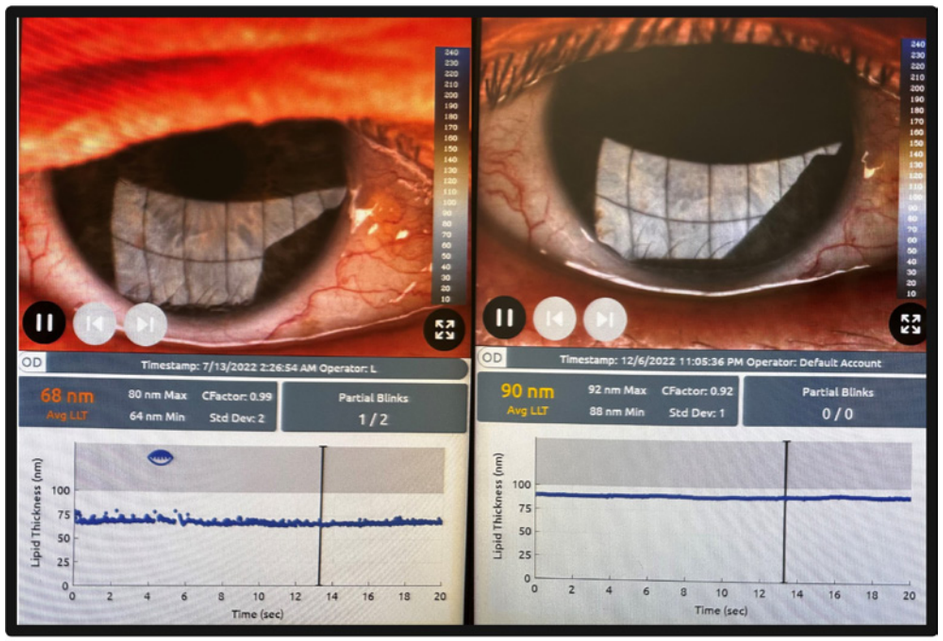


Figure 2



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8:22 – 8:28 am

Effects of Preoperative Intravenous Versus Subcutaneous Tranexamic Acid on Postoperative Periorbital Ecchymosis and Edema Following Upper Eyelid Blepharoplasty: A Prospective, Randomized, Double-Blinded, Placebo-Controlled, Comparative Study

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Introduction: Severe bruising and swelling following eyelid surgery may produce a negative impression and adversely impact a patient's experience, recovery time, satisfaction, and perceived success of surgery. In aesthetic plastic surgery, tranexamic acid (TXA) is gaining wide popularity as a safe, cost-effective antifibrinolytic adjunct to reduce blood loss, to achieve an improved surgical field and surgical precision, and to reduce ecchymosis and edema.[52] Favorable results have been suggested with oral, local, and intravenous preparations of TXA administered at various times before, during, and after surgery. No studies that directly compared local subcutaneous and systemic intravenous TXA on surgical outcomes in the setting of facial plastic surgery. This study sought to formally assess the role of TXA in periocular procedures and better identify a protocol for optimal clinical benefits. More specifically, we sought to compare effects of preoperative tranexamic acid (TXA) administered intravenously (IV) versus subcutaneously on postoperative ecchymosis and edema in patients undergoing bilateral upper eyelid blepharoplasty.

Methods: A prospective, double-blinded, placebo-controlled study of patients undergoing bilateral upper eyelid blepharoplasty at a single center. Eligible participants were randomized to preoperatively receive either (1) 1g of TXA in 100mL normal saline intravenously, (2) 50uL/ml of TXA in local anesthesia, or (3) no TXA. Primary outcomes included ecchymosis and edema at postoperative day one (POD1) and seven (POD7). Secondary outcomes included operative time, pain, time until resuming activities of daily living (ADLs), patient satisfaction, and adverse events.

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Results: By comparison (IV TXA vs. local subcutaneous TXA vs no TXA), ecchymosis scores were significantly lower on POD1 (1.31 vs. 1.56 vs. 2.09, p=0.02) and on POD7 (0.51 vs. 0.66 vs. 0.98, p=0.04) among those that received TXA. By comparison (IV TXA vs. local subcutaneous TXA vs. no TXA), significant reductions in edema scores occurred in those that received TXA on POD1 (1.59 vs. 1.43 vs. 1.91, p=0.005) and on POD7 (0.85 vs. 0.60 vs. 0.99, p=0.04). By comparison (IV TXA vs. local subcutaneous TXA vs. no TXA) patients treated with intravenous and local subcutaneous TXA preoperatively were more likely to experience shorter operative times (10.8 vs. 11.8 vs 12.9 minutes, p=0.01), reduced time to resuming ADLs (1.6 vs 1.6 vs 2.3 days, p<0.0001), and higher satisfaction scores at POD1 (8.8 vs. 8.7 vs. 7.9, p=0.0002). No adverse events occurred were reported.

Conclusions: In an analysis of 106 patients, preoperative TXA administered either intravenously or subcutaneously safely reduced postoperative ecchymosis and edema in patients undergoing upper eyelid blepharoplasty. While statistical superiority between intravenous versus local subcutaneous TXA treatment was not definitively identified, our results suggest clinical superiority with IV dosing.

Figure 1

Figure 1. Consort Flow Diagram

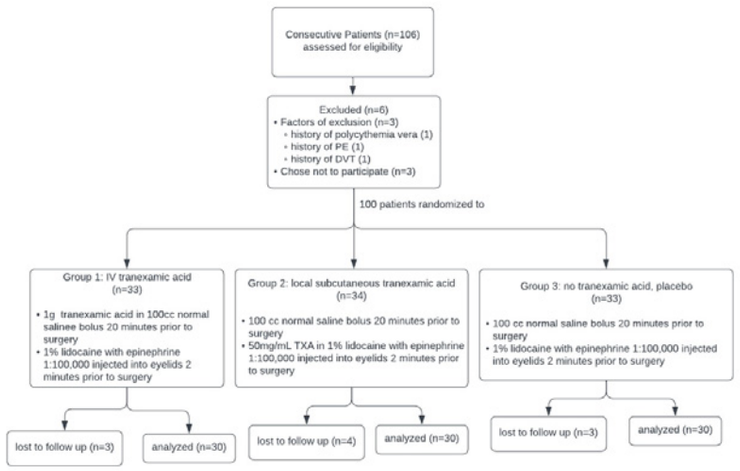
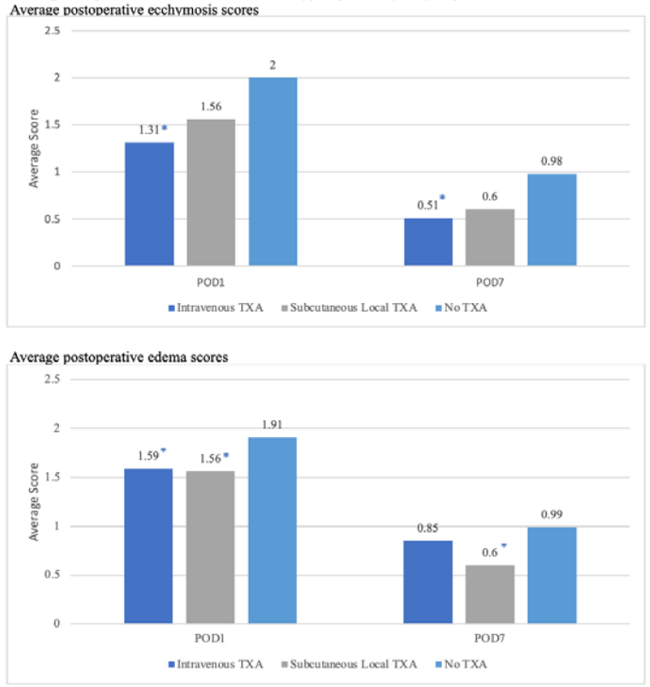


Figure 2

Figure 2. Average ecchymosis and edema scores follow upper eyelid blepharoplasty



Columns represent averaged scores for edema.
Asterisk represents statistical significance (p<0.05) on subgroup analysis compared to placebo control (No TXA).
*POD = postoperative day
*TXA = tranexamic acid

Table 1

Table 1. Demographic Features

	Intravenous TXA (n = 30) [n(%)]	Local Subcutaneous TXA (n = 30) [n(%)]	No TXA (n = 30) [n(%)]	p
Age (years) Mean (median, range)	64.3 64.5 (51-80)	66.6 67.5 (40-80)	67.7 (52-82) 70.5	0.30
Gender				
Male	2 (7%)	1 (4%)	10 (33%)	
Female	28 (93%)	29 (96%)	20 (67%)	**0.01**
Smoking	2 (7%)	1 (4%)	3 (10%)	0.58
Hypertension	12 (40%)	13 (43%)	16 (53%)	0.59
Diabetes	2 (7%)	3 (10%)	6 (20%)	0.26
Anticoagulation	8 (27%)	5 (17%)	5 (17%)	
Acetylsalicylic acid	7 (23%)	4 (13%)	3 (10%)	
Clopidogrel	0 (0%)	0 (0%)	2 (7%)	
NSAIDs	1 (3%)	1 (3%)	0 (0%)	0.59

Bold values indicate statistical significance.
*NSAIDs = non-steroidal anti-inflammatory drugs

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Table 2

Table 2. Primary outcomes of tranexamic acid on postoperative ecchymosis and edema

	Intravenous TXA (n = 30) [n(%)]	Local Subcutaneous TXA (n = 30) [n(%)]	No TXA (n = 30) [n(%)]	*p*
Ecchymosis				
POD1				
POD7	1.31 (1.38, 0.00-3.00)	1.56 (1.25, 0.25-3.25)	2.09 (2.00, 0.00-4.00)	**0.02**
Mean (median, range)	0.51 (0.50, 0.00-2.25)	0.66 (0.50, 0.00-3.00)	0.98 (0.75, 0.00-3.25)	**0.04**
Edema				
POD1				
POD7	1.59 (1.63, 0.50-3.00)	1.43 (1.25, 0.25-3)	1.91 (2.00, 0.25-3.00)	**0.005**
Mean (median, range)	0.85 (0.75, 0.00-3.00)	0.6 (0.50, 0.00-1.50)	0.99 (1.00, 0.00-2.00)	**0.04**

Bold values indicate statistical significance.
*POD = postoperative day

Table 3

Table 3. Secondary outcomes of preoperative tranexamic acid

	Intravenous TXA (n = 30) [n(%)]	Local Subcutaneous TXA (n = 30) [n(%)]	No TXA (n = 30) [n(%)]	*p*
Operative Time (minutes) Mean (median, range)	10.8 (10.5, 7-17)	11.8 (10.5, 7-34)	12.9 (12.5, 8-23)	**0.01**
Efficacy of hemostasis (1-4) Mean (median, range)	1.5 (1, 1-3)	2.2 (2, 1-4)	2.2 (2, 1-4)	**0.0001**
Intraoperative Pain (0-10) Mean (median, range)	0.4 (0, 0-5)	0.5 (0, 0-4)	0.6 (0, 0-4)	0.40
Hematoma Formation	0 (0%)	1 (3%)	1 (3%)	0.60
Ice Pack Compliance (1-4) (10-minute sessions, in first 48 hours) Mean (median, range) 1 = none 2 = 4 or more 3 = 8 or more 4 = 12 or more	2.8 (3, 0-4)	3.1 (3, 2-4)	2.8 (3, 2-4)	0.30
Used Tylenol	18 (60%)	15 (50%)	14 (47%)	0.73
Used NSAID	0 (0%)	1 (3.3%)	0 (0%)	0.60
Days until resuming ADLs Mean (median, range)	1.6 (1.5, 1-3)	1.6 (2, 1-4)	2.3 (2, 1-5)	**< 0.0001**
Adverse Events				
Thromboembolic event	0 (0%)	0 (0%)	0 (0%)	
Seizure	0 (0%)	0 (0%)	0 (0%)	
Nausea	0 (0%)	0 (0%)	0 (0%)	
Allergic reaction	0 (0%)	0 (0%)	0 (0%)	n/a
Patient Satisfaction at POD1	8.8 (9, 7-10)	8.7 (9, 7-10)	7.9 (8, 6-10)	**0.0002**
Patient Satisfaction at POD7	9.7 (10, 9-10)	9.6 (10, 8-10)	9.3 (9, 7-10)	0.56

Bold values indicate statistical significance.
*NSAID = non-steroidal anti-inflammatory drugs
*ADLs = activities of daily living

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8:28 – 8:34 am

Utility of Nerve Integrity Monitor (NIM) in Orbicularis Myectomy surgery for Benign Essential Blepharospasm: A Prospective, Randomized, Split-face Pilot Study

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Introduction: Surgical correction of BEB involves facial neurectomy, and orbicularis myectomy involves extirpation of the orbicularis oculi, and other protractors of the eyelids.

Nerve integrity monitor (NIM) is a tool used intraoperatively to identify and protect branches of sensory and motor nerves during complex surgical procedures. We hypothesized that orbicularis myectomy aided by NIM to selectively severe terminal branches of facial nerve during myectomy could be superior to conventional myectomy.

We therefore undertook this randomized, split face prospective study to compare the two surgical techniques: conventional myectomy Vs NIM guided myectomy in the surgical management of Benign Essential Blepharospasm (BEB).

Methods: Consecutive 10 patients with symmetrical BEB and age more than 18 years who were were included.

After comprehensive eye examination, the spasm would be graded with Jankovic rating scale (JRS), clinical photography and videography. One half of the face was randomly selected (ballot method) to receive NIM guided myectomy, whereas the other side receive conventional myectomy. Follow-up visits were at 2 weeks, 6 weeks and 3 months. The following parameters would be assessed at each visit: Forced choice answer about which eye showed better response (patient and evaluator reported), rating scores of JRS, patient satisfaction on likert scale (0-10), to grade the effect of surgery on each side. Clinical and videographic measurement of complications such as lagophthalmos, corneal staining, and ptosis would be noted. All clinical parameters were analyzed by an independent observer masked to the surgical procedure.

Results: Ten patients were enrolled in this prospective pilot study.; 5 were males. The mean age was 53 years (SD,11 years). Forced choice answer about the better side matched with NIM guided myectomy in 8 of 10 cases, and average patient satisfaction likert scale of 8.6 on NIM guided side, versus 6.3 on conventional myectomy ($p<0.01$). Complications like lagophthalmos, and post-operative edema were comparable on the two groups.

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Conclusions: NIM guided orbicularis myectomy may provide more targeted excision of terminal facial branches along with orbicularis muscle in the surgical treatment of BEB.

Figure 1

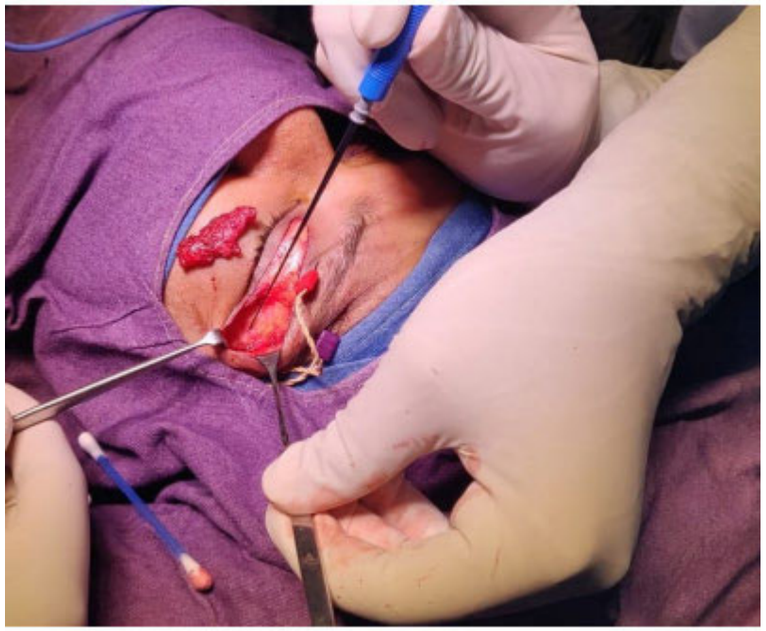
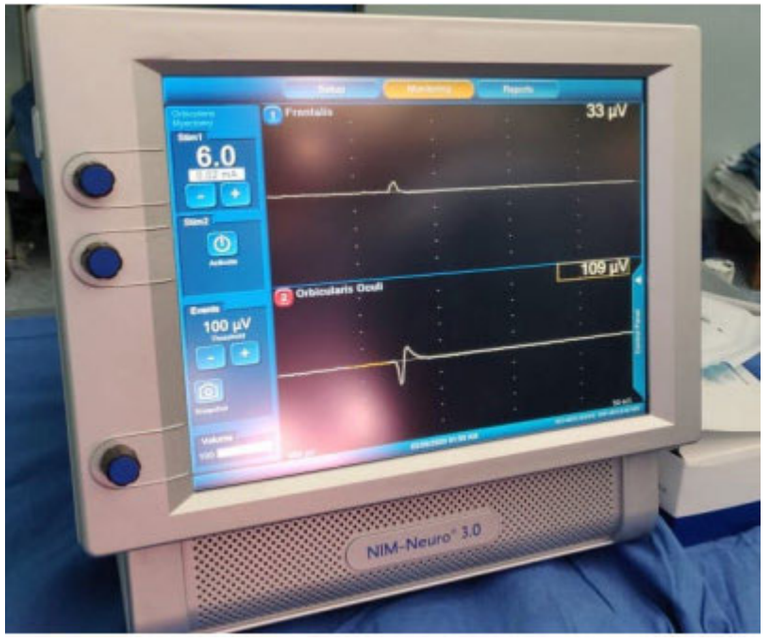


Figure 2



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8:51 – 8:57 am

Pediatric Orbital Fractures: Not All are Trapdoor Fractures

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Introduction: The literature on pediatric orbital fractures is sparse and often fails to adequately report epidemiological data. This lack of information restricts our knowledge of both typical and atypical causes, presentations, associated risk factors, management strategies, and outcomes.

Methods: A retrospective study was done to analyze pediatric orbital fractures (aged 18 or under) seen by a single surgeon at the National University Hospital, Singapore over the period of 2005-2022.

Results: A total 41 cases of pediatric orbital and orbitofacial fractures met the criteria, many of them being males (n=34,83%). The most common causes of these fractures were play and sports-related accidents (n=19,46%), followed by assault (n=13,31.7%), road-traffic accidents (n=6,14.6%), and non-play related accidents (n=3,7.3%). Most pediatric orbital fractures were unilateral (n=36,87.8%) and presented as 'simple/pure orbital fractures' (n=30,73.2%), rather than complex orbitofacial fractures (n=11,26.8%). Amongst simple fractures, blowout fractures (n=27,90%) were the most common, involving the inferior (n=17,63%), medial wall (n=3,11%), or both (n=5,18.5%). Among the complex fractures, zygomaticomaxillary complex (ZMC) fractures were the most frequent (n=5,45.4%), followed by cranioorbital fractures (n=3,27.3%) and Le Fort fractures (n=3,27.3%). Tissue entrapment was a common occurrence (n=23,56%), and most patients underwent surgical intervention (n=27,65.8%) within 24 hours (n=22,53.5%). The majority of those who underwent surgery had implants (n=24,88.8%), with most being bioresorbable (n=18,66.7%). All patients (100%) who underwent surgery showed clinical improvement after.

Conclusions: Although simple/pure orbital blowout fractures are still the most common among pediatric patients, the study showed that a quarter of them can still present with complex orbit and orbitofacial fractures. Most of these pediatric orbital fractures are seen in males, predominantnly at an older age with increasing sports related activity. The study also showed that early intervention is crucial to better outcome, and the promising role of bioresorbable implants in this population to reduce late implant related complications.

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8:57 – 9:03 am

The Status of the Lacrimal Drainage System in Cases with Punctal Agenesis: Clinical and Histopathological Evidence

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Introduction: To understand the development of the lacrimal drainage system in cases with punctal agenesis with clinical and histopathological evidence.

Methods: A prospective interventional case series involving 10 consecutive cases of punctal agenesis with no lacrimal sac swelling and 10 cases of punctal agenesis with lacrimal sac mucocele over a study period of 1 year. Exclusion criteria included cases with punctal dysgenesis or incomplete punctal canalization, secondary/acquired cases of punctal effacement, or any prior interventions. For cases without lacrimal sac mucocele, following the exploration, the entire specimen of the tissue from the expected punctal opening to the medial canthus (length = 8 mm and depth = 3 mm) was sent for histopathological analysis to ascertain the presence and extent of the canalicular tissue. In cases with lacrimal sac mucocele, exploration was done to look for the presence of common canalicular opening, the general status of the lacrimal sac and nasolacrimal duct.

Results: Patients with canalicular exploration: The mean age of the patients at the time of exploration was 7.5 years (range 6-10 years). Histopathological analysis showed tissue surfaces lined with stratified squamous epithelium with occasional interspersed goblets cells (conjunctival epithelium), a few chronic inflammatory cells, and muscle fragments. Epithelium suggestive of proximal lacrimal drainage system was absent. Canalicular tissues were found to be absent in all cases of punctal agenesis.

Patients with lacrimal sac and NLD exploration: Mean age of the patients was 23.83 years (range: 6-39 years). Equal number of males and females were affected. Clinically, the lacrimal sac tissue was extremely thinned out, absence of common canalicular opening was noted. The bony nasolacrimal duct was dilated, lined with thinned mucosal lining with a closed end distally. Histopathologically, irregularly folded thinned columnar epithelium with few goblet cells was seen. Underlying stroma showed gross fibrosis, congested and thin capillary blood vessels to thick hyalinized blood vessels with scattered chronic inflammatory cells. Deep stroma showed smooth muscle bundles with minimal inflammation as opposed to that seen in chronic dacryocystitis.

Conclusions: The present series did not find any histological or clinical evidence of canalicular tissues or common canaliculus in cases of punctal agenesis. The findings of this study do not support retrograde approaches in cases of punctal agenesis, while procedures like canaliculodacryocystorhinostomy should be undertaken with extreme caution.
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Figure 1

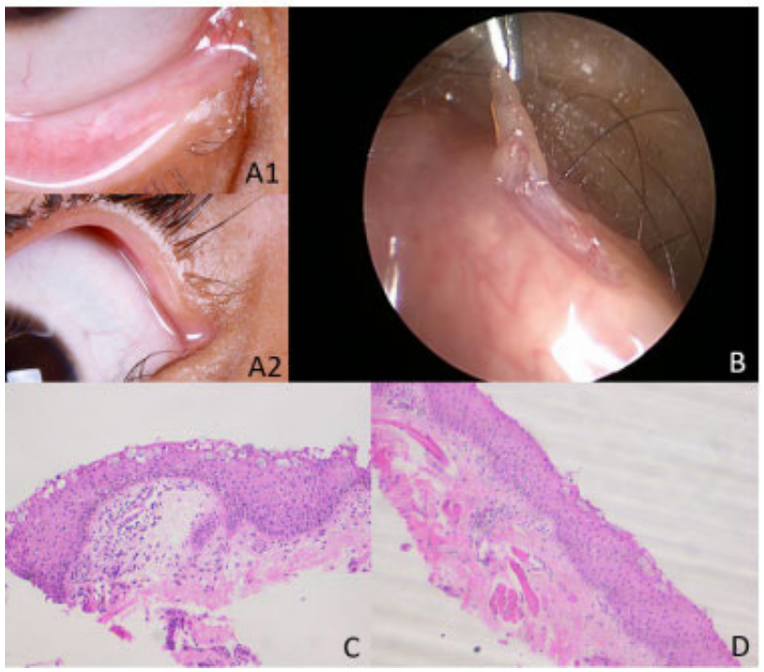
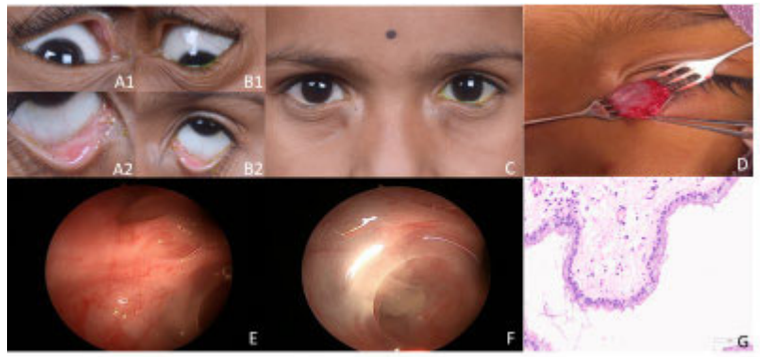


Figure 2



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9:03 – 9:09 am

Dynamic Changes in Lacrimal Canaliculus after Ocular Instillation Using Swept-Source Optical Coherence Tomography

Masahiro Fujimoto[1,2], Sawa Minohara[1], Ryo Kikuchi[1], Yuji Yamana[1], Masashi Mimura[3], Tomoyuki Kashima[1]
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Introduction: Lacrimal canaliculus (LC) plays a crucial role in maintaining the tear film and ocular surface health. We developed a custom-made swept-source optical coherence tomography (OCT) system to visualize the LC non-invasively1. This study aimed to evaluate the reaction of the LC associated with ocular instillation in normal subjects.

Methods: Twenty right eyes of 20 normal subjects were enrolled in this study. Swept-source OCT images of the vertical LC segment were acquired at 1-minute intervals for 10 minutes after topical rebamipide instillation. The cross-sectional area of the vertical LC segment at 1 mm from the lacrimal puncta was measured before and after ocular instillation.

Results: The lumens of the vertical LC segment were significantly dilated after ocular instillation (P<0.001, student t-test). The cross-sectional area of the lumens in all subjects increased at least two-fold within the first minute after instillation. The dilated LC returned to normal within 5 minutes.

Conclusions: This study demonstrated that the LC can dynamically change in response to increased fluid on the ocular surface. The mechanism may play a role in maintaining the homeostasis of the ocular surface.

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Figure 1

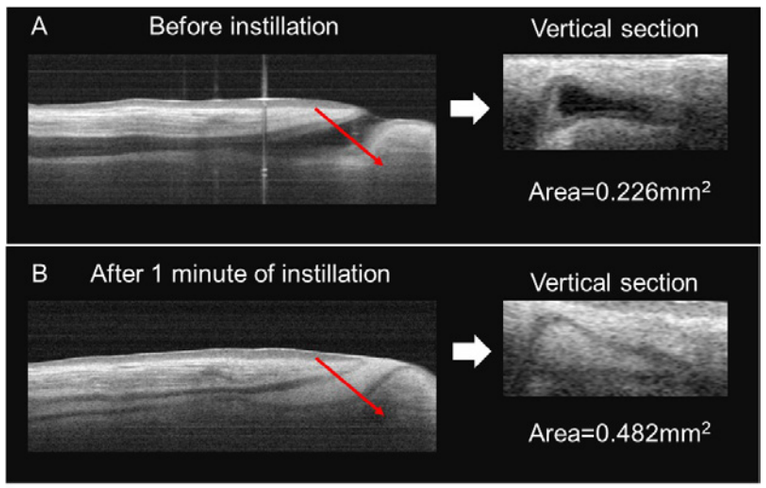

Figure 1. Optical coherence tomography images of the lacrimal canaliculus in normal subjects (A) before and (B) after rebamipide instillation.

Figure 2

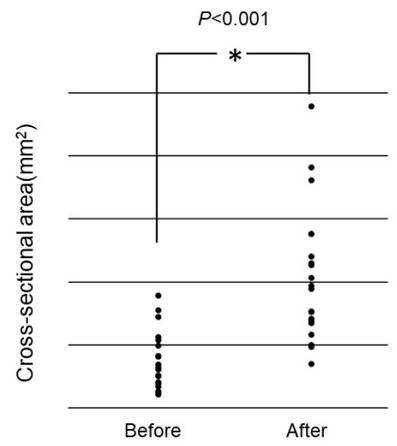

Figure 2. Cross-sectional area change in lacrimal canaliculus before and after the ocular instillation.

9:09 – 9:15 am

Adverse Events from Lacrimal Gland Botulinum Toxin Injection: Twelve-Year Experience in 148 Patients

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Introduction: Tearing is a common ophthalmic complaint that can cause irritation, decreased vision and unpleasant social interactions. Functional and non-functional (obstructive) etiologies can lead to bothersome tearing, with the latter often requiring surgical treatment. Botulinum toxin (BT) injection to the lacrimal gland has been described to treat tearing from both functional and non-functional tearing, including gustatory lacrimation, lacrimal outflow obstruction, lacrimal sacrifice during cancer excision, and a faulty lacrimal pump.1-3 Prior studies describing its use are limited by small sample sizes and short follow-up times. In this study, we describe the adverse events from lacrimal gland BT injection in a large cohort of patients over twelve years.

Methods: Retrospective non-comparative review of 148 patients from 2010 to 2022 who were treated with BT injections by a single surgeon (RS) for subjective tearing. Patients were offered more traditional treatments when appropriate based on etiology and surgical risk and either failed or deferred. Etiology of tearing was confirmed through complete ophthalmic exam. 2.5 units of BT administered transconjunctivally to the lacrimal gland was the initial dose for all patients. Follow-up visits occurred at 1, 4, and 12 weeks after the initial injection. Patients who did not improve satisfactorily after 1 week were re-injected with 2.5 units and a new follow-up regimen began with repeat injections dosed at 5 units. If benefit persisted at 12 weeks, patients were called monthly until their tearing recurred and a re-injection was offered. Excluded were patients with significant dry eye (Schirmer's test <10mm) and those with follow-up <3 months.

Results: 89 females and 59 males with a mean age of 57.4 years (range 19-93) were included. Tearing etiologies were gustatory lacrimation (49 patients; 33%), functional tearing (33 patients; 22%), punctal occlusion (27 patients; 18%), lacrimal outflow sacrifice from cancer excision (16 patients; 11%), faulty lacrimal pump (9 patients; 6%), punctal stenosis (9 patients; 6%), lacrimal obstruction in patients deferring DCR/CDCR (4 patients; 3%), and punctal agenesis (1 patient; 1%). 17 (11%) patients required additional 2.5 units of BT after the initial injection to control symptoms and 5-unit repeat injections thereafter. The mean frequency of re-injection for all patients was every 3.8 months. Adverse events noted with 2.5-unit dosing included 11 (7%) patients with dry eyes that resolved with lubricating drops, and 3 (2%) patients with mild ptosis that resolved within 2 weeks. There were no cases of diplopia. None of the patients treated with 5-unit dosing experienced adverse events. 138 (93%) patients elected for repeat injections after a favorable clinical response. Of the 10 patients who deferred repeat injections, one was secondary to an adverse event (ptosis). Mean follow-up was 33.2 months (range 3-74).

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Conclusions: This may describe the largest series of lacrimal gland BT for functional and non-functional tearing to date, confirming its beneficial effects and tolerability of treatment over a long period of time. A repeat injection rate of 93% reflects a high patient satisfaction rate. Adverse events were rare and included transient dry eye and ptosis. Although there is a theoretic risk of damage to the lacrimal secretory apparatus from repeated trauma to the lacrimal gland, this was not noted in our cohort.

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FEATURED SPEAKER: ELIZABETH A. GIULIANO, DVM, MS

Moderator: Jonathan J. Dutton

Thursday, November 2

9:26 – 9:51 am

Comparative Eyelid and Orbital Surgical Conditions: The Veterinary Ophthalmology Experience

Elizabeth A. Giuliano, DVM, MS

10:31 – 10:37 am

Localized Amyloidosis of the Eyelid, Conjunctiva, or Fornix: Clinical Variants, Management Considerations, Recurrences, and Long-Term Complications

Claire Sun[1], Eva Dafgård Kopp, MD PhD[2], Hakan Demirci, MD[3], Jose-Luis Tovilla, MD[4], Robert Kersten, MD[5,6], Kenneth Morgenstern, MD FACS[7,8], Gustav Stalhåmmar, MD PhD[9], Cat Burkat, MD FACS[10]

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Introduction: Localized amyloidosis involving the eyelids, conjunctiva, or fornices is an uncommon condition characterized by deposition of amyloid protein. Orbital involvement is well documented in the literature and typically managed systemically with chemotherapy. However, localized eyelid, conjunctival, and/or forniceal amyloidosis is less described, with small reports generally stating that these are excised with good prognosis. This study aims to better understand the clinical features, treatment approaches, recurrence rates, and complications in patients with localized eyelid and conjunctival amyloidosis without orbital or systemic involvement, as these can pose different management considerations to achieve complete tumor excision while minimizing surgical morbidity such as eyelid malposition, lagophthalmos, symblepharon, cicatricial retraction, ptosis, cicatricial ectropion or retraction.

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Methods: A retrospective case-series analysis from multiple US/international institutions was performed of patients diagnosed with localized amyloidosis involving the eyelids, conjunctiva, and/or fornices between 2013 - 2023. Clinical data, including demographics, presenting symptoms, examination findings, diagnostic tests, treatment modalities, pathology, recurrences, and complications were collected. Systemic workup to exclude rheumatologic disorders (ie. ANCA, RF) and hematological disorders (ie. imaging, serum protein/urine protein electrophoresis) was performed and negative. Cases of orbital amyloidosis (on neuroimaging) were excluded. Published literature was reviewed for all cases of adnexal amyloidosis.

Results: 47 patients with localized amyloidosis of the eyelids, conjunctiva, or fornices were included. Mean age was 47 years, with slight female preponderance. The most common presentation was a painless, slowly progressive yellow or pinkish-yellow gelatinous mass in the posterior eyelid or conjunctiva. Conjunctival involvement presented with swelling, irritation, or subconjunctival hemorrhage (due to protein deposition in blood vessel walls). The inferior bulbar conjunctiva, including the fornix, was the most commonly affected site, followed by the palpebral conjunctiva, tarsal plate, upper eyelid, lacrimal gland, and plica.

All patients underwent surgical excision and biopsy, which confirmed amyloid deposits. Less than 10% underwent cryotherapy and intralesional corticosteroid injections. Recurrence occurred in 15-35% of our cohort, most commonly within 2.4 years. Factors influencing recurrence rates included the subtype of amyloidosis, completeness of primary excision, canthus and tarsal involvement, and overall health.Recurrence rates were not statistically different with use of adjunctive cryotherapy. Complications were mostly related to extent of surgical excision causing scarring, manifesting as symblepharon, fornix contracture, cicatricial entropion with subsequent trichiasis and epithelial defects, upper/lower eyelid malposition. In certain cases, wide excision of the palpebral conjunctiva and conjunctival fornix necessitated conjunctival grafting or amniotic membrane transplantation to avoid postoperative symblepharon and fornix shortening. Tarsal plate involvement required full-thickness eyelid resection, often involving most of the eyelid posterior lamella.

Average follow up was 5 years (range: 4 months to 9 years). Initial follow-up occurred at 3 months in 20% of cases, 6 months in 80% of cases. After an average of 2 follow-up appointments, serial examinations occurred yearly, including external photography of the conjunctiva and posterior eyelids, slit lamp biomicroscopy, assessment of eyelid position/function, and repeat serum and urine tests in coordination with the PCP or rheumatologist. 1 patient later developed systemic disease 5 years later.

On average, patients underwent 3.3 surgical procedures until disease stabilization. Secondary surgeries commonly involved additional debulking due to incomplete excision or recurrence, release of symblepharon with or without mucous membrane grafting, fornix reconstruction, repair of cicatricial entropion, ectropion, or lateral canthus. Ptosis repair was required in 8 patients. No patients experienced lagophthalmos. The likelihood of recurrence or complications was higher when amyloid deposits extended into deeper tissue layers or affected critical structures like the tarsal plate.

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Conclusions: Localized amyloidosis involving the eyelids, conjunctiva, or fornices is hypothesized to come from local synthesis of protein rather than deposition of light chains produced elsewhere, and occurs most commonly in the inferior fornix, followed by the lower palpebral conjunctiva, tarsus. Conjunctival masses presented typically in the inferior conjunctival fornix, followed by bulbar conjunctiva, and less often as conjunctival hemorrhagic lesions. Cicatricial entropion, trichiasis/distichiasis, lower eyelid margin thinning and ptosis were the most common presenting eyelid abnormalities. Surgical excision is typically successful; however, prior case reports often lacked detail on the surgical nuances. This study provides additional insights into the clinical course, recurrence rates, additional procedures, and long-term outcomes of localized eyelid, conjunctival/fornix amyloidosis. Close follow-up is recommended to monitor for recurrences of eyelid or conjunctival amyloidosis, particularly in the first 3 years after diagnosis.

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10:37 – 10:43 am

Staged Excision Technique for Periocular Cutaneous Melanoma: Long-term Outcomes of the Square Procedure

Delaram Mirzania[1], Zhenyang Zhao[1], Madeline Weber[2], Rodney Ahdoot[2], Sarinee Juntipwong[1], Denise Kim[1], Vinay Aakalu[1], Hakan Demirci[1], Christine Nelson[1]
[1]Kellogg Eye Center, University of Michigan, Ann Arbor, Michigan, United States, [2]University of Michigan School of Medicine, Ann Arbor, Michigan, United States

Introduction: The square procedure is a staged excision of cutaneous melanoma of the head and neck by which peripheral margins are histopathologically cleared of tumor using standard formalin-fixed sections before the central island of tissue is excised.[1,2] We aim to evaluate and update the outcomes of this technique.

Methods: An observational, retrospective, single-center chart review of adult patients with periocular cutaneous melanoma who underwent the square procedure and subsequent reconstruction between January 2010 and October 2022. Patient demographic information, relevant medical history, histopathologic data, and ophthalmology and dermatology visit findings were abstracted. External photos were reviewed.

Results: A total of 108 patients were included; 63.0% were female and 97.2% were White. The mean age at the time of diagnosis was 66.7 years old. The most common diagnosis was lentigo maligna melanoma in 64.0% of patients, followed by atypical junctional melanocytic proliferation (19.4%), invasive melanoma lentigo maligna type (11.1%), and superficial spreading melanoma (5.5%). Histopathologic diagnosis was not associated with recurrence (p=0.60). Average Breslow depth was 0.06 (range: 0-0.4) millimeters (mm) and was not associated with recurrence (p=0.87). Average lesion dimensions were 15.7 mm (+/-10.9) by 11.3 mm (+/-8.5). Average defect size after staged excisions to negative margins were 37.5 mm (+/-14.6) by 28.7 mm (+/- 12.9). Smaller defect size was associated with recurrence (p=0.015). In patients with a recurrence, the margin of excision was 10.2 mm (+/- 3.7). Most defects (49.1%) were reconstructed with only a flap compared to free graft (13.0%) and combination of flap and graft (37.0%). Post-operative complications included lower eyelid retraction (18.5%), lower eyelid entropion (0.90%), lower eyelid ectropion (22.2%), upper eyelid retraction (2.8%), upper eyelid entropion (1.8%), upper eyelid ectropion (22.2%), and lagophthalmos (4.6%). After a median follow-up time of 19 months (range: 3-150), 8 (7.4%) patients had a local recurrence with a median time to recurrence of 47.5 (range: 24-96) months.

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Conclusions: Staged excision via the square procedure for periocular cutaneous melanomas has a local recurrence rate of 7.4% compared to staged excision with rush-processed paraffin-embedded tissue sections or 'Slow-Mohs' procedures with reported local recurrence rate of 14.3%-36%.[3,4]

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10:43 – 10:49 am

An Immunohistochemical Study of CALML5 Expression in Ocular Adnexal Sebaceous Carcinoma

Ryan Gallo[1], Acadia Moeyersoms[1], Michelle Zhang[1], Matthew Camacho[2], Yoseph Sayegh[2], Sander Dubovy[2], Andrew Rong[3]
[1]Dr. Nasser Ibrahim Al-Rashid Orbital Vision Research Center, Bascom Palmer Eye Institute, Miami, Florida, United States, [2]Department of Eye Pathology, Bascom Palmer Eye Institute, Miami, Florida, United States, [3]Department of Oculoplastic Surgery, Bascom Palmer Eye Institute, Miami, Florida, United States

Introduction: Sebaceous carcinoma is an aggressive malignancy that primarily originates from the sebaceous glands of the ocular adnexa. Ocular adnexal sebaceous carcinoma (OaSC) has the propensity for local extension, which often necessitates orbital exenteration. A serious barrier to the timely diagnosis of OaSC is the lack of specific tumor markers, resulting in incorrect initial pathologic diagnoses in a significant number of cases. In this study, we utilized our single-cell RNA sequencing (scRNA-seq) characterization of OaSC to identify calmodulin-like protein 5 (CALML5) as a novel tumor marker for OaSC.

Methods: Approval from the Institutional Review Board was obtained for this study. Differential marker analysis was performed on our scRNA-seq of three primary tumors, two tumors with pagetoid spread, and a normal tarsus sample to identify tumor markers for OaSC. This analysis identified CALML5 as specifically expressed in the tumor cell subpopulation. Validation of CALML5 was carried out via immunohistochemistry (IHC) on archival slides from the Florida Lions Ocular Pathology Laboratory at Bascom Palmer Eye Institute. A total of 34 malignancies resected between 2015 and 2022, including 17 OaSCs, 10 ocular surface squamous neoplasia (OSSN) tumors, and 5 periocular basal cell carcinomas (BCCs), were examined for CALML5 expression. The IHC-stained slides were reviewed by an experienced ophthalmic pathologist blinded to specimen identity.

Results: Analysis of scRNA-seq data from 29,219 individual cells revealed a diverse composition of tumor, immune, and stromal cells in OaSC with CALML5 specifically expressed in the tumor subpopulation. Of the 17 OaSC cases, 14 (82%) showed strong cytoplasmic and nuclear staining for CALML5 (Figure 1A). All five cases of OaSC with pagetoid spread exhibited strong cytoplasmic and nuclear staining (Figure 1B). Among the 10 OSSN tumors, 1 (10%) displayed cytoplasmic and nuclear staining (Figure 1C). Of the 5 BCCs, 1 (20%) had cytoplasmic and nuclear staining for CALML5 (Figure 1D).

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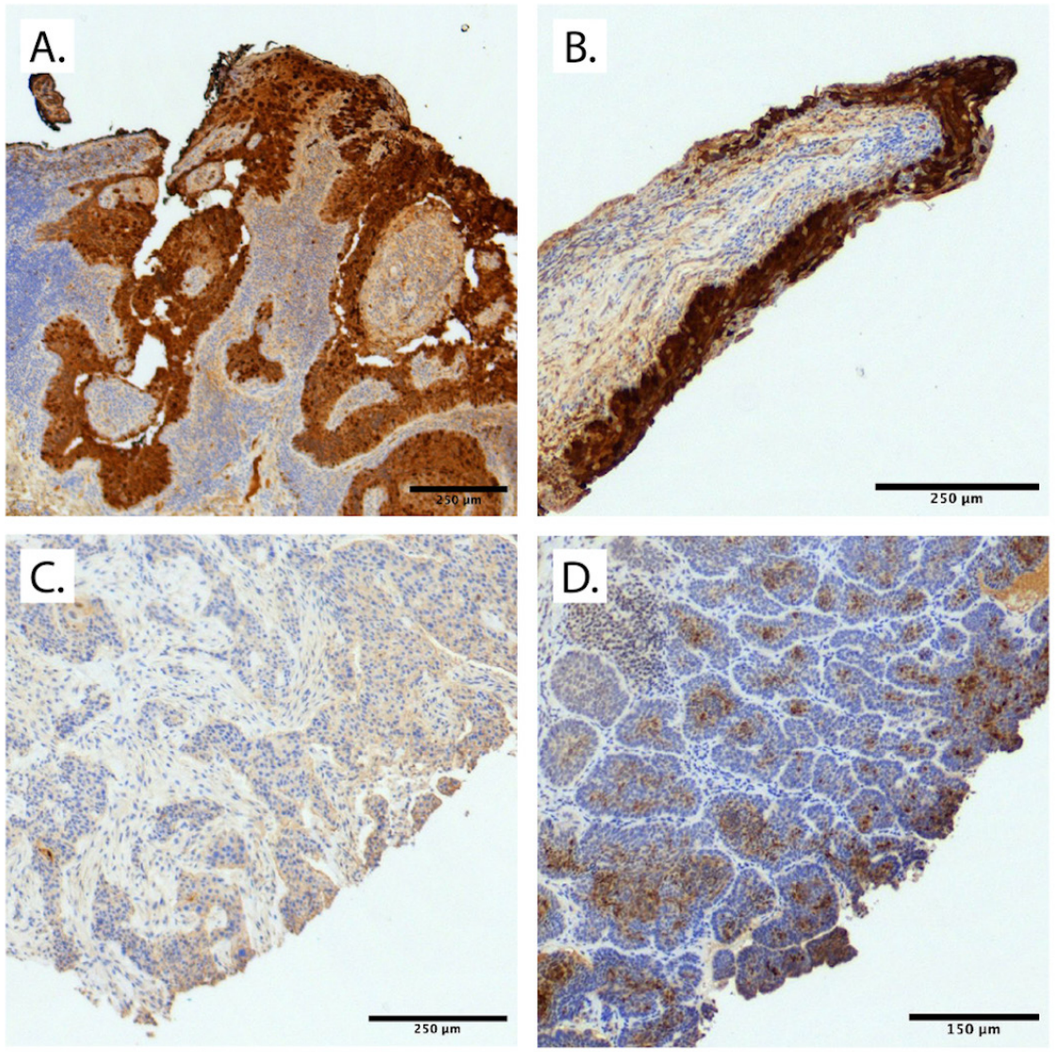
Conclusions: Early and accurate detection of OaSC is crucial for implementing less invasive curative treatments. Using our scRNA-seq data, we predicted CALML5 as a novel OaSC biomarker, which was verified with IHC staining. CALML5 shows promise as a valuable immunohistochemical marker for both eyelid and conjunctival OaSC and may be used to distinguish dedifferentiated OaSC from histologically similar appearing squamous and basal cell carcinomas. Further studies using an expanded set of OaSC and other periocular tumor specimens are currently underway to confirm our findings.

Figure 1



Immunohistochemistry staining for CALML5. A) Strong cytoplasmic and nuclear staining for CALML5 in ocular adnexal sebaceous carcinoma (OaSC). B) Strong cytoplasmic and nuclear CALML5 staining in OaSC with pagetoid spread. C) Negative CALML5 staining in squamous cell carcinoma. D) Mild background CALML5 staining in basal cell carcinoma.

10:49 – 10:55 am

NOTCH1 Pathway Activation and High-Risk Clinicopathological Features and Prognosis of Lacrimal Gland Adenoid Cystic Carcinoma

Jiawei Zhao[1], Michelle Williams[2], Mike Hernandez[3], Hila Goldberg[1], Adel El-Naggar[2], Jing Ning[3], Renata Ferrarotto[4], Bita Esmaeli[1]
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Introduction: Lacrimal gland adenoid cystic carcinoma (ACC) is associated with poor prognosis. Most publications on NOTCH and its role in ACC have been generated from studies of the salivary gland. Whole exome sequencing of salivary gland ACC has demonstrated NOTCH pathway alterations in 11-29% of patients. The majority (91%) of NOTCH mutations in salivary gland ACC were found to be predominantly activating, and NOTCH intracellular domain 1 (NICD1) is an established marker for NOTCH1 pathway activation.1 The purpose of this study was to assess whether NICD1 expression through immunohistochemistry (IHC) can serve as a prognostic factor for patients with ACC of the lacrimal gland, and to examine the relationship between NICD1 expression and high-risk clinicopathological features.

Methods: A retrospective review of medical records of all patients with a diagnosis of lacrimal gland ACC that underwent surgery between Jan 1998 to Feb 2018 was completed. Data concerning patient characteristics, clinical and treatment modalities were collected. All tissues obtained during surgery for lacrimal gland carcinoma were subjected to light microscopy and IHC studies. Cleaved NOTCH1 monoclonal antibody was used to detect NICD1 expression. NICD1 expression was scored in a binary fashion (positive=staining in >/70% tumor cells; negative=no staining in tumor cells or focal or faint nuclear staining in tumor cells <70%).

Results: Out of 43 patients treated during the study period, 21 had archived tumor tissue available for IHC studies. The median age at diagnosis was 47 years (range 29-69), with 62% male. According to the American Joint Committee on Cancer staging system (AJCC) 8th ed, the most common T stage at diagnosis was T2 (n=13, 62%), followed by T4 (n=5, 24%), and none had nodal or distant metastasis on initial presentation. Positive NICD1 expression was found in 8 (38%) cases, and positive expression was associated with predominant solid histopathological pattern (P<0.001), need for exenteration (P=0.008), local recurrence (P=0.047) and death (P=0.012). The estimated overall survival (OS) at 3, 6, and 9 years was: 94.4%, 80.8%, and 80.8%, respectively. On Kaplan-Meier (K-M) survival analysis, AJCC 8th ed T stage of T3-T4 (P=0.025) and distant metastasis (P=0.006) demonstrated significantly poorer OS. Patients with positive NICD1 expression

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demonstrated poorer OS, with P value approaching statistical significance (P=0.051). The median Disease-Free Survival (DFS) was 8.2 years. On K-M survival analysis, positive NICD1 expression (P=0.009), and predominant solid pattern (P=0.031) demonstrated significantly worse DFS relative to their counterparts.

Conclusions: NOTCH1 pathway activation through expression of NICD1 was associated with high risk clinicopathological features including predominant solid pattern and need for exenteration. DFS was poorer in patients with positive NICD1 expression. IHC staining for NICD1 should be considered in all cases of lacrimal gland ACC due to its prognostic value and potential for targetability with NOTCH1 inhibitors.

References

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10:55 – 11:01 am

Primary Lacrimal Gland Adenocarcinoma – Locoregional Control and Survival Compared with Lacrimal Gland Adenoid Cystic Carcinoma

Hila Goldberg[1], Jiawei Zhao[1], Janet Fan[1], Xinyang Jiang[2], Jing Ning[2], Renata Ferrarotto[3], Michelle Williams[4], Bita Esmaeli[1]
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Introduction: Primary malignant epithelial tumors of the lacrimal gland (LG) are rare. Adenoid cystic carcinoma is the most common accounting for about 2/3's followed by adenocarcinoma which accounts for about 20%.[1] The goal of this report is to describe the clinicopathologic features of LG adenocarcinoma (both de-novo and ex-pleomorphic) and compare local recurrence, distant metastasis, and survival in patients with LG adenocarcinoma vs. LG adenoid cystic carcinoma.

Methods: The medical records of 18 patients with LG adenocarcinoma treated by the PI between 2008-2022 were retrospectively reviewed. Data reviewed included: age, gender, ethnicity, clinical stage at presentation, biomarker data (androgen receptor (AR) and Her-2 receptor status), treatments, and status at last contact. Clinical features, locoregional control and survival rates were compared with a cohort of 49 patients with LG adenoid cystic carcinoma; the latter cohort were treated between 1998-2022.

Results: 67 patients were included: 8 de-novo adenocarcinomas (DNA), 10 ex-pleomorphic adenocarcinomas (XPA), and 49 adenoid cystic carcinomas (ACC). Median age at diagnosis was 60 in the DNA, 53 in the XPA, and 46 in the ACC groups respectively. Gender distribution was similar with male predominance in all groups (75% males in DNA, 60% males in XPA, 63% males in ACC). The most common initial T stage in all subgroups was T2: 4 patients with DNA (50%); 6 patients with XPA (60%); 28 patients with ACC (57%). T4 was next most common: 2 patients with DNA (25%); 3 patients with XPA (30%), and 15 patients with ACC (30%). Perineural invasion was present in 2 patients (25%) and 3 patients (30%) of the DNA and XPA adenocarcinomas, respectively, and in 43 (88%) of ACC patients ($p<0.001$). 12 of 18 patients with adenocarcinoma (67%) were treated with eye-sparing surgery, 4 (23%) had exenteration, and 2 (11%) had unresectable disease. 27 of 49 patients with ACC (55%) had exenteration and 22 (45%) had eye-sparing surgery. 100% of adenocarcinoma patients and 96% of ACC patients received postoperative radiation therapy. Local recurrence occurred in 1 of 8 patients with DNA (12%), 2 of 10 XPA (20%), and 16 of 49 ACC (33%) ($p=0.5$). Distant metastasis developed in 2 of 8 DNAs (25%), 2 of 10 XPAs (20%), and 16 of 49 ACCs (33%) ($p=0.7$). The overall 5-year disease specific survival was not significantly different between the three groups (0.8 in DNA, 0.78 in XPA, 0.8

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in ACC, p=0.82). Of the 18 LG adenocarcinoma patients, 13 had data for Her-2 receptor status, and 11 had data regarding AR status. 9 of 13 (70%) were Her-2 positive, and 10 of 11 (90%) were AR positive. Of the 9 Her-2 positive patients, 4 received adjuvant Her-2 receptor inhibitor targeted therapy for 1 year.

Conclusions: Primary LG adenocarcinoma has similar baseline clinicopathological features to ACC, except for perineural invasion which is more common in ACC. Adjuvant Her-2 directed therapy may be appropriate in some patients with LG adenocarcinoma. The rates of local recurrence, distant metastasis, and overall mortality were not significantly different in LG adenocarcinoma patients compared with ACC.

References

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11:14 – 11:20 am

Trends in Orbital Cellulitis Severity: 2016 through 2022

Alison Gibbons[1], Ashley Campbell[2], Emily Li[2]
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Introduction: Orbital cellulitis (OC) can be complicated by formation of a subperiosteal abscess (SPA) or orbital abscess (OA).[1] Literature published after the onset of the COVD-19 pandemic has suggested increased OC severity in the setting of COVID-19 co-infection.[2] The authors aim to assess trends in orbital cellulitis severity by abscess incidence and management intervention over the past 6 years, as well as the effects of the COVID-19 pandemic on OC severity.

Methods: A retrospective chart review was conducted at a tertiary care center using an electronic medical record search of billing codes for OC from 1/1/2016, to 1/1/2023. Manual chart review of radiography categorized patients into three cohorts—OC without abscess, SPA, and OA. Those with simultaneous SPA and OA were excluded. Demographic, clinical features, management interventions, and outcomes were extracted. Proportions of each cohort were compared across years. Age group comparisons consisted of pediatric (< 9 years old), adolescent (9-18 years), and adult (>18 years) categories. Primary outcomes included rate of surgical intervention, rate of readmission within 30 days, length of hospital stay (LOS), and final vision. A subgroup analysis compared clinical features, management, and outcomes within the SPA cohort prior to and after the start of the COVID-19 pandemic as set by the World Health Association (March 11th, 2020). Analyses were conducted using Chi-square tests and an α of 0.05 to indicate statistical significance.

Results: From 2016-2022, there were 378 cases of orbital cellulitis, including 247 (67.3%) cases of OC without abscess, 103 (28.1%) SPA, and 17 (4.6%) OA (Figure 1). The year 2022 had a significantly lower proportion of OC and a higher proportion of SPA and OA than prior years (p = 0.002). The year 2022 also had a higher proportion of pediatric infections compared to previous years of 2018, 2019, and 2020 (p = 0.008). Proportions of cohorts and patient age groups from 2016 to 2021 were similar.

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Within the cohort of patients with SPA, rates of surgical intervention were similar across years (p = 0.240), with an overall rate of 46%. Rates of readmission were higher in 2021 compared to other years (p = 0.039). Outcomes including mean LOS and final vision were similar across all years.

Infections were more severe, defined by higher rates of SPA (25% and 29%) and OA (2.9% and 6.4%), after the onset of the COVID-19 pandemic compared to pre-pandemic cases (p = 0.044). Within the SPA cohort, surgical intervention rate, mean LOS, readmission rate, and final vision did not differ significantly between pandemic onset and pre-pandemic cases.

Conclusions: Orbital cellulitis in the year 2022 demonstrated higher rates of SPA and OA complications and a greater proportion of pediatric patients compared to previous years. Infections appeared to be more severe after the onset of the COVID-19 pandemic. Further investigation is warranted to assess whether heightened rates of abscesses persist in orbital infections as COVID-19 variants and population immunity continue to evolve.

Figure 1

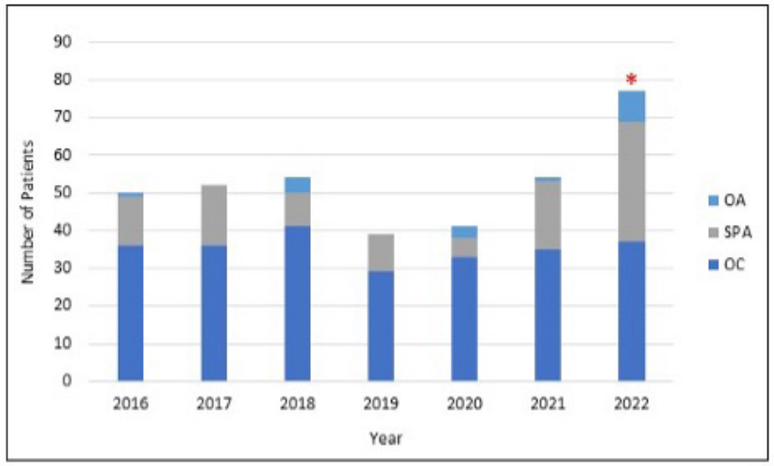

Figure 1. Proportion of orbital cellulitis and associated abscess types from 2016-2022.
*p<0.05.

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11:20 – 11:26 am

Novel Orbital Fracture Triage Algorithm Compared with Previously Reported Protocols

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Introduction: Despite few orbital fractures resulting in urgent ocular conditions, many patients are transferred by ambulance to tertiary care centers for ophthalmic evaluation only to be sent home and return 1-2 weeks later for outpatient evaluation. This overburdens patients and the healthcare system with travel and emergency department (ED) expenses, and overutilizes resources. A simple, easy-to-use clinical decision-making tool is needed to aid local EDs in effectively triaging patients with orbital fractures and identifying those with urgent conditions.

Methods: An IRB-approved retrospective review was performed of patients with orbital fractures who were seen in the University of Iowa ED in 2019. Variables gathered that were used to classify patients as requiring urgent evaluation are listed in Table 1. A new, institution-specific algorithm was developed using Akaike information criterion (AIC) model selection (Table 2). This algorithm was then retrospectively applied and compared to two previously published protocols: the South Texas Orbital Fracture Protocol (STOP) developed at Brooke Army Medical Center and the Bedside Orbital Fracture Algorithm developed at Massachusetts Eye and Ear Institute.[1,2]

Results: The review identified 134 patients (145 orbits) seen in the study institution ED with orbital fractures in 2019. There were 99 males and 35 females with a mean age of 49.9 years (SD = 21.6 years). Nineteen of the 134 patients (14.2%) had ocular or orbital conditions categorized as urgent. The new, institution-specific algorithm classified 43.3% of patients as requiring urgent ophthalmic evaluation, but 1 patient with retrobulbar hemorrhage and 1 patient with extraocular muscle entrapment would have been missed. Using STOP1, 2 patients had to be excluded due to lack of subjective information, 69.7% of the remaining patients would have been urgently evaluated, and no patients with significant ocular injury would have been missed. With the MEEI protocol2, no patients would have been excluded for lack of information, 70.9% of patients would have been evaluated, and 1 patient with choroidal rupture would have been missed.

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Conclusions: This retrospective analysis shows over 85% of patients who presented to the study institution did not need urgent ophthalmic evaluation. The STOP and MEEI protocols appeared to be similarly effective in decreasing the number of patients requiring urgent ophthalmic evaluation with approximately 30% reductions. The STOP (which utilizes a combination of radiographic, subjective, and physical exam findings) was 100% sensitive in identifying urgent ocular injuries but can be difficult to apply as it considers subjective findings which are not always obtainable and radiographic interpretations which can be highly variable. The present study's institution-specific algorithm would reduce patient referrals for urgent evaluation by over 55% but comes at the cost of sensitivity for urgent conditions. Given how commonly patients with orbital fractures present to EDs, implementation of a triage protocol like STOP, the MEEI algorithm, or the novel institution-specific protocol could improve resource utilization and patient and resident satisfaction. A prospective study is needed to evaluate the effectiveness of these protocols when applied to the triage of patients with orbital fractures.

Table 1

Table 1. Data parameters obtained from each patient through chart review

Category	Variables Recorded
Demographics	Date of consult, patient age, patient gender, and mechanism of injury
Subjective Exam Findings	Subjective change in vision and presence of diplopia
Objective Exam Findings	Presence of relative afferent pupillary defect, motility defect, subconjunctival heme, chemosis, eyelid laceration, corneal abrasion, hyphema, and eye injury
Radiographic Exam Findings	Location of fracture(s)
What is considered "Urgent"	Orbital compartment syndrome, open globe injury, major corneal trauma, choroidal rupture, retinal detachment, vitreous hemorrhage, and extraocular muscle entrapment

Table 2

Table 2. Study institution patient and exam characteristics predictive of urgent ophthalmic injury identified using Akaike information criterion model selection in patients with orbital fractures.

Variables Associated with Urgent Ophthalmic Injury	Relative afferent pupillary defect (RAPD), bilateral fractures, double vision, medial wall fracture, lateral wall fracture, and visual acuity
Algorithmic Equation	Output = -3.5 + 20.4*(RAPD) - 55*(Bilateral fractures) + 0.94*(Double vision) + 1.17*(Medial wall fracture) + 0.47* (Visual acuity) – 1.72*(Lateral wall fracture)

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11:26 – 11:32 am

Autologous Platelet Rich Fibrin as a Three Dimensional Structural Scaffold in the Healing Of Contracted Sockets

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Introduction: Platelet-rich fibrin (PRF) is a second-generation autologous biomaterial with platelets and leukocytes embedded in a fibrin network enriched with growth factors that helps in native tissue repair and regeneration by initiating mesenchymal stem cell migration and differentiation. The study aims to evaluate the role of PRF as an adjuvant in surface healing following the reconstruction of the contracted socket.

Methods: A prospective comparative study included 25 patients with a diagnosis of moderate to severe contracted socket (Grade III–IV as per the Gopal Krishna Classification) in need of volume and surface augmentation. Eleven patients (Group1) underwent socket reconstruction with dermis fat graft (DFG) and fornix formation sutures (FFS), with additional PRF as a surface veneer over the DFG. 14 patients (Group2) underwent socket reconstruction with DGF and FFS. After centrifugation of venous whole blood, a fine, flexible, three-dimensional fibrin matrix was obtained, which, upon draining, yielded a polymerized PRF membrane. This membrane was then incorporated as a layered surface adjuvant either with fibrin glue or sutured with 6-0 polyglactin in Group1 patients. The wound assessment was conducted as per the prefixed proforma, using the Wound Evaluation Scale (WES), considering six variables, wherein a score of 6 is considered optimal, a score of 5 is suboptimal, and a score of 0 is a very poor outcome. The pain intensity was calculated using the visual analogue scale (VAS). Soft tissue regeneration was analysed by documenting graft epithelization. All patients were evaluated at 1 month, 3 months, and 12 months post-surgery.

Results: The mean age was 38.8±7.2 years, with a male-to-female ratio of 2:1. The mean WES score at 1 month, 3 months and 12 months follow-up visits was 5.09±0.99, 5.81±0.38, 6.0±0.0 for Group 1 and 4.78±1.14, 5.08 ±0.95, 5.0±1.25 for Group 2 patients respectively. 81.8% of patients in Group 1 achieved a maximum WES score of 6/6 at 4 weeks, and 100% of patients achieved a score of 6/6 at 3 months, which remained the same until 1-year postoperative follow-up. In Group2, a WES score of 6/6 was achieved in 42.8% of cases at one month, 50% at three months, and 57.1% at twelve months ($p < 0.05$). Post-operative wound contracture was noted in three patients in Group2 at the final follow-up, with six patients having an unsatisfactory appearance as per WES. The mean total WES score was significantly higher in Group1 as compared to Group 2 on every follow-up visit. Among Group1, 72% of patients showed statistically significantly lower pain

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intensity in VAS as compared to Group2 on postoperative day 1 (p = 0.03), with no significant difference at 1 week. Additionally, greater surface epithelization was observed in Group1 in comparison to Group2 patients at 4 weeks.

Conclusions: This study reports encouraging outcomes of PRF providing a prudent physiological three-dimensional fibrin reservoir that can expedite surface wound healing following socket reconstruction as early as 4 weeks and can be considered an autologous wound healing booster. Additionally, PRF accelerates tissue epithelization and decreases early postoperative pain.

Figure 1

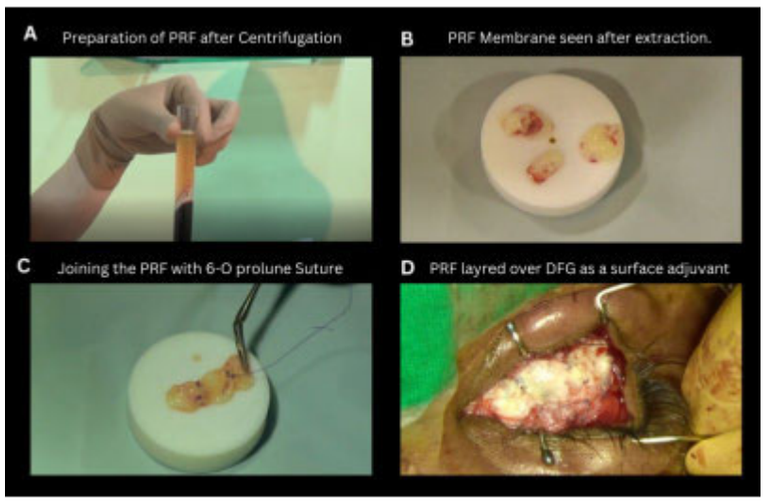


Figure 2

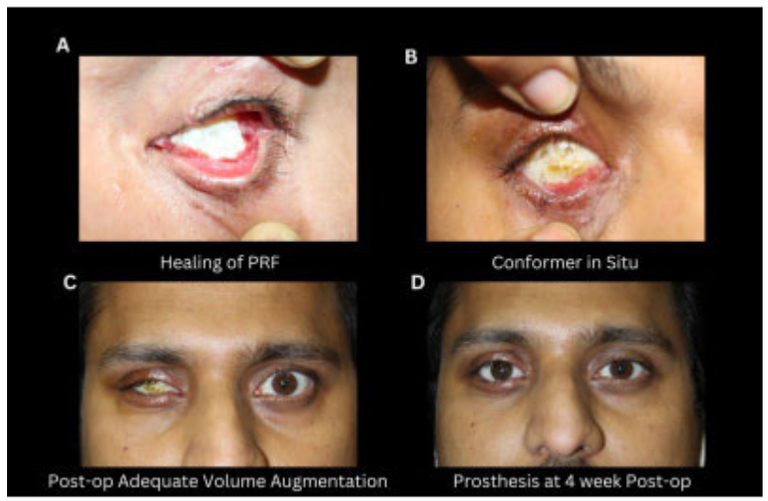
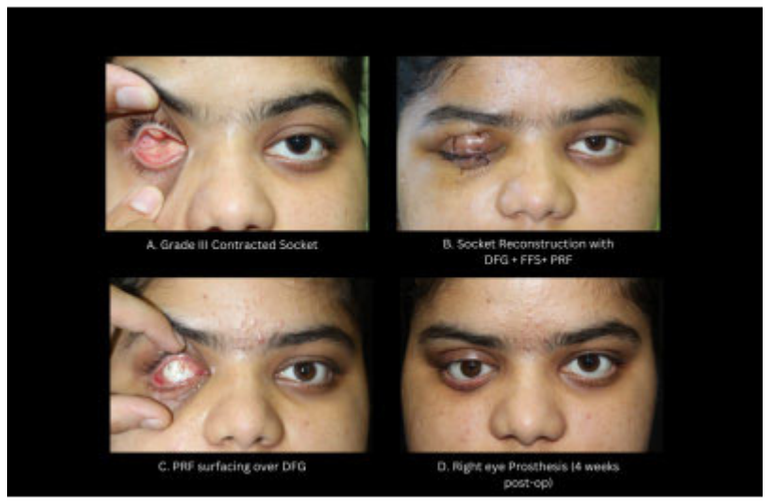


Figure 3



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11:32 – 11:38 am

Versatile Epicranial and Nasal Septal Flaps for Orbital Reconstruction

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Introduction: There is a growing need to reconstruct orbital defects caused by disease processes, tumor resections, trauma and congenital malformations. Pedicled flaps play an essential role to both provide vascular supply and cover orbital implants. The anterior epicranial and nasal septal flaps have been used for anterior skull base and craniofacial reconstruction. In this presentation, we aimed to introduce these flaps, surgical techniques and outcome in orbital reconstruction.

Methods: The author describes and shows surgical videos of a case of a 32-year-old man with granulomatosis and polyangiitis, who developed bilateral globe subluxation, severe decrease in visual acuity, limited extra-ocular movement with recalcitrant severe pain and corneo-scleral melting. He underwent endoscopic reconstruction of medial orbital wall with porous polyethylene that was sandwiched with nasal septal flap in left side and epicranial flap in right side.

Results: The patient made a favorable orbital and sino-nasal recovery with partial restoration of visual acuity and extra-ocular movements. This patient highlights a unique use of the epicranial and nasal septal flaps in orbital reconstruction. The large medial orbital defect was successfully reconstructed with a vascularized pedicled nasoseptal flap and epicranial flap from the ipsilateral side.

Conclusions: Epicranial and nasal septal flaps are long, rich vascular flaps that can be used for orbital reconstructions. These flaps may be turned inward to separate the intracranial contents from the sinonasal cavity and sandwiching the alloplastic orbital implant. These versatile flaps provide orbital surgeons a powerful measure for orbital reconstruction.

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Figure 1. Pre-operative CT scan. Coronal view. Shows extensive bilateral destruction of medial orbital wall and sinu-nasal structures. Globe subluxation into nasal cavity.

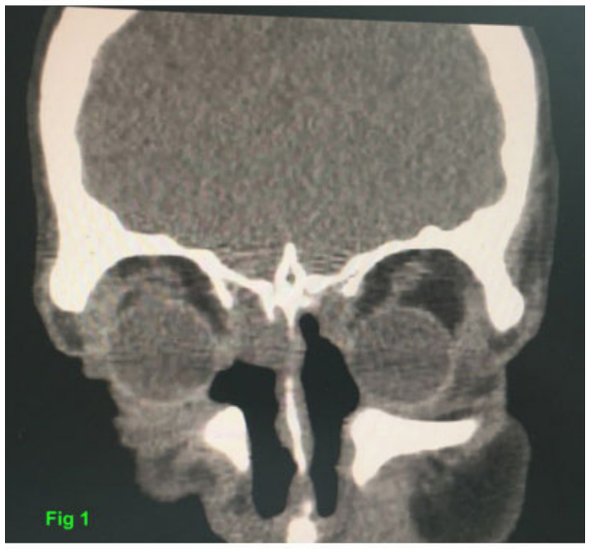


Figure 2. Orbital view from nasal cavity. Globe subluxated into nasal cavity. Ulcerated cornea and sclera are visible.

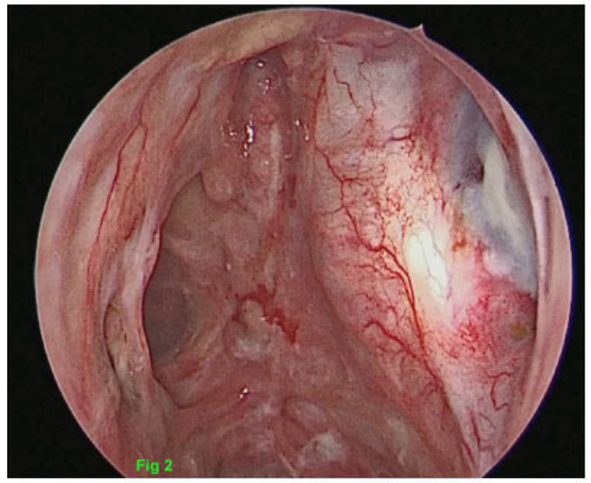


Figure 3. Nasal septal flap covered left orbital implant on medial wall.

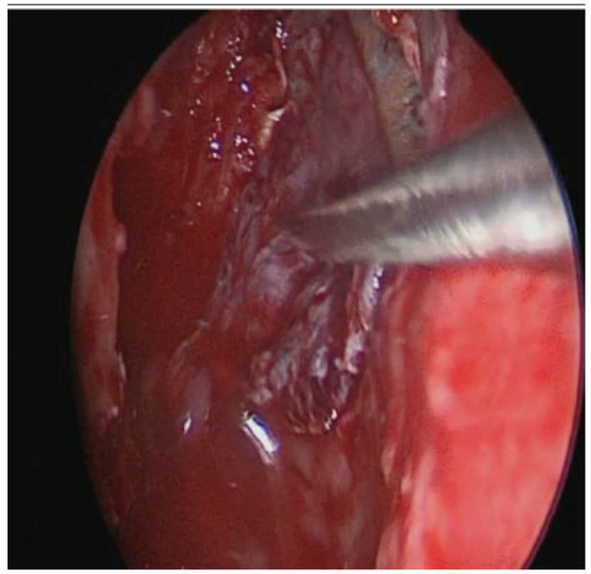
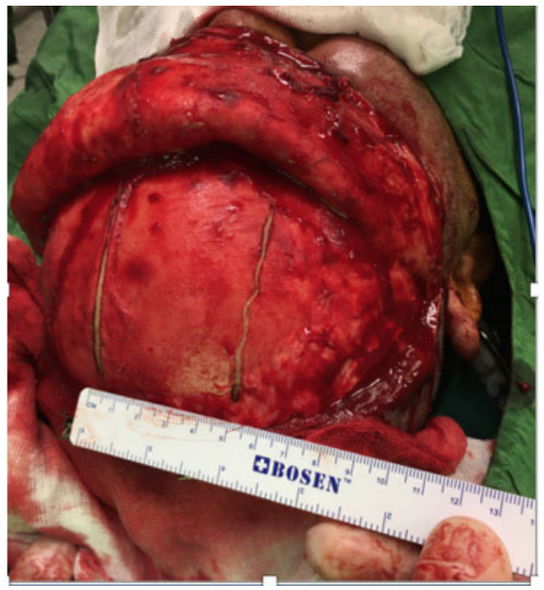


Figure 4. Epicranial flap is created on right side then directed to cover right medial wall defect.



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11:38 – 11:44 am

Comparison of Outcome in Patients with Idiopathic Intracranial Hypertension (IIH) Following Optic Nerve Sheath Fenestration (ONSF) Using a Medial Transconjunctival Approach Compared to Superomedial Lid Crease Incision Approach

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Introduction: Comparison of outcome in patients with idiopathic intracranial hypertension (IIH) following optic nerve sheath fenestration (ONSF) using a medial transconjunctival approach with dural window compared to superomedial lid crease incision approach with fenestration.

Methods: This was a retrospective, comparative study of 67 eyes of 44 patients with IIH who underwent ONSF with two oculoplastic surgeons at the University of Texas Southwestern Medical Center between January 2010 and March 2021. Patients were categorized into Group 1 if they received ONSF using superomedial lid crease incision approach with fenestration or Group 2 if they received ONSF using medial transconjunctival approach with dural window. Demographic data was recorded to ensure similarity between groups. Outcomes measured included changes in visual acuity, changes in visual fields, and changes in color vision within a 180 day post-operative period. Complications, including ptosis and diplopia, were recorded. Statistical significance for the proportion of each group with favorable outcome was calculated using a two sample z-test. Operation time was also documented and mean operating time was compared using simple paired t-test.

Results: Both surgical approaches were highly successful in preventing progression of vision loss in patients with IIH. In Group 1 96% of patients had stable to improved visual acuity and 88% of people in Group 2 had stable to improved visual acuity after operation (p-value 0.11). 80% of Group 1 and 94% of Group 2 did not have any progression of visual fields (p-value 0.93). 86% of Group 1 and 100% in Group 2 had no worsening of color vision after operation (p-value 0.98). There was no statistically significant difference in outcome between groups, except Group1 had more patients with improvement in VA after surgery at 39% compared to 13% in Group 2 (p-value 0.01). Furthermore, mean operation time in Group 1 was 21.9 minutes compared to 52.2 minutes in Group 2 (p- value < 0.0001). Both groups had very low complication rates, with no patients in Group 1 experiencing persistent ptosis or new diplopia and only two patients in Group 2 with new diplopia after operation.

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Conclusions: The superomedial lid crease incision approach with fenestration and the medial transconjunctival approach with dural window for ONSF are both effective in preventing vision loss in patients with IIH without significant differences in outcome in terms of visual acuity and visual field preservation. The superomedial lid crease incision approach has added advantages of decreased operation time and fewer complications.

Figure 1

	Group 1	Group 2	P-value
Mean age	35.6	34.3	0.32
Mean BMI	37.7	39.6	0.29
Mean CSF opening pressure	37.9	34.7	0.12
Sex			
Men, n (%)	4 (14%)	0 (0%)	0.01
Women, n (%)	24 (86%)	31 (100%)	0.99
Race/Ethnicity			
African American, n (%)	11 (39%)	17 (44%)	0.64
Caucasian, n (%)	14 (50%)	27 (44%)	0.30
Hispanic, n (%)	3 (11%)	4 (10%)	0.48
Laterality			
Right, n (%)	13 (46%)	19 (49%)	0.57
Left, n (%)	15 (54%)	20 (51%)	0.43
Number of bilateral procedures, n	11	12	
Admission status			
Outpatient, n (%)	20 (75%)	32 (82%)	0.76
Inpatient, n (%)	7 (25%)	7 (18%)	0.24
Presence of VP shunt prior to operation	0	2	

Table 1. For each variable, n is the total number and % is the percentage of each group. P values for means were calculated using a simple paired t-test. P values for percentages were calculated using a two sample z-test

Figure 2

	Group 1	Group 2	p-value
Mean operation time (minutes)	21.9	52.2	<0.0001
Standard deviation (minutes)	6.3	11.8	
Number of patients (n)	28	39	
Complications			
Tonic pupil (n)	0	0	
Ptosis (n)	0	0	
Diplopia (n, %)	0, 0%	2, 0.05%	0.88
Vision loss (n, %)	1, 0.04%	1, 0.03%	0.42

Table 2. Differences in operation time and known complications of ONSF. For each variable, n is the total number and % is the percentage of each group. P values for means were calculated using a simple paired t-test. P values for percentages were calculated using a two sample z-test. Vision loss reported is defined as a > 2 line decrease in Snellen visual acuity.

Figure 3

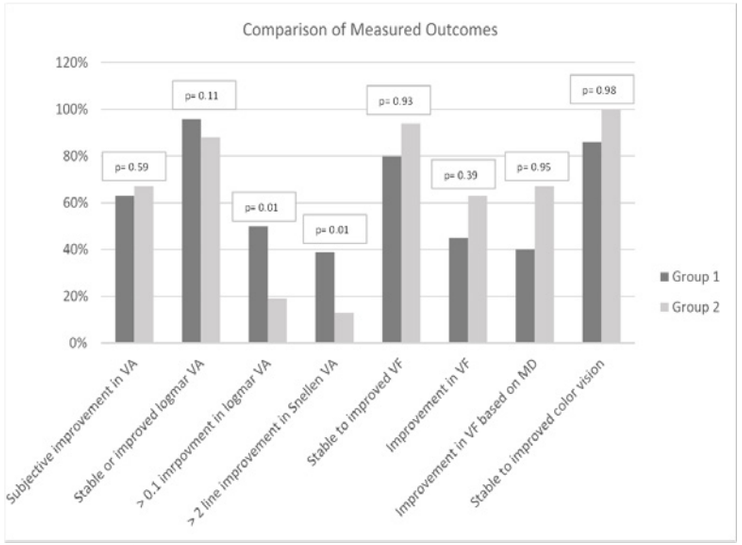

Figure 1. Graph of changes in visual acuity (VA), visual fields (VF), and color vision. MD = mean deviation on static automated perimetry. P values were calculated using a two sample z-test.

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11:44 – 11:50 am

Comparison of Retrobulbar Liposomal Bupivacaine vs Standard Bupivacaine for Postoperative Pain following Enucleation and Evisceration: A Prospective, Randomized, Single-Blinded Trial

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Introduction: Postoperative pain is a major concern for those undergoing enucleation/evisceration surgeries and peaks at approximately 24 hours.[1] Retrobulbar bupivacaine is classically used for pain control, but its effect is limited by its half-life of 2.7 hours. Liposomal bupivacaine allows for slower release of the medication over 48-72 hours. Its use has been studied in orthopedic, breast, and abdominal surgery with limited evidence on its superiority compared to standard bupivacaine in reducing postoperative pain.[2,3] More recently, Cox et al. showed that retrobulbar liposomal bupivacaine in evisceration surgery was more effective than 0.75% bupivacaine for pain control during the first 48 hours postoperatively.[4] In this study, we compare the use of retrobulbar liposomal bupivacaine and standard bupivacaine for patients undergoing enucleation and evisceration surgery.

Methods: Prospective, randomized, single-blinded, comparative trial of adults undergoing either enucleation or evisceration from November 2018 – November 2022. Pts were randomized into two groups: 1) 3 ml retrobulbar liposomal bupivacaine and hyaluronidase or 2) 3 ml 0.25% bupivacaine with 1:200,000 epinephrine and hyaluronidase. All patients were blinded to the treatment they received. Retrobulbar injections were performed at the end of the procedure under general anesthesia by the senior author (RS). Patients used oral acetaminophen 650mg every 6 hours as needed postoperatively. No opioid prescriptions were given to any patients. Postoperative pain was graded using a 10-point Likert-type Wong-Baker FACES visual analog scale. Pain was assessed at post-operative hour 1, via calls at postoperative day 1 and 2, and at the postoperative week 1 appointment. Excluded were patients age <18, pregnant or nursing, allergic to lidocaine or other anesthetics, had prior orbital surgery, current users of analgesics/opioids/anxiolytics, unable to reliably rate pain or understand the analog pain scale, and follow-up <1 week. Statistical analysis was performed using the student t-test.

Results: 88 patients, 48 (54%) of whom were women, had a mean age of 54 years (range 24-77). 54 (61.4%) patients underwent evisceration. Gender, age, and diagnosis necessitating surgery were similar between the two groups. Pain scores (table 1) were less for those who received liposomal bupivacaine at 24 hours (1.8 ± 1.5 vs 5.9 ± 2.2, $P < 0.01$) and at 48 hours (1.9 ± 1.4 vs 6.1 ± 1.8, $P<0.01$). This was seen in both the enucleation and evisceration groups at these time points. Pain at one hour (1.4 ± 1.0 vs 1.7 ± 1.1, $p=0.61$) and one week (1.1 ± 0.9 vs 1.2 ± 1.1, $p=0.81$) were similar for the groups. No complications were noted in either group.

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Table 1: Pain scores at standard time points after enucleation or evisceration

Time Interval	Liposomal bupivacaine pain scores	Standard bupivacaine pain scores	*p-value*
1 hour	1.4 ± 1.0	1.7 ± 1.1	*0.61*
24 hours	1.8 ± 1.5	5.9 ± 2.2	*<0.01*
48 hours	1.9 ± 1.4	6.1 ± 1.8	*<0.01*
1 week	1.1 ± 0.9	1.2 ± 1.1	*0.81*

Conclusions: Retrobulbar liposomal bupivacaine provides reduced perceived pain compared to standard bupivacaine at 24-48 hours following enucleation and evisceration and should be considered by clinicians performing these procedures.

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YASOPRS LUNCH SESSION (NON-CME)

Thursday, November 2

Moderators: Kyle Godfrey and Amy Jain

12 – 1 pm

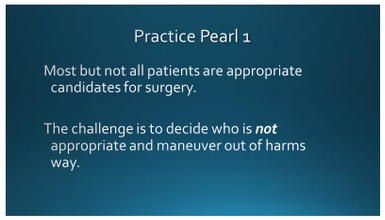
Pearls with the Pros

12:05 – 12:15 pm **Career Stages** – Jeffrey Nerad
12:15 – 12:25 pm **Practical Pearls for the Oculoplastic Surgeon** – Rona Z. Silkiss

1

2


30 Years of Practice Pearls
3



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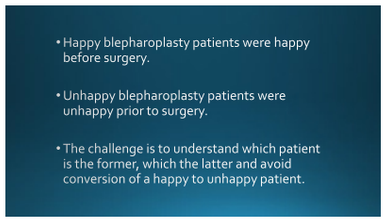

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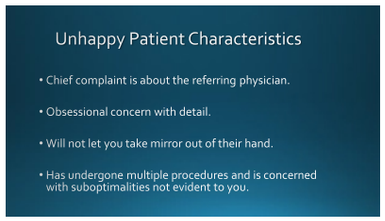

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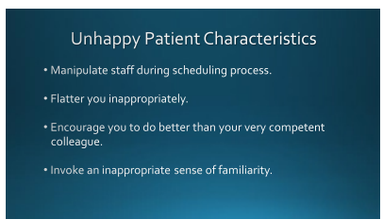

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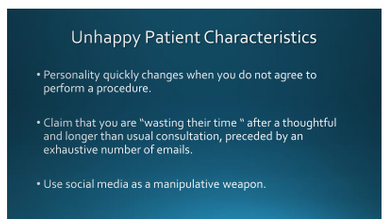

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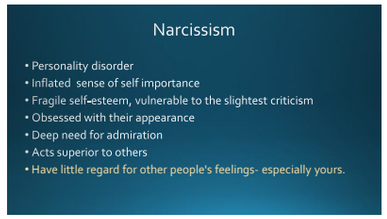

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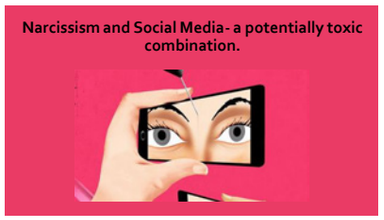

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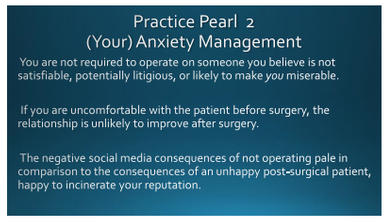

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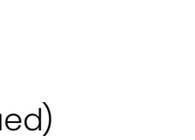
- Be careful how you "decline the opportunity" to operate on someone.
- Narcissists may experience a personalized rejection response with a strong public backlash.
- Express your response with concerns regarding meeting their expectations/needs.

13

- Beware of patients that may have various degrees of body dysmorphic syndrome or unrealistic expectations and pressure you to push the surgery beyond your comfort level.
- They need a different type of specialist- not a surgeon.
- Learn to say no.
- Understand that obsessional fixation on and anger concerning imperfection or aging can be transferred to the surgeon in the event of a "disappointing" outcome - the determination of which is entirely subjective.

14

There may be a good reason you are starting to feel chest pain! Listen to your intuition.



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Practice Pearl 3
Operating Room Culture

- **Create a calm environment.**
- **Lead the surgical team.**
- **Demonstrate care for the patient- a hand on the forehead.**
- **Ask if patient is comfortable, warm, etc.**

16

Practice Pearl 4
Post-operative Counseling

- The patient is looking to you for validation both pre and post operatively.
- Tell them they were a wonderful patient, that they are healing well……and have a great outcome.
- In the event of an issue, offer the patient an opportunity to adjust the surgery over time and your willingness to guide them through the process.

17

Summary
These skills are difficult to master.

1. Patient selection is critical.
2. Learn to say no - in the nicest way possible.
3. Focus on preoperative and post operative communication.
4. Listen to your intuition.
5. Be present fully in the interactions with your patients.
6. Sit with the discomfort of interactions and learn to improve the dialogue (as difficult as that may be at times).

18

Thank you

19

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12:25 – 12:35 pm **Work-Life Integration – Keeping Happy and Satisfied for the Long Game** – John Ng

The presenter will share from his personal experience over several decades, tips he found useful in staying fulfilled and happy by developing and maintaining a cohesive life through integration of career, family life, community involvement and self-care and wellbeing.

Figure 1

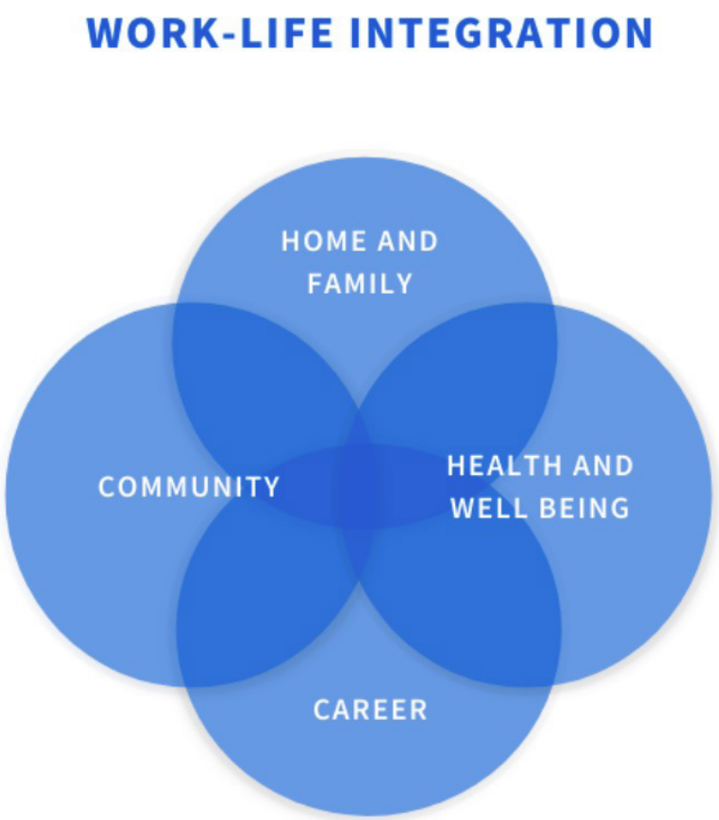
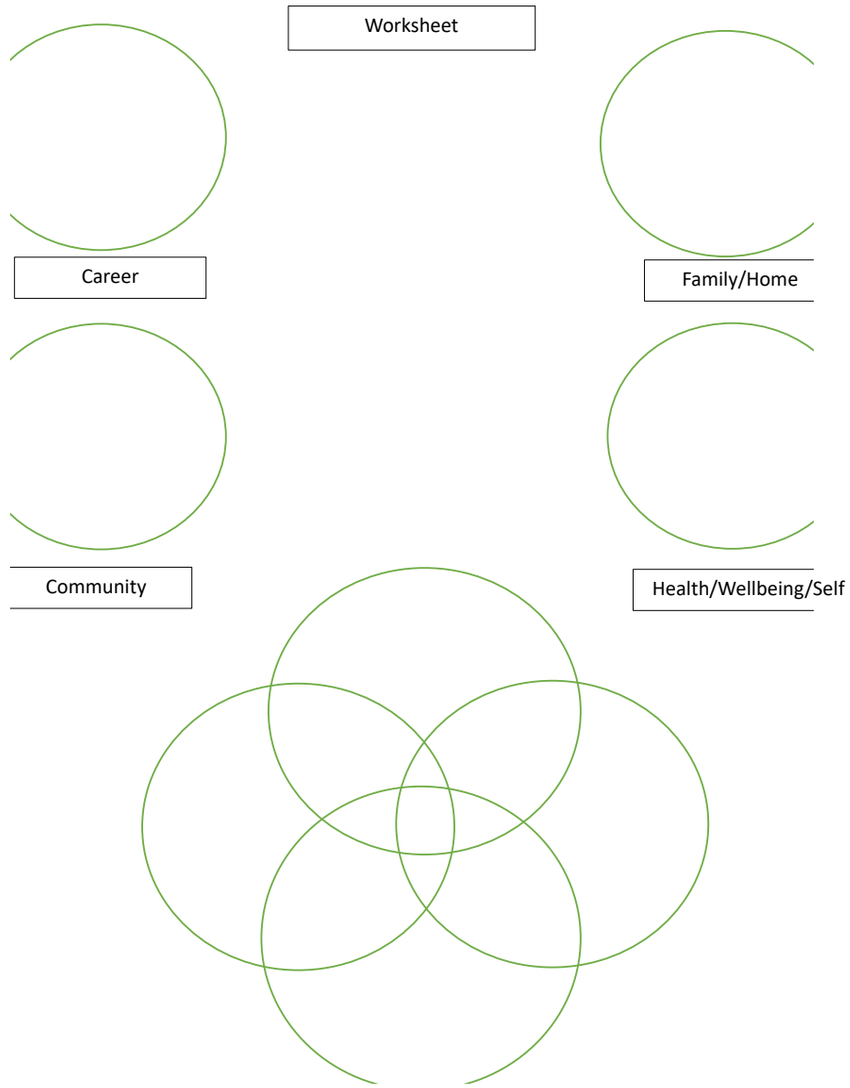


Figure 2



ASOPRS FOUNDATION UPDATE AND MICHAEL J. HAWES LECTURE

Thursday, November 2

1:05 – 1:30 pm

Advances in Facial Reanimation 2023

Patrick Byrne, MD

1:49 – 1:55 pm

Neglected Nocturnal Paralytic Lagophthalmos in Facial Nerve Palsy

Tracy Lu[1], John Nguyen[2], Andrea Kossler[1], Aaron Fay[3], Natalie Homer[4]
[1]Byers Eye Institute, Stanford Medical Center, Palo Alto, California, United States, [2]Department of Ophthalmology, West Virginia University, Morgantown, West Virginia, United States, [3]Department of Ophthalmology, UMass Memorial Health, West Springfield, Massachusetts, United States, [4]Byers Eye Center, Stanford Medical Center, California, California, United States

Introduction: Lagophthalmos is traditionally measured in a sitting position when maximal gravitational forces assist in eyelid closure. However, lagophthalmos assessment in a supine position may be useful to ensure nocturnal corneal protection. We sought to assess positional variability in lagophthalmos in patients with facial nerve palsy.

Methods: A retrospective review of patients with paralytic lagophthalmos, with and without upper eyelid weights, at two academic institutions were included. Primary outcomes were lagophthalmos measurements in the upright and supine positions. Statistical analysis was performed using paired and two-sample T-tests, with p-values < 0.05 considered significant.

Results: Fifty-eight eyelids (57 patients) were included, including 29 men and 28 women, of age range 16-90 years (mean 63.2 years) (Table 1). Twenty-nine (50%) patients had prior upper eyelid weight implantation, with an average post-operative follow-up of 178 weeks. Weights were implanted in an anterior tarsal position in 16 (55%) eyelids and in a supratarsal position in 13 (45%) eyelids, and were average weight 1.3 grams (range 0.8 – 2.2 grams).

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The mean change in positional lagophthalmos from sitting to supine among all patients with facial nerve palsy was a 1.5 mm increase ($p < 0.001$) (Table 2). Patients without eyelid weights had a 1.2 mm lagophthalmos increase ($p < 0.001$). Patients with eyelid weight implantation had an average lagophthalmos of 1.59 mm (range 0 mm – 8 mm) in the upright sitting position, and an average 3.40 mm (range 0 mm – 10 mm) in the supine position (Figure 1). The mean change in positional lagophthalmos among post-operative patients when transitioning from sitting to supine positions was a 1.8 mm increase ($p < 0.001$, range 0.5 mm decrease to 5.5 mm increase). There was no significant difference in the amount of positional lagophthalmos change between patients with and without eyelid weights ($p = 0.07$). Positional increase in lagophthalmos measurements did not correlate with gender ($p = 0.26$), age ($p = 0.12$), weight position (i.e. anterior tarsal vs. supratarsal) ($p = 0.40$), weight (in grams) ($p = 0.58$), or House-Brackmann severity[1] ($p = 0.53$). Patients with platinum weights had less lagophthalmos variability with position change compared to patients with gold weights ($p = 0.049$).

Conclusions: Clinically, lagophthalmos is typically measured only with the patient in the sitting position, which may overlook the presence of nocturnal corneal exposure. Only one small study previously assessed positional change in lagophthalmos following platinum weight implantation and did not find a statistically significant change.[2] Our study is the first to report a significant lagophthalmos increase in the supine position that is present among patients both with and without eyelid weight implantation. This lagophthalmos increase did not significantly vary based on patient demographics, weight load, position, or facial palsy severity, but did vary between platinum and gold weights with borderline statistical significance ($p = 0.049$). Patients with platinum weights demonstrated a smaller increase in lagophthalmos when supine, which could be due its denser concentration centrally where lagophthalmos risk is greatest.[3] We recommend that surgeons routinely measure lagophthalmos in the supine position, as continued corneal exposure may warrant increased nighttime ocular lubrication, occlusion or additional surgical intervention.

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Table 1

Table 1

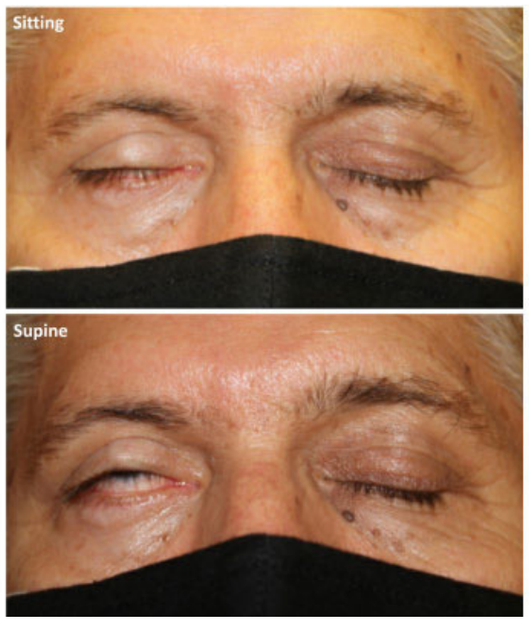
Baseline Patient Characteristics	
Age (years)	63.2 (range 16-90)
Gender	
Male	29 (51%)
Female	28 (49%)
Etiology of lagophthalmos	
Malignancy	23 (40%)
Idiopathic (Bell's Palsy)	12 (21%)
Iatrogenic	10 (17%)
Trauma	8 (14%)
Congenital	2 (3%)
Stroke	2 (3%)
Infectious	1 (2%)
Weight position	
Anterior tarsal	16 (55%)
Supratarsal	13 (45%)
Weight material	
Gold	20 (71%)
Platinum	8 (29%)
Average weight (g)	1.30

Table 2

Table 2

Positional Changes in Lagophthalmos (mm)				
	Upright	Supine	Difference	p-value
All patients	2.32	3.80	1.48	<0.001
Patients without eyelid weight	3.05	4.21	1.16	<0.001
Patients with eyelid weight	1.59	3.40	1.81	<0.001

Figure 1



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1:55 – 2:01 pm

Nasal Valve Repair in Facial Paralysis: A Newly Described Technique

Monica Ray, Karen Brown, Kendall Goodyear, Anish Abrol, Tanuj Nakra
Austin, Texas, United States

Introduction: Facial paralysis disrupts the static and dynamic forces needed for nasal respiration through a variety of mechanisms resulting in nasal valve collapse and obstruction. The effects on facial and periorbital structures caused by facial nerve paralysis can often be severe, with periorbital and lower face sequela often being the focus of patients concerns. However, when demonstrated for the patient, through direct questioning and physical exam, patients often endorse significant functional and cosmetic concerns related to their breathing and the cosmetic appearance of their nose and midface. We describe a new technique to address the cosmetic and functional sequalae of external nasal valve collapse in patients with facial paralysis.

Methods: Retrospective case series of a newly described surgical technique for external nasal valve repair in patients with facial paralysis at a single institution.

A total of eight patients underwent direct external nasal valve repair by two surgeons at a single practice, using a uniform technique. Patients were given a standardized questionnaire at their initial consultation which addresses both functional and cosmetic concerns of the patient (SCHNOS Questionnaire, Figure 1). Patients then underwent surgery, as a stand-alone procedure or in conjuncture with other procedures to address sequela related to their underlying facial nerve paralysis. These procedures included lower eyelid retraction repair, canthoplasty, gold weight placement, and SMAS elevation. Surgical technique involved incision along the nasal sidewall which extended inferiorly to the alar base. The extent of resection was determined by manual elevation of the middle vault and nasal ala to the desired position and an ellipse was designed for excision of the intervening tissue to allow for optimal closure (Figure 2). The ellipse was incised and excised to include all subcutaneous tissue. All underlying SMAS and muscle was left intact to improve volume loss that is present following facial nerve paralysis. A deep 3-0 polyglactin suture was placed suspending the nasal side wall to the periosteum along the inferior orbital rim. The incision was closed with deep 4-0 Polygleicaperone 25 sutures, and the skin was closed using a running locking 5-0 plain gut suture. At post operative visits, patients were again given the SCHNOS questionnaire (Figure 3). Objective measurements were taken of patient's nares on the affected side, before, immediately after and at most recent follow up (Figure 4).

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Results: Comparison of pre-operative and post operative SCHNOS questionnaires showed improvement in both the functional and aesthetic aspects of the reconstruction. Measurement of the total nares area showed an increase during the post operative period that remained stable over the follow up duration. There were no post operative complications related to the procedure. The external scar along the nasal side was found to be aestetically acceptable by all patients and physicians and did not require scar modification treatments during the post operative period.

Conclusions: Patients who present with concerns following facial nerve paralysis should be assessed specifically for nasal valve cosmetic and functional concerns. The addition of nasal valve surgery through direct external excision and suspension is a useful surgical addition that can be combined with other procedure and has long term benefits for patients.

Figure 1

Figure 1. SCHNOS Questionnaire

Over the past month, how much of a problem was the following:	No problem					Extreme problem
1. Having a blocked or obstructed nose	0	1	2	3	4	5
2. Getting air through my nose during exercise	0	1	2	3	4	5
3. Having a congested nose	0	1	2	3	4	5
4. Breathing through my nose during sleep	0	1	2	3	4	5
5. Decreased mood and self-esteem due to my nose	0	1	2	3	4	5
6. The shape of my nasal tip	0	1	2	3	4	5
7. The straightness of my nose	0	1	2	3	4	5
8. The shape of my nose from the side	0	1	2	3	4	5
9. How well my nose suits my face	0	1	2	3	4	5
10. The overall symmetry of my nose	0	1	2	3	4	5

Figure 2

Figure 2. Intraoperative photos of external nasal valve excision design

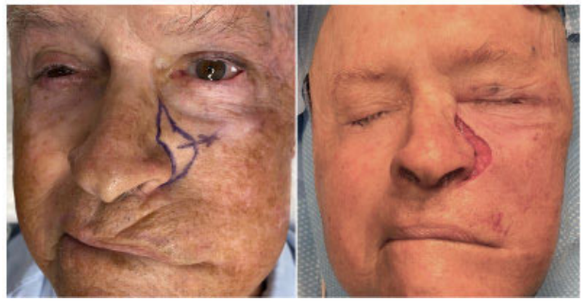


Figure 3

Figure 3. Preoperative, immediately post operative and 3 months post operative

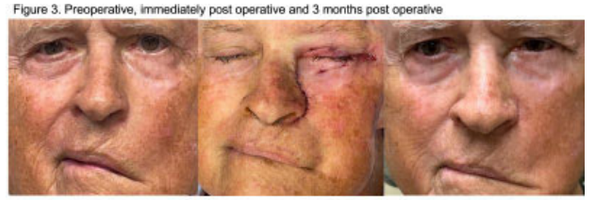
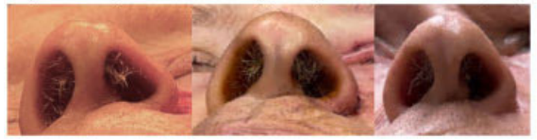


Figure 4

Figure 4. Preoperative, immediately post operative and 3 months post operative



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2:46 – 2:52 pm

Comparison of Clinical Outcomes between Teprotumumab and Orbital Decompression Surgery in Patients with Thyroid Eye Disease

Sasha Hubschman[1], Badal Sojitra[2], Sean Ghiam[3], Connie Sears[1], Nathan Hwangbo[4], Robert Goldberg[1], Daniel Rootman[1]
[1]Ophthalmology, UCLA, Los Angeles, California, United States, [2]Ophthalmology, Rutgers Robert Wood Johnson Medical School, New Brunswick, New Jersey, United States, [3]Ophthalmology, Sackler School of Medicine, New York / American Program of Tel Aviv University, New York, United States, [4]Statistics, UCLA, Los Angeles, California, United States

Introduction: While both teprotumumab[1] and surgical decompression[2] are known to be useful in the management of proptosis related to thyroid eye disease (TED), the relative efficacy of these two options is less well established. This study aims to compare the outcomes of patients with TED who were treated with either teprotumumab or orbital decompression.

Methods: In this interventional cohort study, adults diagnosed with TED and treated with decompression surgery, teprotumumab, or both were included. For patients with bilateral disease, a random side was included in the analysis. Four groups were defined: decompression only (Group 1), teprotumumab only (Group 2), teprotumumab first with decompression later (Group 3), and decompression first with teprotumumab later (Group 4). Four time points were assessed: prior to treatment 1 (visit 1), immediately after completion of treatment 1 (visit 2), late follow up for treatment 1 (immediately prior to treatment 2) (visit 3), and for groups 3 and 4 the final time point was the last visit after completion of treatment 2 (visit 4). Data related to extraocular muscle (EOM) motility, strabismus, diplopia, MRD1, MRD2 and exophthalmometry were collected at each visit. Extraocular muscle diameters were measured on pre-treatment coronal CT scans. The main effect of treatment over time and the additional effect of secondary treatments (groups 3 and 4) were assessed.

Results: Of the patients screened, 139 met inclusion criteria and were included. Group statistics can be found in Table 1. Mean exophthalmometry at baseline was greater in the decompression group (1.3mm, $p<0.05$), while there was no significant difference between the groups at the early or late follow up. Mean change in exophthalmometry from pre-treatment to final follow-up was significantly ($p<0.01$) greater for the decompression group (3.5mm) as compared to teprotumumab (2.0mm). The difference for change

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in exophthalmometry maintained significance when controlling for baseline exophthalmometry in multivariate regression (r2=0.21, p<0.001). Examination of exophthalmometry over time revealed a significant (p<0.01) main effect of time in both groups, and a significant (p<0.01) interaction effect of group (Figure 1).

Group 3 analysis demonstrated that surgery after teprotumumab leads to a significant reduction in proptosis for the affected eye, which is similar to surgery (3.66mm). Group 4 analysis revealed that the effect of teprotumumab after surgery is a reduction in proptosis to the level of teprotumumab alone (1.5mm).

The improvement in total EOM restriction was significantly (p<0.01) greater in the teprotumumab group (14.7 degrees) than in the decompression group (2.6 degrees). No significant difference was noted for change in MRD1, MRD2, strabismus, rate of resolution nor new onset diplopia.

Conclusions: Surgical decompression appears to have a greater overall proptosis reduction effect than teprotumumab. This effect is independent of baseline proptosis. The addition of teprotumumab or decompression to a previous course of the opposite appears to add a similar effect to the supplemental treatment alone, essentially the additional effect is independent of previous treatment.

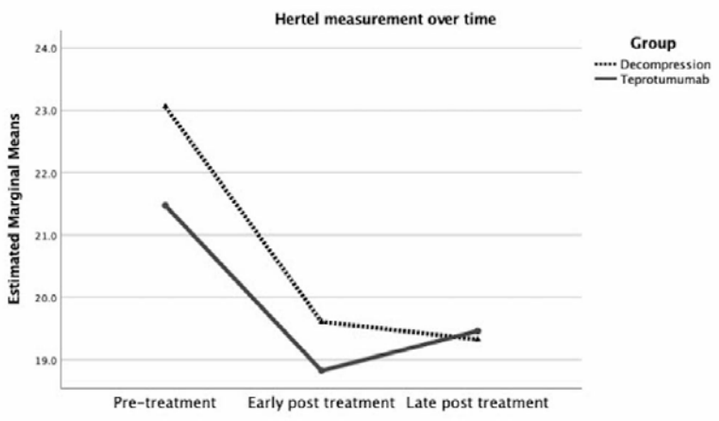
Table 1

Table 1: Group statistics and patient characteristics

Table 1: Group statistics	
Female gender, N (%)	97 (68.8)
Age, years (average)	52.8
Group 1, N (%)	77 (55.4)
Group 2, N(%)	51 (36.7%)
Group 3, N (%)	7 (5%)
Group 4, N (%)	4 (2.9%)
Length of follow up, months (mean)	11.9

Figure 1

Figure 1: Hertel exophthalmometry measurements in Groups 1 and 2 over time, at visits 1, 2 and 3.



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2:52 – 2:58 pm

Proptosis Regression after Teprotumumab Treatment for Thyroid Eye Disease

Tatiana R. Rosenblatt, Carolina A. Chiou, Natalie Wolkow, Nahyoung G. Lee, Michael K. Yoon, Suzanne K. Freitag
Ophthalmology, Massachusetts Eye and Ear, Boston, Massachusetts, United States

Introduction: While teprotumumab has been shown to decrease proptosis in thyroid eye disease, some patients may experience a worsening, or regression, of proptosis after initial treatment benefit.[1] This study analyzed percent proptosis change after teprotumumab therapy to evaluate the degree and timing of proptosis regression.

Methods: This is a retrospective study of all patients who completed eight infusions of teprotumumab at one institution from 1/1/20-12/31/22. Change in proptosis was assessed in millimeters and percentages as compared to the immediate post-teprotumumab proptosis and pre-teprotumumab proptosis. A fixed effects model and paired t-tests were used to evaluate the timing and degree of proptosis regression.

Results: Of 129 patients (Table 1) who completed treatment, 119 had post-teprotumumab proptosis data. In total, 110 (92.44%) patients had initial proptosis improvement in at least one eye after teprotumumab. Of these patients, 57 (51.82%) eventually had a regression in their proptosis. Average percent proptosis regression compared to immediately post-teprotumumab was 12.91% (range 1.85 – 58.82%, SD 8.59%), corresponding to an average of 2.5 mm (range 0.5 – 10.0 mm, SD 1.57). Twenty-two (38.60%) patients had documentation of worsened proptosis within six months of completing teprotumumab, 24 (42.10%) patients worsened between six months to one year, and 11 (19.30%) began regressing more than one year after completing teprotumumab treatment. Proptosis regression over time was analyzed among the 78 patients who had follow-up data beyond their immediate post-teprotumumab clinic visit; for every one month after initial post-teprotumumab follow-up, proptosis worsened by 0.45% (CI 0.21% – 0.69%, $p < 0.001$). Although proptosis change across all patients demonstrated overall reduction at most recent follow-up, with an average reduction of 1.59 mm (range -4 – 11 mm, SD 2.68), 19 (24.36%) patients showed more proptosis by most recent follow-up than their initial proptosis before teprotumumab. Average regression at most recent follow-up compared to pre-teprotumumab was 1.53 mm (range 0.5 – 4 mm, SD 0.95), corresponding to an average percent proptosis regression of 7.74% (range 1.85 – 20.69%, SD 4.91) (Figure 1). Meanwhile 59 (75.64%) patients continued to have proptosis improvement at most result follow-up, averaging 3.13 mm (range 0.5 – 11 mm, SD 2.04) or 13.19% (range 1.92 – 41.67%, SD 8.07) of their initial proptosis. Nine patients ultimately underwent retreatment. Clinical Activity Scores (CAS) demonstrated a slight increase over time, with an average initial post-teprotumumab CAS of 0.62 vs. 1.74 when proptosis regression was first noted ($p = 0.004$).

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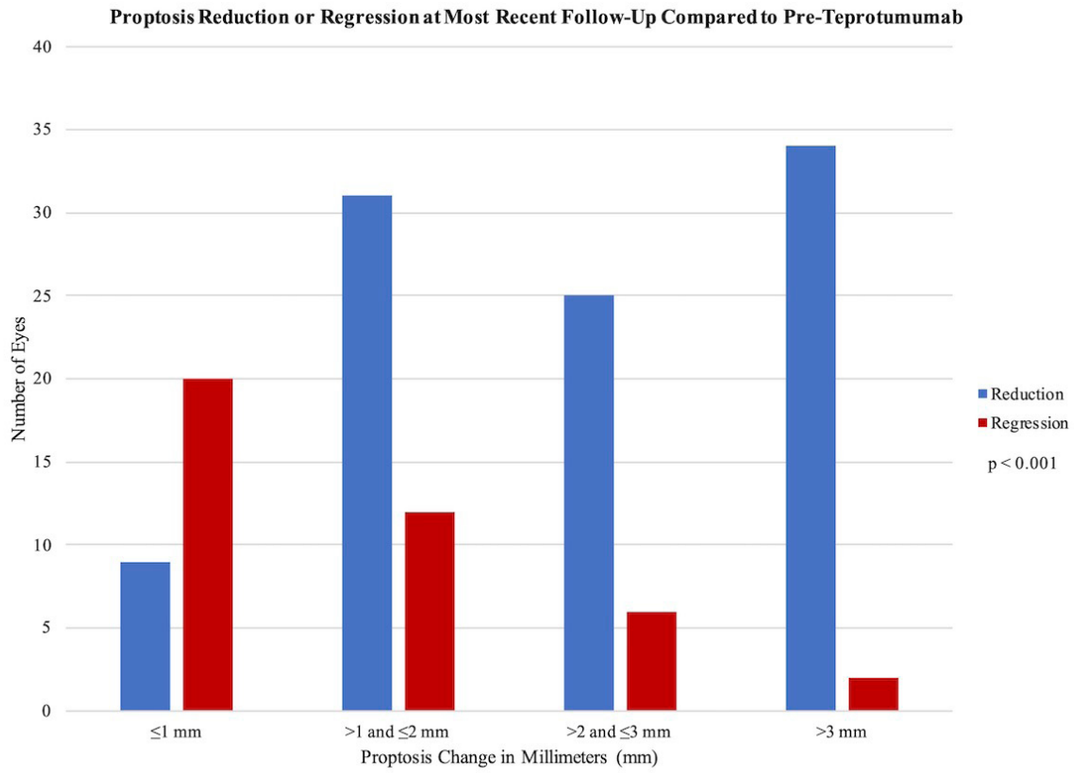
Conclusions: This study revealed proptosis regression in approximately half of patients who were initial teprotumumab responders, though only 17.27% of patients regressed to the point of worsened proptosis compared to before teprotumumab treatment. Overall, when compared to pre-teprotumumab, patients improved to a greater degree than the amount of regression seen in some patients. Most patients began to show signs of regression within one year of completing treatment, with gradual change over time. CAS scores remained overall low, suggesting that thyroid disease activity may stay relatively quiescent after teprotumumab therapy despite potential proptosis regression.

Table 1

Table 1. Study Cohort Demographics

Demographic Categories	N (%)
Sex	
Female	97 (75.2)
Male	32 (24.8)
Race/Ethnicity	
White, non-Hispanic	101 (78.3)
White, Hispanic	3 (2.3)
Black	11 (8.5)
Asian	14 (10.9)
Smoking Status	
Never smoker	81 (62.8)
Former smoker	36 (27.9)
Active smoker	11 (8.5)
Thyroid Disease	
Graves only	121 (93.8)
Hashimoto's only	2 (1.6)
Both	4 (3.1)
Neither	2 (1.6)
Disease Status	
Active	117 (90.7)
Inactive	12 (9.3)
Optic Neuropathy	22 (17.1)
Prior Decompression	13 (10.1)

Figure 1



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2:58 – 3:04 pm

Inhibition of Interleukin-6 Receptor Signaling with Satralizumab in Thyroid Eye Disease: Phase 3 SatraGo-1 and SatraGo-2 Trial Design

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Introduction: Thyroid eye disease (TED) is a complex inflammatory disease which can progress to fibrosis of orbital tissues and sight-threatening complications. There is an unmet need for disease-modifying treatment options in patients with active TED for whom current treatments (intravenous pulses of corticosteroids and/or teprotumumab) are associated with disease relapses and substantial side effects, and in patients with inactive TED who are largely managed with surgery. Interleukin-6 (IL-6) and its receptor (IL-6R) are known to play a key role in the pathogenesis of TED.[1] Satralizumab, a humanized monoclonal antibody that targets IL-6R activity, was designed using novel antibody recycling technology which allows for longer duration of antibody circulation and subcutaneous dosing every 4 weeks (Q4W). Satralizumab has been approved for the treatment of neuromyelitis optica spectrum disorder in 80 countries worldwide.[2] Herein we describe the design of the phase 3 SatraGo-1 and SatraGo-2 trials evaluating the efficacy and safety of satralizumab in participants with active and inactive TED.

Methods: SatraGo-1 and SatraGo-2 are identical, global, phase 3, randomized, double-masked, placebo-controlled, 72-week (primary endpoint, week 24), multicenter studies of satralizumab in participants with TED which will recruit ~120 participants at up to 40 study sites across 13 countries. Participants (≥18 years) with moderate-to-severe active TED (onset of symptoms ≤12 months prior to baseline) or stable, chronic inactive TED (initial diagnosis >12 months but Figure 1). Based on the proptosis response at week 24, non-responders will receive satralizumab treatment Q4W and responders will be re-randomized 1:1 to receive satralizumab or placebo Q4W through week 44, to evaluate the long-term benefits of satralizumab. Rescue treatment will be permitted from week 4 based on protocol-defined criteria (diagnosis of sight-threatening disease) and per investigator discretion.

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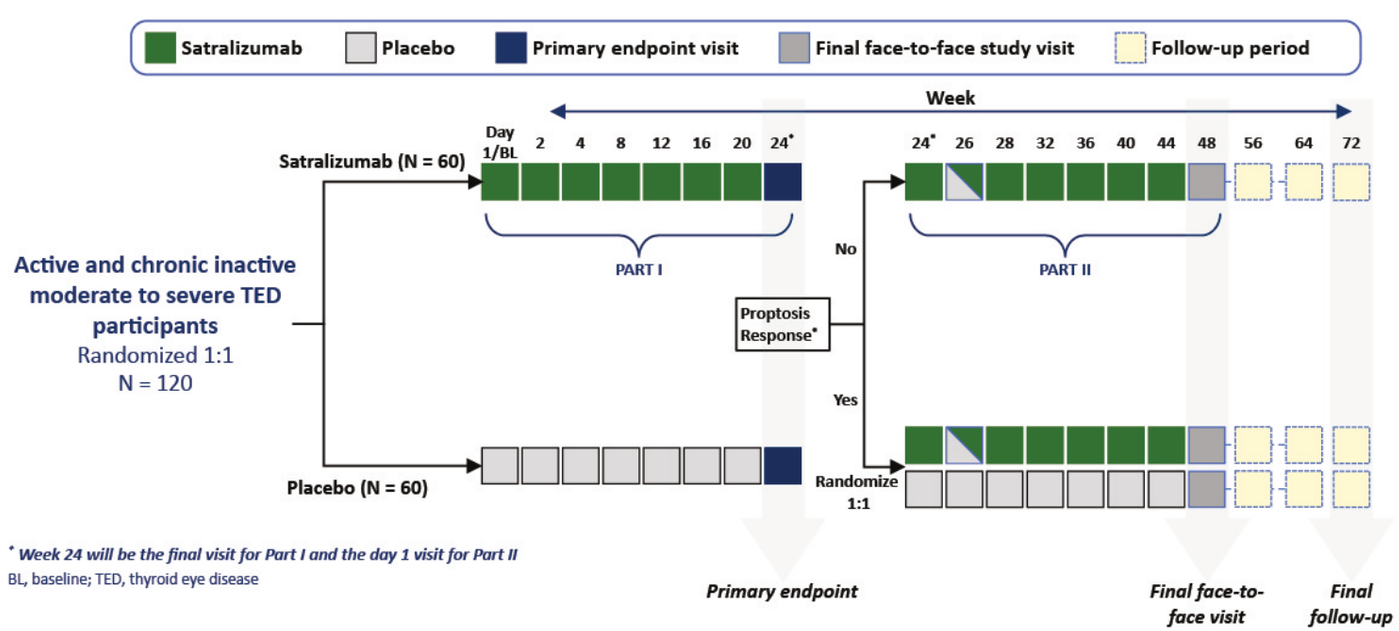
Results: The primary efficacy endpoint is the proportion of participants with active disease who achieve proptosis response (defined as a ≥2mm reduction in proptosis from baseline at week 24 in the study eye, with no deterioration of proptosis in the fellow eye). Secondary endpoints include proportion of participants with active and chronic inactive disease achieving proptosis response, proportion of participants with active disease achieving overall response (defined as a ≥2-point reduction in clinical activity score [CAS] from baseline and a proptosis response in the study eye, with no deterioration in CAS or proptosis in the fellow eye), and proportion of participants achieving ≥1 grade improvement in diplopia. Safety outcomes include the incidence, seriousness, and severity of adverse events.

Conclusions: SatraGo-1 and SatraGo-2 are global trials designed to investigate IL-6 signaling inhibition with satralizumab in participants with TED. Satralizumab presents a potential disease-modifying treatment option for TED while minimizing safety risks associated with current treatment options.

Figure 1

Figure 1. SatraGo-1 and SatraGo-2 Study Design



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3:04 – 3:10 pm

Microscopic Deep Orbital Fat Decompression for Thyroid Eye Disease

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Introduction: Exophthalmos caused by thyroid eye disease is normally treated by orbital decompression, which involves orbital fat and bone resection.[1] The most common postoperative complication is new-onset diplopia (NOD), which is reportedly more frequent after infraorbital and medial wall decompression and relatively less frequent after lateral wall decompression or fat removal.[2-4] However, these reports concerned diplopia around the primary position, and, to our knowledge, there are no reports showing changes in the entire visual field. In this study, we investigated how the fusion image area (FIA) changes after orbital decompression surgery, which mainly involves microscopic resection of the orbital fat inside and outside the muscle cone, using the binocular single vision (BSV) test.

Methods: Included were 203 patients (406 eyes) with thyroid eye disease who underwent bilateral orbital fat decompression using a microscope under general anesthesia at our two clinics (Tokyo and Gunma) between January and December 2021. All patients were diagnosed as being in the non-active phase by MRI and clinical features. Patient age and sex, postoperative changes in exophthalmometer measurements, amount of orbital fat removed, ocular findings, and BSV were recorded. The FIA was defined as the average of the four locations (up, down, right, and left gaze) from the primary position at which diplopia was felt, which were determined using the BSV test (Figure 1). The FIA was determined preoperatively and at 1, 3, and 6 months postoperatively, and of the 203 patients, changes in the FIA were investigated in 75 patients who could be followed up to 6 months postoperatively. Patients who made irregular follow-up visits and those in whom BSV could not be determined were excluded from the statistical analysis of the FIA. The results were analyzed using Student's t-test.

Surgery was performed through a conjunctival incision in the inferior fornix, excising the anterior orbital fat and then the fat outside the muscle cone, entering the muscle cone between the lateral and inferior rectus muscles and between the medial and inferior rectus muscles, and excising the intraconal fat while relaxing it, being careful to avoid nerves and blood vessels. The excised fat was placed in an empty syringe without air to determine the volume after blood removal with gauze.

Results: The 203 patients (163 women, 40 men) had a mean age of 40.0±12.7 years (range, 16–72 years). The mean ocular protrusion decreased from 19.8±2.9 mm preoperatively to 16.7±2.5 mm postoperatively. The average amount of fat removed was 3.5±1.5 ml; accordingly, the volume of orbital fat needed to improve the exophthalmos by 1 mm was 1.13 ml. The FIA decreased from 44.5±12.9

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degrees preoperatively to 44.3±11.9 (p=0.768), 44.1±12.5 (p=0.567), and 44.5±11.8 degrees (p=0.977) at 1, 3, and 6 months, respectively, after surgery (Figure 2). At 6 months postoperatively, no patient exhibited NOD in the first eye position.

Postoperatively, 25 of 406 eyes (6.16%) had mild mydriasis while none had complete mydriasis, and 2 eyes (0.5%) still had very mild mydriasis at 3 months postoperatively. Four of 203 patients (1.97%) were diagnosed as returning to the active phase postoperatively and were treated with intravenous steroids. Relapse times from surgery were 2, 3, 3, and 6 months and age was 57, 58, 62, and 64 years, respectively.

Of the four patients with diplopia in the primary position who could be followed up to 6 months postoperatively, two (50%) had no change in diplopia of primary position, while two (50%) recovered to a FIA of 35 and 50 degrees, respectively. By contrast, one patient with a preoperative FIA of 17.5 degrees had a postoperative FIA of zero (NOD 1/75=1.3%) (Figure 3). There was no case of postoperative visual disturbance or visual field defect.

Conclusions: Microscopic deep orbital fat decompression is a safe procedure that is less likely to cause visual dysfunction than existing techniques. Even in patients with diplopia in the primary position, an improvement of diplopia was observed in 50% of the patients, suggesting that this technique could be the first choice for surgical treatment of thyroid eye disease.

Figure 1

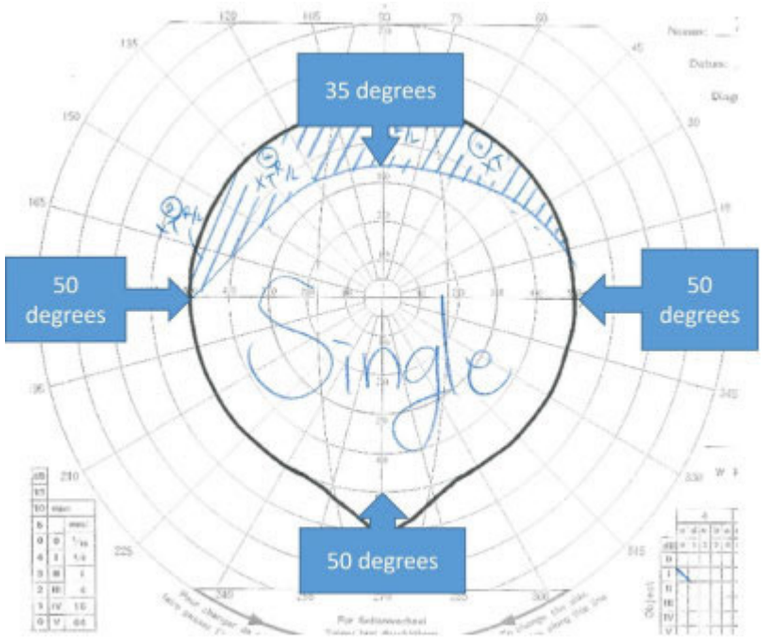

Figure 2

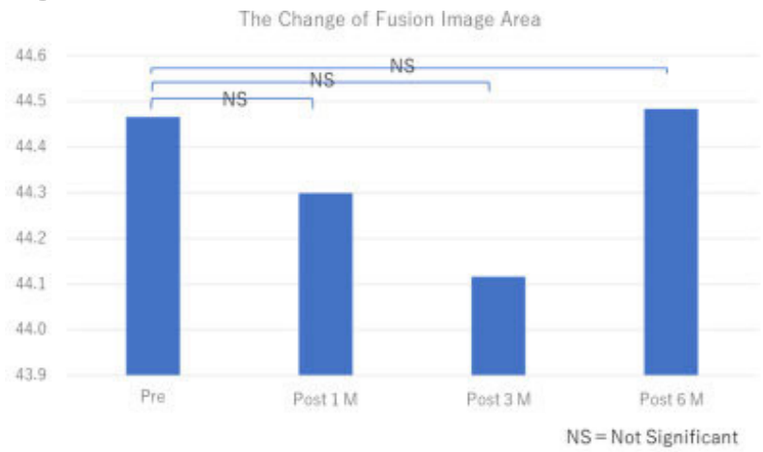

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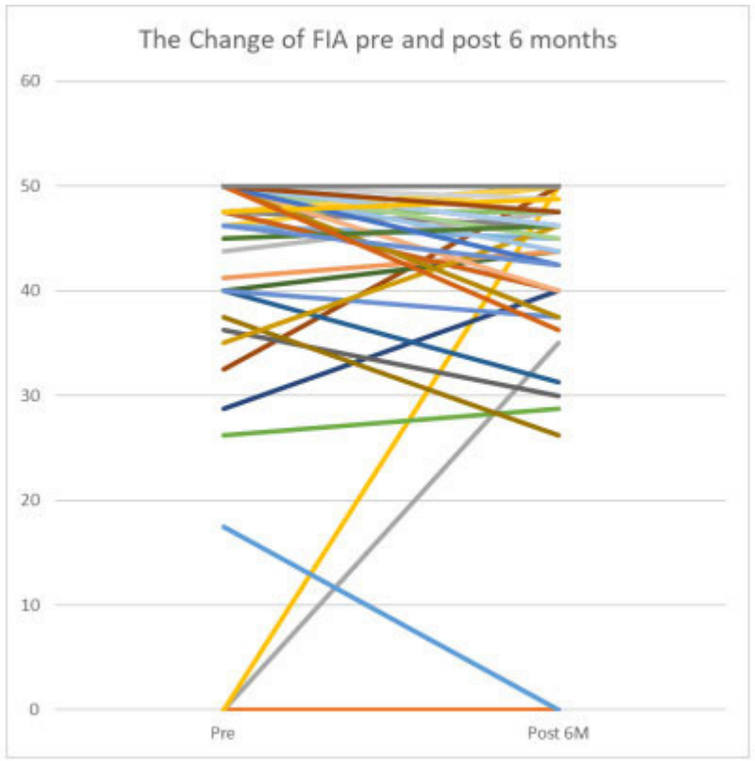
Figure 3



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3:10 – 3:16 pm

How Much Proptosis Reduction is Expected After Orbital Decompression Surgery for Thyroid Eye Disease: Results from a Multicenter Study

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Introduction: Despite recent medical advancements in treatment for thyroid eye disease (TED), orbital decompression continues to play a significant role. While there is extensive literature on techniques for orbital decompression, few comparative studies exist regarding amount of proptosis reduction, with most being underpowered.[1-4] In this, multicenter retrospective study, we examine the results of proptosis reduction in different types of orbital decompression for TED. Additionally, we investigate if fat removal, lateral rim removal, and using an endoscopic medial wall technique impacts decompression outcomes.

Methods: A retrospective multicenter chart review was performed for patients with TED who underwent orbital decompression by eight surgeons at seven institutions, all using similar techniques. The difference between pre-operative and post-operative exophthalmometry by number of walls were compared using paired t-tests. A secondary analysis using t-test was performed stratified by number of orbital walls comparing bony decompression only with bony decompression and fat decompression and medial wall decompression with endoscopic surgery compared to those who underwent medial wall decompression via a non-endoscopic approach. A multi-variate analysis was also performed.

Results: There were 516 participants identified; 358 underwent bilateral decompression, and 158 underwent unilateral decompression, resulting in 874 orbits included in the study. The participants were 76% female (n=392) and 24% male (n=124). The mean (SD) age of the cohort at time of surgery was 51 years (±14.6). 181 (20.5%) underwent one wall, 403 (45.7%) underwent two wall, and 290 (32.9%) underwent three wall decompression. Each successive comparison demonstrated a statistically significant difference in proptosis reduction, Figure 1. Specific types of orbital decompressions were also compared and demonstrated a statistically significant increase in proptosis reduction with increasing wall counts, but addition of lateral orbital rim was not statistically significant, Table 1. The removal of fat and bone was shown to be additive to decompressive effect resulting in a significantly greater decrease in exophthalmometry than bony

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wall reduction alone, Table 2. No significant difference in exophthalmometry reduction between endoscopic versus non-endoscopic surgery was observed for any wall combination, Table 2. Larger pre-operative exophthalmometry values and greater number of walls decompressed was associated with greater amounts of decompression on multivariate analysis (both p< 0.001).

Conclusions: This is largest multicenter study to date to examine proptosis reduction in varying combinations of wall removal in orbital decompression for thyroid eye disease. We confirmed that the degree of proptosis reduction was a function of the number of orbital walls decompressed (p<0.001) and that patients with higher pre-operative exophthalmometry measurements had larger degrees of proptosis reduction (p<0.001) irrespective of other measured factors. Removal of fat in addition to bony decompression was also associated with greater proptosis reduction regardless of the number of orbital walls decompressed. We found no significant difference in proptosis reduction between endoscopic and non-endoscopic techniques, suggesting that similar amounts of proptosis reduction can be achieved with either technique. Lastly, lateral orbital rim removal in 3-wall decompression had greater reduction in proptosis but was not statistically significant, likely due to being underpowered (n=15).

Figure 1

Table 1. Paired t-test Comparisons of Specific Types of Orbital Decompression

	Paired Comparisons of Specific Types of Orbital Decompression					
	Pair 1		Pair 2		Pair 3	
	Lat+fat	Lat+med+fat	Lat+med+fat	Lat+med+floor+ fat	Lat+med+floor+ fat	Lat+med+floor +lat rim+fat
N	117	149	149	234	234	15
Mean (mm)	-3.03	-3.79	-3.79	-5.08	-5.08	-6
SD (mm)	1.61	2.18	2.18	2.25	2.25	2.24
p-value	0.004**		<0.001***		0.141	

Legend: Lat= lateral wall; Med= medial wall; Lat rim= lateral orbital rim

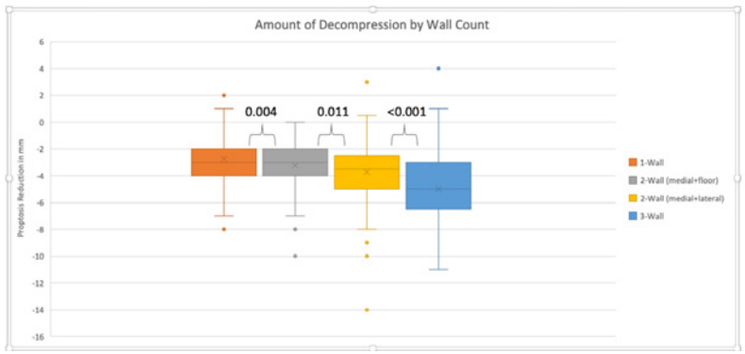
Figure 2

Table 2. Comparisons of 1) Proptosis Reduction with Bony Decompression Alone Versus Bony and Fat Decompression 2) Proptosis Reduction Between Endoscopic Orbital Decompression Versus Non-Endoscopic Approach

Wall Count	N	Proptosis Reduction with Bone Decompression Alone (mm)	N	Proptosis Reduction with Bone and Fat Decompression (mm)	p-value	N	Proptosis Reduction Endoscopic Approach (mm)	N	Proptosis Reduction Non-Endoscopic Approach (mm)	p-value
1-Wall	36	1.91 ± 1.76	145	2.95 ± 1.54	0.007**	61	2.58 ± 1.63	120	2.84 ± 1.64	0.966
2-Wall	164	3.23 ± 1.88	239	3.55 ± 1.89	0.018*	68	3.48 ± 2.08	335	3.41 ± 1.85	0.668
3-Wall	41	4.15 ± 2.42	249	5.13 ± 2.26	0.019*	47	5.15 ± 2.54	243	4.96 ± 2.26	0.534

Figure 3

Figure 1. Amount of Decompression by Wall Count With t-test Comparisons



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3:16 – 3:22 pm

Preoperative Risk Factors for Proptosis Recurrence after Rehabilitative Orbital Decompression in Graves' Orbitopathy Patients

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Introduction: Graves' orbitopathy (GO) is a prominent extrathyroidal symptom in patients with Graves' disease. After an active inflammatory phase, orbital adipogenic proliferation and fibrosis cause appearance changes including eyelid retraction and exophthalmos, which may impact patients' psychological well-being and quality of life[1]. To reduce disfiguring proptosis in patients with GO, rehabilitative orbital decompression may be required[2]. The timing of the rehabilitative decompression should be carefully considered, and many surgeons agreed that the disease has to be inactive for at least 6 months[2,3], however, the optimal timing has not been determined. This study aims to identify risk factors that predict the postoperative recurrence of proptosis after orbital decompression.

Methods: This retrospective review included patients with GO who underwent rehabilitative orbital decompression for disfiguring proptosis in the quiescent state with a clinical activity score (CAS) of less than 2, between Jan 2017 and Dec 2020 by a single surgeon. Exophthalmos was measured using an exophthalmometer by a single observer. Recurrence was defined as an increase of exophthalmos 2 mm or more after decompression during the follow-up period (minimum of 3 months). The association between preoperative variables and proptosis recurrence was analyzed using multivariable logistic regression.

Results: 217 patients were identified and met the inclusion criteria. Eleven patients (5.07%) developed recurrence of proptosis during the follow-up period (range 3-30, mean 15.64 months). Univariate logistic regression analysis identified thyroid-stimulating hormone receptor antibody (TRAb) (p=0.001) and thyroid-stimulating immunoglobulin (TSI) (p=0.008) as significant factors for recurrence. Age, sex, smoking, disease duration, orbital radiotherapy, and total thyroidectomy history were not significant. TRAb remained significant in multivariate logistic regression analysis (OR 1.06; p=0.014). Receiver operating characteristic (ROC) curve analysis revealed an area under the curve of 0.86 corresponding to a sensitivity 90.9% and specificity 82.0% at TRAb level 7.96 IU/L.

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Conclusions: TRAb and TSI are valuable markers to predict proptosis recurrence after orbital decompression. A high level of antibodies represents ongoing autoimmunity. Therefore, in clinical practice, we recommend that TRAb be tested as a screening biomarker for proptosis recurrence and that active management to control antibody levels be implemented prior to elective rehabilitative decompression surgery for GO patients. Our study result may help surgeons to decide the appropriate timing for orbital decompression to lessen the risk of postoperative recurrence of proptosis.

Table 1

Clinical and biochemical characteristics of patients.

	Recurrence (N=11)	No Recurrence (N=206)	*p-value*
Age, years (range)	36.27 ± 12.28 (21-55)	35.83 ± 9.96 (16-59)	0.94
Sex (M : F)	1:10	43:163	0.47
Smoking, n (%)			1.00
Non smoker	9 (81.8%)	158 (76.7%)	
Ex-smoker	2 (18.2%)	36 (17.5%)	
Current smoker	0 (0%)	12 (5.8%)	
Graves' disease duration, months	53.64 ± 40.47	66.31 ± 58.91	0.71
GO subtype (lipogenic : myogenic)	6:5	99:107	0.76
GO CAS (range)	0.27 ± 0.91 (0-2)	0.07 ± 0.28 (0-2)	0.71
OP-follow-up period, months (range)	26.45 ± 5.22 (18-35)	21.49 ± 11.36 (6-61)	**0.02**
OP-recur period, months (range)	15.64 ± 9.74 (3-30)		
Pre-OP exophthalmos (mm)			
Right	20.82 ± 1.78	20.47 ± 2.31	0.33
Left	21.09 ± 1.58	20.47 ± 2.33	0.17
Post-OP exophthalmos (mm)			
Right	17.18 ± 1.31	16.50 ± 1.71	0.07
Left	17.09 ± 1.22	16.61 ± 1.75	0.11
Exophthalmos reduction (mm)			
Right	3.64 ± 1.14	3.97 ± 1.47	0.35
Left	4.00 ± 1.26	3.86 ± 1.45	0.54
Thyroid lab (normal range)			
T3 (ng/mL) (0.61-1.16)	1.05 ± 0.41	0.93 ± 0.21	0.38
Free T4 (ng/mL) (0.80-1.23)	1.00 ± 0.11	1.04 ± 0.20	0.44
TSH (μIU/mL) (0.41-4.30)	0.81 ± 1.18	1.68 ± 2.15	0.05
TRAb (IU/L) (0-1.75)	16.10 ± 8.74	5.53 ± 8.40	**<0.001**
TSI (SRR,%) (0-140%, negative)	438.84 ± 144.22	276.81 ± 184.53	**0.004**
Neutrophil/lymphocyte ratio	1.76 ± 0.71	1.86 ± 1.01	1.00
Radiotherapy, n (%)	3 (27.3%)	73 (35.4%)	0.75
RT-OP period, months	16.33 ± 6.51	19.33 ± 29.61	0.61
Total thyroidectomy, n (%)	2 (18.2%)	38 (18.4%)	1.00
TT-OP period, months	85.50 ± 72.83	33.16 ± 47.34	0.12

GO, Graves orbitopathy; OP, operation; RT, Radiotherapy; TT, Total thyroidectomy; TSH, Thyroid stimulating hormone; TSI, Thyroid stimulating immunoglobulin; TRAb, Thyroid stimulating hormone receptor antibody; SRR, specimen-to-reference ratio.
Data are represented as mean ± standard deviation or number (percentage).
Bold characters refer to statistical significance ($p < 0.05$)

Table 2

Simple logistic regression analysis of preoperative risk factors.

	Odd ratio	95% CI	*p-value*
Age, years	1.00	0.95-1.07	0.89
Sex (M vs F)	2.64	0.33-21.18	0.36
Smoking			
Ex-smoker (Non smoker vs Ex-smoker)	0.00	0.00-0.00	1.00
Current smoker (Non smoker vs Current smoker)	0.98	0.20-4.71	0.98
Graves' disease duration	1.00	0.98-1.00	0.47
GO subtype (Lipogenic vs Myogenic)	0.78	0.23-2.61	0.68
GO CAS	2.45	0.87-6.93	0.09
Pre-OP exophthalmos			
Right	1.07	0.82-1.39	0.62
Left	1.12	0.87-1.45	0.38
Thyroid lab			
T3 (ng/mL)	5.17	0.75-35.82	0.10
Free T4 (ng/mL)	0.31	0.01-7.64	0.47
TSH (μIU/mL)	0.64	0.34-1.21	0.17
TRAb (IU/L)	1.08	1.03-1.13	**0.001**
TSI (SRR,%)	1.01	1.00-1.01	**0.008**
Neutrophil/lymphocyte ratio	0.87	0.39-1.94	0.74
Radiotherapy	0.68	0.18-2.66	0.58
RT-OP period	1.00	0.94-1.06	0.86
Total thyroidectomy	0.98	0.20-4.73	0.98
TT-OP period	1.01	0.99-1.03	0.19

GO, Graves orbitopathy; OP, operation; RT, Radiotherapy; TT, Total thyroidectomy; TSH, Thyroid stimulating hormone; TSI, Thyroid stimulating immunoglobulin; TRAb, Thyroid stimulating hormone receptor antibody; SRR, specimen-to-reference ratio.
Bold characters refer to statistical significance ($p < 0.05$)

Table 3

Multivariable logistic regression analysis of preoperative risk factors.

Independent variable	Odd ratio	95% CI	*p-value*
TRAb (IU/L)	1.06	1.01-1.12	**0.014**
TSI (SRR,%)	1.01	1.00-1.01	0.08

TRAb, Thyroid stimulating hormone receptor antibody; TSI, Thyroid stimulating immunoglobulin; SRR, specimen-to-reference ratio
Bold characters refer to statistical significance ($p < 0.05$)

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SPECIAL INTEREST GROUP BREAKOUT SESSIONS

Thursday, November 2

Moderators will present cases and topics for discussion

3:30 – 5 pm

Aesthetics

Moderator: Kenneth E. Morgenstern
Facilitators: Jocelyne C. Kohn, Martin H. Devoto, Robert M. Schwarcz, Kristin J. Tarbet, Guy G. Massry

Eyelid

Moderator: Cat N. Burkat
Facilitators: Brian Willoughby, Catherine J. Hwang, Michael T. Yen, Shannath L. Merbs, Christina Choe

Orbit

Moderator: James A. Garrity
Facilitators: Gangadhara Sundar, Andrea L. Kossler, Gerald J. Harris, M. Reza Vagefi, Louise A. Mawn

7:01 – 7:05 am

Long-term Outcomes of Dysthyroid Optic Neuropathy Treated with Conventional Therapies Compared to Teprotumumab

Connie Sears[1], Patcharaporn Chandraparnik[2], Badal Singh[1], Bradley Gundlach[1], Sean Ghiam[1], Andrea Kossler[2], Robert Goldberg[1], Daniel Rootman[1]

[1]Oculoplastics, UCLA Jules Stein Eye Institute, Los Angeles, California, United States, [2]Oculoplastics, Byers Eye Institute, Palo Alto, California, United States

Introduction: Dysthyroid optic neuropathy (DON) has been historically treated with high dose intravenous (IV) corticosteroids, surgical orbital decompression and orbital radiotherapy[1,2,3,4]. The approval of teprotumumab in 2020 has provided a new therapeutic agent in our armamentarium for treatment of this disorder[5,6,7,8]. The goal of this study was to compare the long-term outcomes in patients with DON who were treated with conventional therapies compared to patients who received teprotumumab.

Methods: In this case control study, consecutive patients treated for DON at two tertiary centers from January 2015 to May 2023 were included. Patients were divided into three groups: (1) only conventional therapies (a combination of IV corticosteroids, orbital radiation and surgical decompression), (2) teprotumumab alone, and (3) a combination of conventional therapies and teprotumumab. Visual acuity (VA) in LogMAR9, color vision measured as number of color plates missed, presence of relative afferent pupillary defect (RAPD), exophthalmometry and static automated perimetry visual field mean deviation (HVF MD) were evaluated at baseline, immediately following completion of therapy, and at latest follow up. Requirements for repeat treatment were collated. In patients with bilateral DON, the worse eye was selected for evaluation.

Results: Forty-four patients were included in this study, 29 females (mean age 64.6, standard deviation 16.8), 15 males (mean age 58.8, SD 11.3). Twenty-three patients were treated with conventional therapies alone, 6 with teprotumumab alone, and 12 with a combination of conventional therapies and teprotumumab. The mean follow up was 21.5 months after completion of therapy. At baseline, vision ranged from hand motions (HM) to 20/20 in affected eyes and 35% of eyes demonstrated a RAPD, a mean of 5.8 color plates were missed, mean exophthalmometry 22.5 mm, and the mean HVF MD was -11.9. There was no statistical difference in the clinical outcomes

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between the three study groups both immediately after completion of therapy and at last follow up – improvement in visual acuity (p=0.129/p=0.119), improvement in number of color plates missed (p=0.326/p=0.118), resolution of RAPD (p=0.336/p=0.056), improvement in proptosis (p=0.152/p=0.253), or improvement in HVF MD (p=0.718/p=0.130), respectively. After completion of therapy, 7 (15.9%) patients had recurrence of DON requiring re-treatment: 2 patients who received conventional therapies alone and 5 patients who received teprotumumab and conventional therapies.

Conclusions: When treating DON, teprotumumab is not inferior to conventional therapies including a combination of IV corticosteroids, surgical decompression and orbital radiotherapy. The appropriate treatment may be selected for each patient based on risks, comorbidities and accessibility.

Figure 1

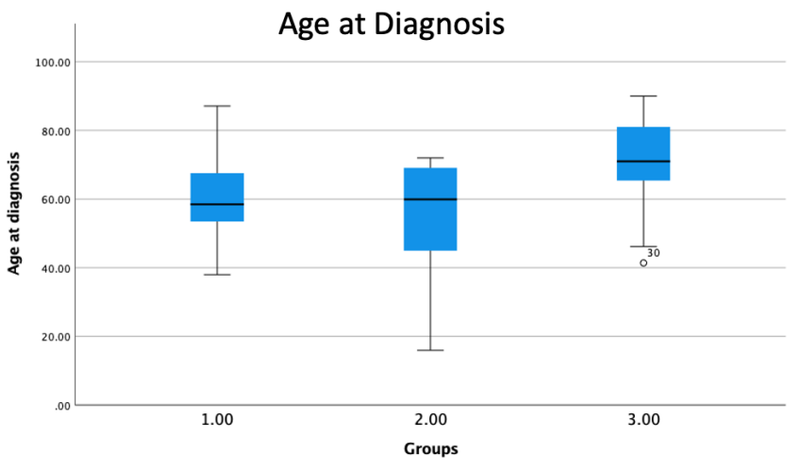

Figure 2

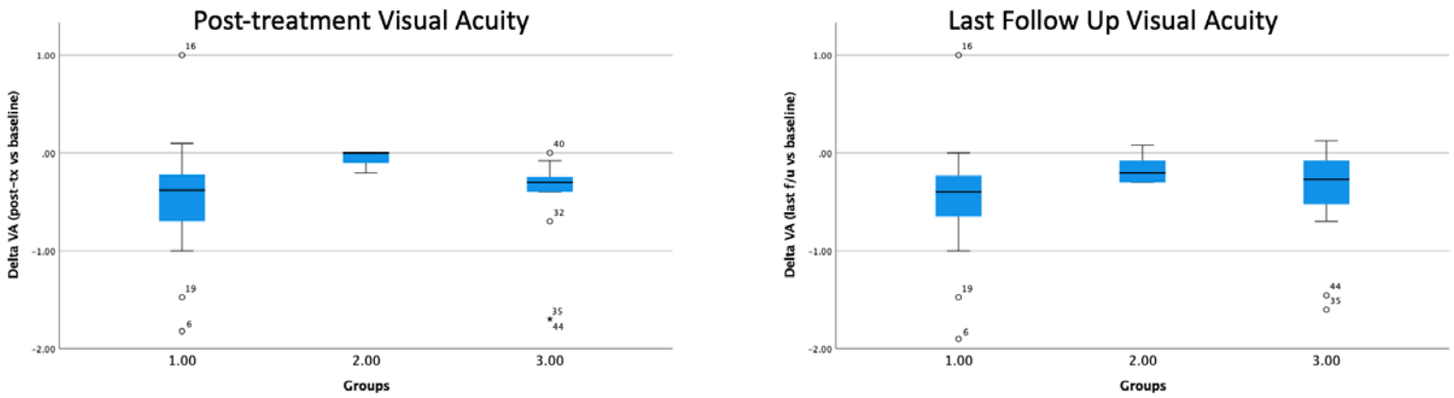

Figure 3

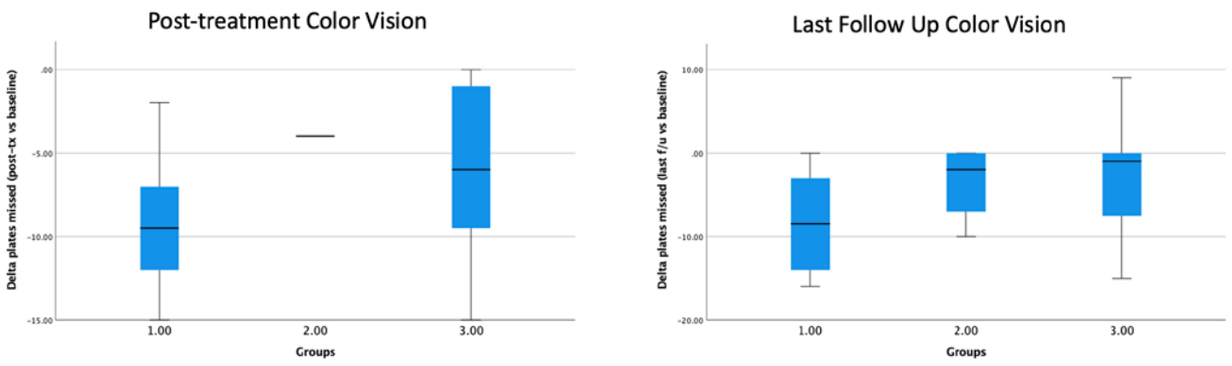

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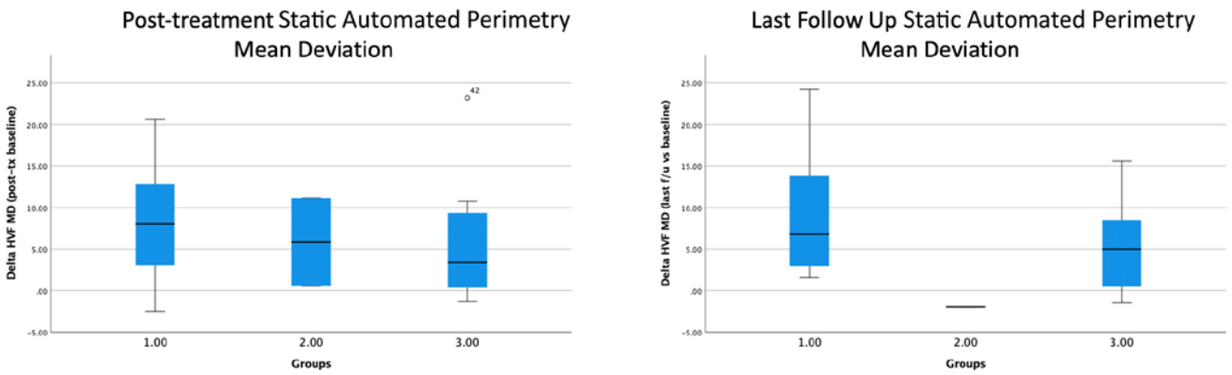
Figure 4



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7:05 – 7:09 am

Opiate Usage Following Oculoplastic Surgery Procedures

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Ophthalmology, UT Southwestern, Dallas, Texas, United States

Introduction: Ophthalmologists typically have low prescription rates of opioids[1,2]. However, when grouped by subspeciality, oculoplastics has the highest rate[3]. Few studies have aimed at examining opioid usage after oculoplastics procedures, but no study has objectively measured opioid usage after surgery[4,5]. The goal of this study is to identify factors that correlate with higher or lower opioid usage after oculoplastic surgery.

Methods: This is a prospective study at a tertiary oculofacial plastic surgery practice. All patients undergoing an oculoplastics procedure were eligible for inclusion. Prior to surgery, informed consent was obtained. Patients enrolled were prescribed 20 tablets of tramadol 50 milligram, one tablet every 6 hours as needed for pain, except for cases of orbital decompression where 20 tablets of hydrocodone-acetaminophen 5-325 milligram, one tablet every 6 hours as needed for pain. Remaining pills were counted at the post op week 1 appointment.

Results: 83 patients were enrolled in our study. 32 patients were excluded from the study at POW1 because they did not have their medication at their appointment. The average number of opioids taken for patients having any eyelid procedure was 3.30 [95% CI, 2.07-4.54]. When subcategorized, the average for procedures on only upper eyelids was 2.62 [95% CI, 0.44-4.78], only lower eyelids was 2.33 [95% CI, -3.91-8.58], and both eyelids was 3.83 [95% CI, 2.09-5.56]. There was no statistically significant difference in the number of tablets taken between only upper eyelids, only lower eyelids, and both eyelids ($p = 0.60$).

The average number of tablets taken for lacrimal/orbit surgery was 2.80 [95% CI, -0.96-6.56]. There was no statistically significant difference in number of tablets taken for eyelid surgery compared to lacrimal/orbit surgery ($p = 0.85$).

The average number of tablets taken for cosmetic surgery was 3.36 [95% CI, 1.20-5.51]. and for non-cosmetic surgery was 4.27 [95% CI, 1.32-7.21]. There was no statistically significant difference in number of tablets taken between cosmetic surgery and non-cosmetic surgery ($p = 0.78$).

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Conclusions: This is the first study in the literature that objectively quantifies opioid usage after oculoplastic surgery. Our study found no difference in opioid usage between those that undergo eyelid surgeries and those that undergo lacrimal/orbital surgeries. There is also no difference in opioid usage between cosmetic and non-cosmetic procedures. The gap between the amount prescribed and amount taken by patients in this study highlights the importance of further investigation to better understand appropriate prescription quantities that limits excess while also adequately controlling pain. Future studies are currently underway to examine how other factors might influence opioid usage after surgery.

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7:09 – 7:13 am

Does Anterior Orbital Fat Contribute to Orbital Decompression?

Connie M Sears[1,2], Taras Gout[1], Pallavi Singh[1], Nathan Pirakitikulr[1], Katherine Lucarelli[1,3], Daniel Rootman[1], Robert Goldberg[1]
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Introduction: Orbital rehabilitation in thyroid eye disease consists of surgical decompression involving the removal of bone and in certain cases orbital fat[1,2]. A fat decompression provides an average reduction in proptosis of 3.5 to 5.9 mm which is correlated with the amount of fat resected[3,4,5]. However, it is not clear if different sources of fat have the same effect on decompression. The aim of this study is to determine whether anterior orbital fat contributes to proptosis reduction.

Methods: In this prospective observational study, patients who underwent cosmetic subtractive or transposition lower eyelid blepharoplasty were included. Exophthalmometry was measured preoperatively and postoperatively. The right eye was selected for evaluation in all patients. Patients who had active thyroid eye disease, were undergoing treatment for thyroid eye disease, had prior orbital decompression for thyroid eye disease, or had an anophthalmic socket were excluded from this study. Exophthamometry reading were compared pre and postoperatively.

Results: Thirty-two eyes in 32 patients who underwent cosmetic lower eyelid blepharoplasty were included in this study. The sample included 20 females (mean age 61.0, standard deviation 9.1) and 12 males (mean age 64.9, standard deviation 9.7). Eighteen patients underwent subtractive blepharoplasty and 14 patients underwent blepharoplasty with fat transposition. Average time to measurement of post operative exophthalmometry was 5.14 weeks. The total average change in postoperative exophthalmometry for all patients was -0.86 mm ($p<0.01$) The average change in exophthalmometry in patients who underwent a subtractive blepharoplasty was -0.61 mm compared to -1.18 mm in those who underwent fat transposition. This was not significant ($p=0.13$).

Conclusions: Removal of the anterior fat pad appears to be associated with a small reduction in proptosis. Future research may focus on the relative volume to decompression ratio of fat available in different compartments of the orbit.

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7:13 – 7:17 am

Orbital and Ocular Morphometrics in Prominent Globe Morphology

Teresa Chen[1], Kendall Goodyear[1], Kelsey Roelofs[1], Robert Goldberg[1], Joseph Demer[2,3], Daniel Rootman[1]
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Introduction: Non-thyroid and non-syndromic globe prominence is a generally recognized but somewhat poorly defined entity. Several etiologies have been proposed, including shallow bony orbit, high myopia, and maxillary hypoplasia[1–5]. Understanding the underlying etiology of relative proptosis would be useful in that it may guide management decisions, such as the choice of orbital decompression or mid-face augmentation.[2,8] The purpose of this study was twofold: to develop an expert consensus-based scoring system for prominent globe morphology (PGM) and to determine contributing factors of PGM.

Methods: In the psychometric portion of the study, six oculoplastic surgeons categorized photographs of 50 randomly selected patients by globe prominence on a 3-point scale: 1 (retruded), 2 (neutral) and 3 (prominent). Photographs in which globe prominence was unanimously scored for each category were identified. From this set, utilizing a normative group technique, a single consensus male and female face were selected. These final 6 images were compiled into a rubric.

The rubric was presented to a larger group of oculoplastic surgeons who utilized the scale to score photographs of a group of patients who had previously undergone high-resolution, surface coil MRI of the orbits. Patients with a clinical diagnosis of thyroid eye disease, a history of orbital trauma, and previous orbital, eyelid, or eyebrow surgery were excluded. Patients with consensus grading in each category were analysed. Globe volume, orbital volume, medial-to-lateral orbital wall angle, medial wall and lateral wall length, and orbital depth (defined as the distance from infraorbital rim to the optic canal outlet in the plane of the optic canal) were calculated using the MRI images in ImageJ (NIH, Bethesda, MD, USA). Differences in these parameters were assessed across the three score categories.

Results: The results of the psychometric study are presented in Figure 1. In the measurement portion of the study, a total of 45 orbits from 26 patients were included. Seven patients had a score of 1, twelve had a score of 2, and seven had a score of 3.All patients with scores 1 and 3 had both orbits segmented. Of the twelve patients with score of 2, seven had both orbits segmented while five had only one side available for review. The average age of score 1 was 60.0 ± 23.8, score 2 was 45.8 ± 16.0, and score 3 was 37.0 ± 15.9. This difference was not significant ($p = 0.079$) (Table 1). There was similarly no significant difference in sex distribution amongst the score

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groups (p = 0.479). The following factors were found to be significantly different amongst the three groups: globe volume, medial wall length, and lateral wall length. Mean globe volume for score 1 was 6.46 ± 0.76 cm3, score 2 was 7.13 ± 0.91 cm3, and score 3 was 9.05 ± 1.98 cm3 (p<0.001) (Table 2). Medial wall length for score 1 was 40.1 ± 2.00 mm, score 2 was 36.2 ± 4.76 mm, and score 3 was 34.9 ± 5.31 mm (p=0.032). Lateral wall length for score 1 was 43.6 ± 3.06 mm, score 2 was 39.4 ± 4.85 mm, and score 3 was 38.7 ± 4.91 mm (p=0.044). The following factors were found to have no difference amongst the three groups: orbital volume, medial-to-lateral wall orbital angle, and orbital depth. Mean orbital volume for score 1 was 26.0 ± 1.2 cm3, score 2 was 26.3 ± 2.1 cm3, and score 3 was 28.2 ± 1.6 cm3 (p=0.563). Medial-to-lateral orbital wall angle for score 1 was 46.8 ± 3.00°, score 2 was 47.1 ± 2.01°, and score 3 was 47.8 ± 2.83° (p=0.661). Orbital depth for score 1 was 44.7 ± 2.71 mm, score 2 was 45.2 ± 2.55 mm, and score 3 was 46.1 ± 5.24 mm (p=0.742).

Conclusions: There was an association of increased globe volume and decreased medial and lateral wall lengths with prominent globe morphology. Other factors such as orbital volume, medial-to-lateral wall orbital angle, and orbital depth were not associated with increased globe prominence.

Figure 1

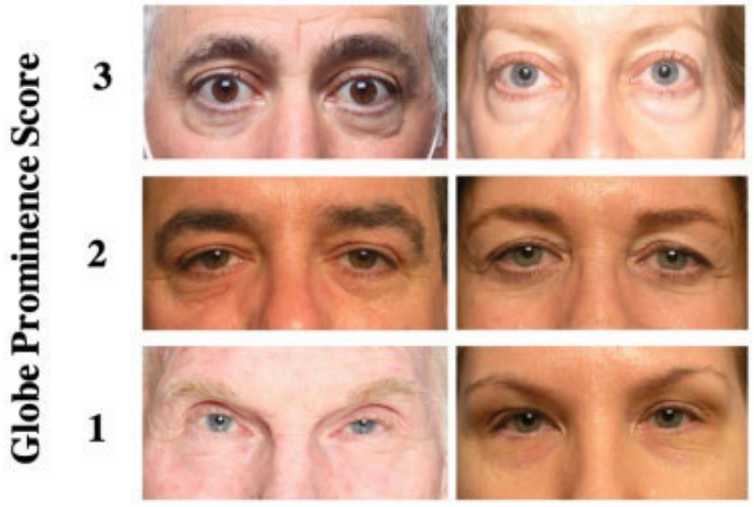

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Table 1

	Total	Score 1	Score 2	Score 3	p value
n	26	7 (27%)	12 (46%)	7 (27%)	
Age at time of MRI	47.2 ± 19.6	60.0 ± 23.8	45.8 ± 16.0	37.0 ± 15.9	0.079
Sex					0.479
Female	12 (46%)	4 (57%)	4 (33%)	4 (57%)	
Male	14 (54%)	3 (43%)	8 (67%)	3 (43%)	
Race					
Caucasian	21 (80%)	7 (100%)	9 (75%)	5 (71%)	
African American	1 (4%)	0	1 (8%)	0	
Asian	2 (8%)	0	1 (8%)	1 (14%)	
Hispanic	1 (4%)	0	1 (8%)	0	
Middle Eastern	1 (4%)	0	0	1 (14%)	

Table 1. Baseline characteristics of patients with prominent globe morphology.

Table 2

Score category	1	2	3	p value
Globe volume	6.46 ± 0.76 cm^3	7.13 ± 0.91 cm^3	9.05 ± 1.98 cm^3	<0.001
Orbital volume	26.0 ± 1.2 cm^3	26.3 ± 2.1 cm^3	28.2 ± 1.6 cm^3	0.563
Medial-to-lateral orbital wall angle	46.8 ± 3.00 °	47.1 ± 2.01 °	47.8 ± 2.83 °	0.661
Medial wall length	40.1 ± 2.00 mm	36.2 ± 4.76 mm	34.9 ± 5.31 mm	0.032
Lateral wall length	43.6 ± 3.06 mm	39.4 ± 4.85 mm	38.7 ± 4.91 mm	0.044
Orbital depth	44.7 ± 2.71 mm	45.2 ± 2.55 mm	46.1 ± 5.24 mm	0.742

Table 2: Mean values with standard deviations of different parameters measured for each score category.

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7:17 – 7:21 am

DNA Damage Checkpoint Kinases and Traumatic Optic Neuropathy

Benyam Kinde[1], Thoms Strong[1], Nicole Tsai[2], Hua Wang[1], Amit Patel[3], Derek Welsbie[4], Daniel Pelaez[1], David Tse[1]
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Introduction: The activation of DNA damage checkpoint kinases, while well-studied in normal cell cycle regulation and the DNA damage response of dividing cells, has yet to be fully elucidated in the pathogenesis of traumatic optic neuropathy.

Methods: A bioinformatic screen was conducted to identify novel compounds for neuroprotection following traumatic optic neuropathy. Gene expression changes associated with neuroprotection in mouse models were input into NIH's Library of Integrated Network-Based Cellular Signatures (LINCS). Twelve compounds were identified to recapitulate transcriptomic changes associated with neuroprotection and subsequently tested in a retinal ganglion cell (RGC) culture survival assay to investigate their potential to increase neuronal survival *in vitro.* Western blot analysis in two different mouse models of traumatic optic neuropathy (the direct optic never crush and ultrasonic pulse injury models) was conducted to assess activation of the DNA damage response after optic nerve injury.

Results: Our unbiased bioinformatic screen revealed candidate compounds that would be predicted to mimic the transcriptomic signatures associated with neuroprotection and neuroregeneration. One of these compounds, PD-407824, a Checkpoint kinase 1 (Chk1) inhibitor, increased survival in an *in vitro* RGC culture survival assay. A secondary screen similarly revealed increased neuronal survival with other Chk1 inhibitors, CHIR-124, prexasertib, and MK-8776 (Figure 1). Consistent with these findings, western blot analysis revealed Chk1 is activated in two *in vivo* models of traumatic optic neuropathy: the optic nerve crush (ONC) and the sonication-induced traumatic optic neuropathy (SI-TON) mouse (Figure 2).

Conclusions: By mining published gene expression datasets for transcriptomic signatures associated with neuroprotection and neuroregeneration and the LINCS database, candidate compounds to promote neuronal survival were identified. An *in vitro* assessment of RGC survival with these compounds revealed that inhibition of Chk1 may stimulate neuroprotection. Chk1 activation in mouse models of traumatic optic neuropathy indicate that Chk1 may be a plausible therapeutic target to promote RGC resiliency after neuronal injury. Future work investigating the impact of Chk1 inhibition on RGC survival and function after neuronal injury *in vivo* will be crucial to evaluate the therapeutic potential of modulating the DNA damage response in traumatic optic neuropathy.

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Figure 1

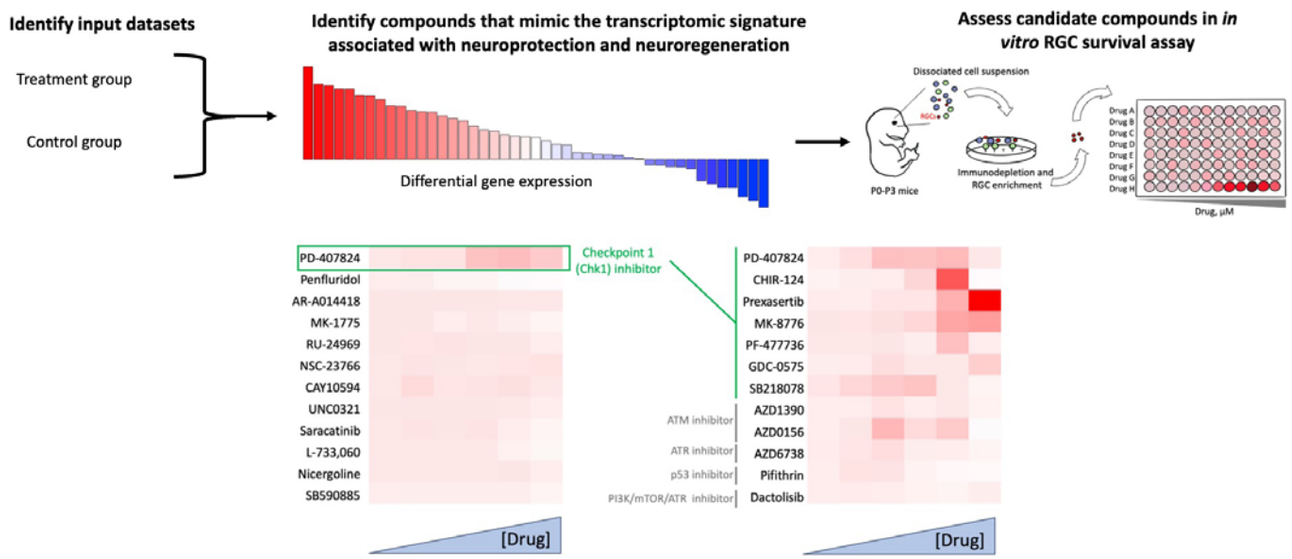

Figure 1: *Top*, schematic workflow for identifying candidate compounds to promote neuroprotection and *in vitro* retinal ganglion cell (RGC) survival assay. *Bottom left*, heatmap representation of neuronal survival in the setting of increasing drug concentration. These 12 compounds were selected based on from output from the LINCS analysis. PD-407824, a Chk1/Wee1 inhibitor demonstrated increased survival. *Bottom right*, a secondary screen of other well-studied Chk1 inhibitors, and other targets of the DNA damage response. Notably, CHIR-124, prexasertib, and MK-8776, all Chk1 inhibitors, demonstrate increased survival in this *in vitro* assay.

Figure 2

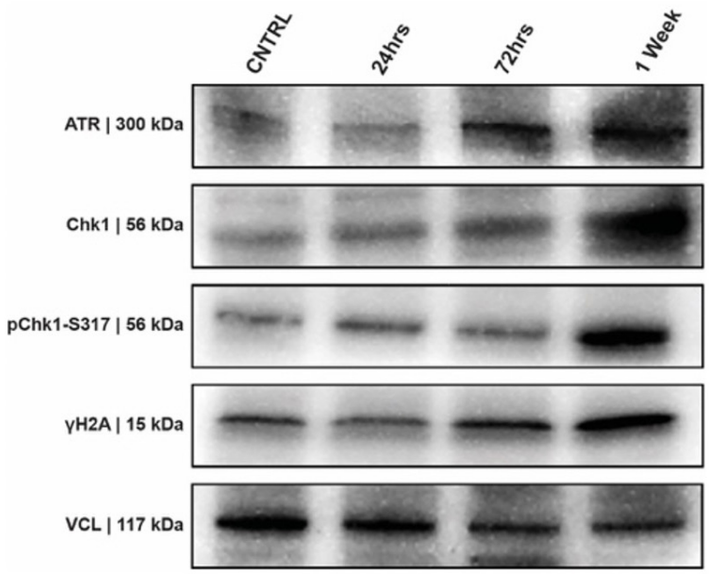

Figure 2: Western blot analysis of sonication-induced traumatic optic neuropathy (SI-TON) model at 24 hours, 72 hours, and 1 week. ATR, Chk1, pChk1-S371 and γH2AX increase after injury. Vinculin (VCL), a house-keeping gene, serves as a loading control.

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7:30 – 7:34 am

Single Cell RNA Sequencing of Periocular Basal Cell Carcinomas: Systematic Elucidation of the Heterogeneity and Subtype-Specific Regulators

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Introduction: High-throughput transcriptomic methods, such as single-cell RNA sequencing (scRNA-seq), have advanced analysis of the complexity of tumor composition and dissect tumor microenvironment. This has led to the identification of novel regulators of tumour growth[1] and cellular interactions that contribute to the development of infiltrative features of basal cell carcinoma (BCC) on histopathology.[2] The objective of this study is to compare the gene expression profile of periocular BCCs to BCCs arising elsewhere on the face and body, with the hope of gleaning additional insights into drivers of locally advanced disease.

Methods: Periocular BCC tumor samples were collected from patients undergoing Mohs micrographic surgery or wide local excision. Tumour cells were dissociated and sorted using fluorescence-activated cell sorting to exclude debris and dead cells (Figure 1). Live cells were captured and generated into scRNA-seq libraries. Reads were aligned to human genome (hg38), and expression count data were generated. Low-quality cells were removed based on a low expression of transcript number and a high percentage of mitochondrial genes and putative doublets. Data was integrated using Harmony to correct batch effects. Clustering analysis was conducted using an unsupervised clustering method. Cell types were annotated based on expressions of canonical markers. We then compared our periocular BCC cohort to scRNA-seq data from BCCs arising at other facial sites2 and from elsewhere on the body.1 The inferCNV analysis was applied to infer tumor cells and the copy number alteration patterns.

Results: Overall, 49,403 cells were recovered from 6 patients with periocular BCC. Demographic, clinical, and histopathologic features of each case are summarized in Table 1. After removing low-quality cells, we identified 20 cell clusters. Based on the expression of canonical markers, we categorized the 20 cell clusters into 9 major subclasses of cells (Figure 2). Individual subclasses contain cells from each of the 6 tumors (Figure 2). Integrating published scRNA-seq data of BCC tumors from elsewhere on the face1 and body2, we found all 9 cell classes in tumors from all locations. We then separated epithelial cells from all three BCC datasets and integrated them with epithelial cells from normal controls.3 Interestingly, we found that some clusters are comprised primarily of cells from tumors in certain anatomic locations, suggesting differences in gene expression between tumor groups (Figure 3). Lastly, from InferCNV analysis, we identified ubiquitous copy number loss on chromosome 19 in all 6 eyelid tumors and on chromosome 12 for the upper eyelid BCC (Figure 4).

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Conclusions: Cell classes are generally shared in BCCs arising from different locations; however, the periocular BCC cells are distinguished from facial or body BCCs in the gene-expression of epithelial cell types and copy number variation in selective chromosomes. We hypothesize that differences in altered regulators or pathways, perhaps secondary to ultraviolet exposure, may underpin these observations. These findings lay a foundation to further investigate the local environment in the tumorigenesis pathway of periocular BCCs.

Table 1. Summary of demographics, clinical and histopathologic features of 6 patients with periocular basal cell carcinoma.

Sample	Age	Sex	Laterality	AJCC 8th edition T category	AJCC 8th edition Stage	Location	Histopathologic subtype
BCC1	79	M	Right	T3b	IIA	Lower eyelid	Mixed nodular and infiltrative
BCC2	84	M	Right	T3c	IIA	Lower eyelid	Mixed nodular and infiltrative
BCC3	78	M	Left	T4b	IIB	Lower eyelid	Nodular
BCC4	57	M	Right	T1a	IA	Upper eyelid	Nodular, pigmented
BCC5	66	M	Right	T3c	IIA	Lower eyelid	Mixed nodular and superficial
BCC6	53	M	Right	T3c	IIA	Lateral canthus	Infiltrative

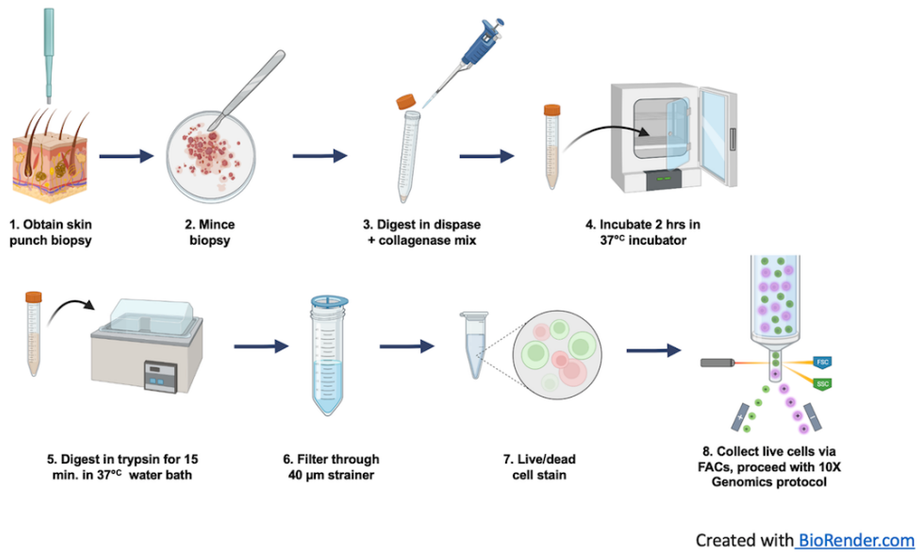

Figure 1. Dissociation protocol for BCC samples undergoing single cell RNA sequencing.

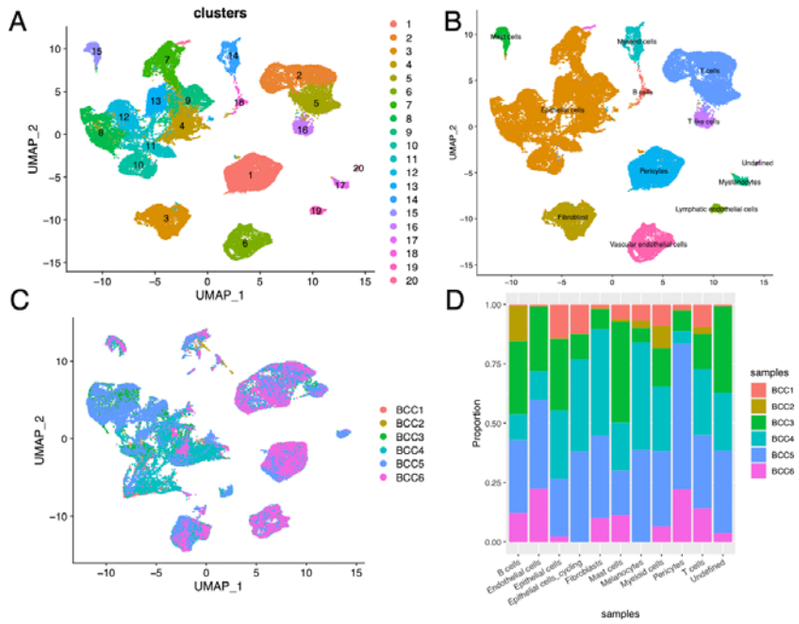

Figure 2. Cell population heterogeneity in the BCCs. (A) Dimension reduction is performed on the filtered dataset, resulting in 20 cell clusters. (B) Using previously published markers, 9 subclasses of cells were identified. (C and D) Each of the 6 BCC samples was comprised of similar cell types.

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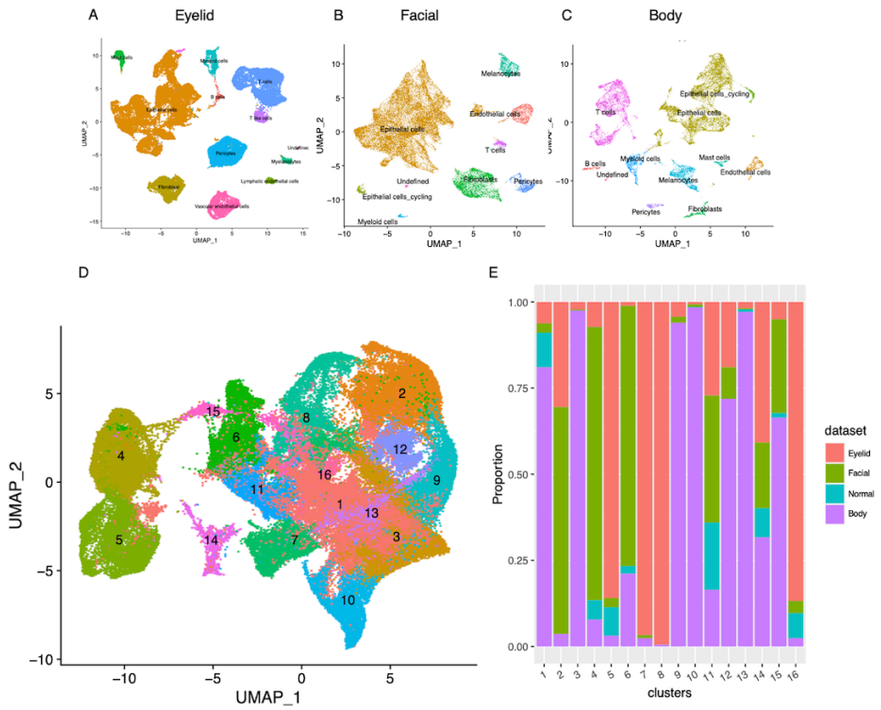

Figure 3. Integration of data demonstrating comparison of cell types in (A) periocular BCC's, (B) non-eyelid facial BCCs and (C) BCCs elsewhere on the body demonstrating similar cell types amongst the three datasets. (D) Analysis of all epithelial cells from all BCCs and normal skin controls demonstrates that some clusters are primarily comprised of cells from specific sites. (E) Clusters 7 and 8 are primarily from the eyelid tumors, cluster 2 is a combination of eyelid and facial tumors and clusters 3, 9, 10 and 13 are primarily from the rest of the body.

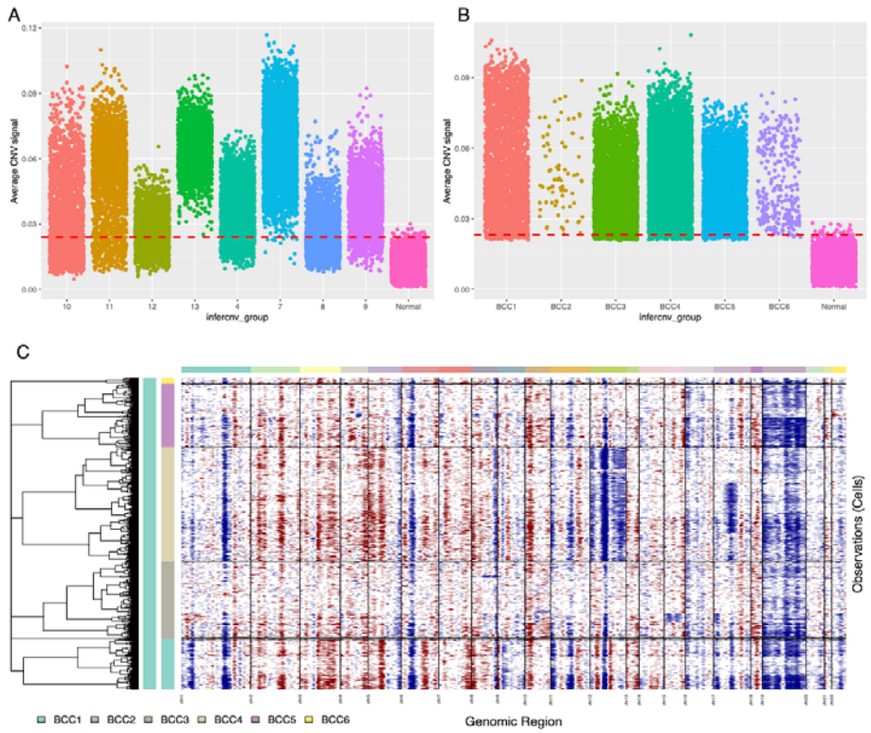

Figure 4. (A and B) An inferCNV analysis was performed, using the average copy number variation signal strength from normal epithelial cells to determine a cut off for identifying tumour cells (red dashed line). (C) All 6 eyelid tumors showed broad copy number losses in chromosome 19 which could be due to large fragment deletions. The only upper eyelid tumour, BCC4, showed broad copy number losses on chromosome 12 as well.

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7:34 – 7:38 am

Evaluation of the Success Rate of Endoscopic Dacryocystorhinostomy with Early Bicanalicular Stent Removal

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Introduction: To evaluate the success rate of endoscopic dacryocystorhinostomy (endo-DCR) if bicanalicular stent removal or loss occurs prior to three months.

Methods: A retrospective review was conducted of patients who underwent endo-DCR with bicanalicular silicone intubation from four oculoplastic surgeons of a single-specialty practice at one ambulatory surgery center between 2020 and 2023. Patients with at least 2-3 month postoperative follow up were included. Demographics including age and sex were assessed. Risk factors for nasolacrimal duct obstruction including chemotherapy, punctal plugs, facial trauma (+/- nasal/sinus surgery), and infection (dacryocystitis) were also evaluated. The reason for early loss or removal of stent due to extrusion, irritation, or infection was assessed. The success of surgery was defined as no repeat dacryocystorhinostomy procedure performed after early stent removal or loss. Patients who were instructed to but did not follow up if symptoms returned were considered to have surgical success. The patients were then categorized into three groups depending on time of stent removal or loss postoperatively: group 1 (<1 month), group 2 (1-2 months), and group 3 (2-3 months). The reason for stent removal or loss and success rates were evaluated for each group.

Results: One hundred and thirty-eight patients were reviewed. Thirty patients had stent removal or loss prior to three months postoperatively and were further analyzed. Mean age was 59.7 +/- 14.4 years, and the majority of patients were female (60%). Most patients had no known risk factors, followed by infection (23%), trauma (20%), and punctal plugs (7%). The majority of patients did not have prior tear duct surgery (70%). Most stents were lost or removed due to extrusion (80%), followed by irritation (17%), and infection (3%). The success rate of the early stent removal or loss patients was 90% (n=3) compared to 93.5% (n=7) of the scheduled stent removal patients. The success rate was lowest in Group 1 (66.7%) compared to Group 2 (92.9%) and Group 3 (100%). Most patients underwent stent removal or loss between 1-2 months postoperatively (Group 2: 46.6%, n=14). The most common reason for stent removal or loss was extrusion for all three groups with the highest percentage in Group 2 (86%), followed by Group 3 (80%), and Group 1 (67%).

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Conclusions: The use of bicanalicular silicone intubation to enhance patency of the ostium created during an endoscopic dacryocystorhinostomy is an established practice for oculoplastic surgeons. However, the effect of early stent removal or loss is not well defined in the literature. This study suggests that patency of the nasolacrimal duct can be achieved if the stent is removed or lost after a minimum of two months. Further prospective studies are needed to compare the success of endo-DCR surgery with variable durations of bicanalicular stent placement.

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7:38 – 7:42 am

Treatment Outcomes of Pediatric External Dacryocystorhinostomy: A Single-Center Review

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Introduction: Dacryocystorhinostomy (DCR) is a procedure that aims to eliminate fluid and mucous retention in the lacrimal sac and increase tear drainage for relief of epiphora in patients with congenital or acquired nasolacrimal duct obstruction (NLDO). Prognosis after DCR is excellent, with success rates ranging between 90-96%[1,2] However, literature in the pediatric population displays variable results. Review of literature yields few studies that provide a comprehensive list of associated risk factors that are associated with pediatric patients to DCR failure.[2,3] Barnes et al. aimed to eliminate confounding factors that led to DCR failure in the pediatric population (i.e. congenital lacrimal fistula, post-traumatic obstruction, or canalicular agenesis). This study aims to identify other potential confounding variables of external DCR failure among pediatric patients.

Methods: Single-center, retrospective chart review of pediatric patients that underwent dacryocystorhinostomy between May 2010 and July 2020. Clinical history and examination findings were evaluated for each patient. Imaging studies, if obtained, were reviewed.

Results: Forty-two pediatric patients underwent an external dacryocystorhinostomy (DCR) on a total of fifty-three eyes. The most common presenting symptom was epiphora (84.9%). Average age at time of DCR was 5.59 years. Twenty-five patients (59.5%) presented with dacryocystitis and seven patients (13.2%) with dacryocystitis required hospitalization with intravenous antibiotic administration. Seven eyes (13.2%) were found to have a lacrimal diverticulum intra-operatively. Three eyes (5.7%) were noted to have a lacrimal fistula. Three patients were noted to have a dacryocystocele pre-operatively on either computed tomography (CT) imaging or digital subtraction dacryocystography (DSDCG). Ten patients (18.9%) acquired nasolacrimal obstruction secondary to trauma, associated with either orbital fractures or canalicular lacerations. The success rate for primary pediatric DCR performed for all appropriate causes of epiphora was 89.7%. Six eyes experienced a recurrence of symptoms (11.30%), such as epiphora or mattering, following external DCR. The underlying etiology of nasolacrimal obstruction in the cases with symptom recurrence included: one case of dacryocystocele with significant fibrosis and a lacrimal sac diverticulum, one case of late failure in a patient with cranial metaphyseal dysplasia with significantly narrowed nasal passages due to bony changes, three post-traumatic canalicular or eyelid lacerations, and a case of congenital nasolacrimal duct obstruction (CNLDO). The case of CNLDO that resulted in symptom recurrence was complicated by preseptal cellulitis and toxic shock syndrome in the immediate post-operative period.

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Conclusions: Pediatric nasolacrimal duct obstruction is a well-described phenomenon. External or endonasal DCR is the definitive treatment of choice, with excellent reported success rates in adults. This study aims to take an in-depth look into the incidence and underlying cause of failure for pediatric external DCR. External DCR failure did not occur in pediatric patients with normal pre-operative anatomy, atraumatic preceding history, and an uncomplicated post-operative course. Craniofacial abnormalities, canalicular trauma, lacrimal sac diverticula, and post-operative infection were identifiable causes for failure in our study cohort. This study aims to identify pediatric patients who are at increased risk of failure of external DCR surgery, as well as highlight the high rate of efficacy of external DCR surgery in the pediatric population.

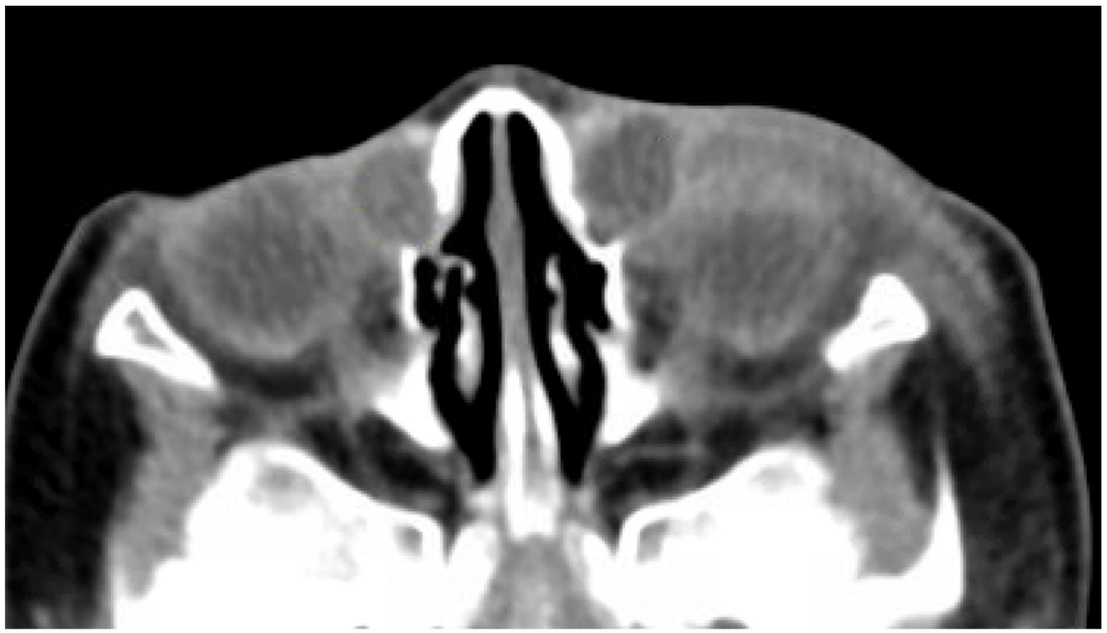

Figure 1. Eight-month-old male with lower eyelid swelling in the medial canthal area. Computed tomography scan revealed bilateral dacryocystoceles. Symptoms resolved with multiple tear duct probe and intubations on the right side. Patient failed initial left external DCR, and was found to have a lacrimal sac diverticulum during revision surgery.

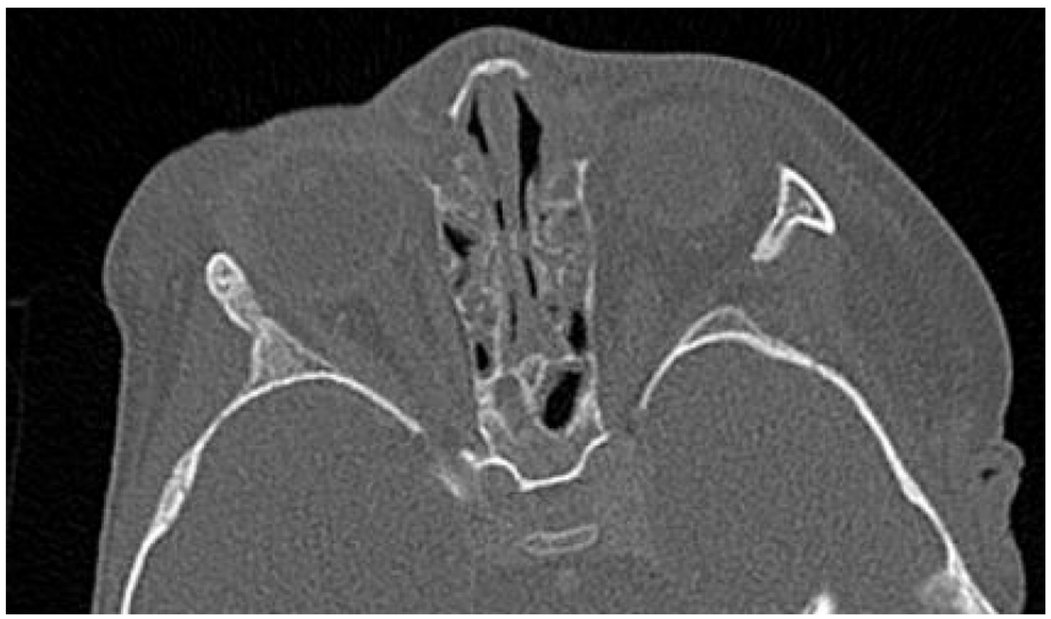

Figure 2. Twenty-three-month-old male with history of bilateral congenital nasolacrimal duct obstructions. CT imaging revealing patent osteotomies on both sides. Patient underwent uncomplicated left-sided external DCR three months prior to imaging. One day after right-sided external DCR, the patient developed a preseptal cellulitis and toxic shock syndrome. Patient experienced recurrence of tearing and mattering on both sides.

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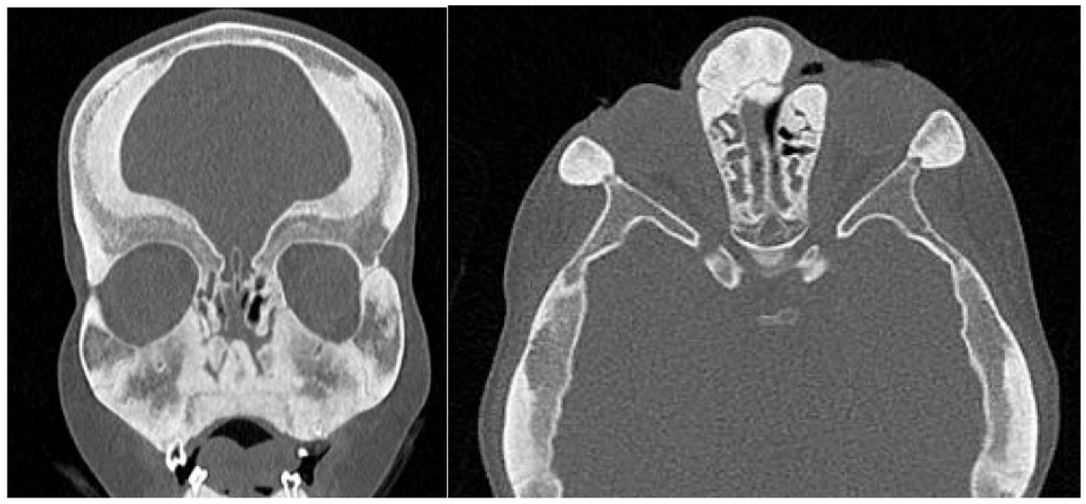

Figure 3. Eight-month-old male with cranial metaphyseal dysplasia. CT scan revealing diffuse bony dysplasia involving all facial bones. Patient underwent consecutive external DCR with recurrence two years after surgery on both sides.

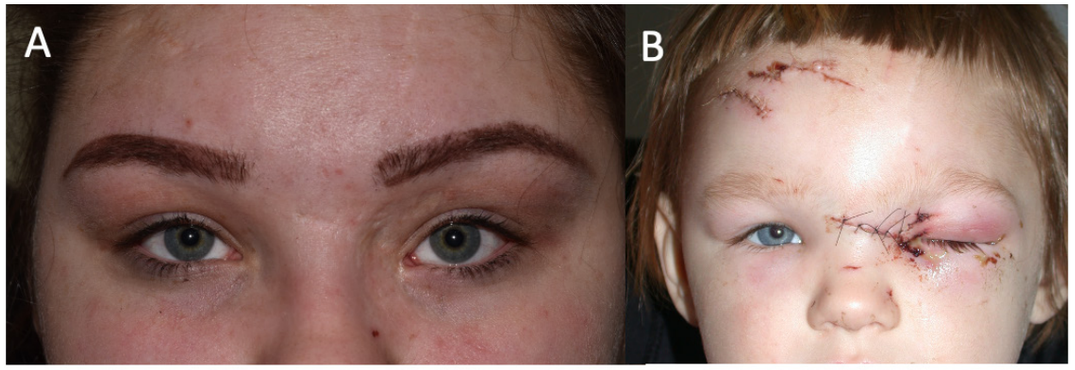

Figure 4: Sixteen-year-old female with remote history of dog bite resulting in left upper and lower canalicular laceration at four years of age. A. External photograph of patient at sixteen years old showing medial canthal scar. B. External photograph of patient at four years of age after initial laceration repair. Initial DCR performed at five years of age with lacrimal fistula and significant scar tissue. Recurrence occurred nine years later, requiring revision DCR.

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7:42 – 4:46 am

Comparison of Success Rates between Blind Probing and Endoscopically Assisted Probing for Congenital Nasolacrimal Duct Obstruction

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Introduction: Congenital nasolacrimal duct obstruction (CNLDO) presents in approximately 5-20% of newborn infants.[1,2] Spontaneous resolution occurs in about 96% of children before the age of 12 months.[1] In some children, however, obstruction persists and requires treatment. Management is based on a step wise approach starting with Crigler hydrostatic massage. followed by a blind probing procedure[3,4], then repeat probing, silicone tube intubation or balloon dilatation, and finally in cases of unresolved or recurrent obstruction dacryocystorhinostomy at the age of 5. Endoscopically assisted probing with direct visualization of the valve of Hasner has been found to be highly successful[4] and avoids further surgical intervention unless a bony or complex obstruction is encountered during the procedure. Endoscopic visualization not only enables direct observation valve of Hasner but also allows direct removal of flaps membranes, cysts or other anomalies that may be associated with CNLDO. The purpose of the current study was to compare the success rates between blind probing and endoscopically assisted probing in the treatment of CNLDO. To our knowledge this type of study has not been performed in the past.

Methods: Retrospective case series including patients 18 years or younger with a diagnosis of CNLDO and who underwent either blind probing or endoscopically assisted probing at 4 academic centers in Cali, Colombia between February 1, 1999 and December 3, 2022.

Results: 287 eyes of 243 patients were included in the study, 44 of the cases were bilateral. Conventional blind probing was performed in 135 eyes and endoscopically assisted probing in 143. Mean age at the time of the surgical procedure was 20.22 months (range: 3-132 months) in the conventional probing group and 32.12 months (range: 6-180 months) in the endoscopically assisted group. A large lacrimal sac with chronic discharge was found in 14 patients (10.37%) in the blind probing group and 28 cases (19.58%) in the endoscopically assisted patients. Seven patients from both groups were excluded from the study because of bony obstruction encountered in the nasolacrimal duct. The endoscopically assisted probing group showed significantly greater treatment success (136 of 143, 95%) compared to conventional probing (101 of 135, 75% ; P=0.001,Student's t test).There was no significant difference in mean age, gender,or laterality between the patients with successful and failed treatment in both groups. However, chronic discharge and large lacrimal sacs were more likely to fail in both groups (P= 0.001 in both series, Student's t test). No intraoperative or postoperative

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complications were encountered. Mean follow up was 15 months in the conventional probing group and 31.5 months in the endoscopically assisted patients.

Conclusions: Endoscopically assisted probing is associated with a higher success rate than conventional (blind) probing in the treatment of CNLDO irrespective of age. A plausible explanation is the direct visualization of the anomalies at the valve of Hasner and the possibility of correcting them in the same operative procedure. Larger lacrimal sacs and chronic lacrimal discharge may be negative variables in successful outcome in any type of probing intervention in CNLDO.

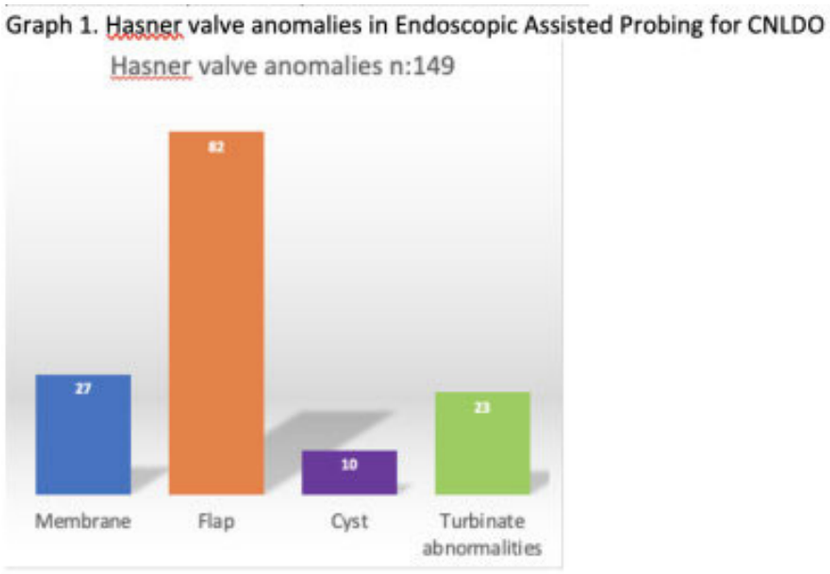
Table 1 Patient demographic and clinical characteristics

		BLIND PROBING n=135	ENDOSCOPIC ASSISTED PROBING n=143
Gender	Girls	54(40%)	52 (36.36%)
	Boys	81(60%)	91 (63.64%)
Eye laterality	Right	65 (48,14%)	68 (47.55%)
	Left	70 (51,85%)	75 (53.45%)
	Bilateral	20 (14,81%)	15 (10.48%)
Age	average age months (DE)	20,22 (20,59)	32.12 (28.87)
Large lacrimal sac	Yes	14 (10,37%)	28 (19.58%)
	No	121(89,62%)	115 (80.42%)

Table 2 Obstruction rate according to age group

Endoscopic assisted probing		Obstruction rate (n (%))
Age group (mth)	Eyes (n)	
6 -24 m	88	2 (28,57%)
25 - 48 m	37	3 (42,85%)
49 - 72 m	8	1 (14,28%)
73 - 108 m	5	1 (14,28%)
> 108 m	5	0 (0%)
	Total: 143	Total 7 (100%)
Blind probing		**Obstruction rate (n (%))**
Age group (mth)	Eyes (n)	
3-24 m	111	29 (85,29%)
25 - 48 m	15	3 (8,82%)
49 - 72 m	5	2 (5,88%)
73 - 108 m	2	0 (0%)
> 108 m	2	0 (0%)
	Total: 135	Total: 34 (100%)

Graph 1. Hasner valve anomalies in Endoscopic Assisted Probing for CNLDO



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7:46 – 7:50 am

Comparison of Orbital Abscess Drainage Outcomes: Transorbital vs. Endonasal Approach

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Introduction: Secondary orbital abscess is seen in approximately 15% infectious sinusitis cases,[1] and may be drained via a transorbital (i.e. transcaruncular or transcutaneous) or endonasal endoscopic approach. A comprehensive comparison of outcomes between these surgical techniques has not yet been reported.

Methods: A retrospective review was conducted at a single institution of patients who underwent orbital abscess drainage from November 2009 - April 2023. Patient demographics, clinical findings, management and outcome details were collected (Tables 1, 2). Statistical analysis was performed using Chi-squared and t- tests, with p-values < 0.05 considered significant.

Results: A total of 64 patients, 44 males (68.8%) and 20 females (31.3%) with median age of 23 years (range 2-84 years) were included. Sixty-two patients exhibited unilateral abscesses, while 2 had bilateral orbital abscesses. Acute microbial sinusitis (90.6%) was the most common causative etiology. Forty-four patients (68.8%) underwent abscess drainage via an orbital approach at time of endoscopic sinus surgery, while 20 patients (31.3%) underwent endonasal endoscopic drainage. Fifty percent of patients who underwent orbitotomy had a drain placed at time of surgery. No statistically significant differences in gender, abscess laterality, visual acuity at presentation, antibiotic selection or perioperative steroid use were present between the treatment groups. A statistical difference was observed for mean age at presentation between orbitotomy (28.1 years) and endoscopic groups (16.20 years) ($p = 0.03$). Longer anterior-to-posterior abscess depth ($p = 0.005$) and superiorly-located orbital abscesses ($p = 0.042$) were more likely to be drained via orbitotomy, while medial abscesses were more often drained endoscopically ($p = 0.0003$). Abscess drainage via orbitotomy was associated with longer average total hospitalization length (8.3 days) and postoperative hospitalization length (7.1 days) compared to the endoscopic group (5.1 days and 4.4 days, respectively), though this difference was not statistically significant. At discharge, patients who underwent orbitotomy were more likely to have periorbital swelling (45.5% vs. 0%, $p=0.0003$), while post-operative pain was more common in endoscopically treated patients (0% vs. 15.0%, $p = 0.009$). Average operative time was not statistically different between the orbitotomy (145.3 minutes) and endoscopic (117.4 minutes) groups. Reoperation rates were higher after orbitotomy (34.1%) compared to endoscopic (15.0%) groups, though this was not statistically significant. No significant differences were observed in visual acuity improvement from admission to discharge, or in visual acuity at discharge or outpatient follow-up, between the two groups.

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Conclusions: Only limited small studies exist comparing orbital abscess surgical drainage techniques.[2-4] At our institution, the surgical approach for orbital abscess drainage was influenced by age (younger patients undergoing endoscopic drainage), abscess location (medial abscess drained endoscopically, superior drained via orbitotomy) and abscess anterior-to-posterior length (longer abscess drained via orbitotomy). Both groups had similar surgical outcomes, with no differences noted in visual acuity change from admission to discharge, follow-up visual acuity, or length of total or postoperative hospitalization length. These findings suggest that orbital abscess surgical approach does not significantly influence patient outcome, though there is a trend towards longer hospital stay in those who undergo orbitotomy that may reach significance in a larger study.

Table 1. Demographics	Orbitotomy	Endoscopic	p-value
Total	44	20	
Patient Characteristics			
Mean age at diagnosis, y	28.1	16.2	0.036
Female sex	13 (29.6%)	7 (35.0%)	0.665
Etiology			
Sinusitis	39 (88.6%)	19 (95.0%)	0.422
Trauma	3 (6.8%)	1 (5.0%)	0.782
Post-operative	2 (4.6%)	0	0.336
Abscess Laterality			
Right	20 (45.4%)	12(60.0%)	0.284
Left	23 (52.3%)	7 (35.0%	0.203
Both	1 (2.3%)	1 (5.0%)	0.564
Abscess Location			
Medial	18 (40.9%)	18 (90.0%)	0.0003
Superior	12 (27.3%)	1 (5.0%)	0.042
Lateral	9 (20.5%)	1(5.0%)	0.117
Inferior	2 (4.6%)	0	0.336
Anterior	6 (6.8%)	0	0.2353
Mean Abscess Size (mm)			
Transverse	19.9	18.8	0.6795
Depth	13.8	7.3	0.005
Days from			
Symptom onset to diagnosis	6.1	4.05	0.223
Symptom onset to drainage	7.3	5.7	0.305
Diagnose to drainage	1.3	1.6	0.474
Visual acuity* (logMAR, Snellen)			
Mean - At presentation	0.73, 20/100	0.86, 20/140	0.702
Median - At presentation	0.18, 20/30	0.10, 20/25	0.814
Steroid Treatment	31 (70.5%)	13 (29.5%)	0.710

*Visual Acuity in ipsilateral eye

Table 2. Outcome measures	Orbitotomy	Endoscopic	P - value
Hospital Stay, d			
Length of stay	8.1	5.4	0.197
Post-operative stay	7.3	4.2	0.136
Operative time (mins)			
Mean	145.3	117.4	0.181
Median	142.0	102.50	0.060
Visual acuity*			
Mean - At discharge	0.58, 20/80	0.86, 20/160	0.555
Mean - At follow up	0.46, 20/63	0.78, 20/125	0.501
Median - At discharge	0.14, 20/32	0.05, 20/20	0.789
Median - At follow up	0.10, 20/24	0.00, 20/20	0.779
Reoperation	34.1%	15.0%	0.115

*Visual Acuity of affected eye

Table 3. Symptoms	Orbitotomy	Endoscopic	p-value
Presenting Symptoms			
Swelling	40 (90.9%)	17 (85.0%)	0.487
Itchiness	7 (15.9)	2 (10.0%)	0.532
Erythema	8 (18.2%)	5 (25.0%)	0.534
Ophthalmoplegia	10 (22.7%)	2 (10.0%)	0.231
Pain	19 (43.2%)	8 (40.0%)	0.812
Chemosis	1 (2.3%)	2 (10.0%)	0.181
Proptosis	7 (15.9%)	4 (20.0%)	0.689
Fever	13 (29.5%)	10 (50.0%)	0.116
Vision Changes*	18 (40.9%)	5 (25.0%)	0.222
Discharge	7 (15.9%)	6 (30.0%)	0.197
Discharge Symptoms			
Swelling	20 (45.5%)	0	0.0003
Itchiness	2 (4.5%)	2 (10.0%)	0.402
Erythema	3 (6.8%)	1 (5.0%)	0.784
Ophthalmoplegia	3 (6.8%)	0	0.236
Pain	0	3 (15.0%)	0.009
Chemosis	3 (6.8%)	0	0.236
Proptosis	1 (2.3%)	0	0.498
Fever	0	0	
Vision Changes*	1 (2.3%)	0	0.498
Discharge	2 (4.5%)	2 (10.0%)	0.402

*Vision changes include diplopia, photophobia, blurry vision

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8:04 – 8:10 am

Use of Virtual Reality in Patient Education Prior to Orbital Surgery

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Introduction: Virtual reality (VR) has the ability to construct and recreate various anatomical structures based on radiographic imaging allowing for an interactive and immersive viewing experience. Recent studies have shown the positive impact VR can have on medical education and surgical training.[1-3] We describe the use of virtual reality models to educate patients on their specific orbital conditions prior to surgery.

Methods: Patient specific three-dimensional VR models were created using software created by ImmersiveTouch (Chicago, IL, USA), an FDA-approved HIPPA-compliant medical device. Both magnetic resonance imaging and computed tomography scans with 1 – 5mm image slices were utilized, with thinner slices yielding greater resolution. These VR models included, at a minimum, the entire boney skull, optic nerves, extraocular muscles, and patient-specific pathology (Figure 1). Patients reviewed their patient VR models using a VR headset with guidance of the surgical attending (Oculus VR, Menlo Park, California). VR models were manipulated (rotated, magnified, minified), and orbital contents were selectively displayed with layers (bone, globe, muscles, tumor) based on the attending discretion. Patients completed surveys both before and after the VR experience rating their understanding of their diagnosis and treatment plan on a 5-point Likert Scale. Survey data was collected without the surgeon present in the room. Paired t-test were used to compare pre and post-VR Likert Scale.

Results: Five patients completed the study. Patients were all female (100%) on average 38 years of age (range 24 to 78). The education levels varied: 60% completed some college and 40% completing a four-year degree. VR models were created for lacrimal gland biopsies (60%), orbital foreign bodies (20%), and extraocular muscle biopsy (20%). Prior to viewing the VR model, 40% of patients rated their understanding of their medical condition and treatment plan as average (3) and 60% rated their understanding as slightly above average (4). Following the use of the VR models, the Likert scale improved 1.2 points for patient understanding of their medical condition and treatment plan, respectively ($p = 0.03$) (Figures 2).

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Conclusions: The use of VR patient specific models showed self-reported improvement in patients understand of their medical condition and the proposed treatment plan. Larger studies are needed to assess if VR models can further help with patient education and treatment compliance.

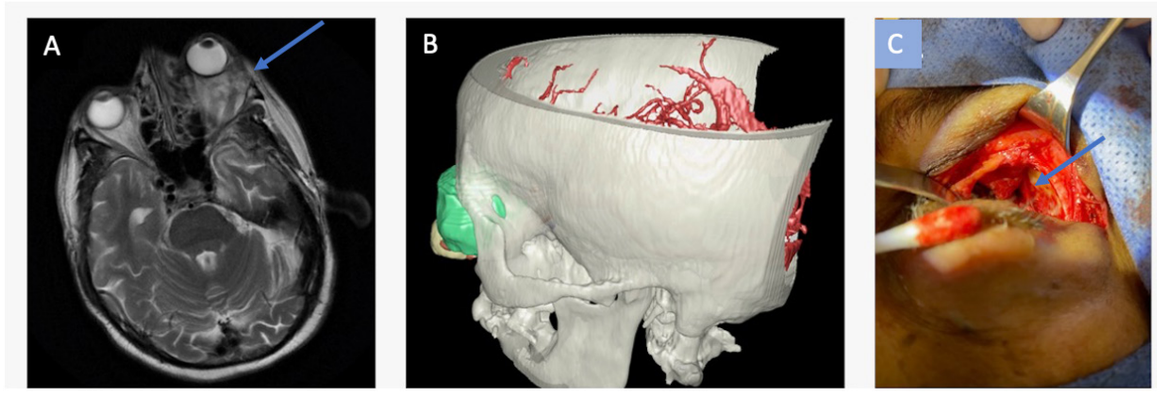

Figure 1: Virtual Reality Model. Example pr a patient specific virtual reality (VR) model developed from the (A) Coronal- T2 MRI image showing a mass in the region of the lacrimal gland. (B) VR reconstruction demonstrating the mass with a bony defect within the orbit also seen (C) intraoperatively during the orbitotomy.

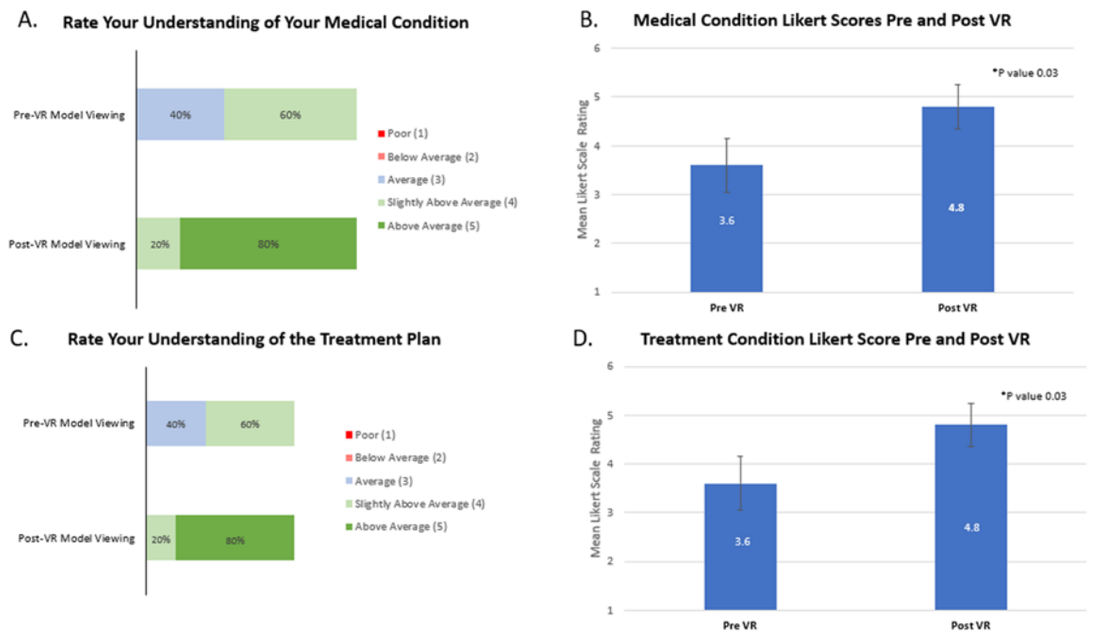

Figure 2. Patient Self-Reported Assessment. Results from 5-Point Likert Scale of the patients understanding of their medical condition (A & B) and treatment plan (C & D) pre and post use of patient specific virtual reality models. Key: VR – virtual reality.

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8:10 – 8:16 am

Evaluating the Accuracy of ChatGPT and Google BARD in Fielding Oculoplastic Patient Queries: A Comparative Study on Artificial vs. Human Intelligence

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Introduction: With its significant advancements in recent years, artificial intelligence (AI) has made its way into the healthcare sector. AI chatbots such as OpenAI's ChatGPT, released in late 2022, and Google's BARD (Big Ad Research Dataset), launched in early 2023, have garnered substantial interest. These platforms present potential solutions for reducing the escalating administrative burdens faced by clinicians in the era of electronic health records. This study intends to evaluate and compare the accuracy of responses provided by these AI platforms to those generated by human intelligence.

Methods: Commonly asked questions directed towards oculoplastic surgeons were collected and rephrased. These queries were then input into both ChatGPT 3.5 and BARD chatbots, using the prompt: 'As an oculoplastic surgeon, how can I respond to my patient's question?' Each question was inputted in a separate session as an independent event to prevent "learning" by the AI algorithm. The responses generated were collected and independently evaluated by three experienced oculoplastic specialists using the categories: agree, disagree, and neutral. The level of empathy conveyed in each response was also assessed. A Chi-square test was conducted to compare the rate of responses between the two AI models.

Results: A total of 112 questions were included in this study. The graders agreed with 78.8% (n=88.3) of ChatGPT responses and disagreed with 11.6% (n=13). In comparison, the graders agreed with only 50% (56.3) of BARD responses and disagreed with 29% (32.3). 9.5% (10.7) and 21% (23.3) of responses of both ChatGPT and BARD were graded neutral respectively (Table 1). Reviewers agreed with ChatGPT responses more than they agreed with Bard responses ($P<0.001$), and also found ChatGPT responses to be more empathic when compared to Bard ($p<0.001$).

The questions were classified into five distinct categories, as illustrated in table 2 and 3. In general, ChatGPT exhibited an accuracy rate exceeding 50% across all categories, while BARD displayed lower accuracy particularly when addressing questions related to medications and treatment. Reviewers agreed with ChatGPT answers more frequently than Bard answers in four out of five categories ($p<0.05$), and agreement was not statistically different when addressing follow-up and appointment-related questions ($p=0.496$). Regarding empathy, both chatbots generally exhibited a neutral level of empathy, as shown in Table 4.

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Conclusions: In this study, we evaluated the accuracy and empathy of two AI-powered chat bots, ChatGPT and BARD, in response to oculoplastic patient questions. ChatGPT exhibited a reasonable level of accuracy, with its answers displaying greater accuracy and conveying more empathy compared to responses from BARD.

One notable strength of ChatGPT was its high level of accuracy when addressing queries pertaining to postoperative care and eye-related conditions. Patients seeking information on these topics can potentially benefit from ChatGPT's responses. However, it is important to note that both chatbots did not consistently provide accurate and appropriate responses regarding medications and treatment.

The limitations observed in the medications and treatment section underscore the importance of continued training and refinement of AI models. As the AI dataset is further trained, the responses can improve significantly, particularly in areas where accuracy is currently lacking. This study highlights the potential of AI-powered chatbots, such as ChatGPT, to become valuable tools in oculoplastic patient education and support. With further development and refinement, they can play a vital role in assisting patients with accurate and empathetic information, contributing to enhanced patient care and outcomes while reducing surgeon burnout.

Figure 1

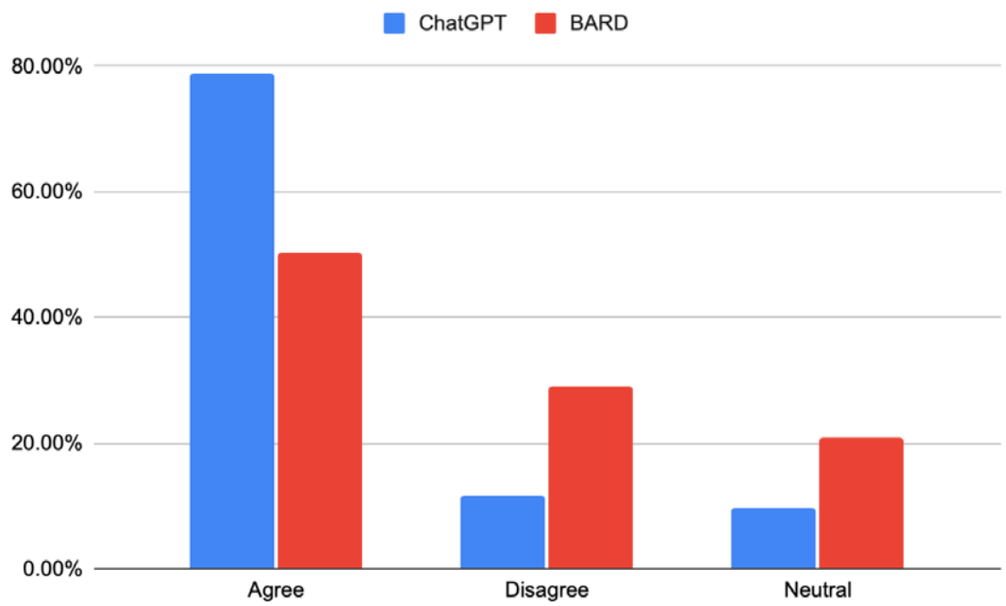

Figure 2

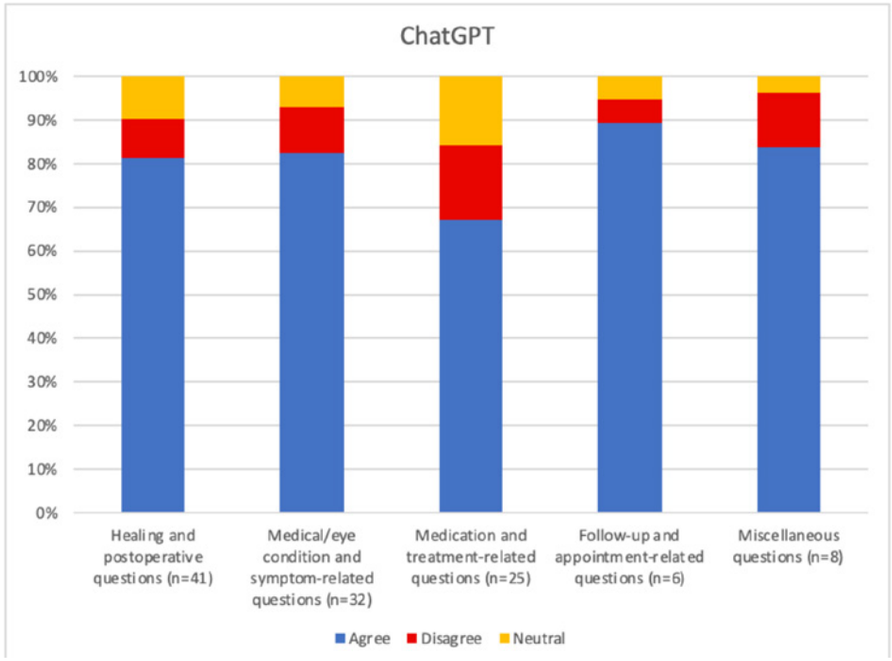

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Figure 3

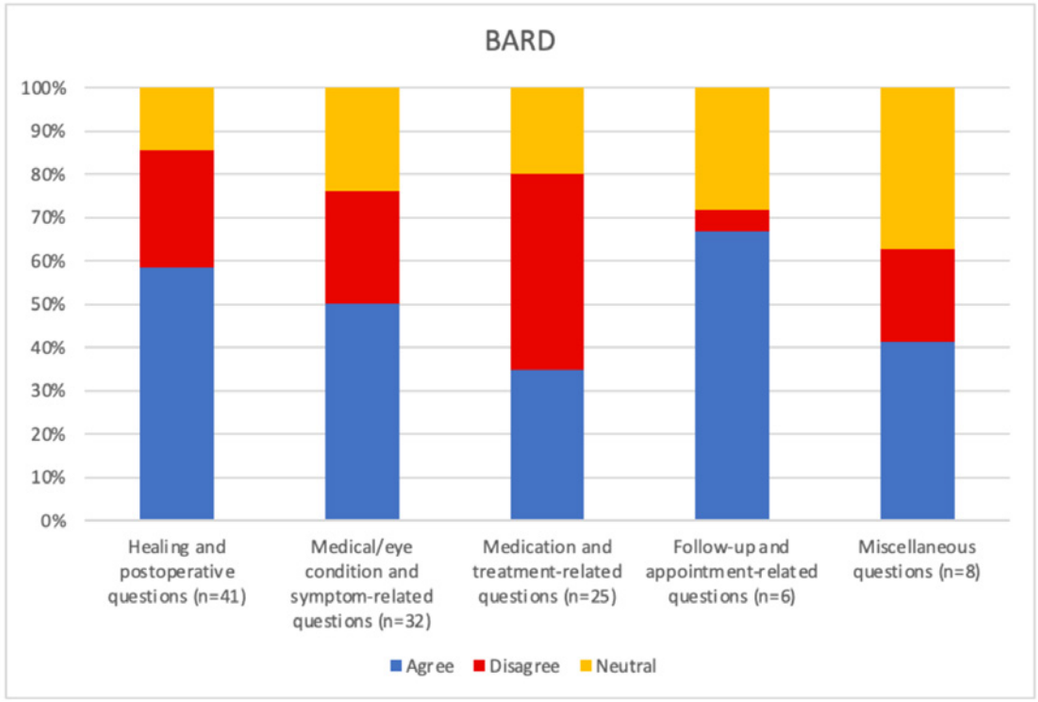
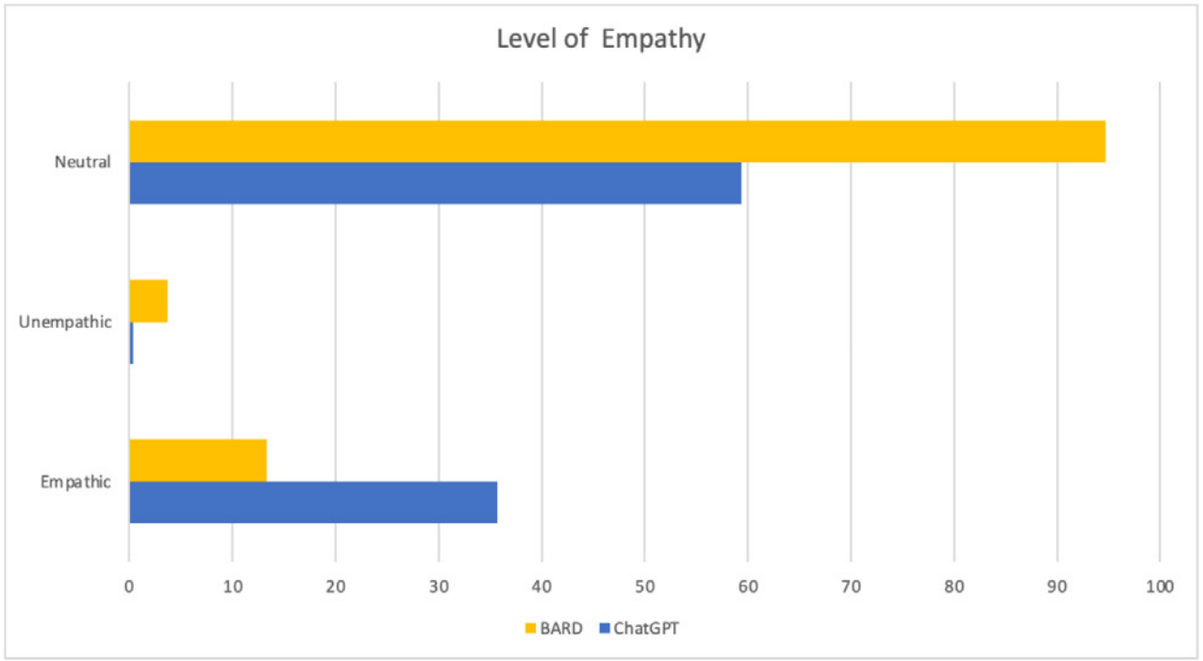


Figure 4



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8:16 – 8:22 am

Scope of Practice of Oculofacial Plastic and Reconstructive Surgeons: A Public Perception Survey

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Introduction: As medicine becomes more specialized, it is becoming increasingly difficult for patients to discern which subspecialist is the most adept at a desired intervention. This is particularly complex in the field of oculofacial plastic and reconstructive surgery (OFPRS) as there is overlap of the scope of practice between OFPRS, plastic surgeons (PRS), and ENT-trained facial plastic surgeons.[1-2] This confusion is amplified as there are now both physician and non-physician practitioners outside these fields performing aesthetic procedures without board certification motivated by their lucrative and prolific nature.[3] In an effort to further clarify the role of ophthalmic plastic surgeons, the name of the field has been recently changed to "Oculofacial Plastic and Reconstructive Surgery."[4] To our knowledge, this is the first general population study on the scope of practice of OFPRS.

Methods: A series of 49 questions were developed under the supervision of OFPRS faculty with IRB approval. The survey was administered electronically via Qualtrics® from respondents' representative of the demographic make-up of the United States. Anyone under the age of 18 or working in healthcare was excluded. Statistical analysis was performed by statisticians using SAS software. Bivariate analysis was performed using Chi squared or Fischer's exact test. Significance was set at $p < 0.05$.

Results: A total of 530 responses were obtained in which most respondents were white (84.15%), female (70.75%), over the age of 35 (80%), with at least a college education or above (73.58%) [Figure 1]. Most respondents did not think ophthalmologists (76.8%) or optometrists (91.38%) were surgeons, and only 29.8% of the respondents knew the primary specialty of OFPRS was ophthalmology. Most (524 respondents, 98.87%) favored board certification and most (505 people, 95.28%) prefer ASOPRS-trained OFPRS [Figure 2].

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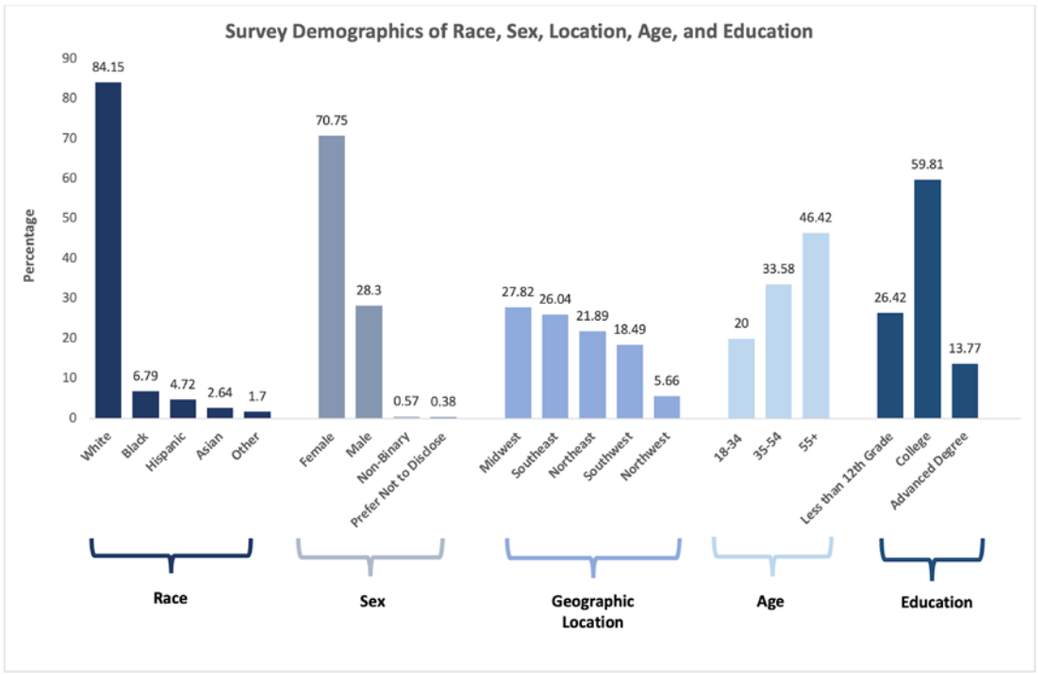
Most respondents considered eyelid reconstruction, cosmetic surgery, facial cosmetic surgery, orbital reconstruction, and neurotoxin injections within the legal scope of practice of OFPRS, but not facial fillers, laser skin resurfacing, eyelid cancer removal, or cataract surgery [Figure 3]. Additionally, most preferred PRS (70.9% -76.8%) followed by cosmetic surgeons (52.1% - 76.2%) for aesthetic procedures including neurotoxin and fillers, blepharoplasty, brow lift, mid-face lift, forehead lift, and fat grafting to the periorbita and cheeks. Notably, for OFPRS specific procedures, PRS was the leading subspecialist chosen for each intervention: orbital decompression (58.5% vs. 71.5%), orbital reconstruction (57.9% vs. 74.2%), enucleation/evisceration (48.1% vs. 53.4%), optic nerve related surgery (39.8% vs. 43.4%), orbital cancer resection (42.8% vs. 46.8%) and tear duct surgery (41.9% vs. 52.5%) [Figure 4].

Older age was associated with correctly identifying that OFPRS perform orbital decompressions (p=0.014), eyelid reconstruction (p=0.003), orbital reconstruction (p=0.002), enucleation/evisceration (p<0.001), orbital cancer resection (p=0.007), dacryocystorhinostomy (p=0.004), and orbital fat grafting (p=0.004). Those with college degrees or above were more likely to know that OFPRS perform orbital reconstruction (p=0.005).

Conclusions: Subspecialty nomenclature has led to misinformation when choosing the optimal provider for a desired procedure. As the network of ASOPRS surgeons expands, it is necessary to understand the perception of the public to increase educational efforts to ensure patients and providers can make the most informed decision when selecting a subspecialist.

Figure 1: Survey Demographic Information Based on Race, Sex, Location, Age, and Education



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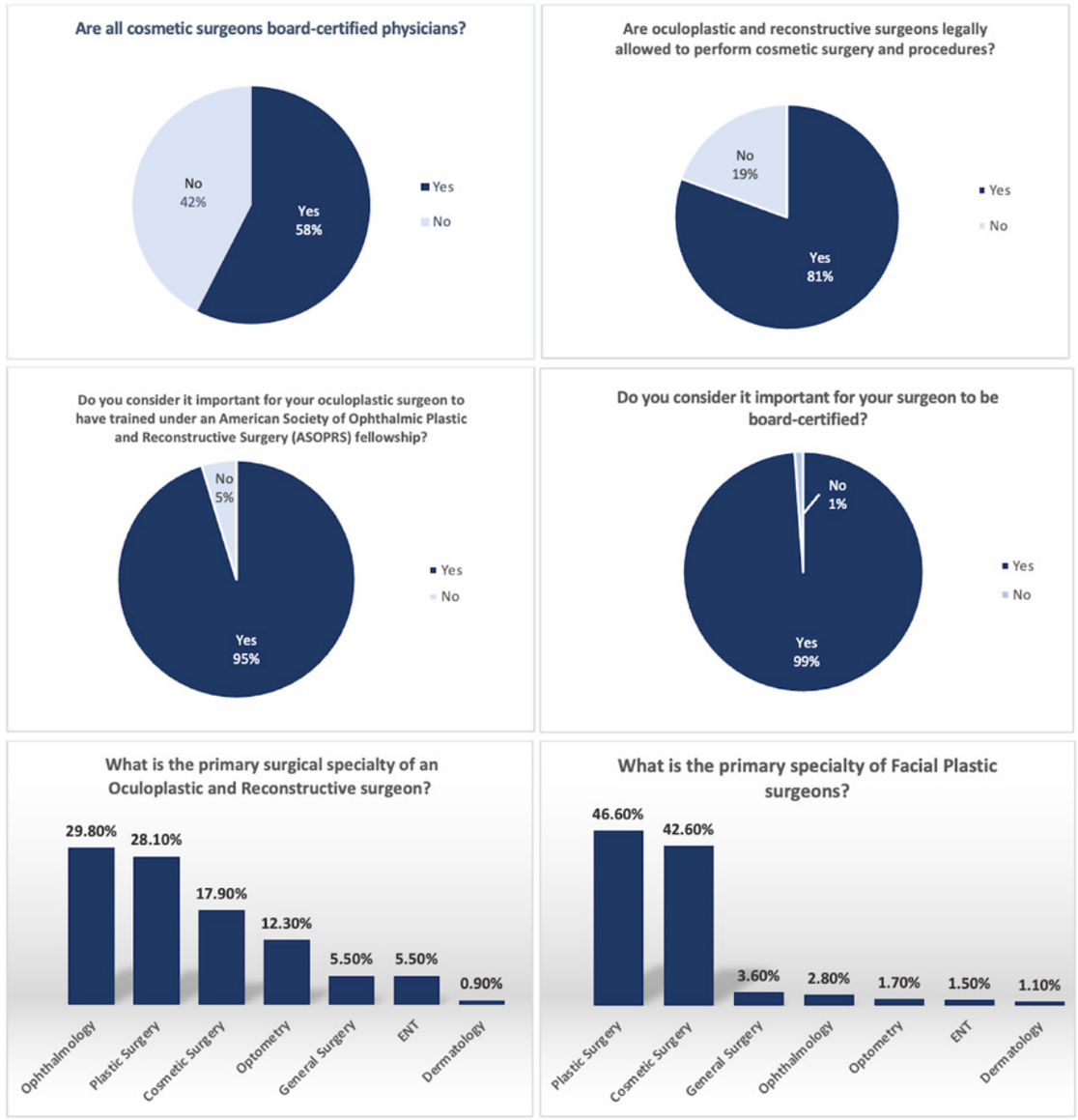


Figure 3: Legal scope of practice of Oculofacial and Reconstructive Surgery

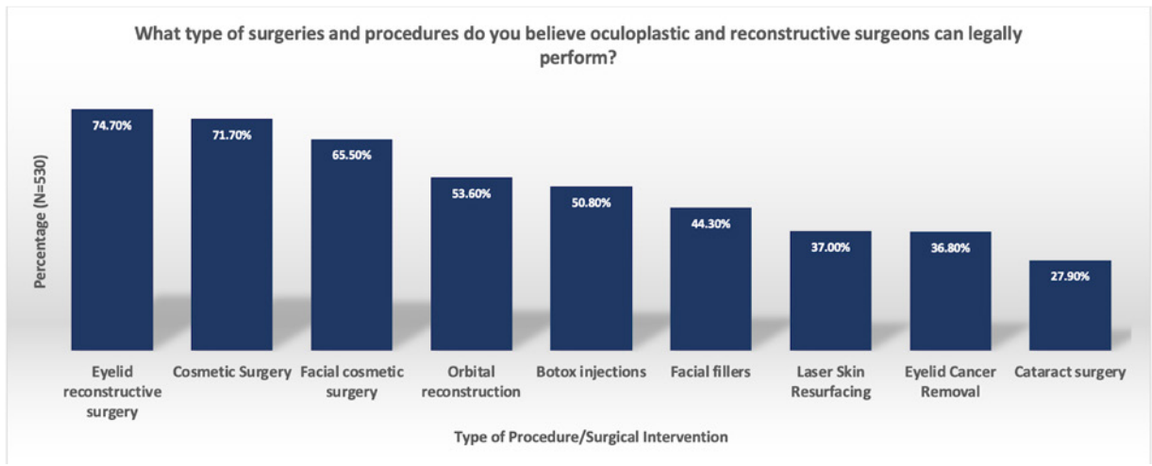
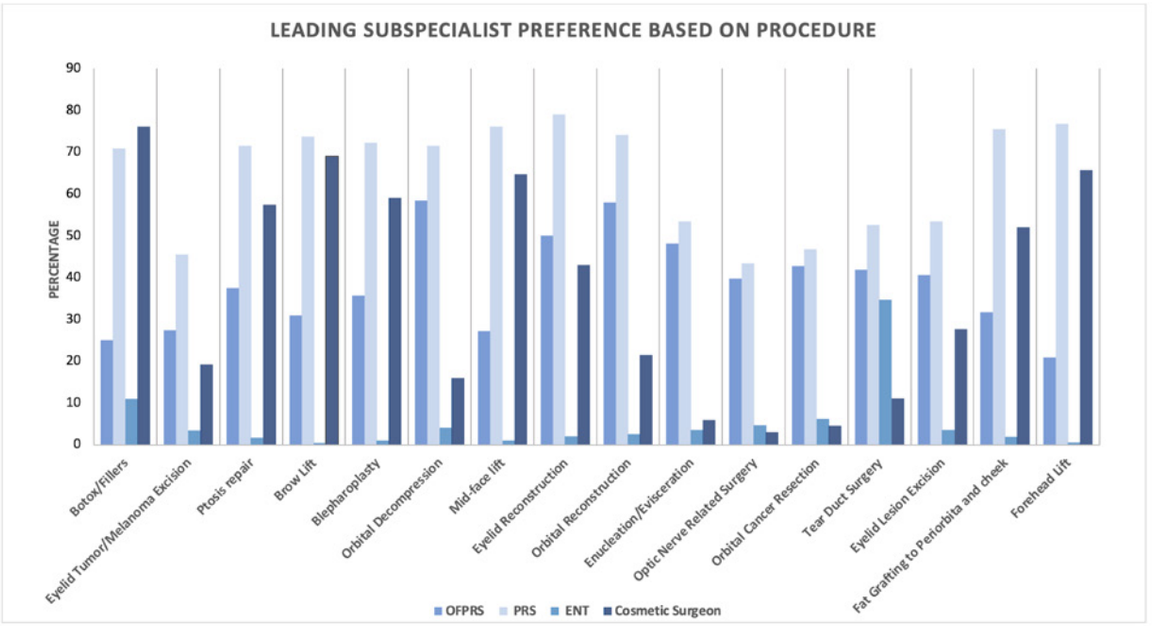


Figure 4: Leading subspecialist preference based on procedure



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8:22 – 8:28 am

The Impact of Frailty on Operative Outcomes following Orbital Surgery from 2005-2018

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Introduction: To determine the impact of frailty, measured by the 5-factor Modified Frailty Index (mFI-5), on temporal perioperative outcomes of orbital surgery. The mFI-5 is a previously validated frailty index comprised of 5 comorbidities –COPD status, diabetes mellitus, pulmonary disease, congestive heart failure, and non-independent functional status—with increasing score implying a greater frailty burden.

Methods: A cohort of patients undergoing orbital surgery including orbitotomies, orbital reconstructions, periorbital osteotomies were identified using CPT codes from de-identified data within the National Surgical Quality Improvement (NSQIP) database from 2005 – 2018. The 5 aforementioned frailty-qualifying comorbidities were tabulated and totaled to provide a mFI-5 score of 0-3. Total operation time, length of hospital stay, and days to readmission were tabulated based on mFI-5 score, and compared using the Kruskal-Wallis test. Analysis treating frailty as a binary variable was also performed, using the Mann-Whitney U test. A Bonferroni correction for overfitting was applied and $P<0.01$ was considered statistically significant.

Results: A total of 2275 patients were included in this analysis. Of these patients 36.4% were male and 63.6 % were female with an average age of 43.9 ± 17.7 years. Total operation time was significantly elevated in patients with a higher mFI5-score, with those patients scoring a mFI5-score of 3 having a higher operation when compared to those with lower scores (179.421 ± 248.031 min vs. 143.601 ± 142.940 min, $p=0.012$). Total length of hospital stay increased directly proportional to mFI5-scores with mFI5-score of 3 exhibiting an average hospital stay of 4.5 ± 5.9 days ($P<0.001$). 56 patients were readmitted within 30 days of their surgery, however there was no significant influence of frailty on time to readmission ($P=0.127$).

Conclusions: The mFI-5 score is a predictive measure of temporal outcomes of orbital surgery including operation time, hospital stay, and time to readmission, all of which can be used by ophthalmic surgeons as a preoperative assessment of their patients. By doing so, proper planning and counseling regarding post-operative outcomes can be made transparent to patients.

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Table 1: Perioperative & Postoperative Outcomes following Orbital Surgery as a function of the mFI-5 Frailty Score (n=2275)

	Mean	Std Dev	SEM	Median	Range	p-value
Total Operation Time (minutes)						0.012[a]
mFI5-Score 0	144	143	4	96	3-1302	Reference
mFI5-Score 1	187	19	9	108	5-1186	
mFI5-Score 2	161	17	14	91	13-928	
mFI5-Score 3	179	248	57	67	20-886	
Frailty composite	181	191	7	105	5-1186	0.014[b]
Total Hospital Stay (days)						<0.001[a]
mFI5-Score 0	1.6	4.4	0.1	1.0	0.0-92.0	Reference
mFI5-Score 1	2.5	4.7	0.2	1.0	0.0-50.0	
mFI5-Score 2	3.4	5.9	0.5	1.0	0.0-36.0	
mFI5-Score 3	4.5	5.9	1.3	2.0	0.0-23.0	
Frailty composite	2.8	5.1	0.2	1.0	0.0-50.0	<0.001[b]
Time to readmission (days, n=56)						0.013[a]
mFI5-Score 0 (n=33)	13.5	9.2	1.6	11.0	0.0-29.0	Reference
mFI5-Score 1	16.1	7.4	1.9	15.0	3.0-29.0	
mFI5-Score 2	16.5	7.1	2.9	14.5	8.0-29.0	
mFI5-Score 3	17.5	12.0	8.5	17.5	9.0-26.0	
Frailty composite (n=23)	16.3	7.3	1.5	15.0	3.0-29.0	0.127[b]

This table shows the values and variances for time-based parameters of orbital surgery stratified by frailty score; [a]p-values for the comparison of time values as stratified by mFI-5 score (Kruskal-Wallis test); [b]p-values for the comparison of time values as stratified by frailty status as a binary variable (Mann-Whitney U test); Abbreviations: Std Dev= standard deviation; SEM = standard error of the mean; Min = minimum value; Max = maximum value mFI-5= 5-factor Modified Frailty Index

8:28 – 8:34 am

Deep Learning Model for Differentiating Thyroid Eye Disease and Orbital Myositis on Computed Tomography (CT) Imaging

Sierra Ha[1], Lisa Lin[2], Min Shi[2], Nahyoung Grace Lee[2]
[1]Harvard Medical School, Boston, Massachusetts, United States, [2]Massachusetts Eye and Ear, Boston, Massachusetts, United States

Introduction: Thyroid eye disease (TED) and orbital myositis are two distinct orbital pathologies which may present with overlapping clinical presentations. Both conditions commonly manifest with symptoms such as orbital pain, diplopia, and proptosis. Differentiation of these diseases is crucial in order to initiate appropriate treatment and to prevent complications such as permanent disability or vision loss. Orbital computed tomography (CT) plays a significant role in diagnosing these conditions. It can reveal distinct features such as unilateral enhancement of extraocular muscles and their tendinous insertions, which is typical of orbital myositis. In contrast, TED may present as unilateral or bilateral and rarely involves the lateral rectus muscle or the tendons of extraocular muscles. This study aims to investigate the use of a deep learning model to accurately differentiate between TED and orbital myositis based on orbital CT images.

Methods: A retrospective review was conducted on patients who underwent dedicated orbital CT scans over a 12-year period at a single academic institution. Patients diagnosed with orbital myositis and TED and were evaluated by the oculoplastics department were included, while those with other diagnoses, such as trauma, tumors, or other inflammatory processes, or with prior orbital surgeries (such as bony decompressions) were excluded. TED was categorized into mild TED and severe TED (defined as those with clinical signs of optic neuropathy). Patients with no orbital disease and normal CTs were used as normal controls. Orbital CTs were preprocessed and adopted for the VCG-16 network to distinguish patients with no disease, mild TED, severe TED, and orbital myositis.

Results: A total of 1610 photos from 192 CT scans (51 orbital myositis and 141 TED patients) were utilized to develop the deep learning model. The model exhibited a high level of accuracy in distinguishing orbital myositis from other scans (normal controls, mild TED, and severe TED), with an accuracy rate of 97% (AUC 0.995). Additionally, the model differentiated normal controls versus orbital myositis with an accuracy of 98% (AUC 0.999), mild TED versus orbital myositis with an accuracy of 98% (AUC 0.999), and severe TED versus orbital myositis with an accuracy of 98% (AUC 0.996).

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Conclusions: The AI model developed in this study demonstrates promising results in accurately distinguishing between orbital myositis and TED, which can present with similar clinical and radiographic features. Further studies will include training the model on a broader range of pathologies and normal controls, with the potential to incorporate the model into radiology screening protocols. The continued development and validation of this AI model can aid in improving the efficiency and accuracy of diagnosing these complex orbital conditions. As a result, it will effectively facilitate timely interventions and enhance the quality of patient care by appropriately stratifying the urgency of referrals to oculoplastic surgeons.

Figure 1

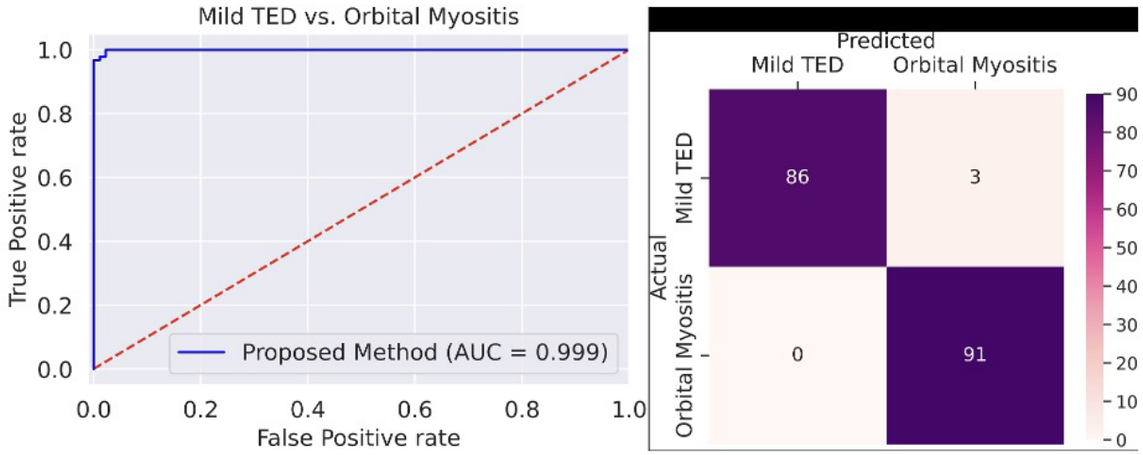
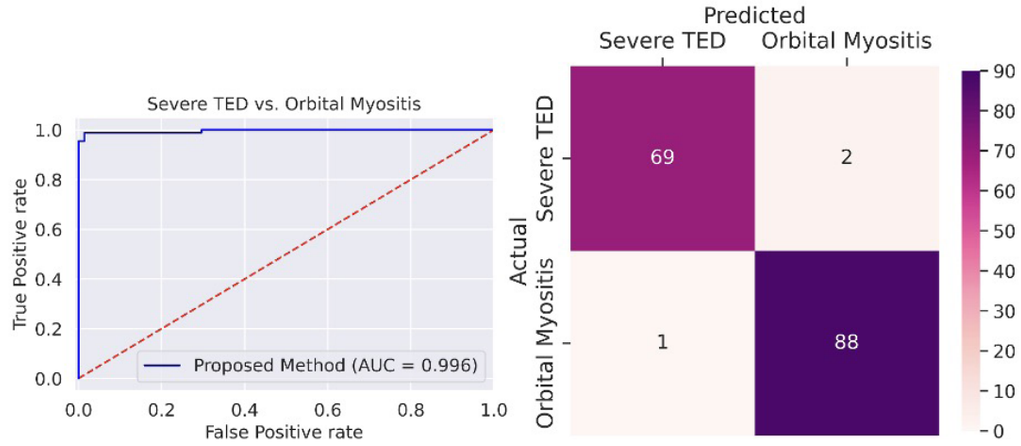


Figure 2



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8:34 – 8:40 am

Mastering the Retrobulbar Block: Using a Novel 3-D Printed Simulator for Practical Training

Remigio Flor[1], Nicole McMinn[2], Peter Liacouras[2], Hind Baydoun[3], Richard Rosen[4], Eva Chou[1], Jason Lewis[1], Brittany Powell[5]
[1]Ophthalmology, Walter Reed National Military Medical Center, Bethesda, Maryland, United States, [2]Radiology, Walter Reed National Military Medical Center, Bethesda, Maryland, United States, [3]Department of Research Programs, Fort Belvoir Community Hospital, Fort Belvoir, Virginia, United States, [4]Ophthalmology, New York Eye and Ear Infirmary of Mount Sinai, New York, New York, United States, [5]Ophthalmology, Naval Medical Center San Diego, San Diego, California, United States

Introduction: The retrobulbar block (RBB) currently has limited simulation options so we developed a 3D-printed training model to realistically mimic critical orbital anatomic features and evaluated whether the model could provide ophthalmologists with an effective simulation option for this high-risk procedure (Figure 1 A and B).

Methods: The training model was created via 3D modeling of anatomical structures and printed using two different 3D printing technologies incorporating a variety of plastic and silicone materials (Figure 2A). Training subjects consisted of 43 ophthalmologists who simulated administering retrobulbar anesthesia using the training model and completed pre- and post-training surveys (Figure 2B). The primary outcomes measured included utility and anatomical fidelity of the training model. Secondary outcomes evaluated included previous experience of retrobulbar training, utility of the use of a training model for retrobulbar blocks, training period in ophthalmology, training status, and location of the simulation injected medication.

Results: This 3D-printed training model realistically simulated ocular and orbital structures and optimized procedural learning. 16% (n=7) of participants had never previously performed an RBB. 77% (n=36) of participants reported that performing an RBB was part of their residency training, and none had performed an RBB with a simulator. In terms of anatomical fidelity, 46% (n=20) indicated that the model was similar or very similar to the actual procedure. Paired t-test analyses comparing pre-training to post-training outcomes suggested that the training improved the level of comfort with performance of an RBB ($P < 0.0001$). The extent to which the participants would include or plan to include an RBB as part of their clinical practice improved between the pre-training and post-training periods ($P = 0.0053$). Similarly, the extent to which participants believed that using a training model would improve their clinical practice increased between the pre-training and post-training periods ($P=0.11$). Anatomical fidelity, level of comfort and planning to include retrobulbar block as part of the clinical practice was strongly correlated with years of experience.

Conclusions: A 3D-printed training model for retrobulbar anesthesia can realistically simulate ocular and orbital structures and successfully simulate critical orbital anatomic features sufficient for use as a training tool.

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Figure 1

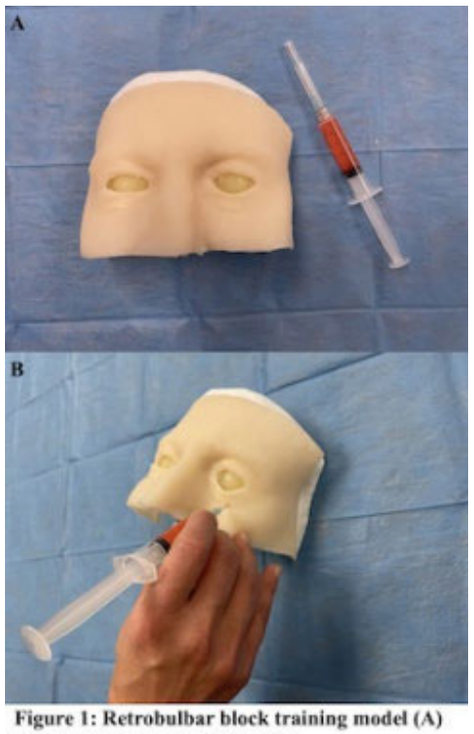

Figure 1: Retrobulbar block training model (A) with procedural simulation (B).

Figure 2

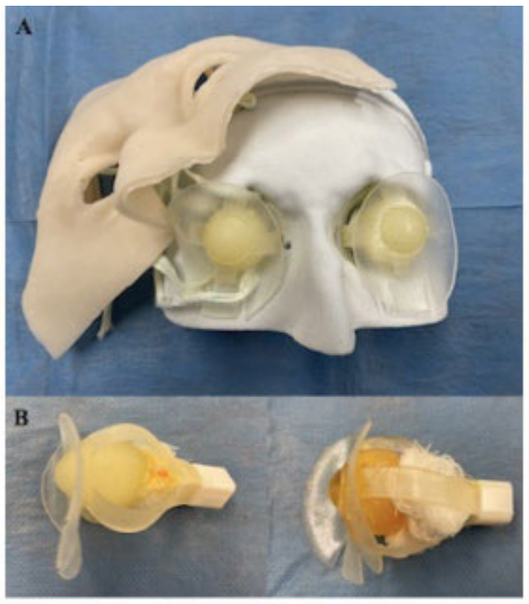

Figure 2: Retrobulbar block simulation model (A) with intraconal placement of simulated anesthetic in the right eye and globe penetration with intraocular placement of simulated anesthetic in the left eye (B).

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FEATURED SPEAKERS:
P. DANIEL KNOTT, MD AND RAHUL SETH, MD, FACS

Moderator: Tanuj Nakra

Friday, November 3

8:53 – 9:18 am

Gender-affirming Facial Surgery

P. Daniel Knott, MD

9:18 – 9:43 am

Gender-affirming Facial Surgery

Rahul Seth, MD, FACS

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10:26 – 10:32 am

Response of Twenty-One Hyaluronic Acid Fillers to Recombinant Human Hyaluronidase

Kristen Park[1], Preeya Mehta[1], Femida Kherani[2,3], Wendy Lee[4], Julie Woodward[5], Jill Foster[6], Sandy Zhang-Nunes[7]
[1]Keck School of Medicine, Los Angeles, California, United States, [2]Ophthalmology & Visual Sciences, University of British Columbia, Vancouver, Canada, [3]Surgery, Cumming School of Medicine, Calgary, Canada, [4]Ophthalmology, Bascom Palmer Eye Institute, Miami, Florida, United States, [5]Oculoplastic and Reconstructive Surgery, Duke University Eye Center, Durham, North Carolina, United States, [6]Ophthalmology, Ohio State University, Columbus, Ohio, United States, [7]Ophthalmology, USC Roski Eye Institute, Los Angeles, California, United States

Introduction: There is a large variety of hyaluronic acid fillers that are commercially available for aesthetic and clinical applications. One favorable aspect of hyaluronic acid fillers is the option of dissolution with the use of hyaluronidase, which may be necessary for serious complications from vascular occlusion and for less acute complications such as overfilling or sensitivity reactions. With the increasing number of fillers that enter the market, it is crucial to understand each of these fillers' responsiveness to hyaluronidase.

Methods: 0.2 mL aliquots of twenty-one hyaluronic acid fillers were placed on slides. 20 units of recombinant human hyaluronidase were injected into the aliquots every 30 minutes for a total of 120 units recombinant human hyaluronidase injected over 3 hours. With each injection, videos and photographs were taken from bird's-eye and lateral views to measure aliquot height. Stirring videos were graded by three oculoplastic surgeons using a four-point reference scale, and these grades were used to categorize each filler's responsiveness.

Results: Restylane Lyft, Restylane-L, and RHA 1/Redensity were the least resistant fillers. The moderately resistant group comprised a wide range from Restylane Silk, Juvederm Volbella, Revanesse Versa, Belotero Balance on the less resistant side, to Juvederm Vollure, RHA2, Restylane Contour, Juvederm Ultra, Restylane Refyne, Belotero Intense, Restylane Kysse, RHA 3, Juvederm Ultra Plus, Restylane Defyne on the more resistant side. The most resistant were RHA4, Juvederm Voluma, Belotero Volume, and Juvederm Volux. The more resistant fillers needed approximately 100 units of hyaluronidase per 0.2 mL aliquot of filler to dissolve, and the most resistant needed 120 units/0.2 mL of filler for dissolution.

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Conclusions: With the increasing popularity of fillers comes the increasing need to dissolve them for both ischemic and non-ischemic complications. The majority of hyaluronic acid fillers available on the market are very resistant to hyaluronidase. It is important to consider this when choosing a filler and the amount of hyaluronidase to dissolve a particular filler when needed.

Figure 1

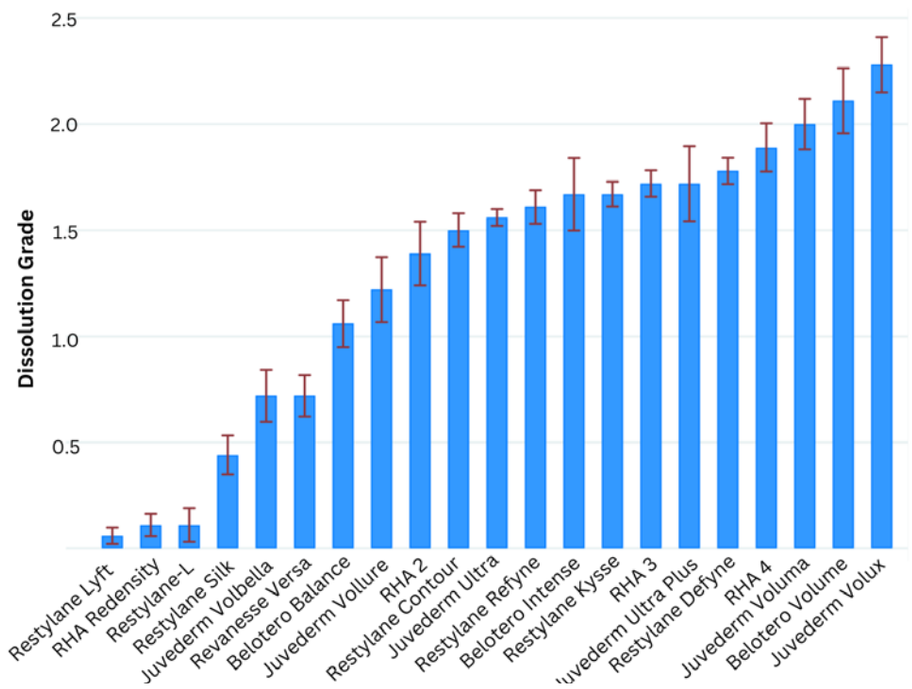

Figure 2

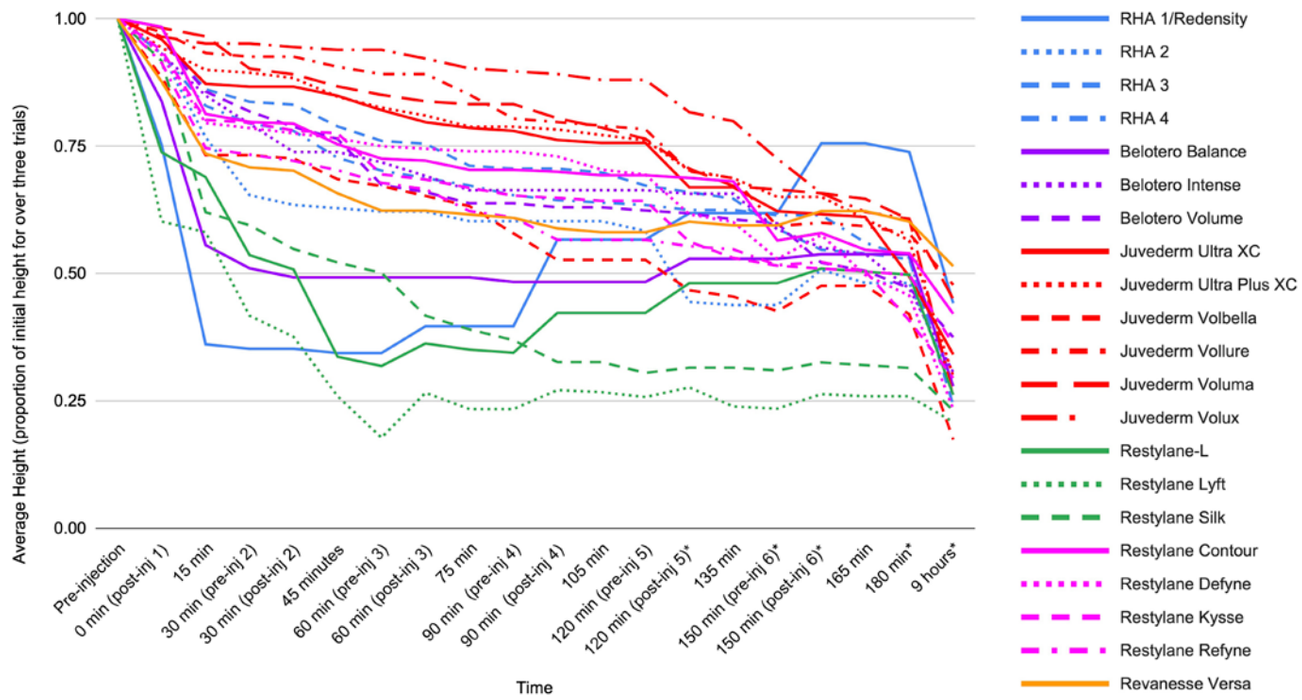

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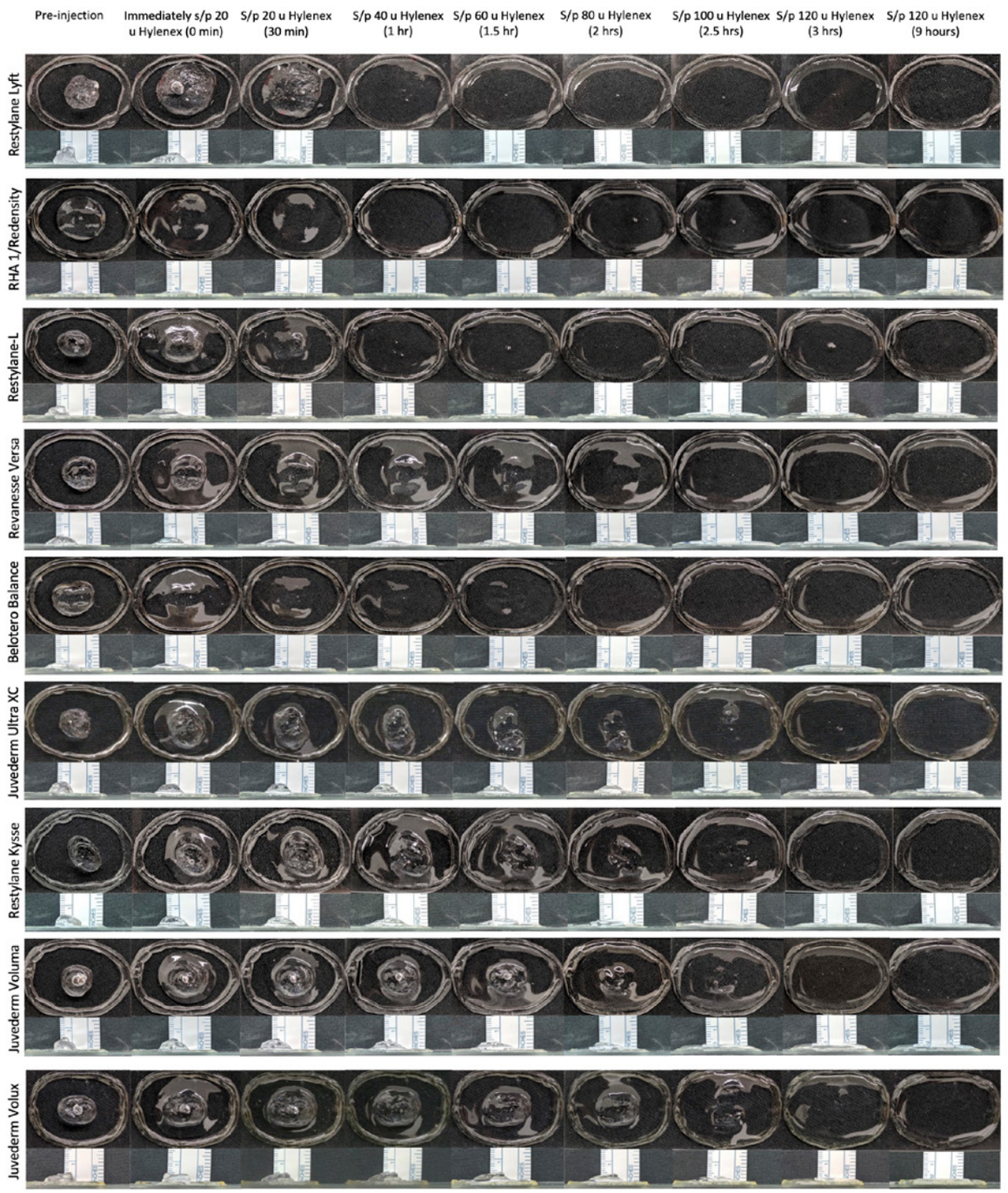
Figure 3



10:32 – 10:38 am

Designing an Electronic Layered Facial Model for Safe Injections of Fillers to Avoid Facial Vasculature

Natalia Kwiecien[1], Nick Izban[1], Aivah Roubal[1], Alexandra Nonn[1], Macoy Socha[1], Cat N Burkat[2]
[1]College of Engineering, University of Wisconsin - Madison, Madison, Wisconsin, United States, [2]Oculoplastics, Orbital, & Cosmetic Facial Surgery; Dept of Ophthalmology and Visual Sciences, University of Wisconsin - Madison, Madison, Wisconsin, United States

Introduction: Facial filler procedures have significantly grown in popularity over the past few decades. From 2000 to 2020, the number of procedures for Botulinum Toxin Type A rose by 459%.[1] Incorrectly placed injections during procedures could be catastrophic for a patient, as direct injection of filler material into or near a vessel can cause obstruction or interruption of vascular supply, causing facial necrosis or blindness.[2] This study aims to determine if an electronic layered anatomic facial model can be a useful teaching/practice tool for correct injection placement.

Methods: The team first crafted a 3D printing file to act as a base structure for the model, which allowed easy reproducibility of the model for repeated testing and design changes. Soldering of 20-gauge copper wiring allowed the team to have a small artery break off yet also twist the wiring in areas of greater arterial diameter while also maintaining high conductivity. As part of the arterial web, an Arduino powered switch circuit offered ample current to run through the web that once obstructed by a needle would illuminate an LED and sound a buzzer (Figs 1,2,3). We conducted multiple quantitative tests in order to validate the accuracy and effectiveness of the anatomic model. Most efforts were focused on the silicone skin like layer of the model to achieve the proper thicknesses. To test this, a caliper was used to measure thickness in the forehead, chin, and chin regions of the silicone layer and averaged out of 10 trials. These values were then recorded and compared to known thickness values. Following the skin thickness testing a wire mesh and circuit accuracy test was conducted to validate the feedback response as properly functioning. Proper responses were classified as activation of LED and buzzer sound when the needle made contact with the wire mesh, and no response when no contact was made. At each testing site, the number of times the LED and audible buzzer activated was recorded out of 5 trials of forced contact.

Results: The results from the skin thickness test found the actual and measured thickness values similar in the range of 3% to 19% difference. A T-Test2 was run between the actual and measured groups using MATLAB which resulted in a P value of 0.4002. This p-value exceeded the set alpha of 0.05 resulting in failure to reject the null hypothesis which stated the two sets of data have the same mean. Because of this, the actual and measured groups were found to not have a statistically significant difference, validating the anatomical similarity of the silicone layer thickness.

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Conclusions: The results of this study suggest that the layered facial model is an effective teaching device for using facial filler in injection procedures, as it helped alert the injector both visually with a red light as well as an audible buzzer sound when a vessel was contacted. It has accurate electronic outcomes as well as near accurate skin thickness in the silicone model with an added bonus of correct sizing of arterial diameters with the copper soldered wiring. This model is a helpful option to reduce the number of negative outcomes and adverse effects related to injections. We validated the wire mesh and circuit as functional from the wire mesh and circuit accuracy test. At each junction, wire end, and every inch on the facial and temporal "arteries", proper responses were recorded with 100% accuracy. Further edifications are being performed.

Figure 1

Figure 2

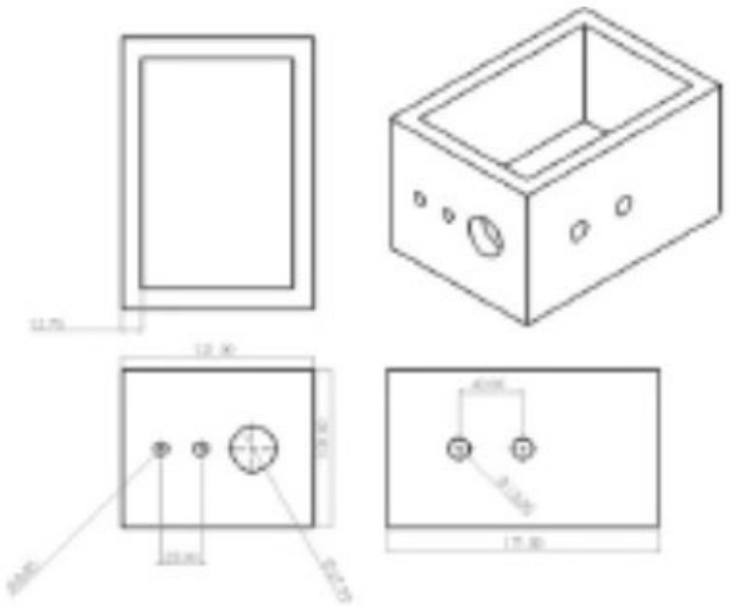
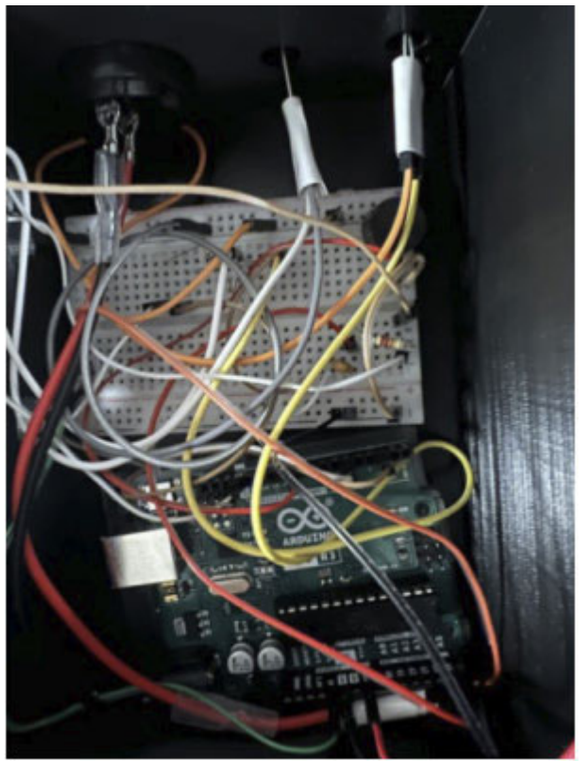


Figure 3



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10:38 – 10:44 am

A Comparison of Fibrin Glue Versus Suture for Anchoring Fat Pedicles in Transconjunctival Lower Eyelid Blepharoplasty

Ryo Kikuchi[1], Kanjanawan Meeprasertsagool[2], Duangmontree Rojdamrongratana[2], Sawa Minohara[2], Yuji Yamana[2], Masahiro Fujimoto[2], Masashi Mimura[2], Tomoyuki Kashima[3]
[1]Oculofacial Clinic Tokyo, Tokyo, Japan, [2]Singburi, Thailand, [3]Oculoplasty, Tokyo, Japan

Introduction: Lower eyelid blepharoplasty involves a variety of surgical techniques. In conventional procedures, fat pedicles are temporarily sutured with external skin or internally fixed with periosteum to anchor the fat. In this research, we compare a new method of anchoring fat with fibrin glue, which requires no sutures, to the conventional way of temporarily suturing with external skin.

Methods: We retrospectively collected data from two oculofacial clinics in Japan to identify 127 patients who underwent transconjunctival lower eyelid blepharoplasty with fat transposition to correct tear troughs between April 2017 to April 2022. The patients were divided into two groups: 55 patients had the repositioned fat anchored with sutures, and 72 patients had the fat anchored using fibrin glue. We focused on the score of postoperative complications (figure 1) multiple times following surgery, including one week, two weeks, one month, two months, and three months after the operation. Additionally, we evaluated postoperative complications.

The Severity of Skin Color Changes
We found that 57.14% of patients who underwent surgery with the suture procedure were classified as Grade 2, and 42.85% were categorized as Grade 3 in the first week post-operation, while patients who used fibrin glue were classified as Grade 1 at 54.54% and no one had Grade 3 skin changes in the first week. The severity of skin color changes was significantly less with fibrin glue than with the suture technique.

The Severity of the Range of Skin Contusion
Most patients who underwent the suture technique had Grade 3 eyelid contusion in the first two weeks, with 71.42% experiencing this in the first week and 36.36% in the second week. In contrast, only 36.36% of fibrin glue patients had severe contusions.

The Severity of Tension in the Skin
None of the patients who had fat anchored with fibrin glue had Grade 3 tension; in contrast, 2.04% of patients who were sutured were defined as having Grade 3 severity. Comparing before and after the operation, patients who had fat anchored with fibrin glue were not

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only considerably less skin tense than the other group at two weeks after surgery, but their outcomes were also better at one month post-operation.

Complications
In the suture group, there were 5 cases of under correction, 2 cases of ectropion, 1 case of conjunctival adhesion, 1 case of hematoma, and 1 case of infection out of 55 cases. In the fibrin glue group, there were 4 cases of under correction, 3 cases of conjunctival adhesions, 1 case of ectropion, and 1 case of scar formation of the inferior oblique muscle.

Conclusions: Among patients who underwent transconjunctival lower eyelid blepharoplasty with fat transposition, the use of fibrin glue produced a substantially lower severity of skin coloring changes and tension of hematoma in the first few weeks of post-operation compared to the sutures. There was no significant difference in the frequency of complications between the two groups.

Figure 1

Score	0	1	2	3
Color	No change	Yellow	purple	Red or black
Range	No change	Only lower eyelid	Beyond the orbital margin or subconjunctival hemorrhage	Extend to the upper eyelid
Tension of Eyelid	No tension	mild tension (MRD-2 change is 1-2mm compared to pre-operation)	moderate tension (MRD-2 change is ≧3mm compared to pre-operation)	severe tension (MRD-2 change is ≧3mm compared to pre-operation and it is difficult to open eyelid)

Figure 2

Complication Outcomes	Surgical Technique for Anchoring Transposition Fat: Suture (n = 55)	Fibrin Glue (n = 72)	P Value
Changes in Skin Color			
0-1 week	2.43 (7)	1.45 (11)	0.001
1-2 weeks	1.27 (11)	1.2 (15)	0.47
2-4 weeks	1.44 (16)	1.27 (18)	0.38
1-2 months	1.21 (28)	1.18 (33)	0.87
2-3 months	1.15 (13)	0.62 (21)	0.1
Range of Eyelid Contusion			
0-1 week	2.57 (7)	1.82 (11)	0.1
1-2 weeks	1.64 (11)	1.47 (15)	0.7
2-4 weeks	1.63 (16)	1.83 (18)	0.6
1-2 months	1.32 (28)	1.39 (33)	0.81
2-3 months	1.15 (13)	0.62 (21)	0.15
Tension of Eyelid Swelling			
2 weeks	0.5 (10)	0 (5)	0.05
4 weeks	0.46 (49)	0.15 (69)	0.001

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10:44 – 10:50 am

Plasma Exeresis for Xanthelasma – The New Edge Management, Our Initial Experience in Indian Population

Shubhra Goel
Oculofacial Plastics and Cosmetic Surgery, Clinica Fai, Hyderabad, India

Introduction: Xanthelasma (XP) is a common eyelid and periocular skin cholesterol deposit. While these are not harmful but can be cosmetic blemishes to the patient. There have been different treatment modalities in literature- Trichloroacetic acid peels, radiofrequency excision, surgical removal, and cryotherapy. These treatment modalities have their respective risks and limitations. The recurrence after primary removal has been reported up to 40%. In addition, post-procedure pigmentation and scar formation are not uncommon. We present our initial experience in Indian patients with a new treatment method using a plasma exeresis device (Plexr®, GMV, Italy). It is a non-invasive, non-ablative, outpatient department technique, where the air between the tip of Plexr Pro and the skin produces plasma from atmospheric gas. This plasma is like a bolt of micro lightning that acts directly only on the outer layer of the skin for its controlled submission and collagen synthesis with no collateral damage.

Methods: 10 patients, with bilateral upper or lower lid XP, were assessed and treated. Each patient was photographed pre and post-procedure. All 10 patients belonged to different Fitzpatrick skin types. The number of plasma cycles was decided based on the size and depth of XP. Any repeated session was performed after a gap of a minimum of 3 weeks. Patients were followed up for a minimum of 6 months after the last cycle of exeresis. The outcome of the procedure was assessed by disappearance, recurrence, pigmentation, and scaring at the site XP and the skin.

Results: 2 out of 8 patients had complete disappearance of XP with a single session of plasma sublimation. The remaining 8 needed 3 more repeated sessions, 3 weeks apart. All 10 cases had no recurrence, or post-inflammatory pigmentation at the end of the 6-month follow-up. 2 cases had mild hypopigmented scar which was invisible in photographs. A survey for patient satisfaction scored 9 of 10 for the cosmetic outcome, ease of the procedure, and post-procedure rehabilitation.

Conclusions: We present plasma sublimation, with a plasma exeresis device (Plexr®, GMV, Italy) as a new and innovative method for the treatment of XP in the Indian population.

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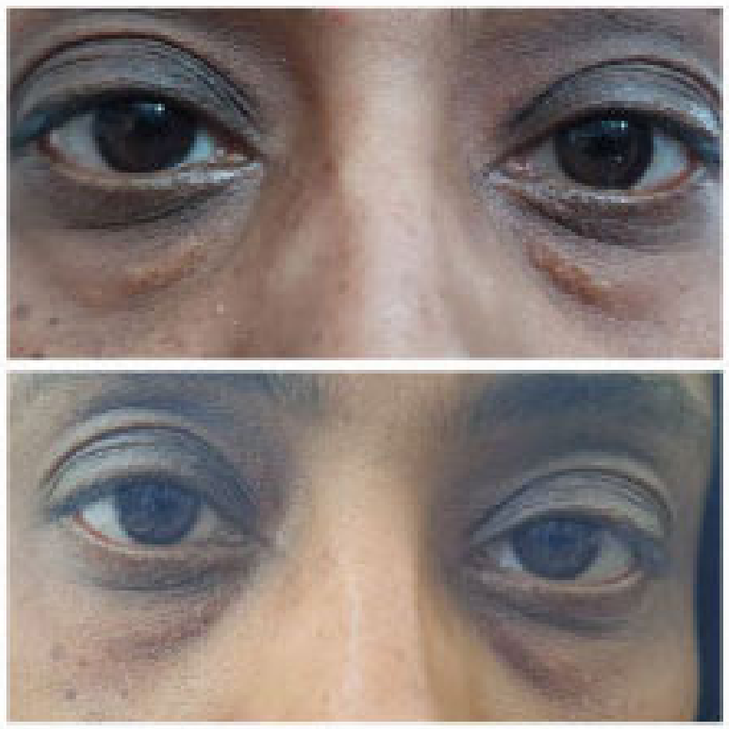
The advantages of this technique include excellent efficacy, minimal downtime, increased safety, and predictability of results. Plexr Pro is a portable device, easy to use, and ideal for office use. The cost of the treatment is affordable, and the risk of damage to the eye is minimal. The other advantages of this energy are immediate contraction of the collagen fibers, collagen reorganization, formation of new collagen, and renewal of the epidermal tissue. Hence, there is no scar or residual contraction at the site of lesion removal.

It is our limited experience with 10 cases of different Fitzpatrick skin types in Indian patients with a mean follow of 6 months. As part of the ongoing study, recruitment of more patients and longer follow-ups will be needed and performed.

Xanthelasma is a complex condition, and while various treatment options are available, Plasma Plexr Pro is a cheaper, more reliable, non-invasive, and more predictable alternative to consider.

Figure 1



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10:50 – 10:56 am

Surgical Factors Associated with Clinically Significant Eyelid Edema in Patients who Underwent Blepharoplasty

Kristen Park[1], Sarah Guo[1], Preeya Mehta[1], Alice Shen[2], Christine Bokman[3], Jessica Chang[1], Sandy Zhang-Nunes[1]
[1]USC Roski Eye Institute, USC Keck School of Medicine, Los Angeles, California, United States, [2]Byers Eye Institute, Stanford Health Care, Palo Alto, California, United States, [3]Frantz Eye Care, Frantz Cosmetic Center, Naples, Florida, United States

Introduction: Severe postoperative edema after eyelid surgery can have negative clinical and psychological effects. Unfortunately, the contributing factors to severe edema are not well understood. In this study, we investigated whether surgical factors, including surgical techniques, procedures, and suture type, are associated with clinically significant eyelid edema (CSEE)[1] in patients following upper eyelid surgery.

Methods: A retrospective chart review was performed on 270 patients who underwent blepharoplasty with or without additional external levator advancement, lid crease formation, brow ptosis repair, or lower eyelid surgery by two oculoplastic surgeons at a single academic institution between December 2021 and December 2022. Postoperative photos were graded by two independent physician graders for eyelid edema using a standardized 4-point grading scale ranging from 0 (no edema) to 3 (severe edema) (Figure 1). Clinically significant eyelid edema (CSEE) was defined either as having an edema grade of 3 at any point postoperatively or any grade that was 1 or greater after 90 days post-operatively. Patients who did not undergo upper eyelid surgery were excluded or who did not have postoperative photos were excluded. Descriptive statistics were used to compare surgical characteristics between groups with and without clinically significant edema. Logistic regression controlling for racial background was used to compare categorical data. All analyses were conducted using Stata version 16.1 (StataCorp LLC, College Station, Texas). Statistical significance level was defined as $p < 0.05$.

Results: Of 270 patients included in the study, 57 patients developed CSEE. We found that blepharoplasty with "mini enhancement," in which the skin is closed with a running polypropylene or plain gut suture with incorporation of the free edge of the levator aponeurosis into every other pass to help with lid crease formation, was associated with higher risk of CSEE. While only 12.5% of patients who underwent blepharoplasty without mini enhancement developed CSEE, 40.5% of those with a mini enhancement did ($p = 0.000$). Blepharoplasty with lid crease formation, mostly in Asian patients, in which several interrupted polyglactin 910 or silk sutures are placed from the orbicularis muscle to the deeper tarsus, was not associated with increased CSEE (16.7% with versus 12.5% without, $p = 0.408$). There was no increased risk of CSEE with the addition of external levator advancement (24.8% with versus 18.9% without, $p = 0.246$),

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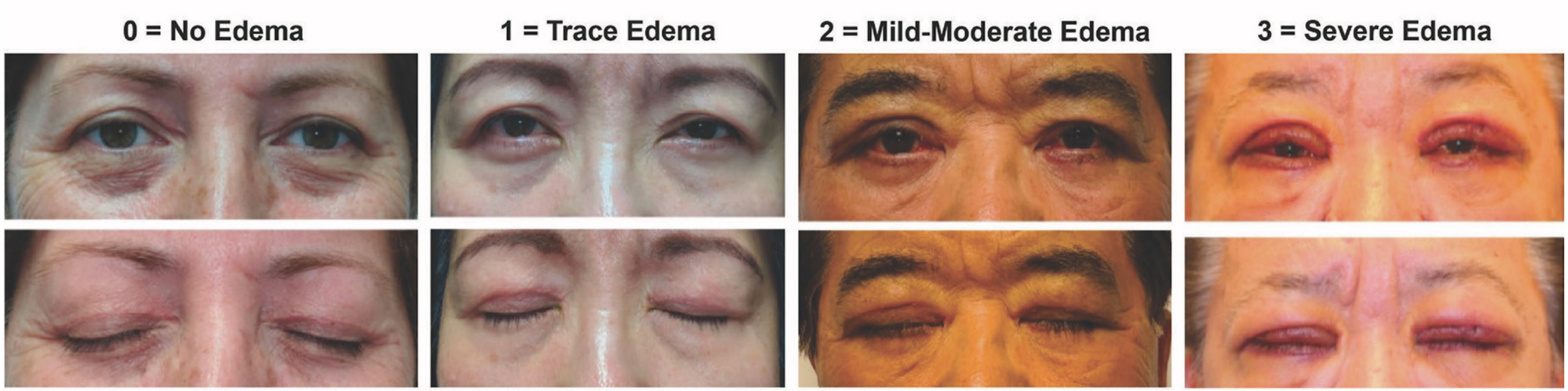
internal ptosis repair (15.8% with versus 22.2% without, p = 0.499), direct or endoscopic brow repair (16.7% with versus 23.4% without, p = 0.247), or lower eyelid surgery (28.6% with versus 20.1% without, p = 0.215). Finally, there was no increased risk of CSEE based on suture type: silk, polyglactin 910, plain gut, or polypropylene.

Conclusions: In patients who underwent blepharoplasty, mini crease enhancement was significantly associated with CSEE, even after adjusting for race.

Figure 1



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10:56 – 11:02 am

Tragal Contouring During Facelift Surgery: A Novel Technique for Prevention of Postoperative Tragal Distortion

Tanuj Nakra[1,2], Karen Brown[1]
[1]TOC Eye and Face, Austin, Texas, United States, [2]Department of Ophthalmology, Dell Medical School, The University of Texas at Austin, Austin, Texas, United States

Introduction: Posttragal incisions offer the benefit of avoiding a visible scar in this region. However, posttragal incision design can lead to tragal deformity if there is inadvertent tension with closure or advancement of the thicker cheek skin onto the tragus without sufficient thinning of the skin. [1-17] The most common postoperative tragal deformities after facelift include blunting of the tragal contour, visible external auditory meatus, blunting of the anterior incisure and/or intertragal incisure, loss of the preauricular sulcus, and loss of tragal height. These tragal deformities are perceived negatively by patients[2] and are visible evidence of prior surgery. (Figure 1) Techniques to avoid these complications have been well described. A tension-free skin closure is advocated to minimize anterior distortion of the tragus. Normal tragal projection and contour can be maintained with sufficiently tension-free closure, defatting of the advanced skin, customizing the incision to preserve prominent supratragal tubercles or intertragal incisura, and placing pretragal tacking sutures to the parotid fascia in the pretragal sulcus to avoid sulcus effacement.[1-17] These techniques are important considerations with management of the tragus and pretragral sulcus during facelift. However, additional techniques to further minimize the risk of tragal distortion are welcome adjunctions to facelift surgery in the persistent goal to optimize patient outcomes. Here we present a novel technique of tragal cartilage manipulation to prevent anterior displacement of the tragus and meatal show.

Methods: This a retrospective review of a single surgeon's cases of tragal contouring during facelifting in a private practice. Using a 4 point scale, blinded graders reviewed pre and postoperative photos for peritragal contour, tragal contour, scar visibility and overall aesthetic outcome. Subjective satisfaction was reviewed using a 4 point scale at final follow-up. Patient charts were reviewed for demographic information, as well as complications, infections, and postoperative interventions. During closure of the facelift, (1) the anterior mucopericondrium of the tragal cartilage was stripped, (2) the superior pole of the tragal cartilage was trimmed, (3) the tragal cartilage was scored vertically, (4) a horizontal mattress 4-0 polypropylene suture was placed to create a convex anterior face, (5) and deep skin sutures were placed anterior to the tragus secured to the immobile SMAS. (Figure 2)

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Results: 28 patients were identified who underwent this modified deep-plane lip lift technique. Average follow-up was 8 months (range 4 months – 12 months.) 24 patients were female and 4 male. Average patient age was 62 years. Blinded graders reviewed peritragal contour, tragal contour, scar visibility and overall aesthetic outcome to be "good" or "excellent" improved for all measures. Subjectively, patients judged their overall tragal aesthetic outcome to be "excellent" in all cases. There were no cases of clinical scarring or infection.

Conclusions: Tragal contouring during facelift surgery is a novel technique that is safe and effective for prevention of postoperative tragal distortion — a common facelift complication. The technique can be easily incorporated into routine facelift surgery.

Figure 1

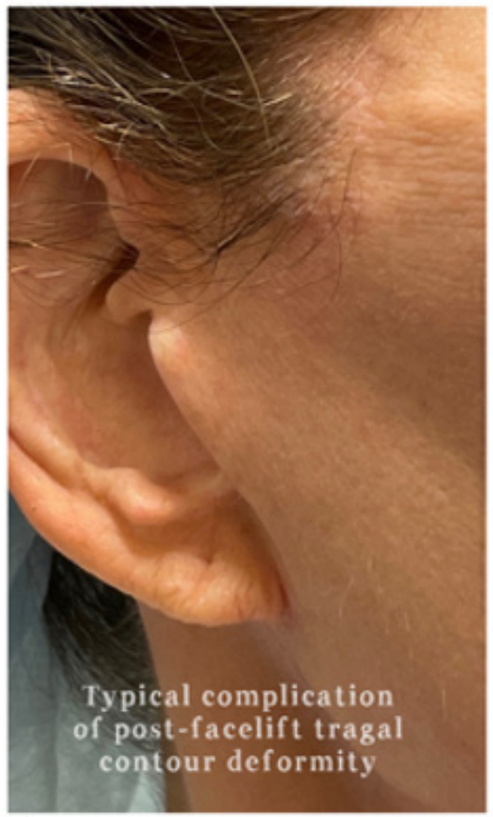

Figure 1.

Figure 2

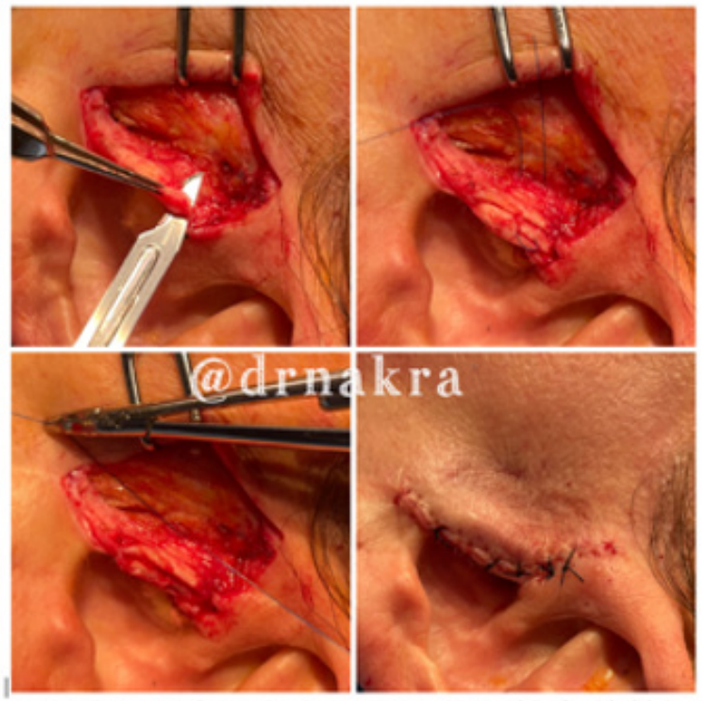

Figure 2. Illustration of surgical technique. During closure of the facelift, (1) the anterior mucopericondrium of the tragal cartilage was stripped, (2) the superior pole of the tragal cartilage was trimmed, (3) the tragal cartilage was scored vertically, (4) a horizontal mattress 4-0 polypropylene suture was placed to create a convex anterior face, (5) and deep skin sutures were placed anterior to the tragus secured to the immobile SMAS.

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SASOPRS LUNCH SESSION (NON-CME)

Friday, November 3

Moderator: Michael J. Hawes

12 – 1 pm

Transitions in Practice

12:05 – 12:15 pm **Transitions in Practice** – John B. Holds

12:15 – 12:25 pm **Transitions in Practice** – Thomas A. Bersani

12:25 – 12:35 pm **Failed Retirement** – Francis C. Sutula

MASTER SURGEONS SESSION

Friday, November 3

Moderators: Robert C. Kersten and Marie Somogyi

1:01 – 1:05 pm

Missing a Master - Remembrance of Richard Anderson

John B. Holds

1:05 – 1:11 pm

The History of Entropion

Philip Custer
John F. Hardesty, MD, Department of Ophthalmology and Visual Sciences, Washington University in St Louis, St Louis, Missouri, United States

Introduction: This presentation will draw upon original manuscripts and images to explore the history and evolution of the treatment for various types of entropion, and how this condition defined the specialty of Ophthalmology.

Methods: Publications were identified with PubMed searches and cross referencing. The staff at the Bernard Becker Medical Library and its Archives & Rare Books Division assisted in obtaining original manuscripts. Foreign language texts were translated with online services.

Results: The literature review included 549 publications published in English (n=372), French (n=90), German (n=66), other languages (n=21). These papers cross referenced the work of an additional 273 surgeons. In total, descriptions of 1051 procedures were accessed. The treatments involved different methods to address involutional entropion (n=353), either involutional or cicatricial entropion (n=321), cicatricial entropion or trichiasis (n=292), and trichiasis (n=85). Figure 1 contains a timeline of selected historic surgeons. The distribution of published procedures over time is shown in Figure 2 (Involutional) and Figure 3 (Cicatricial, Trichiasis).

Conclusions: The history of entropion began around 700BC and involves war and disease, fire and acid, clamps and agglutinins, alcohol and women's hair. The ravages of trachoma were a driving force in the constantly evolving nature of entropion surgery, and many procedures were used both for cicatricial and involutional disease.

Originally lids were everted through shortening eyelid skin and muscle with resection, cautery, caustics, and flaps. Orbicularis function was altered with myotomy, chemical denervation, or mobilization of flaps. Canthotomy was used to create marginal laxity in both involutional and cicatricial disease, and tarsorrhaphy employed to stabilize the margins. Sutures were placed to create anterior lamellar cicatrix, for rotational force, and to fixate the eyelid retractors. Retractor plication and horizontal shortening of the lid margin were performed separately and in combination. Various mechanical devices have been used to either redirect the lashes or reposition the lid margin.

Marginal blepharotomy, or performing posterior tarsal incision or excision, were often used in cicatricial entropion. Marginoplasty involved transposing skin or grafting different tissues onto the margin. Isolated trichiasis has been managed with epilation, lash cauterization (thermal, caustics), electrolysis, excision, radiation, and cryotherapy.

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In 1883, Story commented "Probably more operations have been invented for the cure of inversion of the eyelids than for that of any other abnormal condition of the human frame…" For much of history, entropion surgery was likely the most frequent ophthalmic procedure performed. Treatment of trachoma and entropion contributed to the development of specialized eye hospitals and recognition of ophthalmology as a specialty. A knowledge of the history of entropion will allow oculoplastic surgeons to appreciate the significance of this condition to our specialty and better understand the origins of current procedures.

Figure 1: Selected historic surgeons.

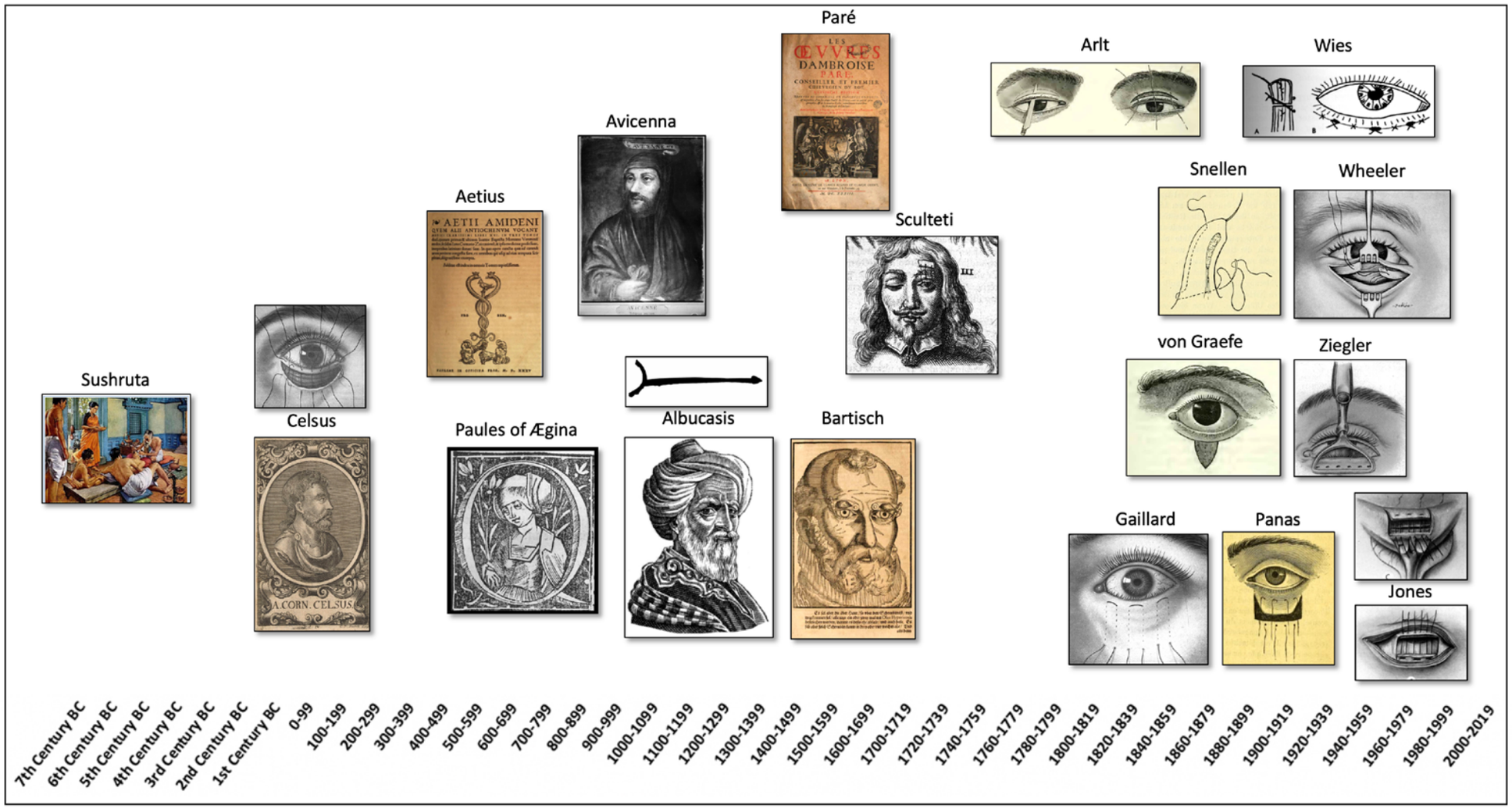

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Figure 2: Procedures for Involutional Entropion.

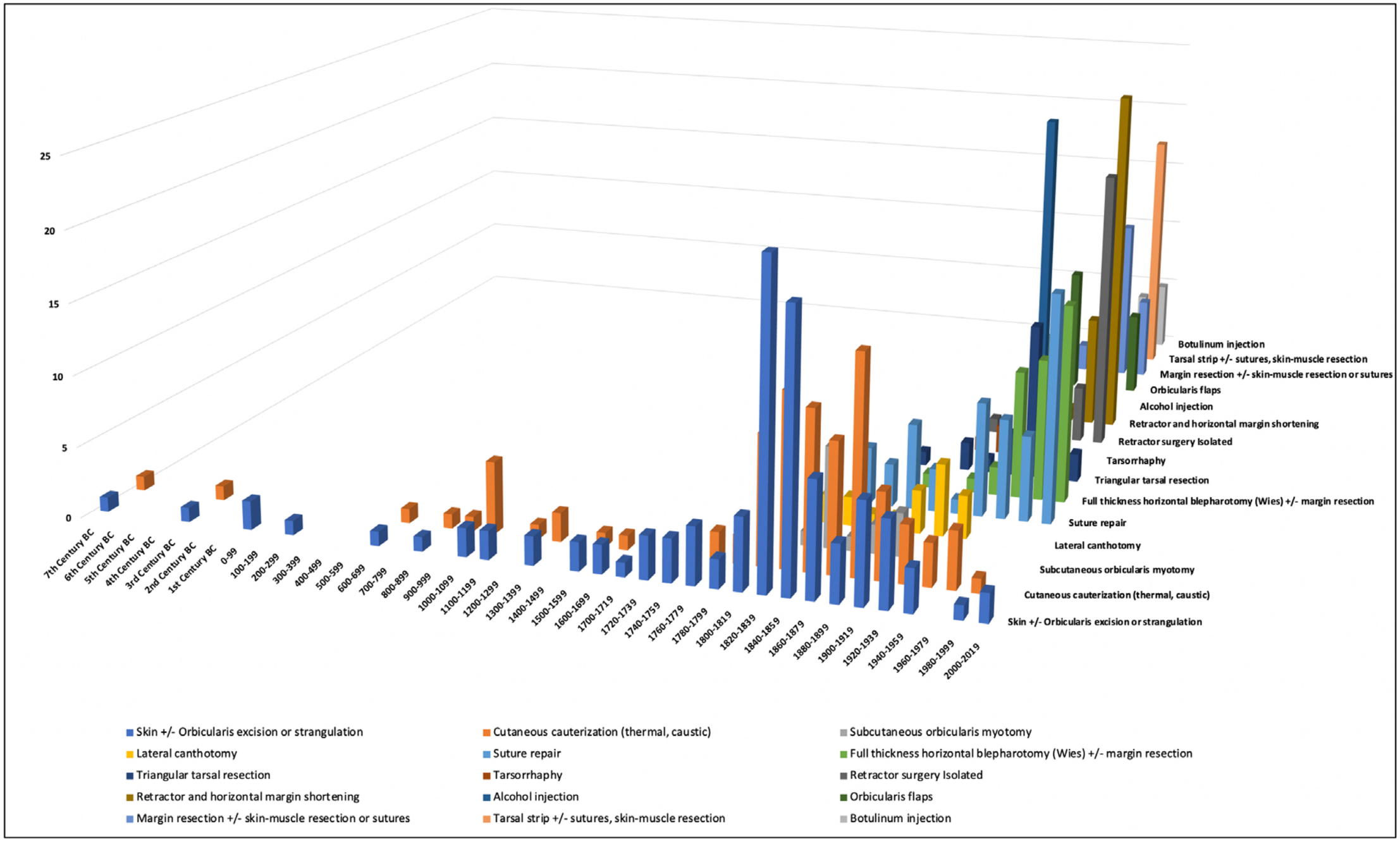

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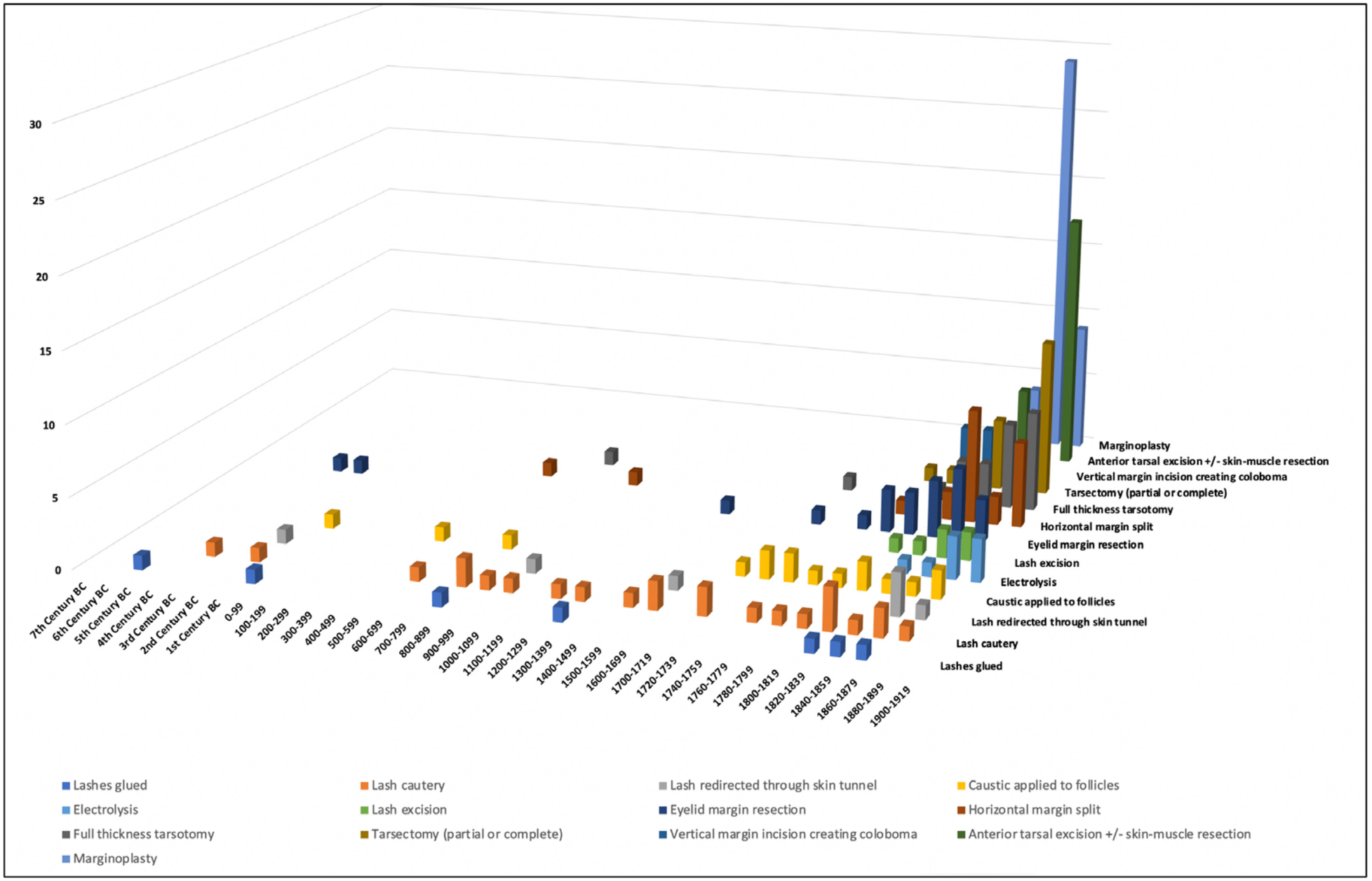
Figure 3: Procedures for Cicatricial Entropion and Trichiasis.



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1:11 – 1:17 pm

Cavernous Venous Malformation: Unique Growth Dynamics Offer Management Options for Orbital Apex Lesions

Gerald Harris
Department of Ophthalmology and Visual Sciences, Medical College of Wisconsin, Milwaukee, Wisconsin, United States

Introduction: The diagnosis of orbital cavernous hemangioma (cavernous venous malformation) is usually possible with imaging alone. Surgical excision may be simple or complex, with lesions in the anterior 2/3 of the orbit generally considered low risk. In the orbital apex, the tumor's growth dynamics can complicate surgical resection, but also offer management opportunities.

Methods: Analysis of the histopathology, micro-anatomic relationships and growth potential of orbital cavernous hemangiomas; consideration of surgical approaches; review of interventions short of complete resection.

Results: A cavernous hemangioma is a low-flow vascular malformation comprising interconnected endothelially-lined channels. We have postulated that pathogenesis involves an acquired local, low-grade hemodynamic imbalance that opens new channels and drives them into surrounding stroma. As the tumor slowly expands and a thin capsule is induced at the interface with normal tissue, persistent imbalance causes vascular budding into that fibrous perimeter. As the capsule continually reconstitutes just beyond the proliferating plexus, it must ultimately displace, compress, or fuse with normal structures. In the crowded orbital apex, dense fibrous union with visually critical structures may occur. The lesion's natural history can vary from spontaneous stabilization, or even shrinkage, to relentless slow growth. In the former, we can speculate that neovascular proliferation to that point equilibrated the local hemodynamic forces, removing the impetus for further expansion.

Since the tumor's micro-anatomic relationships and remaining growth potential are unknown at initial diagnosis, surgery for high-risk apical lesions is generally considered if there is a significant vision deficit at presentation or a documented, worrisome growth trajectory. In such cases, the surgical pathway is tailored to the tumor's location relative to the optic nerve, with the goals of careful separation from visually critical structures and complete excision.

A variety of interventions short of complete resection have stabilized or induced involution of apical hemangiomas. These include local surgical decompression and surface cauterization, local decompression and intralesional bleomycin, surgical exposure and intralesional anti-VEGF agents, stereotactic radiosurgery, and stereotactic fractionated radiation therapy. Although these involve widely

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varied therapeutic mechanisms, a common necessary and sufficient effect may be altering a minor disequilibrium of intra- and extravascular pressures that drives growth.

Conclusions: The management of high-risk apical hemangiomas should be individualized, but the lesion's growth dynamics allow consideration of a range of alternatives to "complete resection at any cost".

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1:17 – 1:23 pm

Endoluminal Lacrimal Duct Recanalization: Step by Step

Alexander Gerard Nino Gungab, Emmanuel Boniao, Blanche Lim, Gangadhara Sundar
Ophthalmology, National University Hospital Singapore, Las Pinas City, Philippines

Introduction: ELDR is a game changer in the realm of lacrimal surgery. Though external DCR is still the gold standard, endonasal DCR has since surpassed the former albeit both being "invasive" surgeries. ELDR offers a minimally invasive non-incisional approach in management of lacrimal duct obstructions. It restores natural lacrimal drainage system integrity and avoids surgical incisions of the skin or nasal mucosa and osteotomy with high patient acceptance and satisfaction in addition to reducing costs.

Methods: We present our step-by-step video on Endoluminal Lacrimal Duct Recanalization (ELDR) for nasolacrimal duct obstructions.

Results: Patient presented with bilateral tearing. On examination, patient had positive fluorescein dye disappearance test (FDDT) and otherwise normal inferior meatus on nasal endoscopy. Post ELDR, our patient had significant improvement with negative fluorescein dye disappearance test and good post operative flow of fluorescein present in tightly adherent inferior meatuses.

Conclusions: Along with other minimally invasive Oculoplastic procedures, Dacryoendoscopy which facilitates direct luminal visualization and ELDR as a reasonable alternative for lacrimal drainage surgeries without attendant complications seen conventional DCR surgeries. Adjuvants for procedure include balloon dacryoplasty with assisted patency. Thus, in suitable patients with focal luminal obstruction, ELDR is emerging as the primary procedure with increasing success and high patient satisfaction with faster recovery and minimal complications.

Figure 1

Figure 2

Figure 3

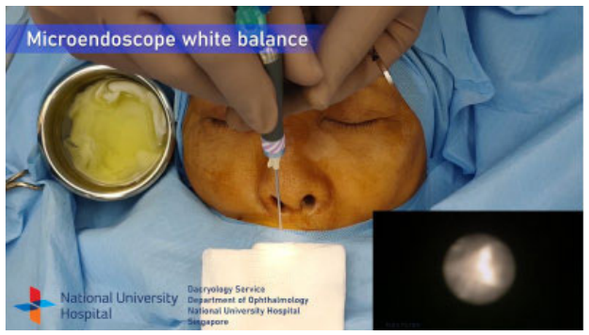
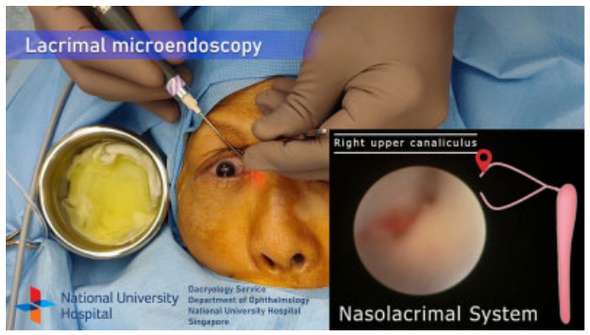


Figure 4



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1:23 – 1:29 pm

A Combined Approach for Puffy Eyelids in Caucasian Patients

Roberto Limongi[1,2], Marisa Figueiredo[1]
[1]Goiânia, Brazil, [2]Former president of Brazillian Oculoplastic Surgery Society, Goiânia, Brazil

Introduction: Although puffy upper eyelids are normal in Asians, this condition also can be found in Caucasians. Many factors are involved in the heaviness and puffiness of the upper eyelid such as eyebrow ptosis, a hypertrophic retro-orbicularis oculus fat (ROOF), and also droopiness of this fibrofatty soft tissue. Many surgeons use full-incision blepharoplasty to remove some orbital fat to ameliorate the problem. These authors propose a combined approach: Brassiere's sutures, the elevation of the Brow, and the exeresis of the Roof ("BEER" approach). This study was carried out to evaluate the clinical application (including the evaluation of photographs for the thickness of the upper eyelid) of upper blepharoplasty combined with the "BEER" approach for correcting puffy upper eyelids in Caucasian patients.

Methods: A total of 60 patients (60 females) with puffy upper eyelids were recruited from January 2021 to October 2022. Full-incision blepharoplasty combined with partial ROOF resection, internal browpexy, and Brassiere sutures, was performed by a single surgeon (RML).

Patients were excluded if undergoing multiple facial procedures had a history of lower blepharoplasty, fillers, or trauma to the midface region. Patients with profound canthal ligament laxity (e.g., floppy eyelid syndrome) were also excluded.

Using standardized photographs with the patient upright, the head and face in a neutral position, and the patient in primary gaze, three measurements were obtained preoperatively and > 6 months postoperatively.

A unique template was demarcated for the TPS area on each patient using preoperative and postoperative patient images. TPS area was calculated between the upper eyelid margin and the crease. These were measured at the eyelid lateral canthus along the eyelid medial canthus (Figure 1).

TPS area was calculated 3 times per side for each patient, and the average value per side was used. Next, the same template was superimposed on the corresponding postoperative images. TPS preoperative area was subtracted from TPS postoperative area to determine the amount of change (in milliliters).

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Pre- and postoperative images were analyzed with ImageJ 1.58 software (National Institutes of Health, rsbweb.nih.gov/ij/download). The software was calibrated using a corneal diameter of 11.5 mm to convert pixel measurements to millimeters. The data were submitted to preoperative and postoperative TPS area statistical analysis in millimeter square and comparisons were performed between pre and postoperative measures.

The institutional review board at the CBCO Brazilian Eye Surgery Center, Goiania, Brazil approved this study that adhered to the principles outlined in the Declaration of Helsinki and informed written consent to publish an identifiable photograph archival statement was obtained from each patient.

Surgical Technique

On each side, 3 to 4 cc of 2% lidocaine with 1:100,000 epinephrine was infiltrated into the eyelids. The preseptal orbicularis skin and muscle were removed with a size 15 scalpel blade and scissors. Hemostasis was achieved with conservative electrocautery.

Two points of fixation of ROOF, being posterior with an internal browpexy and inferior with brassiere suture. The brassiere suture technique was performed as follows. Before skin closure as above, three 6-0 polyglactin sutures were passed along the lateral fourth of the orbital rim, from the orbicularis oculi muscle adjacent to the inferior skin edge to the periosteum at the arcus marginalis and back to the orbicularis. The sutures attached the inferior orbicularis oculi muscle edge to the arcus marginalis of the lateral ROOF. Sutures were placed until there was a visible “plumping” of the sub-brow tissues.

Postoperatively, the wounds were dressed with combined anti-biotic/corticosteroid ointment four times per day for 1 week. Cold pads were applied off and on for 48 hours. The skin was cleansed with water and a neutral soap. The skin sutures were removed after 1 week.

Statistical Analysis

The TPS area variable showed normality and homogeneity when evaluated using the Shapiro-Wilk and Levene tests, respectively. Thus, the paired t-test was used to compare the TPS area before and after the surgical intervention. Variables were presented as mean and standard deviation. To specify the size of the effect of the intervention, Cohen’d was calculated (KELLEY; PREACHER, 2012).

All statistical analyses were performed in the Statistical Package for the Social Sciences version 18.0 (SPSS Inc, Chicago, IL). A p-value <0.05 was considered to indicate statistical significance.

Results: The mean age was 56 years. One hundred and twenty eyelids (60 patients) had blepharoplasty with brassiere sutures and internal ROOF sutures. The mean follow-up time was 8 months (range, 6-12 months). No significant complications were noted.

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The preoperative TPS was shorter in both groups separately and the blepharoplasty was successful in increasing the TPS in the postoperative period, which means blepharoplasty alone and concurrent brassiere sutures caused the lengthening of TPS (Table 1). Preoperative BFS was similar in both groups, and postoperative BFS decreased in both groups (Table 1).

A significant increase in TPS area was observed in the right eye (Cohen'd = -3.61), left eye (Cohen'd = -3.30), and both eyes (Cohen'd = -3.61) after treatment (Table 1; Figure 1), with a large effect size observed. No significant correlations were noted between the right and left upper eyelids.

There were no serious complications. Lastly, all patients were subjectively satisfied with the aesthetic improvements and no patient required any revision surgery or other interventions.

Conclusions: Brassiere's sutures, the elevation of the Brow, and exeresis of the Roof ("BEER" approach) can be used as a powerful tool to treat puffy eyelids in Caucasian patients.

These authors believe that a combined approach can improve patient satisfaction.

Figure 1

Figure 2

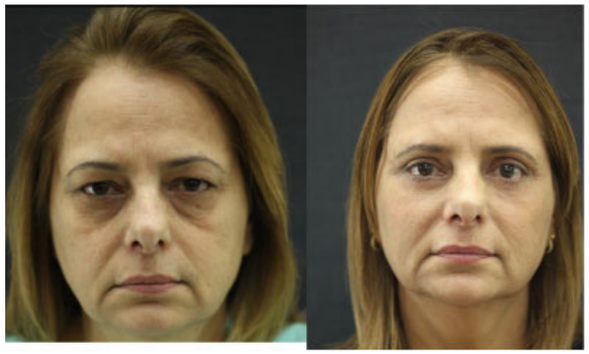

Figure 3

Figure 4

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1:29 – 1:35 pm

Is it Possible to Predict a Satisfactory Result after Cosmetic Eyelid Surgery?

Martin H. Devoto, Andres Diaz Ricci, Cecilia Gasparini
Somosmirada, Buenos Aires, Argentina

Introduction: As Oculofacial surgeons performing aesthetic surgery, the most valuable result is a satisfied patient[1]. It can be extremely frustrating to have an unhappy patient with, what we believe, is a satisfactory result[2,3]. Therefore, the ability to predict satisfaction is of extreme importance[4]. We studied our cosmetic eyelid surgery patients to try to find factors that can predict satisfaction.

Methods: We retrospectively studied 454 consecutive patients between (confirm date range), who underwent any combination of 7 cosmetic surgical procedures: upper lid blepharoplasty (ULB), lower lid blepharoplasty (LLB), fractionated CO2 laser, Autologous Fat Grafting (AFT), Minimally Invasive Vertical Endoscopic Lifting (MIVEL), Ptosis correction (Pt) and Direct Brow Lift (DBL). Patients answered the Dysmorphic Concern Questionnaire (DCQ)[5] before surgery. We studied age, gender, type and number of procedures performed, DCQ score, presence of complications, and history of previous fillers. At the 3-month follow-up visit, patients were given an outcome report survey to graduate their surgical results on a scale from 1 to 5, where 1 is Bad, 2 is Poor, 3 is Good, 4 is Very Good, and 5 is Excellent. Results were evaluated using a model of binary logistic regression in which the outcome variable was divided into two groups: 1 and 2 as Not Satisfied and 3, 4, and 5 as Satisfied

Results: 386 patients (85%) were female, the median age was 54.8 (9) years old. The median for the number of procedures was 2 (range 1-5). 202 of the 454 patients (44.5%) had a history of fillers. 25 patients had complications: chemosis, dry eyes, and superficial keratitis and others with a lower frequency. The distribution of surgical procedures is depicted in Fig 1. The satisfaction score is shown in Fig 2. DCQ score was significantly lower in the Satisfied Group (Median score 3) vs the Unsatisfied group (median 6) p=0.007 as seen in Fig 3. In the multiple binary logistical model, Fig 4, the variables Age, DCQ, and ULB resulted as significant: a patient having an upper lid blepharoplasty had 245% more chances of being satisfied [OR 3.45; IC95%(0.99 - 10.94); p-value 0.039], for each year of age there is a decrease of 5% of chances of being satisfied (OR 0.95; IC95%(0.90 - 0.99); p-value 0.048)

and for every point of the DCQ score there is a 19% decrease in the chances of being satisfied [OR 0.81; IC95%(0.71 - 0.92); p-value 0.0008] The number of simultaneous procedures, gender, the occurrence of complications, and the history of previous fillers were not found to have a significant association with postoperative satisfaction.

Conclusions: We found a significant positive association with upper lid blepharoplasty and a negative association with age and DCQ score, as predictors of patient satisfaction. All other variables were not associated with patient satisfaction in this population.
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Figure 1

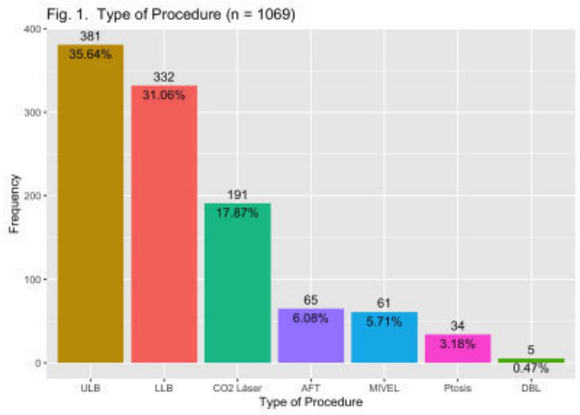


Figure 2

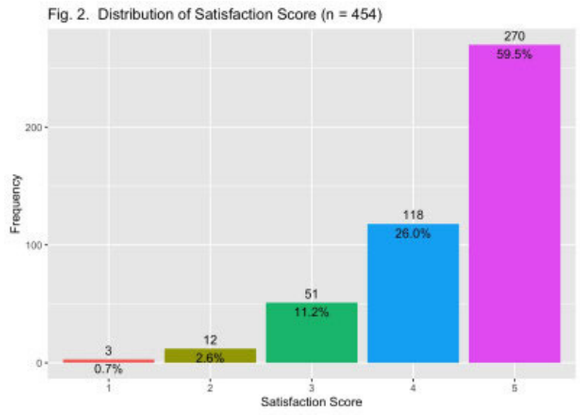
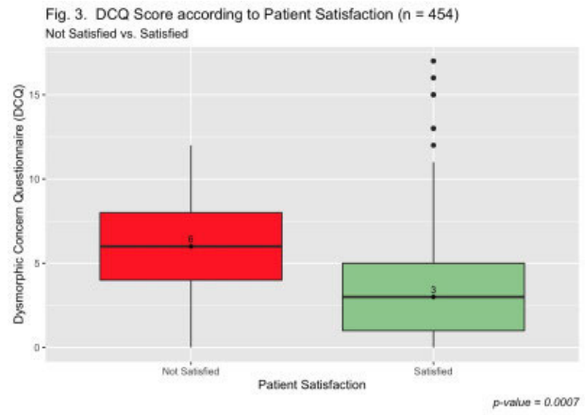


Figure 3



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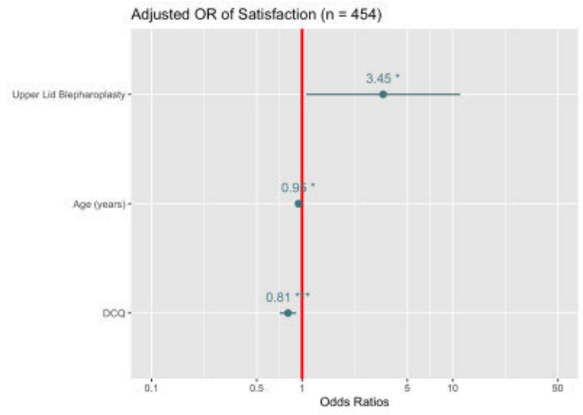

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1:35 – 1:41 pm

Vertical Endoscopic Lifting of the Midface

Francesco Bernardini
Oculoplastica Bernardini, Genova, Italy

Introduction: The midface is a key area of the central face and as such it has a major role in determining perceived patient aging and fatigue. A combination of tissue descent and fat atrophy participate in determine the major changes to this area. To date, the two most commonly used approach include either the trans-palpebral route or the deep-plane face lifting. We recently published the results of the endoscopic lifting for lateral canthal and lower lid malpositions. Herein we want to present the technical details and the results using the endoscopic approach in midface lifting in a consecutive series of patients coming from a single-author practice.

Methods: The tecnhnique consisted in a temporal incision followed by dissection of the temporal area in the plane superficial to the deep temporal fascia, visualization of the zygomatico-facial and zygomatico-temporal bundles and tunnelization across the zygomatic arch. Past the zygomatic arch, the key step is to fully release, under endoscopic visualization, the zygomatico-cutaneous ligament (ZMC) and to proceed with the dissection into the pre-zygomatic space and pre-maxillary space all the way down towards the naso-labial folds. The plane of dissection in this area is superficial to the zygomatic muscles, which protect the zygomatic branch of the VII nerve that lies below these muscles. Caution needs to be exerted in the caudal part of dissection when crossing the vertically oriented oprbicularis braches of the zygomatic nerve, which can be spared thanks to endoscopic control. Suture fixation was consisted in grasping the superficial tissues at the apex of the dissecet midface to the deep temporal fascia using one or two 3/0 polyglactin sutures.

Results: A total of 48 consecutive patients from june 2020 to july 2022 who underwent vertical endoscopic midface lifting by the senior author were included in this study: all patients were female aged on average of 46 years (range, 34-56 years). All patients had a minimum follow-up of >6 months. Variously associated procedures included temporal (100%) or fronto-temporal lifting (93%), lower 'eyelid lift' blepharoplasty (87%), upper blepharoplasty (80%) and fat grafting (76%) using the SEFFI technique. There were no complications attributable to the midfacial lifting in this series, namely no cases of oral incompetence, orbicularis apraxia/weaksness, or partial smile asymmetry. Aesthetic results were subjectively rated by patients to be satisfactory (4/5) or highly satisfactory(5/5) in 92% and good (3/5) in the remaining 8%.

Conclusions: Addressing the eyelid/cheeck junction and the naso-labial folds is the main goal of midface lifting and represents a crucial step in successfuylly rejuventaing a patient face. In my previous experience with sub-periosteal trans-palpebral dissection,

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results were inconsistent and often underwhelming despite full trans-oral periosteal releases and strong trans-orbital bone fixation. On the contrary, the vertical endoscopic midface lifting is based on a superficial dissection plane, above the zygomatic muscles, requires full release of the main ligamentous structure, the ZMC, followed by straighforward suture fixation of the fully dissected midfacial flap to the temporali fascia. While lifting of the midface allows to address midface descent, a full three-D result required concomitant filling of the atrophic fat compartments using fat grafting and addressing the lower eyelid in a high percentage of cases.

Figure 1

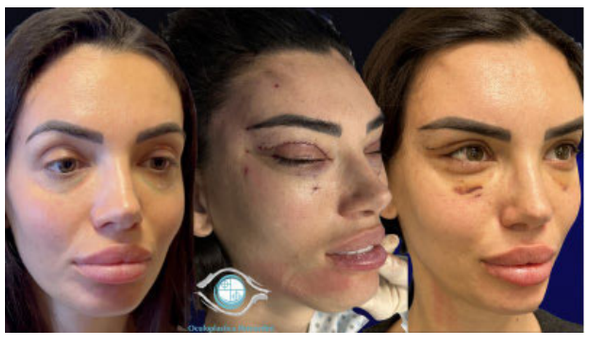

Figure 2

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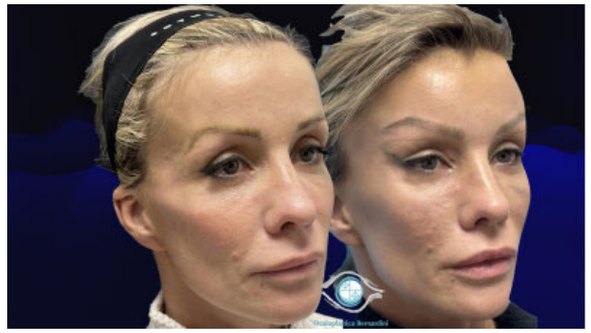

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HENRY I. BAYLIS COSMETIC SURGERY AWARD LECTURE

Friday, November 3

Moderator: Pete Setabutr

1:58 – 2:18 pm

Management of Eyelid Crease Abnormalities

Yoon-Duck Kim

2:26 – 2:30 pm

Combined Orbital Adipose Tissue and Activated Platelet Rich Plasma Fibrin Membrane Promotes Conjunctival Regeneration

Ying Chen[1,2], Kristen Ortega[1], Angela Gomez[1], Esther Roucaute[1], Daniel Pelaez[1,3], Sara Wester[1], Alfonso L. Sabater[1]
[1]Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, Miami, Florida, United States, [2]Ruiz Department of Ophthalmology, McGovern Medical School at UTHealth Houston, Houston, Texas, United States, [3]Al-Rashid Orbital Vision Research Center, University of Miami Miller School of Medicine, Miami, Florida, United States

Purpose: To evaluate the viability of a scaffold containing orbital adipose stem cells (OASC) and platelet rich growth factor (PRGF) and its wound healing effect on conjunctiva for potential use in cicatricial conjunctival disease and contracted orbital socket.

Methods: Orbital fat containing OASCs was obtained from medial fat during routine eyelid surgeries performed between 2019 and 2022. The processed orbital fat was combined with activated platelet rich plasma (aPRP) to create an aPRP/Orbital fat complex (Figure 1 and 2). Human primary conjunctival epithelial cells (HPCEC) were seeded and treated with different experimental conditions: 1) HPCEC with aPRP only, 2) HPCEC with orbital fat only, and 3) HPCEC with aPRP/Orbital fat complex. Cell proliferation assay was assessed at different time points. Cell migration assay was then performed to evaluate for wound closure, and immunofluorescence staining was used to characterize the cells in the different conditions.

Results: Proliferation assay illustrated that aPRP/Orbital fat complex contributes the greatest to cell proliferation (Figure 3). HPCEC incubated with aPRP and aPRP/Orbital fat complex further demonstrated migration and complete wound closure as demonstrated by dotted lines at 96 hours compared to other conditions (Figure 4). Immunofluorescence staining revealed positive staining for CK-13 (conjunctival cell marker) and CD34 (mesenchymal cell marker) in HPCEC treated with aPRP/Orbital fat complex.

Conclusion: We demonstrate here that aPRP/Orbital fat complex scaffold can facilitate conjunctival cell proliferation. This scaffold has regenerative and anti-fibrotic properties that may further promote conjunctival wound healing. The aPRP/orbit fat complex is easily obtainable in the OR setting and can potentially serve as an alternative graft in-vivo for treatment of cicatrizing ocular disease.

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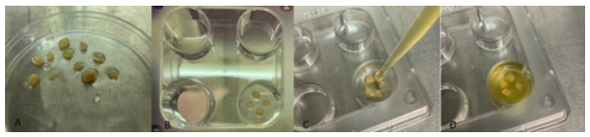
Figure 1



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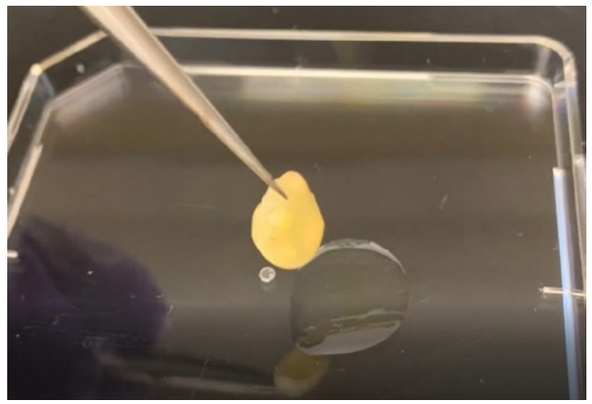

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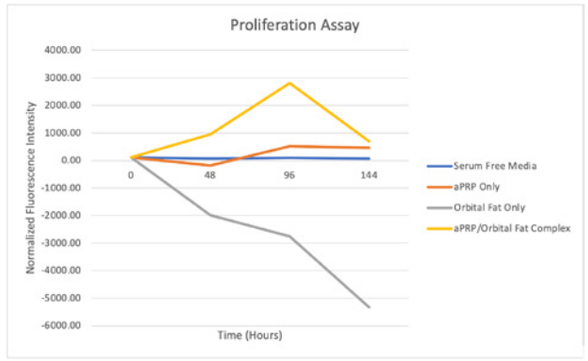

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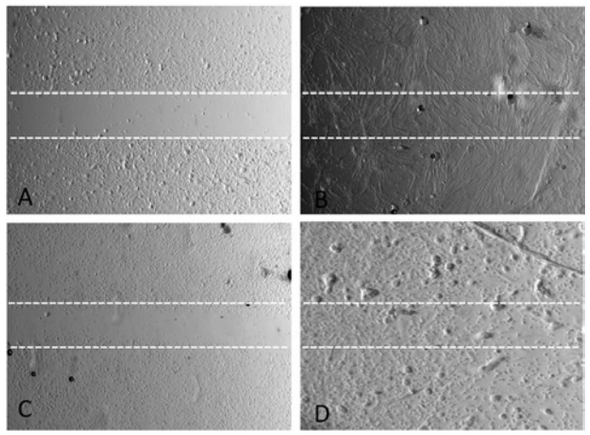

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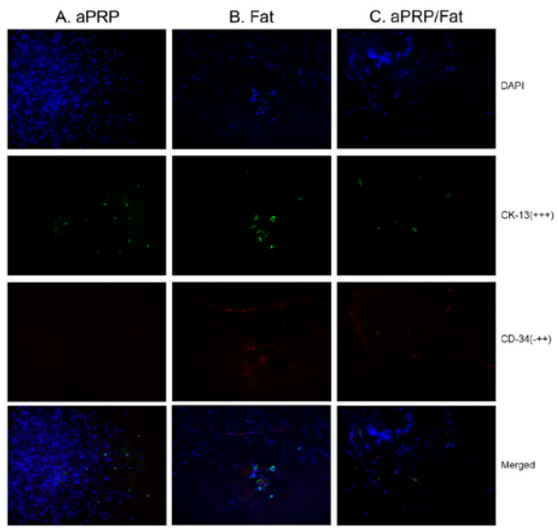

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2:30 – 2:34 pm

Spatially Resolved Molecular Investigation of Perineural Invasion in Lacrimal Gland Adenoid Cystic Carcinoma

Michelle M. Maeng[1], Ryan A. Gallo[2], Acadia H. M. Moeyersoms[2], Madison E. Weiss[2], Rayan Abou Khzam[4], Qikai Wang[2], Sander R. Dubovy[4], Daniel Pelaez[2], David T. Tse[1,2,3]

[1]Department of Ophthalmology, Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, Miami, Florida, United States, [2]Dr. Nasser Ibrahim Al-Rashid Orbital Vision Research Center, Bascom Palmer Eye Institute, University of Miami Miller School of Medicine, Miami, Florida, United States, [3]Sylvester Comprehensive Cancer Center, University of Miami Miller School of Medicine, Miami, Florida, United States, [4]Florida Lions Ocular Pathology Laboratory, Bascom Palmer Eye Institute, University of Miami Miller School of Medicine Miami, Florida, United States

Introduction: Lacrimal gland adenoid cystic carcinoma (LGACC) is characterized by its propensity for perineural invasion (PNI), strongly associated with local recurrence, metastasis, and a bleak prognosis. This study aims to utilize novel and groundbreaking scientific technology to measure and map gene activity in LGACC to understand the molecular underpinnings of PNI better.

Methods: Spatial transcriptomic techniques were used to describe the cellular heterogeneity of LGACC in the perineural invasion. The biological context of the transcriptionally distinct cell clusters was predicted with molecular annotation tools.

Results: Analyses of the tumor clusters near the nerve revealed that low-affinity neurotrophin receptor p75 (p75NTR) expression correlates with LGACC PNI. The authors further validated p75NTR and its correlation with LGACC PNI in a cohort of 10 patient specimens, where consistent expression was visualized specifically in the nerve perineurium.

Conclusion: This study is the first to show the unbiased spatial gene expression profile of LGACC in PNI. Our study's findings suggest that p75NTR and its ligands may play a crucial role in the neurotropism of LGACC. Identifying molecular players in PNI is crucial in developing potential targeted therapeutics to improve patient survival.

2:34 – 2:38 pm

Expression and Role of Indoleamine-2,3-dioxygenase 1 in Sebaceous Glands and Related Tumors of the Eyelid: A Potential Diagnostic and Therapeutic Target

Jan Paul Ulloa[1,2], Cat N. Burkat[3], Raul Hernandez-Rubio[4], Jacqueline Carrasco[2,5], Kenneth Morgenstern[1,6]
[1]Department of Ophthalmic Plastic and Reconstructive Surgery, Morgenstern Center for Orbital and Facial Plastic Surgery, Wayne, Pennsylvania, United States, [2]Department of Ophthalmic Plastic and Reconstructive Surgery, Wills Eye Hospital, Philadelphia, Pennsylvania, United States, [3]Department of Ophthalmology and Visual Sciences, University of Wisconsin-Madison, Oculoplastic, Facial Cosmetic & Orbital Surgery, Madison, Wisconsin, United States, [4]Ophthalmology, Lankenau Medical Center, Wynnewood, Pennsylvania, United States, [5]Department of Ophthalmology, Lankenau Medical Center, Wynnewood, Pennsylvania, United States, [6]Department of Ophthalmic Plastic and Reconstructive Surgery, Thomas Jefferson University Hospital, Philadelphia, Pennsylvania, United States

Introduction: To describe the role and expression of indoleamine-2,3-dioxygenase 1 (IDO1) in sebaceous glands and its potential role in sebaceous carcinoma of the eyelid.

Methods: We conducted a clinical-pathologic prospective study in sebaceous adenomas (SA), sebaceous hyperplasia (SH), and sebaceous carcinoma (SC), using normal sebaceous glands as controls. Immunohistochemical staining for IDO1 was performed on each group. Staining intensity and distribution (H-score) were determined. Clinical data was evaluated for correlation with IDO1 activity. Statistical analysis was performed to compare the groups.

Results: The study cohort included 38 patients, composed of 6 controls, 5 SA, 6 SH and 18 SC. The mean age for the SC group was 75.5. The mean H-scores of the controls, SA, SH and SC were: 0, 110, 127.5 and 201.9, respectively. A Spearman rank test was performed to evaluate the clinical data and the H-scores and found a positive correlation between age-IDO1 (p-value < 0.00225) and tumor stage-IDO1 (p-value < 0.001). An ANOVA analysis showed a statistically significant difference among the groups. A Turkey HSD test showed a significant difference between control-SA, control-SH, control-SC, SA-SC, and SH-SC. No difference was found between SA-SH.

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Conclusions: Mechanisms that modulate the immune response hold great potential as viable strategies for combating cancer. Among these, novel molecular compounds that inhibit indoleamine-2,3-dioxygenase 1 enzyme (IDO1) have emerged as one of the most promising therapeutic opportunities for impeding tumor growth. Targeting IDO1 potentially serves as a therapeutic option to inhibit tumor growth and revolutionize our current management of sebaceous carcinoma. Our study demonstrated a statistically significant upregulation and reactivity of IDO1 in sebaceous gland tumors. Prior to these findings, clinical management centered around surgical excision. The use of molecular compounds such as indoximob, epacadostat, BMS-986205 and navoximod, that directly target IDO1 opens new possibilities for shrinking these tumors, improving clinical outcomes, and minimizing the morbidities often associated with surgery. Further studies are warranted to determine the efficacy of these compounds.

Figure 1

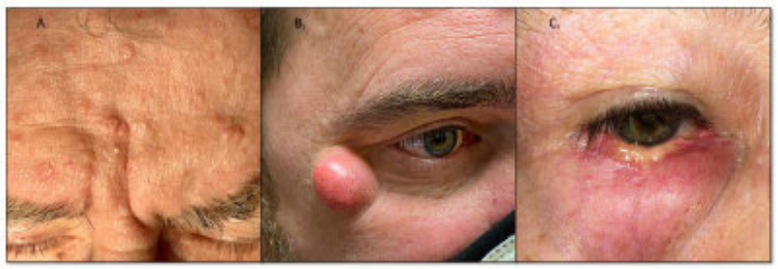

Figure 2

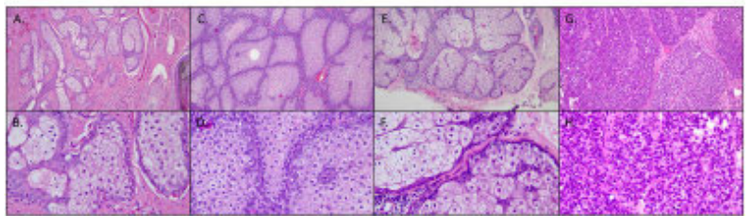

Figure 3

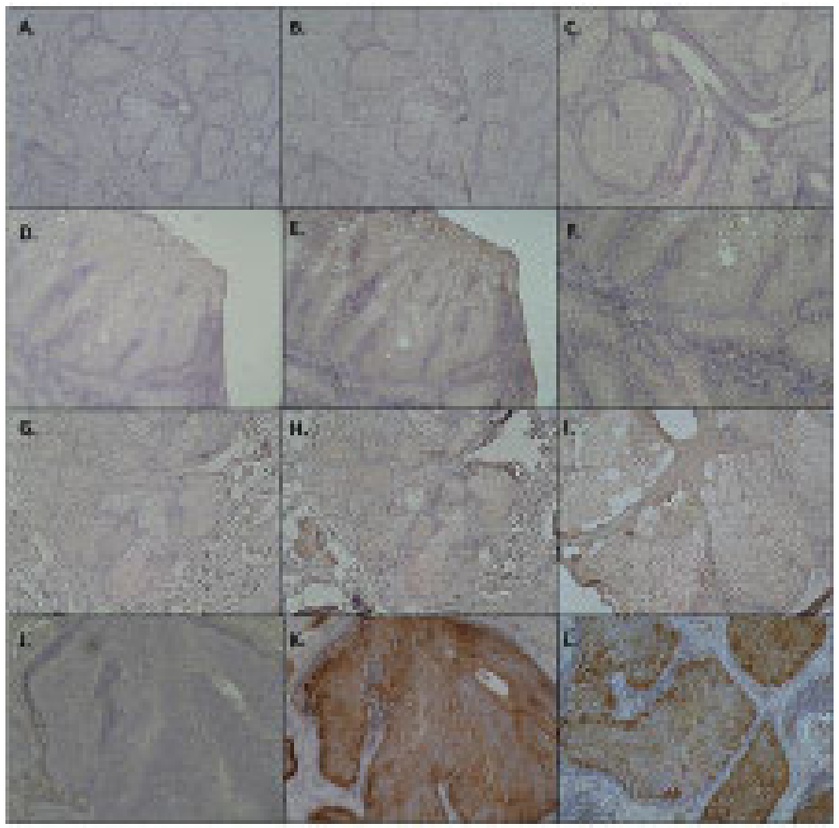

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Figure 4

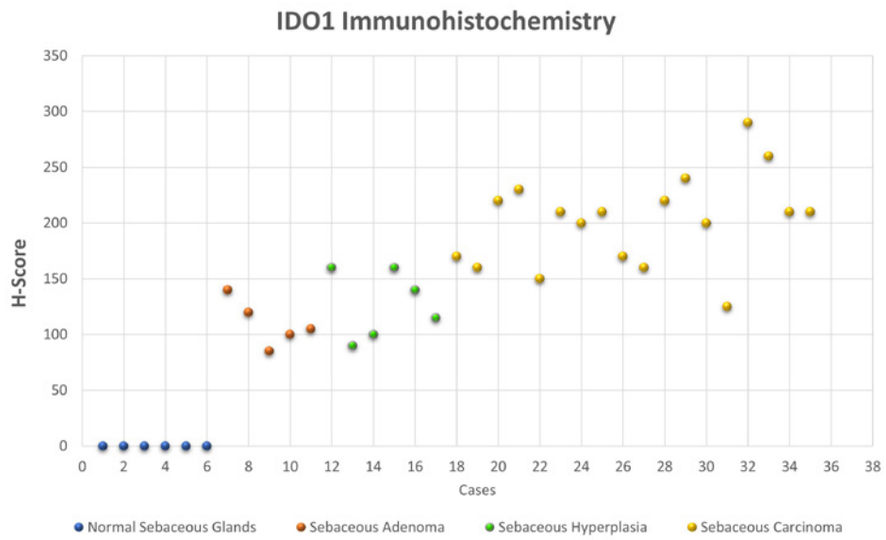
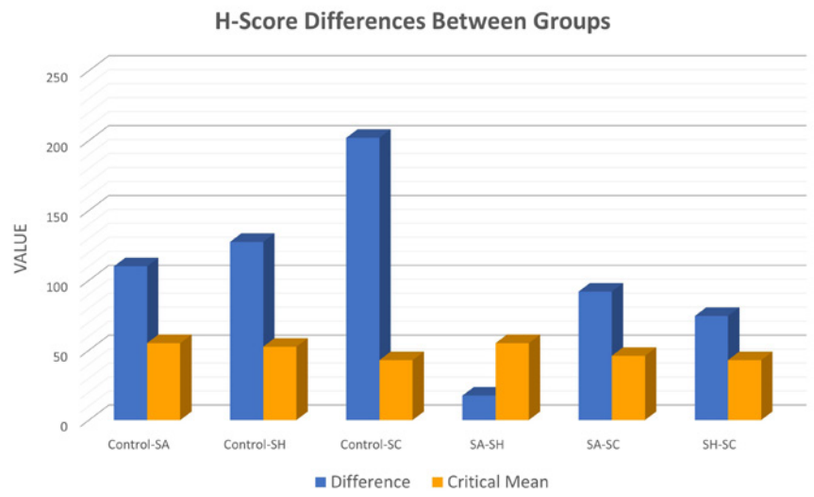


Figure 5



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SPECIAL INTEREST GROUP BREAKOUT SESSIONS

Moderators will present cases and topics for discussion

Friday, November 3

3:25 – 5 pm

Aesthetics

Moderator: Kenneth E. Morgenstern
Facilitators: Jocelyne C. Kohn, Martin H. Devoto, Robert M. Schwarcz, Kristin J. Tarbet, Guy G. Massry

Eyelid

Moderator: Cat N. Burkat
Facilitators: Brian Willoughby, Catherine J. Hwang, Michael T. Yen, Shannath L. Merbs, Christina Choe

Orbit

Moderator: James A. Garrity
Facilitators: Gangadhara Sundar, Andrea L. Kossler, Gerald J. Harris, M. Reza Vagefi, Louise A. Mawn

No CME is provided for viewing of posters.

1 Current Trends in Lower Lid Blepharoplasty Among ASOPRS Members

Cameron Nabavi[1,2], Jill Foster[1,2], Daniel Straka[1,2], Jessica Crawford[1,2], Craig Czyz[3], Kenneth Cahill[4,2]

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Introduction: Approaches to lower lid blepharoplasty vary among oculofacial plastic surgeons regarding approach, dissection and techniques used to address the orbital fat, skin and laxity. Recent trends in literature tend to favor transconjunctival lower lid blepharoplasty with fat repositioning to reduce postoperative lid retraction and soften the nasojugal groove[1,2], We present the results of a survey looking at lower lid blepharoplasty techniques among ASOPRS members.

Methods: A 16 question web based multiple choice survey (SurveyMonkey, San Mateo, CA) was sent to 238 ASOPRS members that opted in to receiving emails from ASOPRS members to understand the current trends in lower eyelid blepharoplasty.

Results: The survey had an overall response rate of 63% (150). 62% (92) stated that 0-25% of their practice is cosmetic, while 10% (15) of respondents had a greater than 75% cosmetic practice. One notable finding was that 71% (106) of respondents performed 0-25% of their lower lid blepharoplasty via a transcutaneous approach while 67% (101) utilize a transconjunctival approach greater than 75% of the time. 58% (87) of respondents perform subtractive-only lower lid blepharoplasty greater than 50% percent of the time. Fat transposition greater than 50% of the time was performed by 31% (47) of respondents, where it was mainly performed medially (70%) and centrally (67%), with resection prior to repositioning performed by 44% (56) of respondents greater than 50% of the time. Polypropylene suture is used by 65% of surgeons performing transposition (6-0 polypropylene-25%, 5-0 polypropylene-25%, 4-0 polypropylene-15%).

How people address the lower lid skin varies as well. Skin pinch is employed by 89% (113) of respondents while 11% do not perform any skin excision. 51% (75) of the respondents indicated they perform no laser resurfacing at the time of lower lid blepharoplasty while 11% (16) perform resurfacing in greater than 75% of their cases, with a majority of resurfacing performed via CO_2 laser (31%). Lid tightening performed in conjunction with laser resurfacing was performed less than 25% of the time by 68% (80) of respondents.

Postoperative lid retraction is a concern for lower lid surgery. However, only 4 respondents inject 5-fluorouracil and 5 inject Kenalog at the end of their procedure.

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Lower lid surgery is combined with functional/medical procedures greater than 50% of the time by 52% of surgeons in our survey. Of our respondents, 94% (143) were somewhat or highly satisfied with their current lower lid blepharoplasty results.

Conclusions: A previous survey performed in 2018 by Kossler et al looked at trends in upper and lower lid blepharoplasty amongst ASOPRS members[3]. We approached cosmetic lower lid blepharoplasty in order to dig deeper in understanding how surgeons approach the complicated periorbital rejuvenation of the lower lid and lid cheek junction. Lower lid blepharoplasty is a mainstay of an oculofacial surgeon's cosmetic practice. 71% of respondents prefer a transconjunctival approach to lower lid blepharoplasty, which correlates with literature that has established that a posterior approach reduces risk of lower lid retraction[4]. However, despite trends in the literature regarding fat transposition as being superior when compared to a subtractive approach[5], 47% of respondents perform a subtractive-only technique. It would be additive to understand whether those surgeons that prefer a subtractive approach tried transposition previously and, if so, what in their experience led them to prefer the subtractive technique.

Skin pinch with lower lid blepharoplasty doesn't seem to have a strong trend amongst ASOPRS respondents, while those that perform laser resurfacing have a strong tendency to use a CO_2 laser. Last, antifibrinoloytics and anti-inflammatory injections are not commonly utilized post lower lid blepharoplasty. Further elaboration would be beneficial as to whether there is concern for poor wound healing or a very low rate of postoperative lid retraction. Further understanding of use of these medications in the months following surgery would be beneficial.

It would be interesting to understand whether these trends in lower lid blepharoplasty have any relation to geographical location of practice. Also, understanding age distribution of patients that tend to undergo subtractive-only versus fat transposition would be revealing. Furthermore, there appears to be a trend where patients come in for evaluation pre-educated on lower lid blepharoplasty techniques via social media and internet resources, and may have certain preconceived notions about their specific surgical plan. It would be illuminating to see how that can impact a surgeon's decision for specific techniques in lower lid blepharoplasty.

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2 Prevalence of Opioid Prescription for Cosmetic Plastic Surgery Procedures

Gabriel Scott[1], Denisse Cristina Porras Fimbres[2], Jason Liss[3], Julie Woodward[3]
[1]Ophthalmology, Duke University, Durham, North Carolina, United States, [2]School of Medicine, Duke University, Durham, North Carolina, United States, [3]Ophthalmology, Duke, Durham, North Carolina, United States

Introduction: Surgery is among the most common indication for opioid initiation[1,2], yet there is considerable variability in prescription trends among plastic surgery procedures[3,4], and given the scarcity in data regarding facial cosmetic surgeries[5,6], this study aims to compare differences in postoperative pain for cosmetic oculofacial plastic surgery procedures in opioid and nonopioid groups.

Methods: A retrospective chart review was conducted to identify cases of cosmetic blepharoplasty performed by three surgeons at a single institution in 2021. Patients with a history of opioid prescriptions prior to surgery were excluded. Twenty cases performed by each attending surgeon were sequentially selected from the list generated after applying the search criteria. Demographic, operative, and postoperative variables were collected. These included age, comorbidities, primary and secondary procedures performed, opioid prescription, refill requests, and mention of pain. The sample was selected to reflect equal representation of procedures performed by the three single institution attending surgeons.

Results: Sixty patient charts were examined: 19 (32%) patients received opioids (oxycodone N=18, oxycodone-acetaminophen N=1) while 41 (68%) did not (Figure 1). Dosing varied from 5 mg every 4 to every 6 hours. 5-20 tablets were prescribed for oxycodone, with 6 being the most common and 20 being the least (N=2). For the single oxycodone-acetaminophen case, a 5-325 mg tablet every 6 hours was recommended, with 10 tablets being dispensed. Patients did not request or receive refills on their initial prescription. These findings can be seen in Table 1. The number of postoperative visits, telephone calls, and messages ranged from 0-5. Three patients mentioned pain in their postoperative encounters (2=nonopioid group, 1=opioid group). One patient's pain was attributed to a newly discovered antibiotic-drop allergy, while another patient's pain was reported as mild and intermittent and resolved with artificial tear drops. These patients did not receive opioids for their procedure. The third patient who was in the opioid group reported mild eyelid ache at month 1 without requiring additional therapy. Figure 2 illustrates the incidence of pain, opioid requests, and refill requests among all patients.

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Conclusions: Cosmetic oculofacial surgeries including bilateral upper and lower blepharoplasty, brow lifts, laser resurfacing, canthal reconstruction, and additional oculofacial surgeries were well tolerated without opiates in the postoperative period for the majority of patients. There were no requests for refills or requests to start opioids during the postoperative period for any of the patients. There was also not an increase in phone calls or messages in the nonopioid group. Complaints of pain were rare, mild, and none required opioid therapy. Most pain was related to irritation and relieved with artificial tears. With cosmetic surgery, there is often a desire to minimize any possible pain postoperatively and ensure patients are comfortable, however, these findings suggest that opioid therapy may not be needed and complaints of pain after these procedures are minimal.

Figure 1

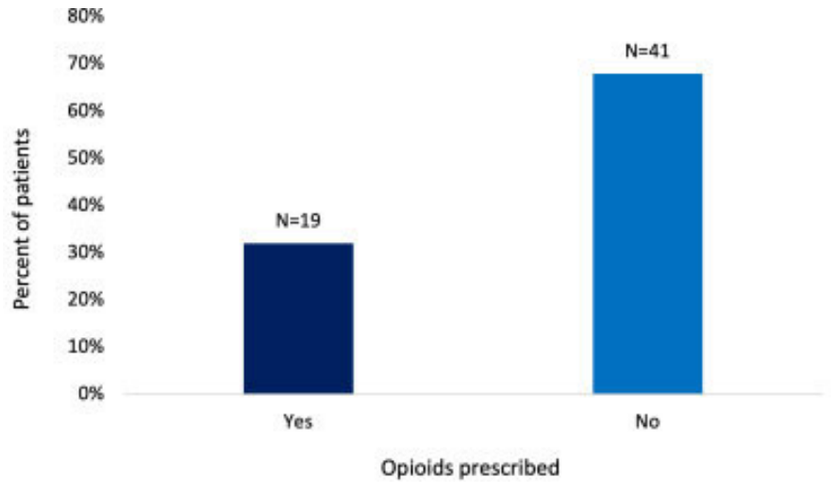

Figure 2

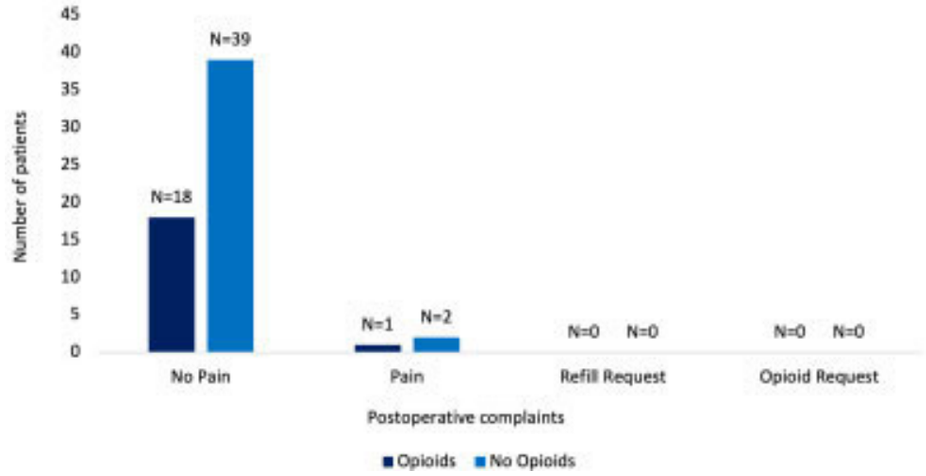

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Table 1

Table 1. Frequency of procedure performed, number of opioid prescription occurrences, and mention of pain.

Type of procedure performed[a]	Frequency of procedures	Opioid prescription	Pain reported (No opioids)	Pain reported (Opioids)	Number of refills/requests
Blepharoplasty, lower	59	19	2[b,c]	1[d]	0
Blepharoplasty, upper	44	16	2[b,c]	1[d]	
Laser skin resurfacing	26	4	2[b,c]	0	0
Levator aponeurosis advancement/resection	11	3	-	1[d]	0
Brow repair	11	6	-	1[d]	0
Ptosis repair, internal	9	4	-	-	0
Ectropion, extensive (e.g., Lateral Tarsal Strip)	7	5	-	-	0
Canthoplasty/Canthopexy/ Canthal resuspension	6	3	-	-	0
Chemical peel	5	2	-	-	0
Eyelid biopsy	3	-	-	-	-
Entropion repair, thermocauterization	3	-	-	-	-
Rhytidectomy	2	-	-	-	-
Lesion excision	2	2	-	-	0
Lower Lid Myectomy	1	-	-	-	-

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3 Applied Anatomy: Utilizing the Pre-Septal Space for Long-Term Correction of Lower Lid Malposition with Hyaluronic Acid Fillers

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Introduction: Lower eyelid malposition can result from age-related changes such as ectropion or post-surgical changes such as post-blepharoplasty lower lid retraction. Treatment is often surgical, but it has been reported that soft tissue fillers offer an alternative treatment with good outcome. However, the underlying anatomy is incompletely described when guiding practitioners toward minimally invasive injections of the lower eyelid. We describe a minimally invasive injection technique specifically designed for the complex anatomy of the lower eyelid for the treatment of ectropion and retraction of the lower eyelid.

Methods: Thirty-nine lids of 31 pateints with lower lid ectropion/retraction were retrospectively analyzed using photographs prior and post repair of the lower eyelid malposition with soft-tissue fillers. Filler was injected into the pre-septal space using a standardized protocol. Two independent raters assessed the degree of ectropion and lower eyelid retraction (DELER; 0 - 4, best-to-worst) before and after the reconstruction as well as the overall aesthetic improvement using the Periorbital Aesthetic Improvement Scale (PAIS).

Results: The median DELER score improved statistically significantly from 3.00 (1.5) to 1.00 (1.0) with $p < 0.001$. The mean volume of soft tissue filler material applied per eyelid was 0.73 cc (0.5). The median PAIS following the treatment was rated as 4.00 (0.5) indicating improvement of the periorbital functional and aesthetic appearance. Lid position remained stable during the follow-up period which ranged from 6 to 60 months with an average of 19.3 months.

Conclusions: Anatomic knowledge of the lower eyelid and of the preseptal space is of significant clinical relevance when attempting to reconstruct the lower eyelid with soft-tissue fillers. This targeted space provides optimal lifting capacities for improved aesthetic, functional and long-lasting outcome in patients with lower eyelid malposition. This technique also has high patient acceptance and can replace a surgical procedure.

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Figure 1

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4 Applying Umbilical Amniotic Tissue Graft for A Large Upper Eyelid Defect: An Alternative Approach for Eyelid Reconstruction After Necrotizing Fasciitis Debridement

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Introduction: Necrotizing fasciitis around the periorbital area carries high mortality and vision morbidity.[1] Aggressive debridement of affected tissue is warranted as a life-saving measurement. However, the timing and strategy of reconstructing the resultant defect is not well established. Amniotic tissue has been widely used in different ophthalmic conditions based on its biological properties of anti-inflammation and promoting regeneration.[2,3] In this study, we report a case of applying umbilical amniotic tissue graft as a skin substitute in a patient with large upper eyelid defect secondary to the debridement of necrotizing fasciitis.

Methods: Retrospective chart review with photographic documentation of clinical progression.

Results: A 54-year-old female with past medical history of myelodysplastic syndrome on active chemotherapy presented with progressive left upper eyelid swelling and redness for 1 week. On initial evaluation, she had diffuse left periorbital erythema with complete ptosis. She was started on intravenous broad-spectrum antibiotics. Her condition rapidly deteriorated within the initial 24 hours with necrotic appearance of the eyelid (Figure 1). Aggressive debridement was performed with removal of 80% of the upper eyelid tissue to the depth of the septum (Figure 2). Daily wet to dry wound care with hydrogen peroxide irrigation were performed. Upon resolution of infection 9 days after the initial debridement, a 4 by 5 centimeter umbilical amniotic tissue graft was placed to cover the eyelid defect (Figure 3). The graft slowly dissolved and replaced by regenerated skin in 10 weeks. At the last follow up, the patient had recovered eyelid function with minimal lagophthalmos (Figure 4).

Conclusions: This case highlights the importance of aggressive initial treatment and innovative wound management strategies in the context of necrotizing fasciitis. The utilization of amniotic tissue graft can offer a viable alternative to immediate skin grafting, allowing for significant healing with reduced complications. Future research should aim to better understand the role and efficacy of such amniotic tissue grafts in managing large periorbital defects secondary to severe infectious processes.

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Figure 1

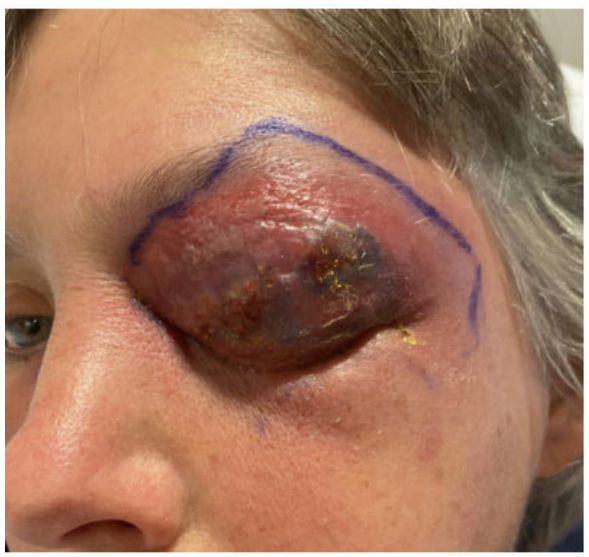


Figure 2

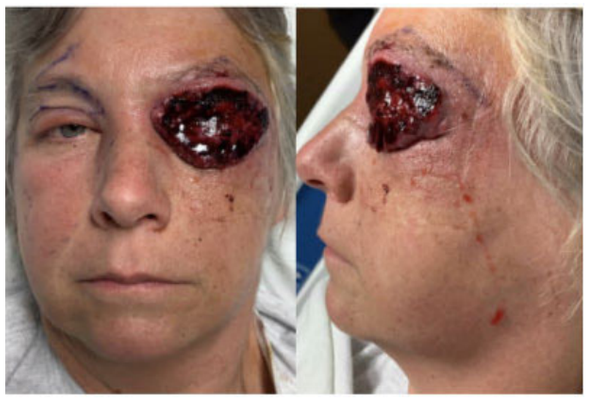


Figure 3

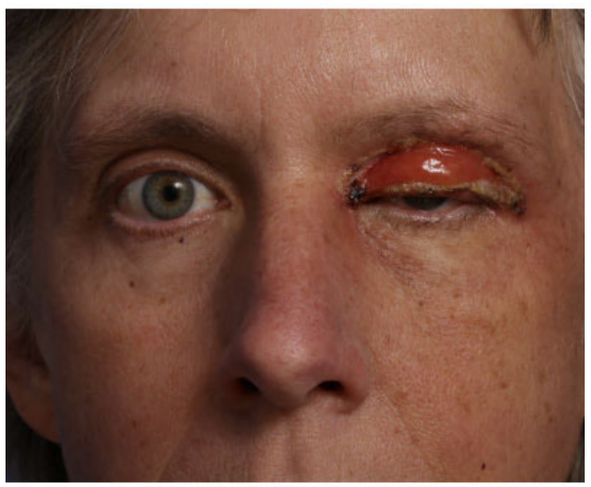
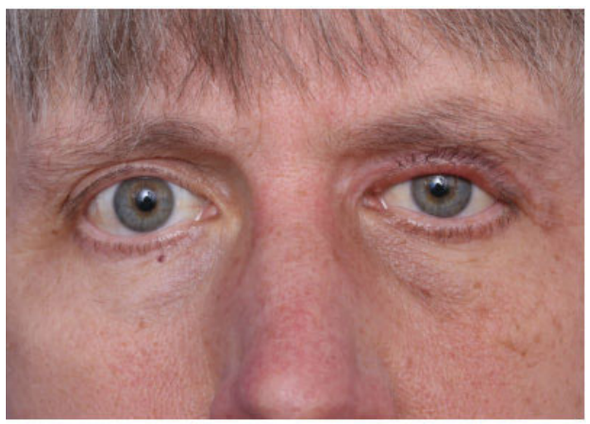


Figure 4



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5 More Than Meets the "Eye"lid: The Prevalence of Dangerous Ptosis in a Neuro-ophthalmology Clinic

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Introduction: The occurrence of ptosis, a drooping eyelid, is frequent within ophthalmology. It can stem from benign age-related changes or more severe conditions that pose risks to both life and vision. This study aims to explore the referral patterns, prevalence, and underlying causes of life or vision-threatening (LVT) ptosis in patients attending a neuro-ophthalmology clinic at a single center.

Methods: A single center retrospective study was conducted on neuro-ophthalmology visits between 1/1/2017 and 3/1/2023. Patients included in this study were those who presented with ptosis, with or without other neurologic deficits, and underwent workup to determine underlying ptosis etiology. Patients were excluded if ptosis was noted on physical exam without further workup. Demographic data, ptosis etiology, and referring specialist were recorded. Underlying tumor, vascular emergency, or active myasthenic crisis defined LVT ptosis. Descriptive statistics were used to investigate the prevalence LVT ptosis, non-LVT ptosis, ptosis etiologies, and referral patterns. Regression analysis was performed to determine clinical or demographic data predictive of underlying LVT ptosis.

Results: 3207 patients were seen in the neuro-ophthalmology clinic between 1/2017-3/2023. 416 (13%) patients had documented ptosis, and 192 patients (6.0%) met the inclusion criteria. Of eligible patients, 99 patients (52%) were referred specifically for evaluation of ptosis with or without other neurologic findings. 116 (60%) were female and 136 (71%) were non-white race (Table 1). The etiologies of ptosis can be seen in Table 2. 18 patients (9%) had LVT ptosis, with etiologies including mass or tumor (83%), aneurysm (6%), Myasthenic crisis (6%), and carotid dissection (6%). Of the patients presenting to neuro-ophthalmology with LVT ptosis, 4 (22%) were referred by other subspecialty, 3 (17%) by oculoplastic surgeons, 3 (17%) by neurology, and 3 from inpatient/ER follow up. While the majority of patients referred by oculoplastic surgery were found to have aponeurotic ptosis (44%), 20 (33%) were found to have the neurogenic type. All three patients referred by oculoplastic surgeons with LVT ptosis had the neurogenic type. Referrals were made by various ophthalmology and medical fields, but most referrals derived from oculoplastic physicians (32%) (Figure 1). LVT ptosis had a 10.7 times higher odds of diagnosis if referred by Neurology (95% CI 1.98-57.4, p = 0.006). Other features such as presence of extraocular motility deficits (OR 4.1, 95% CI 1.98 - 57.4, p = 0.03) and ipsilateral relative afferent pupillary defect (OR 14.2, 95%CI 3.65-55.3, p <0.001) also indicated higher odds of LVT etiology as compared to other types of ptosis (Table 3).

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Conclusions: This study reveals that amongst all physician types oculoplastic surgeons make the most ptosis referrals to neuro-ophthalmology. However, patients referred by these surgeons do not present with LVT ptosis at significant rates whereas when referred by neurology, they do. Furthermore, ptosis patients presenting with ipsilateral rAPD and extraocular motility deficits are more likely to present with LVT ptosis. Thus, these characteristics should raise special concern on ophthalmic exam.

Table 1. Baseline Demographic and Clinical Characteristics of patients presenting with ptosis.

Characteristic n (%)	Overall n=192	LVT Ptosis n=18	Not LVT Ptosis n=174	p-value
Mean Age ± SD	52.9 (19.7)	58.1 (16.2)	52.4 (20.0)	0.24
Gender				0.66
Male	76 (39.6)	8 (44.4)	68 (39.1)	
Female	116 (60.4)	10 (55.6)	106 (60.9)	
Race				
Black	53 (27.6)	7 (38.9)	46 (26.4)	0.26
Asian	6 (3.1)	0 (0.0)	6 (3.4)	0.42
White	56 (29.2)	4 (22.2)	52 (29.9)	0.50
Other/Multiple	71 (37.0)	7 (38.9)	64 (36.8)	0.86
Unknown	6 (3.1)	0 (0.0)	6 (3.4)	0.42
Referring Specialty				
Oculoplastic	61 (31.7)	3 (16.7)	58 (33.3)	0.15
General Ophthalmology	32 (16.7)	2 (11.1)	48 (27.6)	0.13
Neurology	9 (4.7)	3 (16.7)	6 (3.4)	**0.01**
Other Subspeciality	11 (5.7)	4 (22.2)	7 (4.0)	**0.002**
Other Ophthalmology Subspecialty	18 (9.4)	0 (0.0)	18 (10.3)	1.00
Inpatient/ER Follow Up	12 (6.2)	3 (16.7)	9 (5.1)	0.06
Primary Care	5 (2.6)	0 (0.0)	5 (2.9)	0.47
Established Patient	32 (16.7)	2 (11.1)	30 (17.2)	0.51
Self-Referral	12 (6.3)	1 (5.6)	11 (6.3)	0.90
Anisocoria	53 (27.6)	9 (50.0)	44 (25.3)	**0.03**
rAPD	18 (9.4)	8 (44.4)	10 (5.7)	**< 0.001**
EOM Deficit	74 (38.5)	14 (77.8)	60 (34.5)	**< 0.001**
Laterality				
Unilateral	135 (70.3)	15 (83.3)	120 (67.0)	0.20
Bilateral	57 (29.7)	3 (16.7)	54	

Table 2. Etiologies of Ptosis.

Ptosis Subtype	n (%)
Neurogenic	91 (47.4%)
Aponeurotic	61 (31.8%)
Myogenic	23 (12%)
Congenital	7 (3.6%)
Inflammatory	3 (1.6%)

Table 3. Predictive Factors of LVT Ptosis.

	Univariate Analysis		
	OR	95% CI	p-value
Years of Age	1.0	0.99-1.0	0.25
Gender	1.2	0.47-3.3	0.67
Race			
Black	1.8	0.65-4.8	0.27
Asian	0		
White	0.67	0.21-2.1	0.50
Other/Multiple	0	0.00	1.00
Unknown	1.1	0.40-3.0	0.86
Referring Specialty			
Oculoplastic	0.40	0.11-1.4	0.16
General Ophthalmology	0.33	0.07-1.5	0.15
Neurology	5.6	1.27-24.8	**0.02**
Other Subspeciality	6.8	1.78-26.1	**0.005**
Inpatient/ER Follow Up	3.7	0.90-15.0	0.07
Primary Care	0	0.00	1.00
Established Patient	0.60	0.13-2.7	0.51
Self-Referral	0.87	0.11-7.2	0.90
Anisocoria	2.9	1.07-7.7	**0.04**
rAPD	13.0	4.20-40.0	**< 0.001**
EOM Deficit	6.5	2.04-20.5	**0.002**
Laterality	2.3	0.63-8.1	0.22

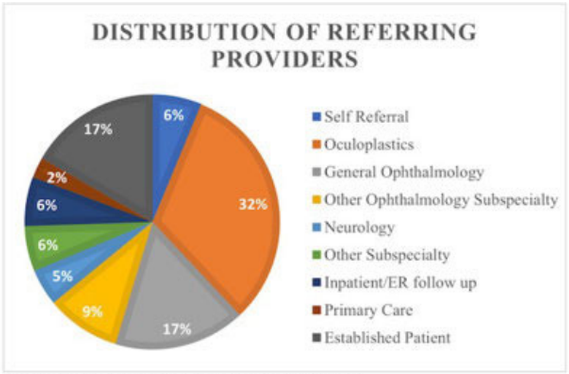

Figure 1. Distribution of referring providers.

6 Müller Muscle Conjunctival Resection without Phenylephrine Test for Congenital Ptosis: 6-Year Experience

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Introduction: Some patients with congenital ptosis (CP) have levator function (LF) that is fair or better (>4mm). Classically, CP with good LF was corrected with levator advancement. More recently posterior techniques have been described in the correction of CP with at least fair LF including Müller muscle-conjunctival resection (MMCR) with or without tarsectomy that each utilized phenylephrine testing. However, many reports question the universal use of phenylephrine testing with some patients with poor phenylephrine response still benefiting from MMCR. In this study, we investigate the efficacy of MMCR without phenylephrine testing in patients with CP with at least fair LF.

Methods: This is a retrospective noncomparative review of consecutive patients with CP with at least fair LF who underwent MMCR without preoperative phenylephrine testing by a single surgeon (RS) between February 2017- February 2023. Excluded were patients with acquired ptosis, follow-up < 4mm, moderate/severe dry eye, poor/fair Bell phenomenon, & lagophthalmos. An algorithm of 4mm resection for every 1mm of desired lid lift was used, with 10mm being the maximal resection. MMCR was performed with key steps including lid eversion with a Desmarres retractor, marking of the desired resection medially and laterally from the superior tarsal border (Fig 1A), imbrication of Müller muscle-conjunctiva complex at these 2 points with toothed forceps (Fig 1B), placement of the Putterman clamp (Fig 1C), placement of a single central 6-0 plain-gut horizontal mattress suture 1mm from clamp, subsequently externalized at the central lid crease and tied (Fig 1, D-K), and excision of tissues within the clamp with a #15 blade (Fig 1L). Patients were started on erythromycin ointment postoperatively. Follow-up was at postoperative week 1, month 1, month 3 and every 6 months thereafter. Primary outcome measure was MRD1 at postoperative month 3. Secondary outcomes included change in MRD1, lid symmetry within 1mm, requirement for reoperation, and postoperative complications.

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Results: 79 patients with 80 ptotic lids were included. 55 (69.6%) were male, with a mean age of 5.9 years (range 3-27). One (1.3%) patient had bilateral repair. Mean preoperative MRD1 and LF were 0.9mm (0-3) and 7.2mm (5-14), respectively. All patients demonstrated improved lid position with a mean postoperative MRD1 at 3 months of 3.7mm (2.5-5) and mean increase in MRD1 of 2.8mm (1-3.5). 77 (97.5%) patients showed lid symmetry within 1 mm (P<0.001, Fig 2). There was no difference in results between fair vs good LF groups (P=0.21). Six (7.6%) patients had asymptomatic <2mm lagophthalmos without keratopathy at postoperative week 1 that resolved with observation. There were no cases of postoperative corneal abrasions, suture breakage or children requiring reoperation. Mean follow-up was 13.3 months (3-31) and lid improvement showed a durable response during follow-up.

Conclusions: MMCR without preoperative phenylephrine testing is a safe and effective method for repair of CP with at least fair LF. Strengths of this procedure include speed of surgery (typically <5 minutes), quick learning curve, ability to perform in the office in select patients, absence of a skin scar, better lid closure, low complication rate and high patient/parent satisfaction rate.

Figure 1

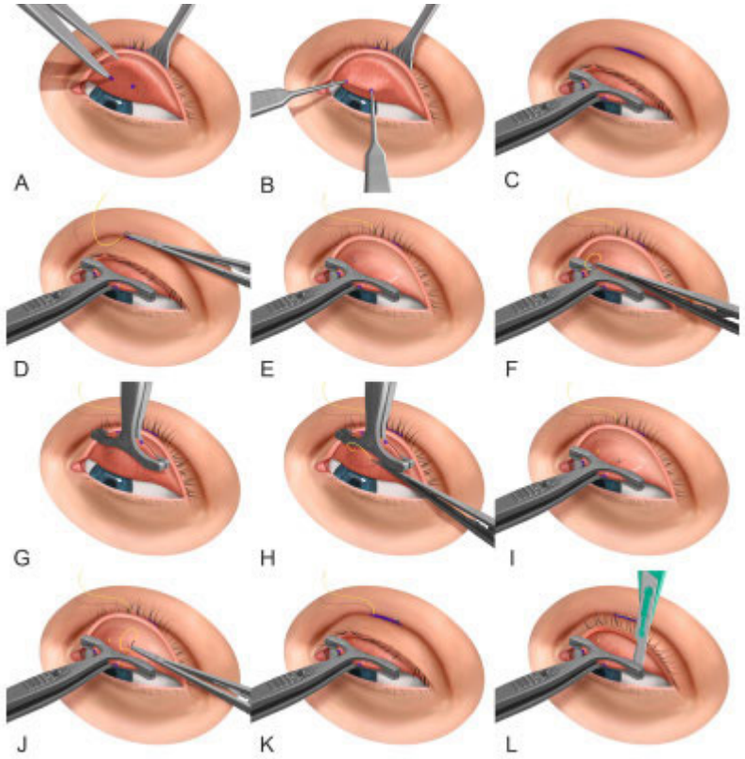
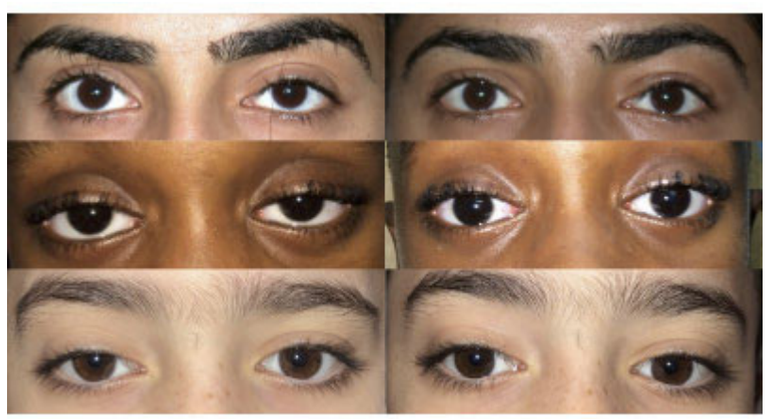


Figure 2



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7 Treatment with Alpha-1 Antagonists for Eyelid Retraction in Patients with Thyroid Eye Disease – A Prospective Pilot Study

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Introduction: Sympathetic overstimulation of the Muller's muscle is a suggested mechanism of upper eyelid retraction in thyroid eye disease (TED). This study examines the effect of Tamsulosin (alpha-1 antagonist) on eyelid retraction in patients with TED.

Methods: This is a single-center prospective study. All patients with TED and eyelid retraction were offered treatment with oral 0.4mg/day Tamsulosin for 3 months. Evaluation of upper eyelid margins-to-reflex distance (MRD1), vertical palpebral fissure height (PFH), subjective improvement, signs and symptoms of dry eye, and the use of eye lubricants were assessed at baseline and each subsequent visit.

Results: Eleven patients enrolled in the study. The mean age of participants was 47.5±9.68 (range 36 – 68) years, and eight (73%) were females. Active TED at baseline was diagnosed in 4 (36%) patients. Three patients discontinued the drug due to mild adverse effects (dizziness, bradycardia, nausea, and gastrointestinal distress), which resolved immediately upon stopping treatment. All other 8 patients who used the drug tolerated it well with no reported side effects. Five patients (62.5%) showed objective improvement in eyelid position and subjective improvement in eye discomfort. The mean MRD1 decreased by -1.04±0.81 mm (p=0.015), and the mean PFH decreased by -1.46±1.33 mm (p=0.039). Patients were treated with Tamsulosin for a mean of 84.63±71.9 days (range 12-244). Patients discontinued the drug for the following reasons: no subjective or objective improvement in MRD1 (3), referral for eyelid surgery with stable inactive TED (2), treatment with intravenous methylprednisolone due to worsening active TED (2), and voluntarily after 5 months of treatment with spontaneous resolution of symptoms (1).

Conclusions: Tamsulosin is a potentially safe treatment for eyelid retraction in TED and can be used as a temporizing measure for patients unsuitable for surgery.

8 Using Artificial Intelligence for Evaluating Structural Eyelid Change Following Müller's Muscle-Conjunctival Resection

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Introduction: This study aimed to evaluate structural eyelid contour change following Müller's Muscle-Conjunctival Resection (MMCR)[1] with a deep-learning (DL) model.

Methods: Patients who had MMCR surgery for involutional ptosis were included in this study. Front-facing facial photography was obtained pre and post-operatively. A DL model for defining the eyelid margin was developed and validated on a separate dataset of 1206 patients. This model was applied to the MMCR test dataset. An eye-detector algorithm was used to normalize the image, in order to have the same dimension before being fed to the model. A separate DL model was used to define the limbus and the iris was used to normalize the preoperative and postoperative images to perform a more precise comparison between the preoperative and postoperative contours. The change in eyelid contour after surgery was assessed in three ways; 1) vertical distance between 3 points and the upper eyelid margin: center of the pupil (equivalent to MRD 1), nasal limbus, and temporal limbus (Figure 1, first row); 2) horizontal distance from the center of the pupil to the highest point of the upper eyelid (Figure 1, middle row); 3) the area between the eyelid margin and two lines connecting the medial and lateral canthi and the peak of upper eyelid contour respectively (triangular contour area, TCA) (Figure 1, last row). A linear mixed-effect model was used to evaluate the change of all the mentioned parameters before and after surgery. All the measurements were in pixels.

Results: 171 eyes from 109 patients were included in this study. Figure 2 represents examples of estimated eyelid contours before and after MMCR surgery. The mean (SD) of preoperative and postoperative MRD1 was 21.6 (5.6) and 25.7 (5.2), respectively. There was a significant association between postoperative and preoperative MRD1 (β=0.46, P<0.001), the postoperative and preoperative distance between the center of nasal limbus and the upper eyelid contour (β=0.51, P<0.001), and between the center of temporal limbus and the upper eyelid contour (β=0.36, P<0.001). The mean (SD) of the horizontal distance between the peak point of the upper contour and the center of the pupil shortened postoperatively from 8.5 (6.3) to 7.4 (5.4). This difference was significant (β=0.31, P<0.001). The mean (SD)

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preoperative and postoperative triangular contour area increased from 992.1 (343.2) to 1126.6 (349.6). This difference was statistically significant (β=0.49, P<0.001).

Conclusions: The designed DL model for defining eyelid margin demonstrated clinically relevant findings regarding changes in eyelid contour following MMCR surgery. The contour peak became more centralized and the triangular contour area increased. This model could be used to compare outcomes of alternate approaches to ptosis surgery.

Figure 1

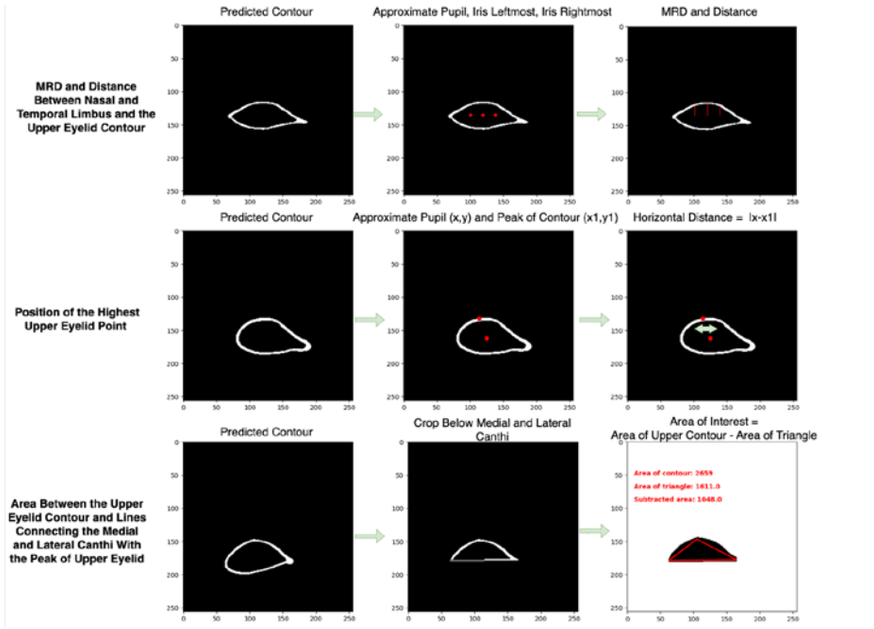

Figure 1. Illustrating the metrics used for comparing the eyelid contour before and after Müller's Muscle-Conjunctival Resection (MMCR). The first row represents the distance between the pupil and upper eyelid (equivalent to MRD 1) and the distance between the most nasal and temporal points of the limbus and the upper eyelid contour. The second row demonstrates the approach used to define the location of the highest point of the upper eyelid contour and the pupil in order to calculate the horizontal distance between them. The third row shows how an area between the upper eyelid contour and the lines connecting the medial and lateral canthi and the peak of the upper contour. First, a line was drawn between the medial and lateral canthi (middle plot), and the area above that line was calculated. In the next step, we drew a triangle with the dimensions being 1) the line connecting the medial and lateral canthi; 2) the line connecting the medial canthus and the peak of the upper eyelid contour; 3) the line connecting the lateral canthus and the peak of upper eyelid contour. The area of this triangle was calculated and subtracted from the remaining area, which will provide the area between the upper eyelid contour and the lines connecting the medial and lateral canthi and the peak of the upper eyelid contour.

Figure 2

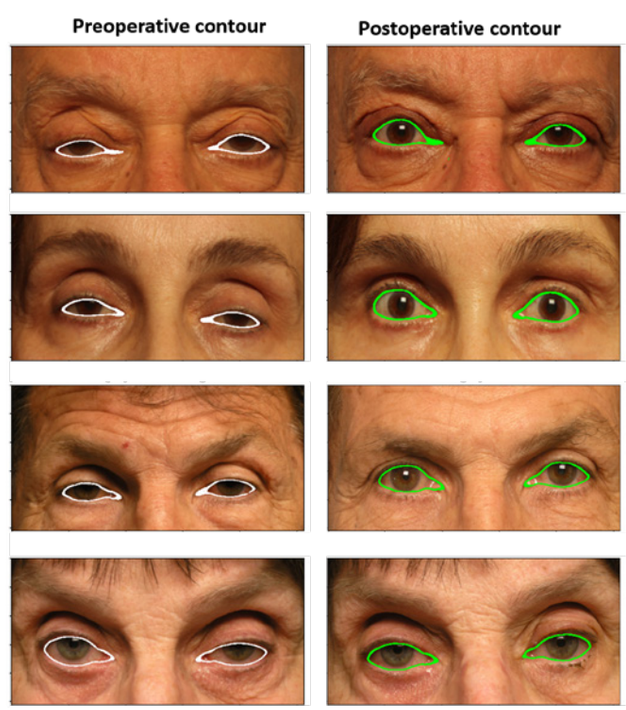

Figure 2. Examples of eyelid margins defined by the deep learning model for ptosis patients have undergone Müller's Muscle-Conjunctival Resection.

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25 No Longer a Rare Entity; Re-examination of Current Clinical Findings, Treatment Modalities, Management and Outcomes in Periorbital Necrotizing Fasciitis

Allison Coombs[1], Maria Garcia[2], Amy Shteyman[3], Yi Ling Dai[4], Erin Lanzo[4], Victoria North[4], Elizabeth Maher[5], Amar Joshi[6], Kyle Godfrey[1], Gary Lelli[1]

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Introduction: Necrotizing fasciitis of the periorbital region is historically considered a rare entity(1), however, at present, the Center for Disease Control (CDC) is investigating a surge in invasive group A streptococcal (GAS) infections, including necrotizing fasciitis(2). The authors have appreciated an increased incidence of periorbital necrotizing fasciitis in New York, Minnesota, and New Mexico, with limited literature available to guide management and treatment decisions. Since periorbital and orbital necrotizing fasciitis is a life and vision-threatening entity, this rapidly progressive condition requires expeditious diagnosis and intervention to prevent morbidity and mortality. Given the increasing incidence of GAS-invasive infections, we present a case series to enhance the limited available data, including pertinent clinical findings, management, and outcomes in periorbital necrotizing fasciitis.

Methods: This series presents eight periorbital necrotizing fasciitis cases seen in New York, New Mexico, and Minnesota, managed by oculofacial plastic and reconstructive surgeons and additional subspecialty services.

Results: Eight cases of periorbital necrotizing fasciitis are included in this case series. 62.5% of subjects were septic on presentation. Predisposing comorbid conditions included diabetes (37.5%), substance use disorder (37.5%), and rheumatoid arthritis on prednisone(12.5%). 75% of subjects had prior periorbital trauma. However, two subjects presented with necrotizing fasciitis without preceding trauma or precipitating events; one was immunosuppressed on high-dose steroids for rheumatoid arthritis and one had well-controlled diabetes. 87.5% of subjects had confirmatory pathology or were culture positive for group a streptococcus (GAS), with one subject primarily having methicillin-resistant staphylococcus aureus (MRSA). Two subjects had polymicrobial infections including methicillin-sensitive staphylococcus aureus (MSSA) and propionibacterium acnes (p.acnes), and enterobacter. All subjects were treated with broad-spectrum IV antibiotics including at least one medication from the following list: vancomycin, ampicillin-sulbactam, piperacillin-tazobactam, ceftriaxone, and clindamycin. 85% of subjects underwent at least two debridements in addition to

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broad-spectrum IV antibiotics. No subjects were managed exclusively with medical therapy. Additional therapies, outside of surgical debridement and broad-spectrum IV antibiotics, have been explored in literature and include intravenous immunoglobulin (IVIG), systemic steroids, and hyperbaric oxygen therapy (HBOT)(5,6,8). This series includes subjects treated with steroids, IVIG, and HBOT. Four subjects had periorbital reconstruction while inpatient, with the earliest reconstruction successfully accomplished on hospital day 10, and delayed outpatient reconstruction timed at 6 months, with viable graft success and no recurrence of the disease. One subject died (14%) from septic shock which is congruent with previous reports of periorbital necrotizing fasciitis mortality(8). In the surviving patients, no acute disease-related vision loss occurred.

Conclusions: All cases of periorbital necrotizing fasciitis were treated with broad-spectrum IV antibiotics and debridement which resulted in successful treatment, with preserved visual function in all surviving subjects. At present, there is limited data on ophthalmic function in the setting of necrotizing fasciitis, and we report the visual outcomes of the six surviving subjects. The cases included in this series presented to institutions with oculofacial plastic surgeons, which may have aided in prompt intervention including appropriate antibiotic coverage and surgical debridement, possibly contributing to the positive visual and systemic outcomes.

This case series is limited by its retrospective nature, lack of randomization, and small sample size. There is a continued need for randomized, controlled trials in necrotizing fasciitis to delineate which additional treatments, such as steroids, HBOT, or IVIG would aid in the development of a treatment paradigm. Given the increase in GAS infections at present, a better understanding of the incidence, behavior of such infections, management, and outcomes is of great benefit.

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Figure 1

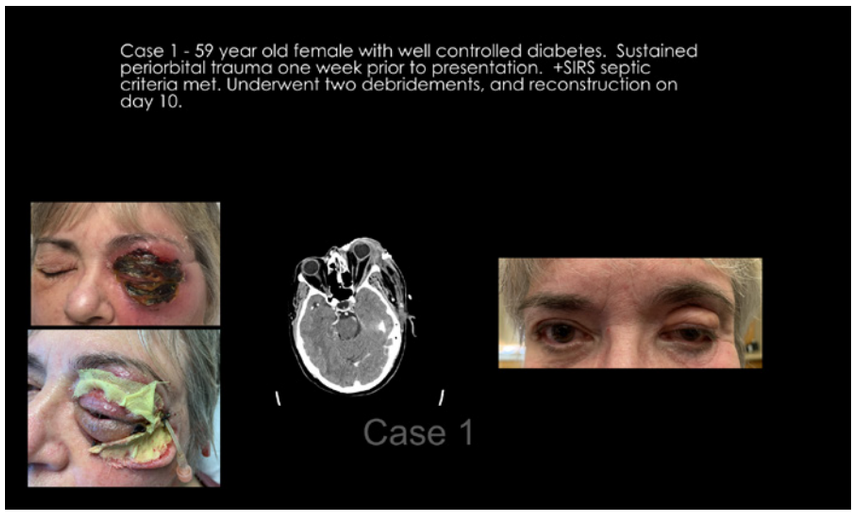


Figure 2

Figure 3

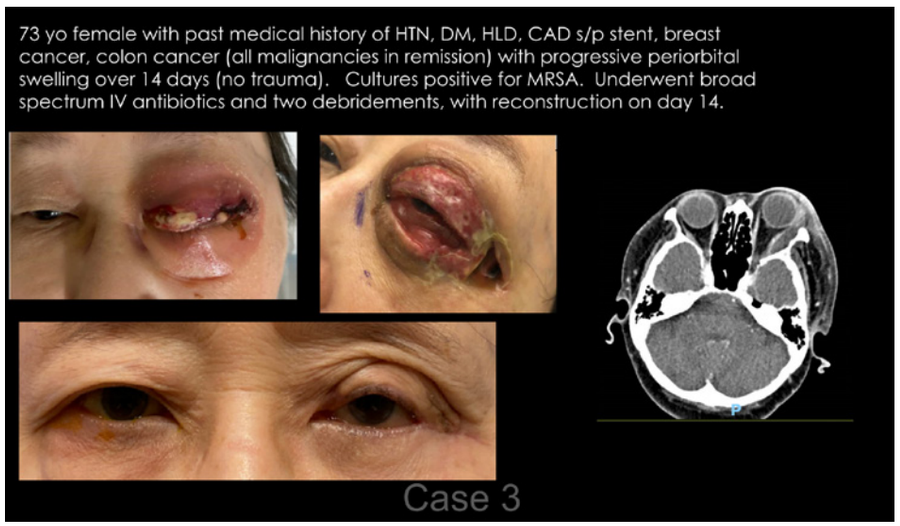
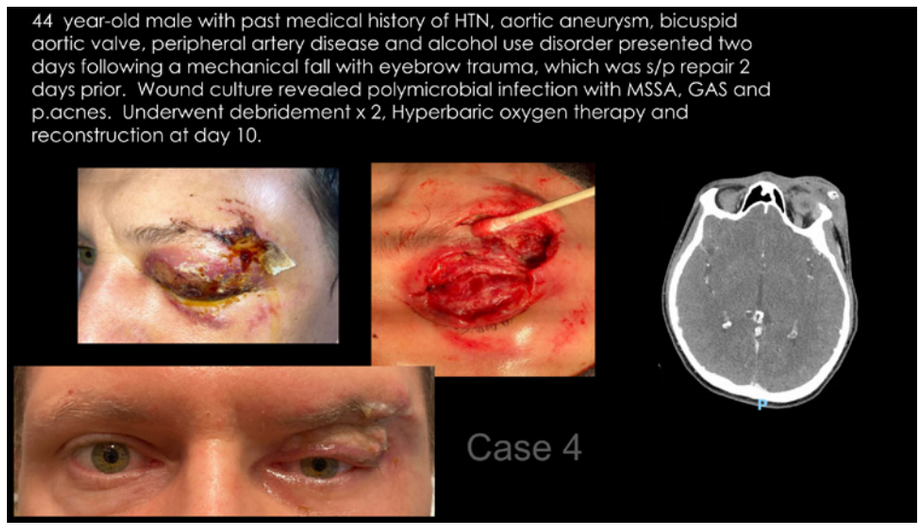


Figure 4



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9 Acute and Chronic Dacryocystitis in Adult Patients: Epidemiologic and Demographic Profiles, Management, and Outcomes in a Nation-Wide Database

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Introduction: Dacryocystitis commonly presents in the pediatric population secondary to congenital nasolacrimal duct obstruction, while adults typically develop dacryocystitis from acquired lacrimal drainage obstruction (ALDO).[1] Current epidemiologic descriptions of acute dacryocystitis (AD) and chronic dacryocystitis (CD), their management, and disease sequalae among adults in the United States (US) are limited to case reports and series, warranting better characterization in the literature.[2,3] The present study aimed to describe epidemiologic features and clinical profiles of AD and CD among US adults.

Methods: A retrospective study was conducted using search of the National Institutes of Health All of Us Research Program, a database of adults aged 18+ years in the US.[4] Those with acute or chronic dacryocystitis were identified using ICD-9 and ICD-10 codes. Data including demographic features, epiphora, ALDO, and nasolacrimal procedures undergone by CPT code were collected. Descriptive statistics were used to categorize AD and CD by demographics and clinical profiles. Tests of $\chi 2$ were used to identify statistically significant differences in characteristics between AD and CD patients using a p-value cutoff of 0.05.

Results: Of the 87 participants identified, 52 had AD (mean age 54.8 ± 17.3 years, 80.8% female) and 35 had CD (80.0% female). The overall prevalence of acute and chronic dacryocystitis was 2.35 cases in 10,000 population during the 6-year period observed in the present study. The incidence of AD was 0.23 cases per 10,000 population per year. Date of diagnosis for CD codes was not available, precluding age and timeframe analyses. Most patients were non-Hispanic White in both cohorts (63.5% in AD cohort and 65.7% in CD cohort, $p = 0.200$). CD was more likely to be associated with ALDO (80.0% versus 48.1%, $p = 0.006$) and epiphora (54.3% versus 28.8%, $p = 0.031$) at or after the time of dacryocystitis diagnosis. Among patients with AD, the average time to subsequent ALDO diagnosis was 0.81 months (IQR 0-2.3), and the average time to subsequent epiphora diagnosis was 3 months (0.29-9.5 months). In the AD cohort, 15 (28.8%) underwent a procedure after diagnosis, with most (10/15) undergoing dacryocystorhinostomy (DCR). In the CD cohort, 16 (45.7%) underwent a procedure after diagnosis, also with most (13/16) undergoing DCR. Recurrence occurred in four cases of AD patients (7.7%), all of whom had not undergone a procedure between AD episodes. No recurrence occurred in those who underwent surgery after initial AD over the six-year period.

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Conclusions: Based on a nation-wide database of US adults, the prevalence of dacryocystitis and incidence of AD in this population are low and predominantly affect females. Approximately one third of AD patients underwent surgical intervention, compared to roughly half of CD patients, who were more likely to experience epiphora and carry a diagnosis of ALDO. A minority of adults diagnosed with AD underwent surgery, which was highly effective in preventing recurrent infection. Additional investigations are warranted to assess factors that contribute to recurrent infection or development of symptomatic obstruction after AD, as well as disease time course and management considerations in CD.

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10 Lacrimal Obstruction in Craniosynostosis: Anatomical and Genetic Risk Factors

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Introduction: Craniosynostosis, characterized by the premature fusion of one or more cranial sutures, can lead to secondary oculofacial anatomical and functional abnormalities that involve the orbit and adnexal structures.[1,2] These abnormalities include strabismus, refractive errors, shallow orbits, proptosis, lid abnormalities and may also result in papilledema due to elevated cerebrospinal fluid pressure.[3–5] Additionally, orbital and nasal anatomical abnormalities may potentially affect the lacrimal drainage system. The objective of this study is to investigate whether patients with craniosynostosis have elevated rates of nasolacrimal duct obstruction (NLDO), and to explore potential associated anatomical and syndromic/genetic risk factors.

Methods: A retrospective review of medical records was conducted for all patients diagnosed with craniosynostosis and treated at both the Division of Ophthalmology and the Division of Plastic and Reconstructive Surgery at The Children's Hospital of Philadelphia (CHOP) between the years 2009-2020. Anatomical variables included the type and number of involved sutures, while genetic variables comprised known genetic variants and syndromes. The primary outcome measures were the rate of NLDO and any associations with anatomical and syndromic/genetic risk factors.

Results: 767 patients were included, 465 (60.6%) males, mean age 2.8±3.8 years (range, 0.0-20.6), median follow-up length 25.2 months (inter-quartile 2.4-57.6). Four hundred and eighty-five patients (63.2%) had no known genetic or syndromic association; 631 patients (82.3%) had one major suture involved, while 128 (17%) had involvement of 2 to 4 major sutures; 429 (55.9%) underwent craniofacial surgical intervention.

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Out of the 767 patients, 51 (6.6%) were diagnosed with NLDO. This was more prevalent in the genetic/syndromic group (12.1% vs. 3.5%, p<0.001), with the highest prevalence observed in patients with Apert (5/13, 38.5%) and the lowest in those with Muenke syndrome (1/15, 6.3%). When considering genes, NLDO was most prevalent with variations in EFNB1 (n=1/1, 100%), FGFR2 (7/31, 22.6%), FGFR3 (3/23, 13.0%), and TWIST1 (2/18, 11.1%) (p<0.001). When examining the sutures involved, NLDO was more common when the coronal suture was affected (10.2% unilateral, 11.1% bilateral, vs. 3.9% for no coronal suture, p=0.001), whereas it was less frequent in the sagittal group (4.4% vs. 8.5%, p=0.02). There was no association observed between NLDO and other sutures or the number of sutures involved.

Conclusions: NLDO is more common in patients with craniosynostosis, especially those with involvement of the coronal suture, compared to the general population. It is also more prevalent in patients with syndromic craniosynostosis. Therefore, it is recommended to conduct ophthalmic evaluations for all craniosynostosis patients and carefully assess any symptoms of tearing.

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11 Same-Hospitalization Surgery in Acute Dacryocystitis: 5-Year Assessment of Predictors, Timing, and Impact on Outcomes in the United States

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Introduction: Conventional guidelines have recommended delayed surgical intervention in acute dacryocystitis (AD) to address underlying nasolacrimal duct obstruction.[1] More recent studies on AD in adults have advocated for earlier surgery, demonstrating faster recovery and greater likelihood of drainage patency when endoscopic dacryocystorhinostomy is performed during active infection in the outpatient setting.[2-4] The role of surgical intervention in severe AD warranting hospital level of care remains ambiguous. The authors investigated potential predictors of surgical intervention and outcomes associated with same-hospitalization surgery in the management of adults with AD in the United States (US).

Methods: The present study was a retrospective comparative cohort study using data from the National Inpatient Sample database from 2016 through 2020. Patients admitted with AD were identified using the ICD-10 code H04.32. Inclusion criterion consisted of age 18 years or older. Patients were categorized into two cohorts–those who underwent same-hospitalization surgery and those who did not. Surgical procedures were identified using ICD-10-PCS codes which described lacrimal duct drainage or bypass. Lacrimal passage dilations alone were excluded. Variables assessed included demographics and presence of orbital cellulitis, sinusitis, diabetes mellitus (DM), and cancer. Primary outcome compared was hospital length of stay (LOS). Subgroup analysis was performed in the surgical cohort to assess time to surgical intervention. Student t-tests, 95% confidence intervals (CI), logistic regression, and linear regression were performed with an alpha of 0.05 to indicate statistical significance.

Results: There were 359 adult patients with AD in the NIS database over the five-year period, which extrapolated to a weighted total of 1,795 cases nationally. A total of 385 (21.4%) patients underwent surgery. Age of patients the surgical cohort (mean 65.6 years, SD 18.7 years) was similar to that of the nonsurgical cohort (mean 62.8 years (SD 19.7 years) (p=0.510). Most patients in both cohorts were female, including 285 (74.0%) in the surgical group and 1,025 (72.7%) in the nonsurgical group (p=0.813).

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Factors independently associated with increased odds of surgery included the presence of sinusitis (p<0.001) but not concurrent orbital cellulitis (p=0.080), DM (p=0.401), or cancer (p=0.629). The overall mean LOS was 3.8 days (CI: 3.5-4.1 days), and LOS was similar between the surgical (3.8 days; CI: 3.5-4.2 days) and nonsurgical (3.8 days; CI: 3.3-4.3 days) cohorts (p=0.900). Factors independently associated with longer LOS included presence of sinusitis (p=*0*.010) or DM (p=0.026) but not orbital cellulitis (p=0.845) or cancer (p=0.864).

Subgroup analysis in the surgical cohort demonstrated the mean time to surgery was 1.2 days (CI: 0.9-1.6 days). When surgery was performed within the first 48 hours of hospitalization, mean LOS (3.1 days; CI: 2.5-3.7 days) was significantly shorter compared to surgery performed after 48 or more hours (5.1 days; CI: 4.5-5.8 days; p<0.010). There were no clinical factors independently associated with time to surgery.

Conclusions: Concomitant sinusitis may be a predictor of same-hospitalization surgical intervention in adults with AD requiring inpatient management. When surgery is warranted, intervention within the first two days may reduce LOS. Further investigation assessing additional outcomes, such as recurrence and readmission rates, are indicated to help guide management.

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12 Topical Application of Perchlorate: A Toxicity Study in Rats

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Introduction: Various types of cancer treatments involve excessive use of radioactive iodine (RAI), such as for treatment of thyroid cancer. Mega doses of I131 have been correlated with nasolacrimal obstruction. Although the etiology of the obstruction has not been proven, the presence of high levels of Sodium Iodide Symporter (NIS) in the lacrimal sac and lacrimal duct correlate well with the observed pathology. The lack of reported proximal lacrimal gland disease, corneal disease or conjunctival changes further support the distal nature of this mechanism. Once the RAI secondary fibrosis occurs and symptoms of nasolacrimal obstruction present, patients are often treated surgically with stent placements, DCR, or conjunctival dacryocystorhinostomies. Depending on the degree of fibrosis, these treatments are not always successful. A preventive treatment modality has been proposed and consists of topical application of perchlorate anion in ophthalmic solutions. This would locally prevent the ability of NIS to concentrate RAI in lacrimal sac and duct and potentially avoid the systemic limitations of the therapy. Although perchlorate has been used systemically for years without ocular complications, there have been no topical formulations. This study is aimed to document the ocular safety profile of topical perchlorate.

Methods: Nine Wistar male rats (18 eyes) were randomly assigned to receive an ocular application (topical eye drop OD, TID for 5 days) consisting of either:

1. sterile saline solution
2. 30 mg/ml NaClO4 or
3. 30 mg/ml KClO4

The rat eyes were examined daily for corneal cloudiness/clarity, discharge, mucous secretions, conjunctival injection, eyelid erythema, and/or changes in behavior. Seven days after the first dose, the rats were euthanized and both eyes were harvested, fixed, embedded in paraffin, and stained with H&E and Masson Trichrome. A blood test for levels of perchlorate was performed on all rats.

Results: The data collected over the 7 days revealed no behavior changes or ocular complications in any of the 3 study groups. Pathologic analysis of the corneas revealed normal findings on all groups without signs of inflammation, fibrosis, or any other abnormality, and no difference between the treated and control eyes. Blood perchlorate was undetectable on all rats.

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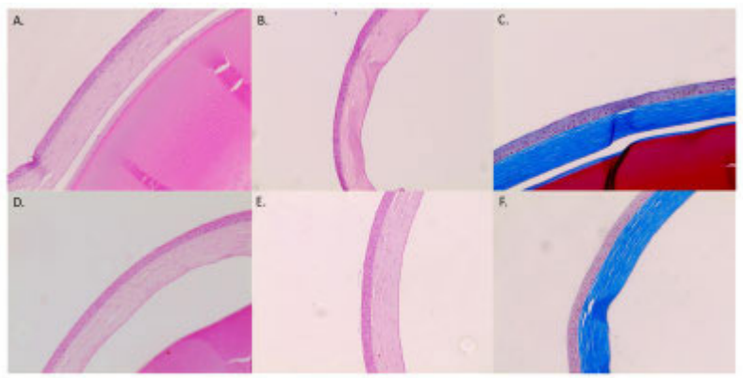
Conclusions: The findings of this study suggest that the use of topical perchlorate is safe to use on eyes in high concentrations. The efficacy of this compound in minimizing fibrosis of the nasolacrimal sac and duct warrants further study.

Figure 1



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13 More than Meets the Eye: Unmasking a Case of Dermatomyositis with Unilateral Periocular Edema

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Introduction: Dermatomyositis is an immune-mediated inflammatory myopathy characterized by progressive proximal muscle weakness with characteristic cutaneous eruptions. The authors present an atypical case of dermatomyositis presenting with progressive unilateral periorbital edema.

Methods: A previously healthy 20-year-old Latino man presented to the emergency room with a two-month history of progressive right periorbital swelling. On presentation, his uncorrected visual acuity was 20/60 OD and 20/25 OS. Vital signs, intraocular pressure, pupils, extraocular motility, and exophthalmometry were within normal limits. Mechanical right lower eyelid entropion with trichiasis and linear corneal abrasions was noted. A review of systems was notable for mild odynophagia, generalized malaise, and weakness. He had failed four courses of antibiotics and acyclovir for presumed preseptal cellulitis. The periorbital edema initially involved only the right upper eyelid (Figure 1). It progressed over several weeks, developing well-demarcated erythematous patches extending to the right temple, cheek, and jaw (Figure 2). He more recently developed a rash on his chest and torso, bilateral buccal musical erosions, and several faintly erythematous papules on the extensor surface of his hands (Figure 3a-c).

Computerized tomography (CT) revealed diffuse superficial right facial and preseptal cellulitis. Magnetic resonance imaging (MRI) of the head and neck demonstrated right periorbital soft tissue swelling (Figure 4) and diffuse symmetric edema of the neck muscles.

Results: Systemic workup was notable for elevated lactate dehydrogenase (608u/L; normal <246), aspartate transferase (308u/L; normal <34), alanine transaminase (129u/L; normal <41), and creatine kinase (CK) (5398u/L; normal <171). White blood cell count, c-reactive protein, and erythrocyte sedimentation rate were normal.

A cutaneous punch biopsy of the chest revealed interface dermatitis. MRI of the lower extremities was suggestive of anterior compartment myositis. A biopsy of the left quadricep muscle revealed infiltration of endomysial lymphocytes, areas of focal perifascicular atrophy, and diffuse MHC-I upregulation in the muscle fibers, confirming the diagnosis of dermatomyositis (Figure 5a-

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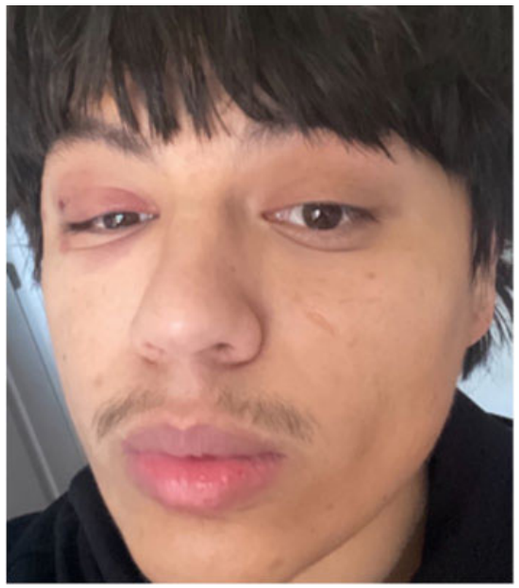
c). Serologic myositis-specific autoantibody testing was positive for anti-NXP2 antibody, commonly associated with malignancy.[1] A screening CT for malignancy was negative.

The patient was treated with intravenous and oral steroids resulting in gradual clinical improvement. During hospitalization, he experienced rebound symptoms and steroid-induced CK escalation, necessitating intravenous immunoglobulin and long-term immunosuppression.

Conclusions: Dermatomyositis is a rare condition that typically presents with symmetric proximal muscle weakness, skin rash, and esophageal dysfunction. The presence of a pathognomonic heliotrope rash, classically described as bilateral periorbital pink or violaceous erythema, with or without edema, can lead to expedited diagnosis and management. This case demonstrates that the heliotrope rash can present asymmetrically and may not be apparent in patients with increased cutaneous pigmentation. The disease course can vary from mild inflammation to rapidly progressive multiorgan failure. Patients require evaluation for malignancy, interstitial lung disease, dysphagia, and cardiac abnormalities. In addition to older age and underlying malignancy, delay in diagnosis and treatment is associated with poorer outcomes.[2] In cases of periocular cellulitis that respond poorly to systemic antibiotics, clinicians must consider alternative diagnoses, particularly those with life-threatening associations.

Figure 1



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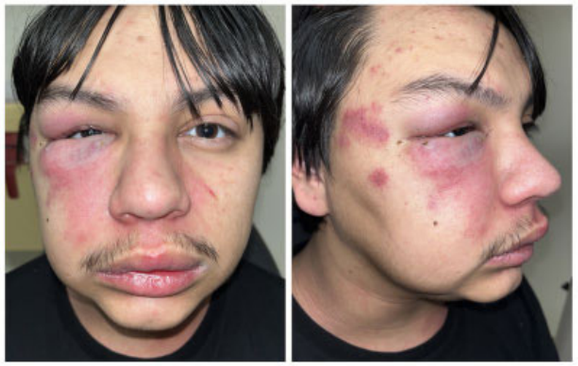

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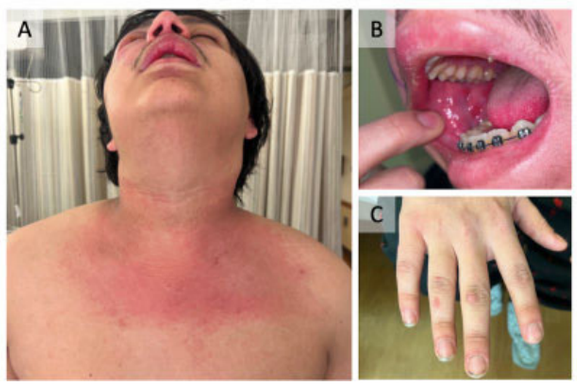

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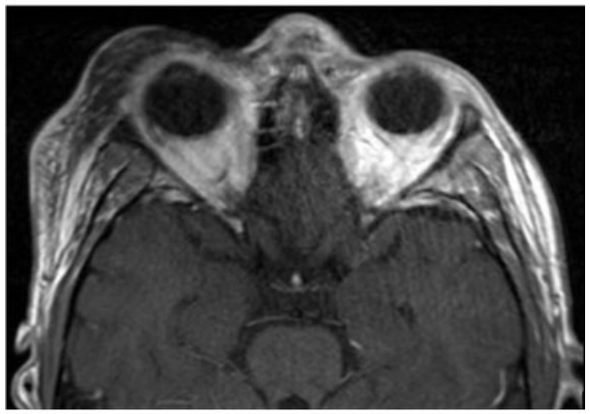

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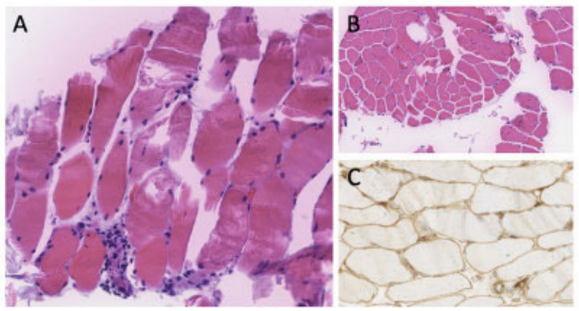

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14 Clinical Presentation and Treatment Outcomes of Immunotherapy in Patients with Periorbital Cutaneous Squamous Cell Carcinoma with Perineural Spread

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Introduction: The aim of this study is to evaluate clinical presentations and treatment outcomes of immunotherapy in patients who has periorbital cutaneous squamous cell carcinoma(cSCC) with perineural spread.

Methods: Retrospective chart review was performed at Kellogg Eye Center, University of Michigan between July 2022 to May 2023. This study included all patients with periorbital cSCC with perineural spread who have been treated with immunotherapy.

Results: We included four patients with periorbital cSCC with perineural spread. The primary site of periorbital cSCC was temporal area (2 patients), lateral orbital area (1 patient), and tip of nose (1 patient). The largest diameter of primary site varied between 1.3 and 13 cm. Two patients were diagnosed with periorbital cSCC with perineural spread at presentation and 2 patients developed recurrent disease with perineural spread during the follow-up. The time interval between diagnosis of cSCC and diagnosis of perineural spread was 1 to 7 months in 3 patients Presentation symptoms included trigeminal neuralgia(3 patients), facial palsy(2 patients), and diplopia(1 patient). The duration from initial presentation of symptoms to diagnosis of perineural spread was between 3 to 23 months for trigeminal neuralgia and facial palsy, and 3 weeks for diplopia. The first MRI after presentation of symptoms was underdiagnosis in 3 patients. PET scan showed an increase in FDG uptake in one patient and did not show it in other 2 patients.

All four patients received immunotherapy, including Cemiplimab (350 mg every 3 weeks) in 2 patients, Pembrolizumab (200 mg every 3 weeks) in 1 patient, or combined treatments (Cemiplimab first, later Pembrolizumab with cetuximab, 5-FU, and methotrexate) in 1 patient. After immunotherapy, two patients developed partial response and two developed stable disease during 3 to 32 months follow-up period. During treatment, one patient reported an improvement in motor function, specifically facial weakness, and a reduction in trigeminal neuralgia pain and numbness. Another patient experienced a decrease in pain. Among the partial response patients, subsequent MRI scans demonstrated reduced bulkiness and prominent enhancement or even the disappearance of enhancement.

Conclusions: Early diagnosis and management of perineural spread in pocSCC is challenging. Immunotherapy including Cemiplimab and Pembrolizumab can improve clinical symptoms, MRI result, and delay progression of disease.

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15 The Efficacy of Topical Chemotherapy in the Management of Sebaceous Carcinoma

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Introduction: Pagetoid conjunctival spread of ocular adnexal sebaceous carcinoma (OaSC) remains a challenge to manage. Shields et al. reported three patients that were successfully treated with 3-4 cycles of 0.04% mitomycin-C (MMC).[1] Additionally, MMC has been shown to be effective in decreasing tumor cell proliferation and migration in vitro, while 5-fluorouracil (5-FU) has been shown to have primarily antiproliferative properties.[2] The purpose of this study is to report on the outcomes of topical chemotherapeutic agents in treating intraepithelial invasion of OASC within the ocular surface at a single institution.

Methods: A retrospective, single institution, case series study was conducted under approval of the University Institutional Review Board between 2000-2023. Study inclusion criteria included 1) biopsy proven OaSC and 2) use of topical chemotherapy in a neoadjuvant or adjuvant setting. Histopathology slides were evaluated by a board-certified pathologist (SRD).

Results: Ten patients (Males=1, Females=9) with intraepithelial invasion of OaSC were included in this study. The average patient age was 70.5 years (Range: 39-84 years). Primary tumor sites included the upper eyelid (7), lower eyelid (2), and the caruncle (1). Local surgical resection of the primary tumor was performed in nine cases. Topical chemotherapy was used via the following methods: neoadjuvant (4) and adjuvant (6). Topical chemotherapy regimens included MMC (0.02% or 0.04%) only (6), MMC + interferon alpha (IFNα) (2), and 1% 5-FU (2). Recurrence of pagetoid spread was observed in eight cases [80% (MMC only: 4, MMC + IFNα: 2, 5-FU: 2)] and orbital exenteration was ultimately performed in seven of those cases, with one patient undergoing palliative care. Control of pagetoid spread was observed in one case treated with continuous neoadjuvant MMC 0.02% QID for three months, followed by excision of the entire upper eyelid. Notably, despite aggressive topical chemotherapy with control of conjunctival disease, there was still active tumor noted within the eyelid (Figure 1). One patient treated with local excision and two cycles of adjuvant MMC 0.02% QID was lost to follow up after six months.

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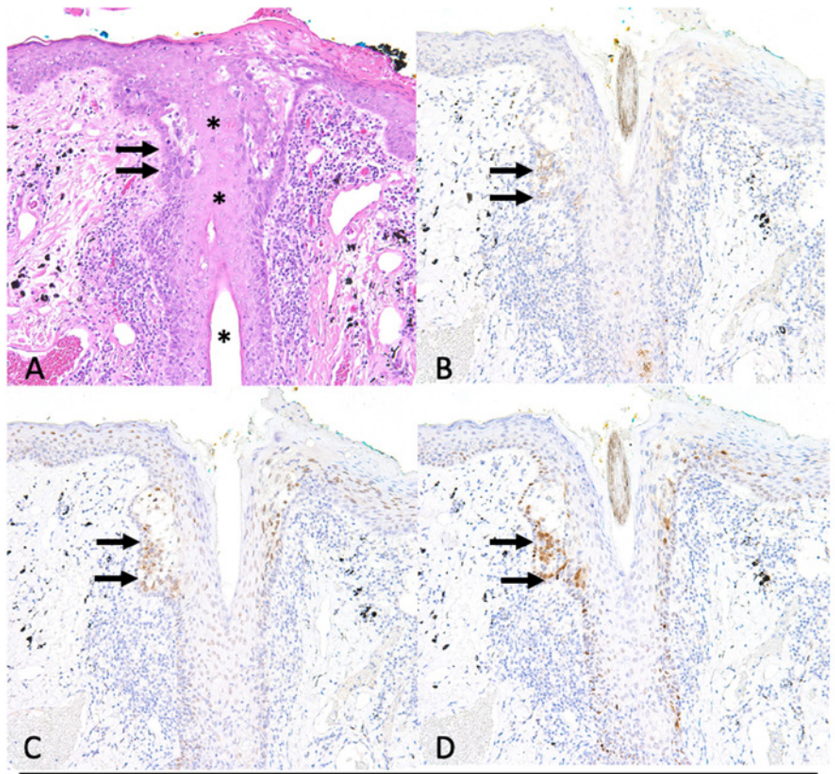
Conclusions: We present 10 advanced cases of OaSC that were treated with a variety of topical chemotherapy for pagetoid spread. We note a high recurrence rate within our series with the majority of these patients requiring orbital exenteration, highlighting the continued challenge of treating OaSC. Notably, despite successful treatment of pagetoid disease with continuous topical MMC in one case, surgical resection of the eyelid demonstrated residual tumor. This case serves to caution against the use of mono-modality topical chemotherapy for OaSC with pagetoid spread.

Figure 1



A) Examination discloses large, basophilic, atypical cells (arrows) surrounding a hair follicle (asterisks) (Hematoxylin and eosin, original magnification x 200) that stain variably positive for B) Adipiphilin (original magnification x 200), C) Androgen receptor (original magnification x 200), and C) p53 (original magnification x 200)

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16 Acute on Chronic Proptosis in a Patient with a Previously Diagnosed Lymphatic Malformation

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Introduction: Lymphatic malformations (LM) in the orbit may remain clinically unapparent until acute hemorrhage or upper respiratory infection induces mass effect, leading to proptosis, strabismus, and progressive optic neuropathy. Previous case series have reported a possible association between orbital LMs with intracranial vascular anomalies,[1,2] however among these cases, only one patient was diagnosed with an intracranial dural arterio-venous fistula (AVF). In another report, one female newborn with an orbital LM was noted to have an intracranial dural AVF.[3] To the best of the authors' knowledge, an orbital LM with a concomitant orbital AVF has not previously been reported. Herein, we present an adult patient with acute orbital signs with a long-standing stable LM.

Methods: Case Report

Results: A 71-year-old woman was referred by an outside ophthalmologist for one month of left eye bulging, eye pain, and vision loss that started after a sinus infection. She has a history of a left LM that was reportedly stable since 1988 and a left eye lamellar hole, with her last annual exam demonstrating a visual acuity of 20/20 in the right eye and 20/40 in the left eye. On exam, her right eye exam was unremarkable. Her left eye had hand motion vision with a left relative afferent pupillary defect, 9 mm of relative proptosis, and restricted extraocular movements in all gazes. She also had left periorbital edema, conjunctival injection, and chemosis. Dilated fundus exam was normal.

An MRI orbits obtained by the referring ophthalmologist revealed multiple hypointense lesions in the T1 imaging and a heterogeneously enhancing T2 lesion in the left medial orbit, as well as a soft tissue lesion along the left planum sphenoidale, suggestive of extension of the prior LM (Figure 1). Additional imaging with a CT head demonstrated an area of bone erosion in the region of the planum sphenoidale (Figure 2). CT angiography showed enlarged vessels in the medial and superior left orbit, including the left superior ophthalmic vein, as well as vessels possibly abutting the optic nerve (Figure 3). In discussion with radiology, these findings shifted the differential to a possible sphenoid meningioma or vascular lesion. For further characterization of the vascular structures, a digital subtraction cerebral angiography was performed, which revealed a dural AVF with rapid shunting from the right internal carotid artery to the left superior ophthalmic vein (Figure 4). The patient then underwent coil embolization of the AVF, achieving near-complete obliteration. Subsequently, the patient's orbital signs resolved, and her left eye vision improved to 20/150 (Figure 5).

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Conclusions: Our patient had a chronically stable LM who presented with acute orbital signs soon after a sinus infection. While her ocular history and initial imaging suggested acute LM growth, the cerebral angiography revealed a dural AVF. To the best of our knowledge, this is the first report of an adult with an orbital LM presenting concomitantly with an orbital AVF. Cerebral angiography should be considered for accurate depiction of potential vascular lesions. More research is needed to further characterize the relationship between orbital LMs and orbital AVFs.

Figure 1

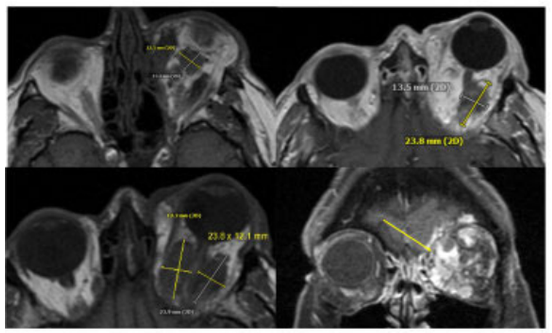


Figure 2

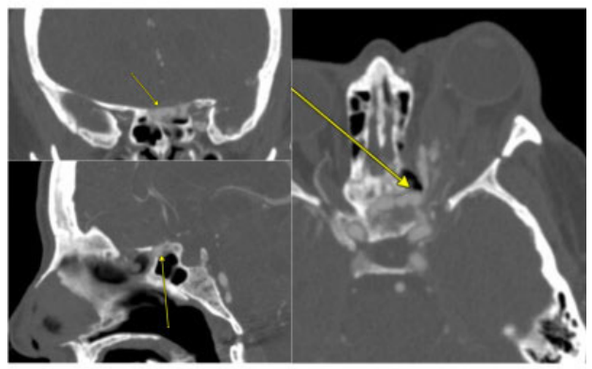


Figure 3

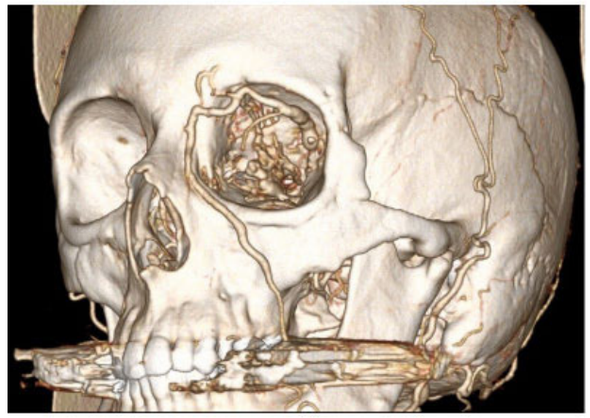
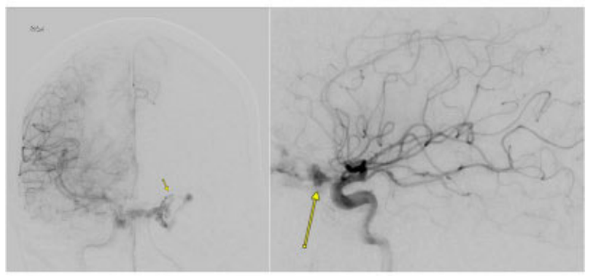


Figure 4



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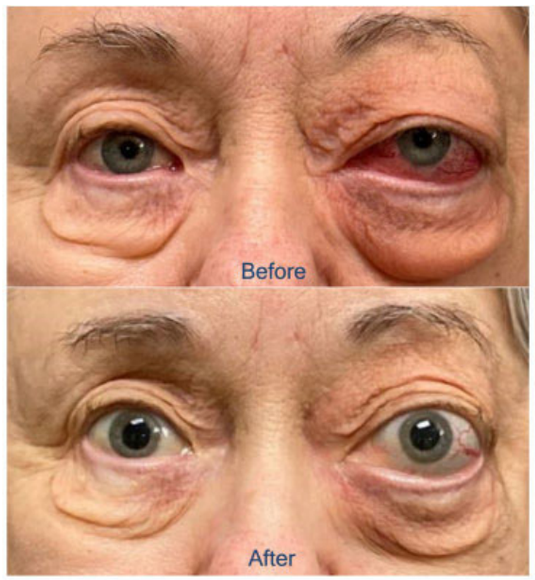

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17 Concurrent, Symptomatic Leiomyomas involving the Orbit and Uterus

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Introduction: We discuss a rare case of symptomatic orbital leiomyoma in a middle-aged female with a history of menorrhagia and iron deficiency anemia. Systemic evaluation revealed concurrent symptomatic uterine leiomyomas.

Methods: Case report.

Results: A 47-year-old female presented with right upper eyelid swelling, tenderness, and pain with eye movements. Past medical history was notable for four months of preceding headaches and chronic menorrhagia with associated iron-deficiency anemia. Visual acuity was 20/20 in both eyes. Pupil exam, intraocular pressures, and extraocular eye movements were normal. Exophthalmometry revealed 2 mm of right globe proptosis and external examination was notable for mild, right upper eyelid edema with pain on palpation. Anterior segment and fundus examinations were unremarkable. Computed tomography of the orbits with and without contrast demonstrated mild asymmetric anterior prominence of the right lacrimal gland, without distortion of the globe or extraconal extension (Figure 1A). In comparison to reference magnetic resonance imaging of the brain, obtained for headaches three months prior to presentation, the mass appeared enlarged (Figure 1B).

The patient underwent excisional mass biopsy via a right anterior orbitotomy. On histopathologic examination, the nodular-appearing lesion measured 7 x 4 x 3 mm. Microscopically, the sections showed proliferation of benign appearing, elongated, spindle-shaped cells with long, oval nuclei and eosinophilic cytoplasm (Figure 2A-C). Immunohistochemistry revealed positive staining for smooth muscle actin, desmin, and CD4; staining for S100, congo red, and crystal violet was negative. These findings were consistent with a diagnosis of orbital leiomyoma (Figure 2D-F). At one-month post-excision, the patient reported complete resolution of her presenting symptoms and no recurrence of the mass.

In the setting of a biopsy-proven orbital leiomyoma, the patient was referred to gynecology for further evaluation of her menorrhagia. She underwent transvaginal ultrasound, which revealed two uterine leiomyomas and a complex right ovarian cyst (Figure 3). A decision was made to monitor these leiomyomas without medical or surgical intervention.

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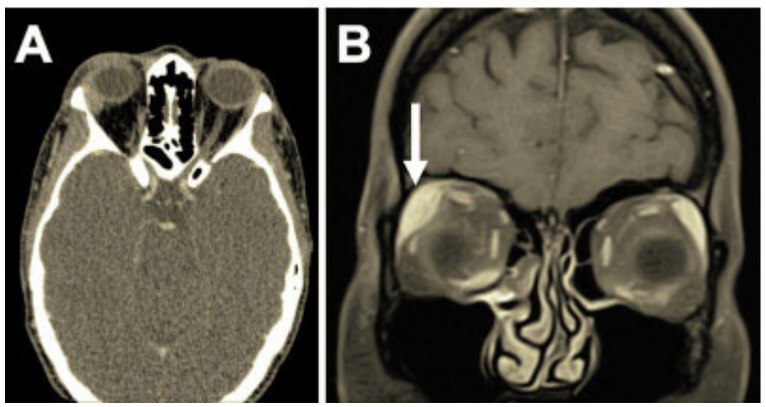
Conclusions: To our knowledge, the concurrent presence of symptomatic leiomyomas in the orbit and uterus has not been previously reported. A hyper-estrogenic state – as suggested by the presence of multiple uterine leiomyomas in conjunction with an ovarian cyst – in our patient may have contributed to excessive proliferation of vascular smooth muscle cells in the orbit. Orbital leiomyomas represent an important consideration among female patients who have one or more risk factors for uterine leiomyomas, including: age greater than 40 years, African race, nulliparity, early menarche, and obesity.

Figure 1



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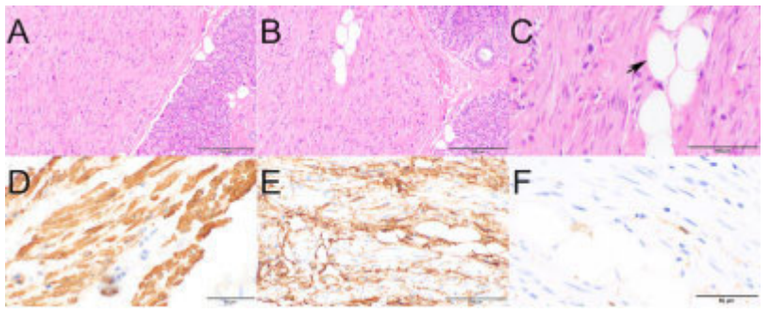
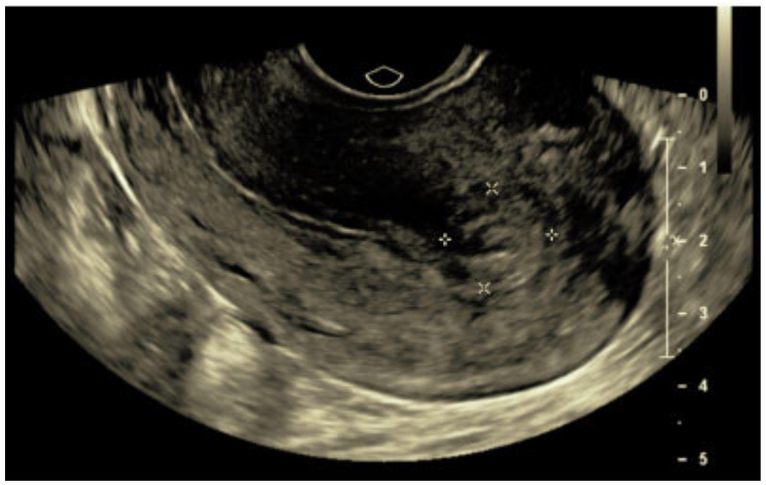


Figure 3



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18 Delayed Repair of Isolated Orbital Floor Fractures

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Introduction: The timing of isolated orbital floor fracture repair remains controversial. Though delayed repair is now becoming more commonly advocated, the literature examining the surgical success rate in eliminating diplopia following delayed repair is limited. While several studies have investigated repair specifically after 2 weeks[1,2], data on the results of later repair (after 30 days) remain scarce. In the present study, our aim is to determine, from a single surgeon series, the success rate for eliminating clinically significant diplopia when repairing isolated orbital floor fractures present for at least 30 days, well beyond the "2-week window" traditionally quoted.

Methods: The records of all patients from February 2017 to March 2023 who underwent repair of an isolated orbital fracture by a single surgeon (PDL) for persistent, clinically significant diplopia for at least 30 days after the injury were reviewed. Patients who underwent repair solely for enophthalmos, who suffered other periorbital fractures (e.g., ZMC fractures), who had undergone prior surgical repair of the floor fracture, or who had less than 2 months of postoperative follow up were excluded. Surgery was considered successful if the diplopia completely resolved or if diplopia persisted only in such extreme gaze that it was not present during the patient's normal daily activities.

Results: 27 patients met the inclusion criteria. The mean time to surgery was 160 days after injury (range 30-550 days) and the median time to surgery was 90 days. 23 patients (85%) had complete resolution of diplopia or had clinically insignificant diplopia following surgery. Among patients whose diplopia resolved, 4 patients underwent fracture repair between 6 and 12 months after the injury, and 4 patients underwent repair over a year after the injury.

Conclusions: Isolated orbital floor fractures can be observed for a considerable period of time prior to repair without sacrificing the chance for surgical success. Since a significant percentage of patients will experience spontaneous resolution of diplopia over the course of several weeks without intervention[3], observation of non-trapdoor orbital floor fractures well beyond 2 weeks seems prudent to avoid unnecessary surgery. Meticulous dissection of adhesions, isolating the bony defect for 360 degrees, skeletonizing the infraorbital neurovascular bundle if unroofed by the fracture, and placing the implant on the posterior bony ledge under direct visualization are important technical considerations in achieving surgical success in these cases.

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19 Eyelid Kinematics during Reflex Blinks as a Marker for Trigeminal Sensitivity in Chronic Orbital Pain: An Evaluation with Automated Upper Eyelid Tracking

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Introduction: The blink reflex has been shown to be a useful marker for trigeminal nerve function with alterations in the reflex reported in migraines[1], trigeminal neuralgia[2], and neurotrophic keratopathy.[3] The aim of this study was to use automated upper eyelid tracking technology to analyze eyelid kinematics during the blink reflex and investigate whether peripheral trigeminal nerve blocks modify trigeminal sensitivity in chronic orbital pain.

Methods: Patients with chronic orbital pain without clinical or radiologic signs of disease and healthy subjects were recruited to this IRB-approved prospective trial. The EyeStat (Generation 3, blinktbi, Inc.) is an FDA-approved device that stimulates the blink reflex by delivering an air puff to the lateral canthus at random intervals, records the blink reflex at 280 frames/sec, and provides parameters related to eyelid kinematics during reflex blinks using an automated upper eyelid tracking algorithm. Twelve stimuli of 30 ms duration, 6 for each eye, were delivered to unilateral orbital pain patients at baseline and at 30 minutes after unilateral peripheral trigeminal nerve blocks.[4] The orbital injections consisted of lidocaine and bupivacaine and were administered in the region of the supraorbital and supratrochlear nerves. Healthy subjects underwent the testing once and did not receive injections. Variables collected included latency (elapsed time between the air puff delivery and detection of the blink onset), mean upper eyelid velocity during the first 7 frames as the eyelid is moving toward the closed position and during the entire closing movement, mean time to open and close the upper eyelid, mean time the upper eyelid spent below the mid-pupil position (under threshold time), number of direction changes of the upper eyelid (oscillations), and excursion (number of pixels traversed by the upper eyelid during a complete blink) (Figure 1).

Results: Six female patients with chronic orbital pain (mean age 48.2 years) and 10 healthy female subjects (mean age 49.7 years) were included. One patient could not complete the testing after the orbital injection due to severe ptosis. For pain patients, the mean latency of the ipsilateral upper eyelid was 50.1 ms at baseline and 50.5 ms post-injection (p=0.8); for the fellow upper eyelid, the mean latency was 49.4 ms at baseline and 44.7 ms post-injection (p=0.5). At baseline, the latency was similar between eyelids among pain patients (p=0.8), but it was significantly longer for the ipsilateral upper eyelid relative to the fellow upper eyelid post-injection (p=0.03)

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(Figure 2A). The mean excursion of the ipsilateral eyelid decreased significantly from 144.5 pixels at baseline to 111.8 pixels post-injection (p=0.02) (Figure 2B). The mean excursion of the fellow eyelid was 142.5 pixels at baseline and 136.2 pixels post-injection (p=0.6). The mean excursion was similar between eyelids at baseline (p=0.9) and post-injection (p=0.3). Other eyelid kinematics (initial velocity, time to open/close, velocity during close, under threshold time, and oscillations) did not significantly differ between eyelids (Table 1) or between time points (Table 2). All eyelid kinematics were similar between pain patients and controls.

Conclusions: The blink reflex circuit is not sensitized in chronic orbital pain. However, the asymmetry in eyelid latency after treatment with peripheral trigeminal nerve blocks suggests that the injections have a greater attenuating effect on the trigeminal afferent pathway in the ipsilateral upper eyelid relative to the fellow upper eyelid. While peripheral trigeminal nerve blocks do not alter eyelid kinematics during reflex blinks, they may result in a decrease in upper eyelid movement likely secondary to ptosis due to the volume of the anesthetic and/or the effect of the anesthetic on the levator muscle. Emerging technology for rapidly quantifying eyelid kinematics during reflex blinks provides objective data on trigeminal sensitivity and may prove beneficial in evaluating the impact of eyelid disorders or surgery on blink dynamics.

Table 1. Change in blink reflex parameters of the ipsilateral eyelid compared to the fellow eyelid in chronic orbital pain patients and change of the right eyelid compared to the left eyelid in healthy subjects

	Chronic orbital pain patients Change from ipsilateral to fellow eyelid				Healthy patients Change from right to left eyelid	
	Baseline (n = 6)	p	30 min post-injection (n = 5)	p	Baseline (n = 10)	p
Latency (ms)	0.7	0.8	5.8	0.03*	2.6	0.5
Initial velocity (pixels/ms)	-0.3	0.6	-0.8	0.3	0.0	0.9
Time to open (ms)	0.9	1.0	-128.9	0.2	0.0	0.9
Time to close (ms)	-3.3	0.2	-2.6	0.1	-2.2	0.4
Velocity during close (pixels/ms)	-0.5	0.3	-0.7	0.2	-0.1	0.8
Under threshold time (ms)	2.9	0.9	-67.0	0.5	21.3	0.3
Oscillations (quantity)	-0.7	0.7	-1.6	0.3	1.9	0.7
Excursion (pixels)	1.9	0.9	-24.4	0.3	-11.5	0.4

*Statistically significant

Table 2. Change in blink reflex parameters post-injection compared to baseline

	Upper eyelid laterality	Change from baseline at 30 min post-injection (n = 5)	p
Latency (ms)	Ipsilateral	0.5	0.8
	Fellow	-4.7	0.1
Initial velocity (pixels/ms)	Ipsilateral	-1.0	0.1
	Fellow	-0.5	0.1
Time to open (ms)	Ipsilateral	-12.1	0.3
	Fellow	117.7	0.2
Time to close (ms)	Ipsilateral	-2.4	0.2
	Fellow	-3.1	0.2
Velocity during close (pixels/ms)	Ipsilateral	-0.4	0.2
	Fellow	-0.2	0.7
Under threshold time (ms)	Ipsilateral	1.3	0.8
	Fellow	71.2	0.5
Oscillations (quantity)	Ipsilateral	-4.5	0.1
	Fellow	-3.6	0.4
Excursion (pixels)	Ipsilateral	-32.7	0.02*
	Fellow	-6.3	0.6

*Statistically significant

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Figure 1. Sample tracing of the upper eyelid pixel position around the time of an air puff stimulation

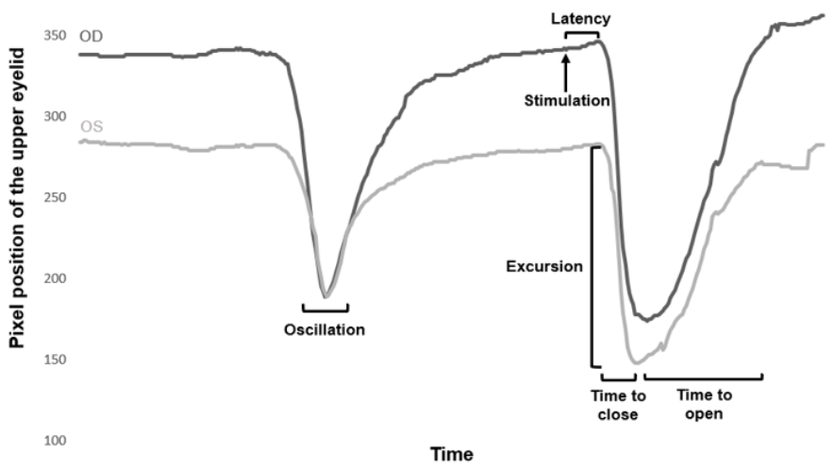
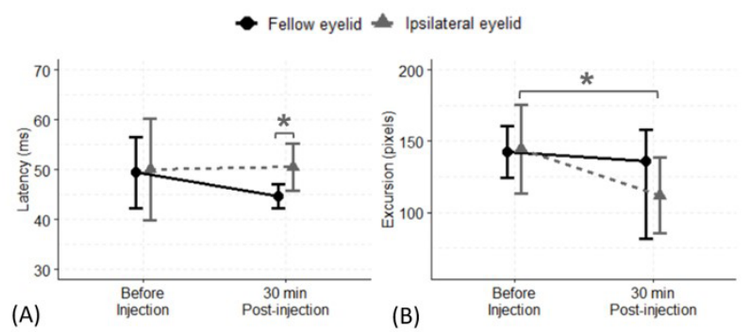


Figure 2. (A) Difference in latency between the upper eyelids before and 30 minutes after orbital anesthetic injection (B) Change in upper eyelid excursion before and after injection



*P<0.05

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20 Frequency and Patterns of Hearing Dysfunction in Patients Treated with Teprotumumab

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Introduction: The aim of this study was to investigate the frequency and patterns of hearing dysfunction in patients who have received teprotumumab to treat thyroid eye disease.

Methods: A review of patients who underwent audiology testing before and after completion of teprotumumab infusions. Additional mid-treatment audiogram testing was included when available. Hearing function was analyzed using audiogram data measuring threshold hearing levels at specific frequencies. Basic demographic data as well as information regarding otologic symptoms were also obtained and analyzed.

Results: Twenty-three patients (46 ears) were included in the study, with baseline and most recent post-treatment audiology testing ranging from 84 days before to 496 days after treatment. Sixteen patients (32 ears) also had mid-treatment testing starting after the second infusion up until the day of but before the eighth infusion. Post-treatment hearing loss met criteria for ototoxicity in 17 of the 46 ears (37%) with 11 of the 23 patients (48%) meeting criteria in at least one ear. The pure tone average (PTA) decibel hearing levels (dB HL) across all 46 ears demonstrated post-treatment hearing loss ($p=0.0089$) specifically at high ($p=0.0011$) and mid-frequencies ($p=0.0158$), but not at low frequencies ($p=0.5138$). Patients who were older were also more likely to experience post-treatment hearing loss ($p=0.0008$).

Conclusions: Audiometric data demonstrates that teprotumumab influences hearing function, most significantly at higher frequencies and in older patients. Audiometric testing is critical for counseling patients regarding teprotumumab treatment. A protocol for monitoring hearing during treatment is needed to detect and manage hearing changes associated with teprotumumab.

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Figure 1

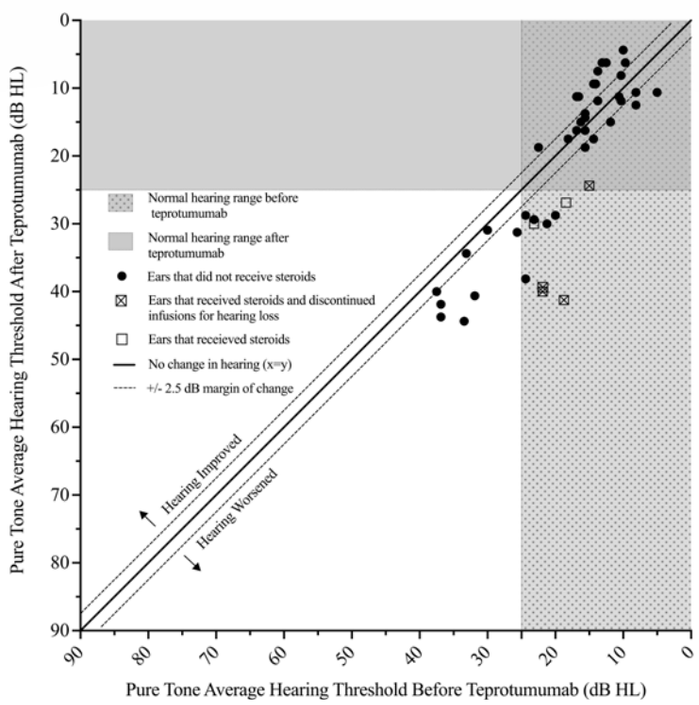

Figure 2

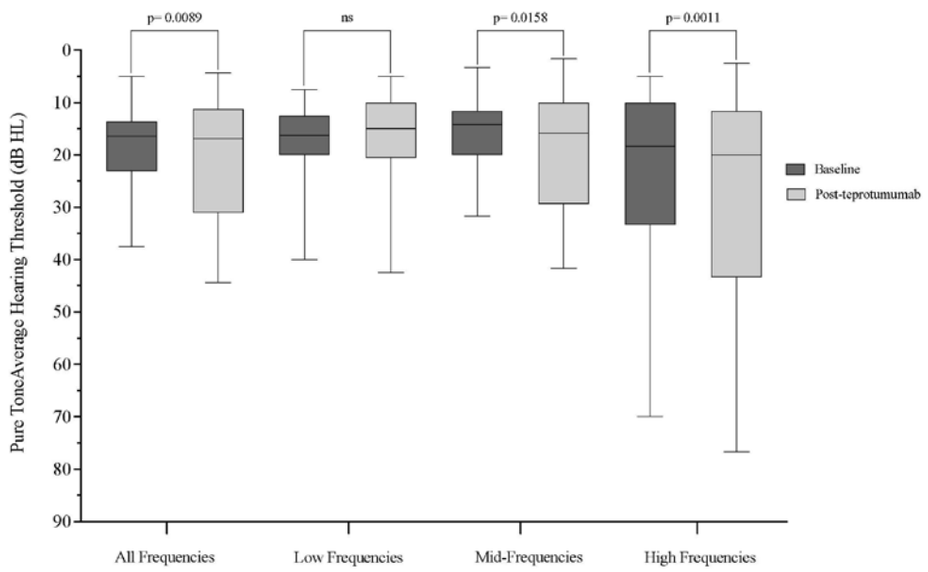

Figure 3

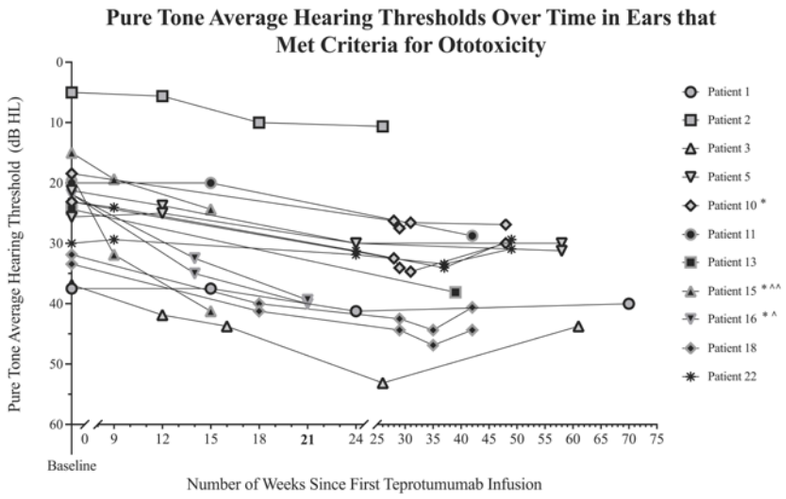

Table 1: Symptoms and Hearing Loss

Patient	Age (yrs)	Gender	Subjective Symptoms	Hearing Loss Meeting Ototoxicity Criteria
1	61	M	None	**Y**
2	39	F	None	**Y**
3	68	F	None	**Y**
4	43	F	None	N
5	60	F	None	**Y**
6	54	F	None	N
7	31	F	Ear popping	N
8	31	F	None	N
9	36	F	Tinnitus	N
10	43	F	Autophony, Ear fullness	**Y**
11	63	F	None	**Y**
12	43	F	None	N
13	72	F	None	**Y**
14	57	F	None	N
15	49	F	Tinnitus	**Y**
16	61	F	Hearing loss, Tinnitus	**Y**
17	42	M	Vertigo, Tinnitus, Ear pain	N
18	73	F	Improved tinnitus	**Y**
19	56	F	None	N
20	55	F	None	N
21	43	M	None	N
22	58	F	Hearing loss	**Y**
23	46	F	None	N

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Table 2: Hearing Loss and Pure Tone Average (PTA) at Specific Frequencies

Frequency PTA	All Ears Pre/Post Teprotumumab (n=46)
All Frequencies (250Hz-8kHz)	p=0.0089
Low (250Hz, 500Hz)	p=0.5138
Mid (1kHz, 2kHz, 3kHz)	p=0.0158
High (4kHz, 6kHz, 8kHz)	p=0.0011

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21 Long-Term Complications of Osseointegrated Orbitofacial Prosthetic Implants

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Introduction: Osseointegrated orbitofacial prostheses are used to replace an eye and the surrounding eyelid and periocular soft tissues following exenteration. Limited or more extensive exenterations are typically due to aggressive malignancies, infection, birth defects, irreparable trauma. Patients may experience emotional stress and difficulty with functional adaptations. Osseointegrated orbitofacial implants are anchored into the bone through a process called osseointegration, where the implant is integrated into the bone and becomes a permanent part of the skull. They provide a stable and secure base for the prosthetic device, allowing for greater comfort, functionality, and aesthetics. The implants are made of titanium, which is a biocompatible material highly resistant to corrosion. They are surgically implanted into the bone, and over time, the bone grows around the implant, creating a secure attachment.

While osseointegrated orbitofacial implants have become increasingly popular in recent years, as they offer a viable alternative to traditional prosthetic devices that can be unstable, this study aims to analyze the long-term complications of osseointegrated orbitofacial prosthetics.

Methods: A retrospective study was performed on all orbitofacial osseointegration cases in 4 practices (oculoplastics and anaplastologists) from the past 16 years. Collected data included: etiology of exenteration, laterality, range of follow up, number of implants placed, age, gender, history of radiation to the face, long term complications, loss of implants, skin irritation/infection/odor. Appropriate IRB approval was obtained.

Results: 40 patients were included, ages 29-71 at the time of osseointegration implant procedure. 134 orbital implants were placed (ranging in 1st to 2nd generation of implants). Range of follow up was 6 months – 17 years. Indication for exenteration included rhabdomyosarcoma, retinoblastoma, squamous cell carcinoma, basal cell carcinoma, sebaceous carcinoma, melanoma, disfiguring trauma. 26% patients had their implant replaced within 3-5 years of the implantation of the prosthetic. The most common reason for replacement was general discomfort of the prosthetic: as the body changed and grew, changes in size or shape or the sockets

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led to suboptimal fit of the osseointegrated prosthesis/ implants. This long-term complication appeared more prevalent in younger populations and those with osteoporosis, as bones change at an increased rate in these groups.

Peri-implant discharge, bad odor, frequent socket infection, and implant material failure were other reasons for replacement. Irritation, inflammation, and redness of the surrounding tissues were observed as well, with tissue erosion/atrophy around the implant occurring in a significant percentage of patients. Strong odors or infection occurred in 22% due to superior fixtures that were too close to each other, limiting the ability to clean around the implants (Figure 1). As a thin layer of skin is typically desired around the implant at the time of placement in order to avoid tissue overgrowth over the implant posts, this also results in less cushion of the peri-implant tissues due to negligible subcutaneous layer. Thus over time, tissue compression between the orbitofacial prosthesis and implants potentially resulted in tissue breakdown, exposure of implants, infection, recurrent erosion, and loss of implants. Late-onset material failure in the implant was also noted. As lacrimation still occurs in the socket posterior to the prosthesis, calcification may occur around the implants which could affect fit and stability. Also, some osseointegrated implants shifted over time: ie. the abutment loosened/fell out, or the tissues surrounding the abutment rendered the implant nonfunctional through tissue overgrowth (Figure 1, 2). 13% of implants were lost due to instability or delayed tissue overgrowth, with some having had prior radiation at time of exenteration. There was an increased risk of implant failure for implants in the inferolateral orbit in faces with thick midfacial soft tissue, although this did not reach statistical significance. Patients also had to come frequently to remove the magnet and place temporary caps each time an MRI was necessary for other medical issues, resulting in increased patient visits with time off work/office fees, both before and after each MRI. Aesthetics and color changes were also a cause for replacement.

Conclusions: This is the largest reported study on the long-term effects of osseointegrated orbitofacial prosthetics to the socket and the surrounding periocular tissues. The findings will help identify common complications with this biomaterial, in order to provide better preoperative patient guidance, and ultimately improve the comfort and longevity of osseointegrated orbitofacial implants. Implant failures were more often related to previous radiotherapy, poor bone quality, or tissue overgrowth. However, implant failure did not typically result in prosthetic failure as the remainder of the implants were able to still adequately retain the orbitofacial prosthesis. Intraoperative adjustments that can minimize the risk of these delayed complications will also be discussed.

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Figure 1

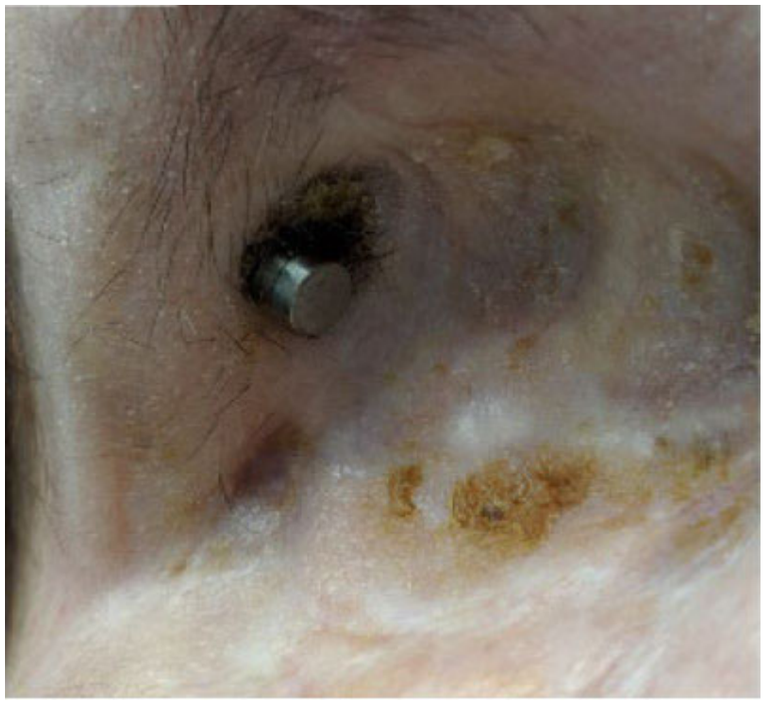
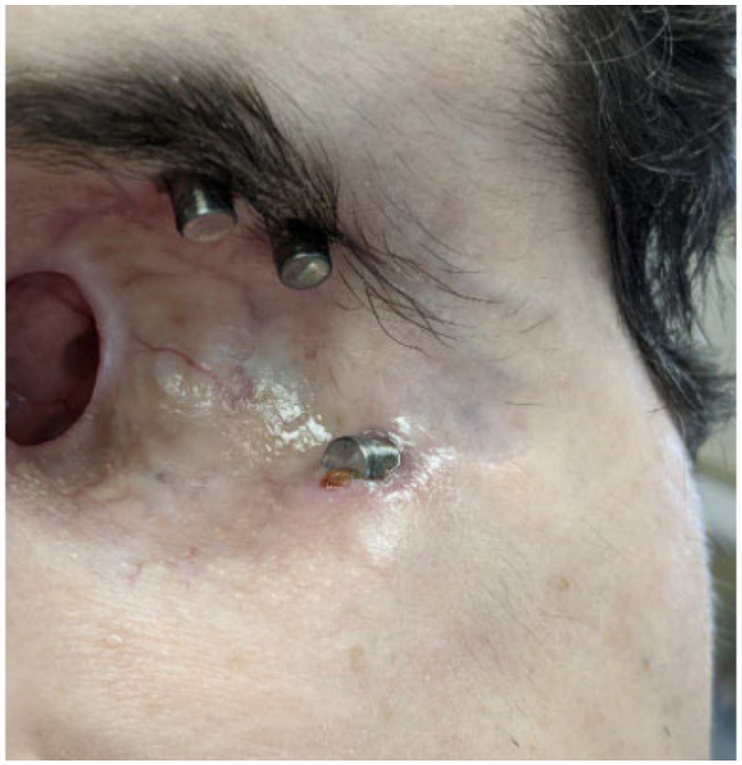


Figure 2



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22 Orbital Compartment Syndrome following Transcutaneous Retrobulbar Amphotericin B (TRAMB) – Factors Affecting Occurrence and Visual Implications in a Missed Diagnosis

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Introduction: Orbital compartment syndrome (OCS) is a condition characterized by increase in intraorbital pressure, subsequent ischemia of the optic nerve and retina and resultant vision loss.[1,2] One of the emerging modalities for the management of orbital fungal infections is transcutaneous retrobulbar amphotericin B (TRAMB).[3,4] We report the occurrence of OCS in our subset of rhino-orbital-cerebral-mucormycosis (ROCM) that underwent TRAMB. We also compare the demographic and clinical features of the subset that developed and that did not develop OCS and elicit risk factors for the development of OCS.

Methods: This is a retrospective observational study including patients with proven ROCM treated between June 2021 and December 2022 with TRAMB. The diagnosis of OCS was based on clinical signs and symptoms of reduced vision, pain, eyelid edema, chemosis, proptosis and diplopia and radiological imaging demonstrating tenting of the globe or the guitar pick sign.

Results: Forty-six orbits and eyes of 44 patients that underwent TRAMB for ROCM were included. Mean age at presentation was 50.13±12.93 years (median 49). Of the 44 cases, 15 (32.6%) developed compartment syndrome (OCS) and 31(67.39%) did not (NOCS). The interval between TRAMB injection and the development of OCS was 4.46±6.68 days (median 3). The mean number of injections preceding the development of OCS was 4.26±2.12 injections (median 5). The demography and clinical features were comparable between the two groups including the mean number of repeat TRAMB injections. Forty percent in the OCS group lost vision during treatment as compared to the NOCS group (p=0.005, 95% C.I. 8.84% to 58.24%). A prominent difference along the management of the ROCM in the two groups was the number of orbits that underwent decompression in the OCS and the NOCS groups, 7% and 61% respectively (p=0.0006, 95% C.I. 24.9% to 70.1%). On both bivariate and multivariate analysis a sinus debridement without a medial orbital wall decompression had an odds of 22.16 (p=0.004, 95% C.I. 2.57 to 190.99) in favor of developing an OCS during follow up. Relative risk of OCS developing was 10.76 (p=0.01, 95% C.I. 1.54 to 75.28) when medial wall was not decompressed along with sinus debridement. The number needed to harm by not performing a medial wall decompression was 2 (95% C.I. 3.93 to 1.38). That means that for every two patients who are treated with TRAMB but do not undergo a medial orbital wall decompression, 1 patient is at a risk of OCS. The number

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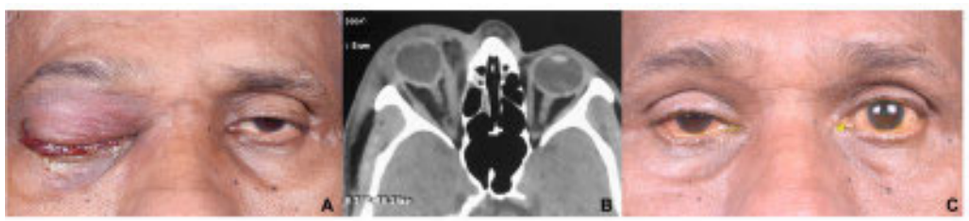
needed to harm for occurrence of vision loss due to OCS was 2.98 (95% C.I. 8.13 to 1.82). That means that for every 3 patients that develop OCS, 1 patient is at the risk of vision loss.

Conclusions: Any inflammatory changes that occur following repeated injections of TRAMB in the management of rhino-orbital-cerebral mucormycosis should be closely watched for the development of orbital compartment syndrome. If missed this could lead to vision loss that may be wrongly attributed to the primary disease process. This risk reduces though if a medial wall orbital decompression is done during the treatment course along with TRAMB.

Figure 1



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23 Systemic Implications of Insulin-like Growth Factor-1 Receptor Inhibition: A Systematic Review

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Introduction: Teprotumumab, an insulin-like growth factor-1 receptor (IGF-1R) inhibitor, is the first FDA-approved disease-modifying therapy for thyroid eye disease (TED). As IGF-1R is ubiquitously expressed throughout the human body, its inhibition could have extensive systemic implications.[1,2] We aim to review these physiologic effects and their underlying mechanisms, exploring both previously reported adverse effects as well as potential effects based on our current understanding of the role of IGF-1R in various tissues.

Methods: A literature review was conducted in PubMed/MEDLINE to identify publications published through May 2023, using keywords including "IGF-1," "IGF-1R", "inhibition", "adverse effect", "systemic", and terms related to specific organ systems and tissues. Our review included translational studies, clinical trials, case series, and case reports on teprotumumab and on IGF-1R inhibitors in other disease applications. Studies were included if they were full-text articles discussing human subjects or tissues, and excluded if they were not in English. Articles were evaluated for their discussion of the physiologic effects of IGF-1 and IGF-1R in major organ systems and tissues, and the reported adverse effects of IGF-1R inhibition. The results were then synthesized into a narrative review.

Results: Initial literature search yielded a total of 5,576 entries. After removal of articles that were duplicates, incomplete, published in a language other than English, or that studied non-human subjects or tissues, 2,169 remained. Of these, 1,425 articles discussed IGF-1R activity in the oncological context, 103 in ophthalmic disorders, 89 in endocrine disorders, and 71 in cardiovascular disorders. The remaining comprised of articles discussing the structure and systemic roles of IGF-1 and IGF-1R. Documented adverse effects of teprotumumab can be broadly classified into the following categories by physiologic system affected: metabolic, musculoskeletal and connective tissue, gastrointestinal, auditory and vestibular, dermatologic, reproductive and menstrual, and neurologic. In addition, immunological, hematologic, cardiovascular, hepatobiliary, and pulmonary adverse effects have been documented in oncological studies of IGF-1R inhibition. We discuss management modalities for the most common and serious adverse effects. Given our understanding of the physiological activity of IGF-1R, its inhibition may result in adverse effects that have not been reported yet, including those in the setting of comorbidities such as cerebrovascular accidents and neurodegeneration. Since regimens of IGF-1R inhibitor treatment differ for cancers and TED (the two most studied applications), the effects of treatment dosage and duration are also examined.

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Conclusions: While teprotumumab has demonstrated efficacy in the treatment of TED, the broad influence of IGF-1R on numerous physiological processes necessitates a careful and comprehensive understanding of systemic implications when considering IGF-1R inhibition as a therapeutic strategy. As more patients are treated with teprotumumab, further research is warranted to explore yet-unreported and long-term consequences of IGF-1R inhibition. Additionally, combination therapeutics, adjustments in dosing regimen, or achievement of more targeted inhibition could be crucial strategies in managing the risks and improving the benefits of IGF-1R inhibition.

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24 Teprotumumab-Related Hyperglycemia in Thyroid Eye Disease

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Introduction: Teprotumumab is an insulin-like growth factor 1 receptor antagonist that was recently approved for the treatment of Thyroid Eye Disease (TED). Despite the relative safety of Teprotumumab, a risk of hyperglycemia was identified. We seek to identify to what extent Teprotumumab causes hyperglycemia in comparison to IV corticosteroids, another TED treatment modality, to help define better monitoring guidelines for hyperglycemia caused by Teprotumumab.

Methods: A retrospective chart review was performed on patients with TED seen at a large private academic teaching hospital from August 2021 to February 2023. We identified 171 patients with TED. 48 patients were documented to have received IV corticosteroid and/or Teprotumumab therapy. Data regarding demographic characteristics, IV corticosteroid and Teprotumumab use, blood glucose (BG) levels, and HbA1c levels were collected. Data were analyzed using Fisher's exact test, Wilcoxon test, and ANOVA test.

Results: For the 48 subjects, the mean age was 59.08±13.68 years. 60% (29 subjects) were female and 40% (19) were male. 27.08% (13) were white, 14.58% (7) were African American, 20.83% (10) were Asian, and 37.5% (18) were not reported. In terms of baseline glycemic status (either reported or defined by recorded HbA1c values) 70.83% (34) were normoglycemic, 12.5% (6) had pre-diabetes (HbA1c≥5.7%), and 16.67% (8) had diabetes (HbA1c≥6.5%). 25% (12) patients received only corticosteroid therapy, 52.08% (25) patients received only Teprotumumab, and 43.75% (21) patients received both corticosteroids and Teprotumumab. There was no significant difference ($p=0.1081$) in hyperglycemia events (either reported or BG ≥126) between patients taking Teprotumumab (10/42) vs IV steroids (2/27). Of the 6 hyperglycemic events with recorded BG levels associated with Teprotumumab, 67% (4/6) occurred after the 4th Teprotumumab infusion, and 33% (2/6) occurred between the 2nd and 4th infusions. BG levels were averaged across different visits for each patient. There was a significant difference ($p = 0.046$) in the mean BG levels associated with Teprotumumab use (127.565±73.9) vs. IV corticosteroid use (118.95±113.06). While mean BG levels were not significantly different in patients taking Teprotumumab when stratified by baseline glycemic status ($p=0.138$), the number of Teprotumumab-related hyperglycemic events was significantly different in patients with baseline pre-diabetic and diabetic status (12/42) vs. non-diabetic status (30/42) ($p<0.001$).

Conclusions: This study suggests that Teprotumumab use is associated with a higher mean BG level when compared to that of IV corticosteroid therapy. Furthermore, a baseline glycemic status of pre-diabetes or diabetes is significantly associated with hyperglycemic events while taking Teprotumumab. Future studies will be necessary to guide current screening and management of hyperglycemia in patients taking Teprotumumab.

26 Thyroid Eye Disease and Marijuana: A Case Series

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Introduction: Thyroid eye disease (TED) is an immune-mediated, inflammatory condition associated with thyroid dysfunction, most commonly autoimmune hyperthyroidism or Graves' disease.[1] The etiology of TED is complex and likely an intersection of genetic and environmental factors.[2-4] Among those environmental factors, tobacco smoking is a modifiable risk factor that is positively associated with the development of TED with odds ratios ranging from 1.94 to 10.1 when compared to patients with Graves' disease but no TED.[5,6] Importantly, the reversability of this association between smoking and TED has been investigated with a prior cohort study showing no increased risk for ophthalmopathy in ex-smokers relative to never-smokers.[7] Marijuana use has been associated with lower TSH, but not thyroid dysfunction in one prior study but the effect of marijuana on the hypothalamic-pituitary-thyroid axis is largely unknown.[8] We present four patients with severe TED in the setting of marijuana use, which has been increasing in frequency with recreational legalization.[9]

Methods: A case series of four patients, three presenting between 2020-2023 and one presenting in 2014, treated for TED at a single institution. This study is approved by the Mass General Brigham Institutional Review Board.

Results: All patients were male with a median age of 27.7. Patient 1 was 56 years old at the time of presentation, Patient 2 was 34, Patient 3 was 21, and Patient 4 was 20. Three patients were Caucasian and one was Asian. Two patients (Patients 1 and 2) reported daily marijuana smoking, one reported daily marijuana vaping and previously occasional marijuana smoking (Patient 3), and one reported marijuana smoking 5-10 times a year (Patient 4). One patient reported concurrent cigarette smoking of 1 pack every 2 days (Patient 2). Two patients had a known history of Graves' Disease (treated, in part, with radioactive iodine ablation – Patients 1 and 4), and two were noted to have thyroid dysfunction at the time of TED diagnosis (Patients 2 and 3). The median Clinical Activity Score (CAS) at the time of presentation was 6.5 (IQR 6-7), median TSH 0.01 (IQR 0.01-13.3), and median free T4 5.6 (IQR 3.6-7.6). One patient presented with bilateral compressive optic neuropathy (Patient 1) requiring IV corticosteroid and bilateral orbital decompressions. Three patients received teprotumumab (Patients 1-3), two of whom (Patients 1 and 2) required two courses of teprotumumab, and one subsequently received IV corticosteroid and orbital radiation (Patient 4). Median CAS at the last follow-up was 2.0 (IQR 0.88-3.31). Median follow-up time was 17.6 months (IQR 12.0-23.9).

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Conclusions: Prior studies have shown increased TED severity in older patients.[4] This case series highlights atypical examples of severe, inflammatory phenotypes in a primarily younger TED demographic which may be related, in part, to concurrent marijuana use. Until more data is available about the relationship between marijuana use and TED, physicians should consider advising TED patients to avoid usage and encourage cessation. While prior studies have investigated the effect of tobacco use on TED, future studies are needed to further characterize the impact of marijuana use on TED as this mechanistic relationship remains elusive.

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27 Access to Care by Oculofacial Plastic Surgeons in the United States by Geographic Distribution, Socioeconomic and Demographic Indicators, and Chronic Conditions in 2022

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Introduction: Among ophthalmologists, oculofacial plastic surgeons (OPS) comprise a minority of eye care providers. One prior study identified disparities in the OPS supply in the United States (US), with the majority of OPS clustering in larger metropolitan areas.[1] Access to medical care is dependent on a variety of demographic and socioeconomic determinants. However, to the best of the authors' knowledge, prior studies have not addressed demographic and socioeconomic differences between areas served by OPS and those without access to OPS. Therefore, the purpose of this study is to investigate the distribution of OPS in relation to US population characteristics, including georaphic distribution, socioeconomic and demographic indicators, and chronic health conditions.

Methods: ArcGIS was used to geocode office addresses of oculofacial plastic surgeons listed on the AAO and ASOPRS physician directories, which was then overlaid with the 2022 American Community Survey data and 2018 Centers for Disease Control and Prevention data on chronic conditions. Student t-tests and Wilcoxon rank sum tests were used with an alpha value of 0.05 to indicate significance.

Results: A total of 1009 OPS (755 ASOPRS members) were identified. States with the most specialists were California (n=140 [13.9%]), Texas (n=78 [7.7%]), Florida (n=77 [7.6%]), and New York (n=75 [7.4%]), while North Dakota and Wyoming both had 0 specialists. A total of 2921 of 3221 counties (90.7%) had 0 OPS.

Counties with 0 compared to 1 or more specialists had a lower median (SD) household income ($54,671 [$14,854] vs $69,638 [$21,112]), greater mean proportion of families without internet service (17.3% vs 9.1%), greater mean proportion of persons without health insurance (9.8% vs 8.0%), greater mean proportion of persons whose highest level of education was high school (34.8% vs 24.3%), and lower mean proportion of persons who achieved at least a bachelor's degree (21.5% vs 37.8%) (all $P<.001$). Interestingly, counties with 0 compared to 1 or more specialists also had a greater mean proportion of population that was white (74.6% vs 61.4%) and spoke only English at home (89.2% vs 79.8%) (both $P<.001$). With regards to comorbidities, counties with 0 compared to 1 or more specialists had a greater mean proportion of any chronic condition (47.5% vs 39.6%), including chronic kidney disease (3.5% vs 2.9%), chronic obstructive pulmonary

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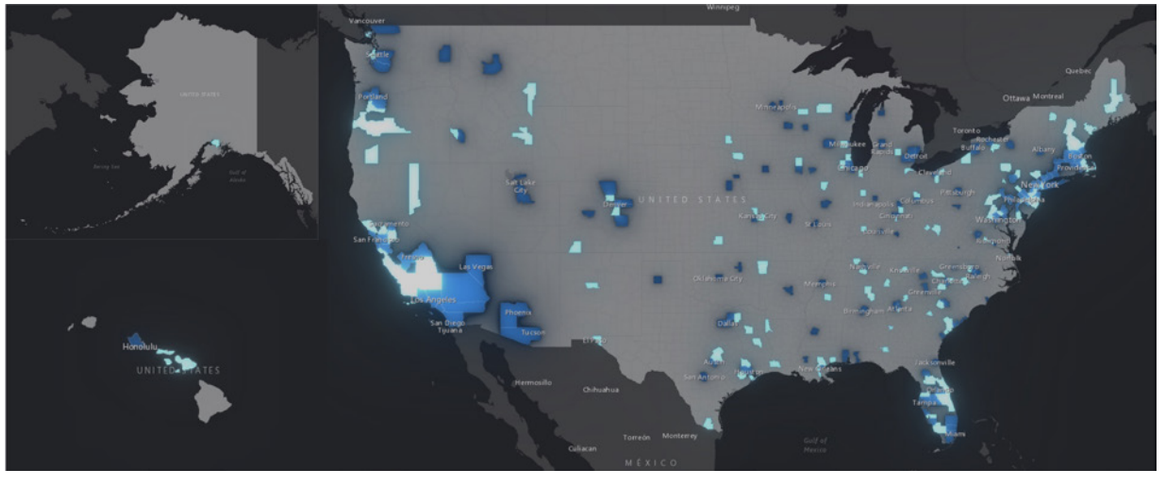
disease (9.3% vs 6.8%), diabetes (13.3% vs 11.0%), and obesity (35.5% vs 30.2%) (all *P*<.001), as well as a higher mean cancer mortality rate (168.4 vs 148.6 per 100,000 persons, *P*<.001) but not mean cancer incidence rate (451.8 vs 452.4 per 100,000 persons, *P*=.9).

Conclusions: Oculofacial plastic surgeons are concentrated in less than 10% of US counties. Lack of geographic access to oculoplastic specialty care was associated with lower socioeconomic characteristics including income, health insurance status, and education, as well as chronic conditions including chronic kidney disease, chronic obstructive pulmonary disease, diabetes, obesity, and cancer mortality. Conversely, lack of geographic access to oculoplastic specialty care was not associated with demographic characteristics such as race and language.

Figure 1

Figure 2



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28 Characteristics of Industry Payments to ASOPRS vs Non-ASOPRS Oculoplastic Surgeons from 2015 to 2021

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Introduction: The Physician Payments Sunshine Act was designed to increase transparency around financial relationships between physicians, teaching hospitals, and manufacturers of drugs and biologics. Prior work has showed that 90% of U.S. physicians overall have some relationship with the pharmaceutical industry[1]. While other fields such as general plastic surgery and dermatology have published regarding industry partnerships among physicians, there is currently no literature characterizing these relationships among oculoplastic surgeons. The purpose of this study was to characterize trends in industry payments made to US-based oculoplastic surgeons.

Methods: The Centers for Medicare and Medicaid Services Open Payments database was queried for all industry payments from drug and medical device companies to U.S.-based oculoplastic surgeons from 2015 to 2021. Data was collected including company name, payment dollar amount, and payment category. The ASOPRS membership site was used to stratify surgeons based on ASOPRS membership status. Descriptive statistics were tabulated and differences between membership status was calculated using Student's t-test.

Results: 342 oculoplastic surgeons received at least one industry payment during this time frame (Figure 1). A minority of overall ASOPRS members reported industry relationships within the CMS database (192/739, 26%). The top two companies, Allergan, Inc. and Horizon Therapeutics PLC, made up 68% of the total payments (Figure 3). Consulting and compensation for services such as speaking made up 65% of the total payments (Figure 4). Average industry payments per provider increased more for ASOPRS members ($227 in 2015 to $581 in 2021) compared to non-ASOPRS surgeons ($49 in 2015 to $162 in 2021; Figure 5). ASOPRS members constituted 56% of the surgeon pool but received 89% of the total dollars paid over the 6-year period (Figure 2). The difference in average payment amount to ASOPRS members ($4,489) vs. nonmembers ($796) was statistically significant ($p < 0.05$).

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Conclusions: Results of this study help to elucidate the landscape of industry partnerships among oculoplastic surgeons. Overall, the 26% industry relationship rate reported by ASOPRS members overall is far below plastic surgery (54.5%), otolaryngology (57.9%), orthopedics (62.4%), neurosurgery (87.8%) and urology (63.1%), calculated using the same database[2]. Two pharmaceutical companies constitute the majority of industry payments within the field. Despite ASOPRS oculoplastic surgeons making up roughly half the surgeons receiving payments, they received nearly 90% of the payments. Further work is required to fully understand the broader impacts of industry partnerships. While these partnerships may be pivotal in advancing the field, it would be beneficial to also maintain a watchful eye on transparency and conflict of interests.

Figure 1

Industry Payments to ASOPRS Member and Nonmember Oculoplastic Surgeons from 2015 to 2021

	2015		2016		2017		2018		2019		2020		2021	
Number of individual payments	**1322.00**		**1683.00**		**1552.00**		**1805.00**		**2373.00**		**1527.00**		**2661.00**	
ASOPRS Members, No. (%)	870.00	*0.66*	1207.00	*0.72*	1049.00	*0.68*	1273.00	*0.71*	1788.00	*0.75*	1090.00	*0.71*	2002.00	*0.75*
Nonmembers, No.	452.00		476.00		503.00		532.00		585.00		437.00		659.00	
Number of surgeons receiving payments	**201.00**		**225.00**		**232.00**		**235.00**		**253.00**		**228.00**		**245.00**	
ASOPRS Members, No. (%)	121.00	*0.60*	130.00	*0.58*	142.00	*0.61*	135.00	*0.57*	151.00	*0.60*	128.00	*0.56*	139.00	*0.57*
Nonmembers, No.	80.00		95.00		90.00		100.00		102.00		100.00		106.00	
Total payments	**220032.93**		**404059.47**		**448909.07**		**728460.47**		**978663.70**		**732008.39**		**1269947.21**	
ASOPRS Members, $ (%)	197744.39	*0.90*	369947.49	*0.92*	352622.57	*0.79*	640207.08	*0.88*	885103.68	*0.90*	637279.73	*0.87*	1163315.27	*0.92*
Nonmembers, $	22288.54		34111.98		96286.50		88253.39		93560.02		94728.66		106631.94	
Average total payments per surgeon	**1094.69**		**1795.82**		**1934.95**		**3099.83**		**3868.24**		**3210.56**		**5183.46**	
ASOPRS Members, $	1634.25		2845.75		2483.26		4742.27		5861.61		4978.75		8369.17	
Nonmembers, $	278.61		359.07		1069.85		882.53		917.26		947.29		1005.96	
Average individual payment amount	**166.44**		**240.08**		**289.25**		**403.58**		**412.42**		**479.38**		**477.24**	
ASOPRS Members, $	227.29		306.50		336.15		502.91		495.02		584.66		581.08	
Nonmembers, $	49.31		71.66		191.42		165.89		159.93		216.77		161.81	
Median individual payment amount	**913.00**		**1365.07**		**1457.50**		**2529.38**		**2895.45**		**1946.83**		**3488.87**	
ASOPRS Members, $	1300.95		2090.10		1846.19		3810.76		4136.00		2666.44		5147.41	
Nonmembers, $	250.43		286.66		822.96		735.44		754.52		691.45		772.70	
Max individual payment amount														
ASOPRS Members, $	78500.00		142000.00		73943.48		125500.00		233900.00		98040.00		367075.00	
Nonmembers, $	2000.00		6000.00		36875.00		23062.50		24500.00		14507.00		10900.00	
Min individual payment amount														
ASOPRS Members, $	5.00		11.01		7.78		9.19		8.65		11.38		2.64	
Nonmembers, $	7.72		10.81		9.99		7.89		7.70		11.50		8.14	

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Figure 2

Payment Type	ASOPRS Members	Non-ASOPRS Members
Number of Individual Payments	9,279 (72%)	3,644 (28%
Number of Surgeons Receiving Payments	192 (56%)	150 (44%)
Total Payments ($)	4,246,220	535,861
Average Individual Payment ($)	458	147
Median Individual Payment ($)	3,106	635
Maximum Individual Payment ($)	367,075	36,875
Minimum Individual Payment ($)	3	8

Table 2. Industry Payments to ASOPRS Member vs Non-Member Oculoplastic Surgeons (2015-2011)

Figure 3

Top 15 Companies Reporting Payments to Oculoplastic Surgeons from 2015 to 2021		
Company Name	**Total Payments, $**	*%*
Allergan, Inc.	2,232,473	*43%*
Horizon Therapeutics plc	1,306,760	*25%*
Stryker Corporation	407,316	*8%*
Galderma Laboratories, L.P.	330,333	*6%*
Visant Medical, Inc.	120,000	*2%*
Rapid Pathogen Screening, Inc.	95,516	*2%*
Genentech USA, Inc.	84,573	*2%*
Mallinckrodt Enterprises LLC	78,017	*2%*
Merz North America, Inc.	50,433	*1%*
Mallinckrodt LLC	49,787	*1%*
Genentech, Inc.	45,646	*1%*
Alcon Vision LLC	33,881	*1%*
Mallinckrodt Hospital Products Inc.	25,485	*0%*
US Retina LLC	24,881	*0%*
KLS-Martin L.P.	22,667	*0%*

Figure 3. Top 15 Companies Reporting Payments to Oculoplastics Surgeons from 2015-2021.

Figure 4

Industry Payments to Oculoplastic Surgeons by Category (2015-2021)							
			Individual Payment Amounts				
	Number of Payments	%	Median, $	Min, $	Max, $	Total Payments, $	%
Compensation for services other than consulting, including serving as faculty or as a speaker	607	*5%*	4,225	11	367,075	1,861,442	*39%*
Consulting	359	*3%*	13,061	45	126,639	1,240,765	*26%*
Honoraria	395	*3%*	5,959	8	36,235	649,575	*14%*
Travel and lodging	1,882	*15%*	3,349	11	57,695	428,643	*9%*
Food and beverage	9,341	*72%*	265	3	14,520	413,711	*9%*
Royalty or license	3	*0%*	40,000	10,000	100,000	120,000	*3%*
Gift	80	*1%*	424	15	21,469	29,249	*1%*
Long term medical supply or device loan	28	*0%*	22,249	22,249	22,249	22,249	*0%*
Education	210	*2%*	63	5	393	9,008	*0%*
Grant	1	*0%*	5,000	5,000	5,000	5,000	*0%*
Current or prospective ownership or investment interest	7	*0%*	278	129	399	1,948	*0%*
Entertainment	10	*0%*	70	10	124	491	*0%*

Figure 4. Breakdown of Industry Payments to Oculoplastics Surgeons (2015-2021).

Figure 5

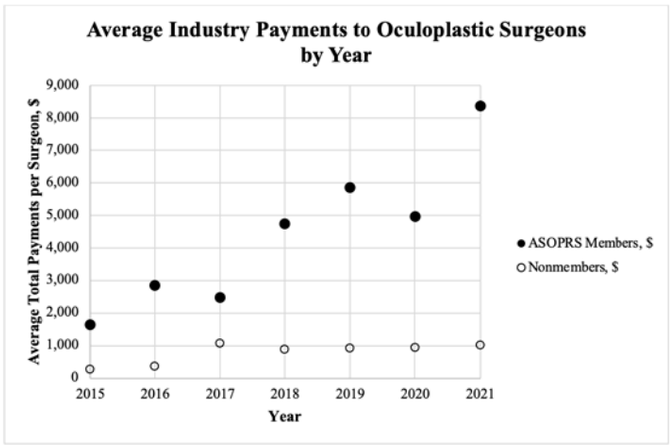

Figure 5. Industry Payments to ASOPRS Member and Nonmember Oculoplastic Surgeons by Year

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29 The Burden of Diabetes Mellitus on Oculofacial Pathology

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Introduction: Diabetes mellitus (DM) affects over 37 million Americans and is a multi-organ health burden. In ophthalmology, it causes retinopathy and is well known to increase the risk of cataracts or glaucoma, among other pathologies. However, the burden of DM on oculofacial conditions has not been well characterized.

Methods: Retrospective chart review or electronic medical records system at a tertiary, academic eye institution. Logistic regression was used to assess the odds ratio (OR) of oculofacial pathologies in diabetic versus non-diabetic patients.

Results: Charts from 2018 to 2022 of 55,968 patients (age 57 +/- 24 years, 10,939 with DM, 45,029 without DM) were analyzed. After adjusting for age, sex, and race, patients with DM had significantly higher odds of experiencing ptosis (OR=1.367, p<.001), dermatochalasis (OR=1.458, p<.001), hordeolum (OR=1.48, p<.001), thyroid eye disease (OR=2.240, p<.001), and orbital cellulitis (OR=2.130, p<.001). Insignificant odds ratios were found for eyelid carcinoma, ectropion, entropion, brow ptosis, and acquired stenosis of the nasolacrimal system.

Conclusions: DM was a risk factor for ptosis, dermatochalasis, hordeolum, thyroid eye disease, and orbital cellulitis in this large data set. Further study is warranted to further characterize the burden of DM in the oculofacial plastic surgery specialty.

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30 Trends in Teprotumumab Insurance Authorization

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Introduction: Teprotumumab, the first FDA-approved medication for thyroid eye disease (TED)[1,2] can be cost-prohibitive compared to other TED treatments[3], especially without insurance authorization; therefore, patients' access to teprotumumab can be highly dependent on various socioeconomic factors, especially insurance type and status.

Methods: This study is a retrospective chart review of all TED patients presenting to the division of ophthalmic plastic and orbital surgery at a tertiary care academic center from December 2019 to March 2023 for whom insurance authorization for teprotumumab treatment was requested. Patients were excluded if they were recommended treatment with teprotumumab, but no insurance authorization request was made. Patients were divided into two groups based on whether they were able to (A) or unable to (NA) obtain insurance authorization for treatment with teprotumumab at the first request. The two cohorts were compared based on various factors, including insurance type and status and clinical activity score (CAS) before the authorization request. In addition, descriptive analysis of insurance denial reasons was performed.

Results: In total, there were 77 patients with TED for whom insurance authorization for teprotumumab was requested. Authorization request was approved on the first submission for 65 patients (84.4%) and denied for 12 patients (15.6%). The two groups were mostly comparable without statistically significant differences in basic demographic factors and clinical findings (Table 1). There was a statistically significant difference in type of insurance between the two groups ($p<0.05$): 25 patients (38.5%) in A with Medicare versus zero patients in NA, 25 patients (38.5%) in A with private insurance versus five patients (41.7%) in NA, 14 patients (21.5%) with Medicaid/Medi-Cal in A versus seven patients in NA (58.3%).

The most common reasons for insurance denial (noted for three patients each), were lack of prior oral corticosteroid course for at least four weeks, collection of thyroid labs over 30 days prior to the request, and automatic denial requiring physician peer to peer. Other reasons are included in Table 2.

Seven patients with a request in 2020 were denied, compared to three in 2021, one in 2022 and one in 2023. In total, eight patients out of 12 (66.7%) were able to obtain approval after appeal.

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Conclusions: Insurance type was found to be an important factor in obtaining teprotumumab insurance authorization in our region. In addition, a trend of decreased authorization denials over the last few years was noted. This may be due to increased experience of physicians and staff in meeting the requirements of requests, increased acceptance of teprotumumab as an effective treatment for TED[4] and increased availability of teprotumumab after supply disruption during the COVID-19 pandemic[5]. Studies including larger patient populations, as well as different geographical locations are warranted to further investigate this process and possible disparities to medication access. Despite the limited size of the study population, this data could assist physicians in counseling patients on their options for treatment and help increase the chances of obtaining insurance authorization for this medication.

Table 1: Patient Baseline Characteristics

	Authorization Status			
	Approved	**Not Approved**	**Overall**	**p-value**
Number (%)	65 (84.4)	12 (15.6)	77	
Average age at time of clinic visit (SD), years	57.26 (15.20)	50.98 (12.26)	56.28 (14.88)	0.181
Sex (%)				0.505
Female	54 (83.1)	9 (75)	63 (81.8)	
Male	11 (16.9)	3(25)	14 (18.2)	
Current Smoker (%)				0.306
Yes	13 (20)	4 (33.3)	17 (22.1)	
No	52 (80)	8 (66.7)	60 (77.9)	
Disease Phase (%)				0.799
Active	58 (89.2)	11 (91.7)	69 (89.6)	
Stable	7 (10.8)	1 (8.3)	8 (10.4)	
CAS before request (SD)	5.26 (1.75)	5.5 (1.68)	5.30 (1.73)	0.664
Prior treatment of TED (%)				0.484
Yes	48 (73.8)	10 (83.3)	58 (75.3)	
No	17 (26.2)	2 (16.7)	19 (24.7)	
Insurance				0.02
Medicare	25 (38.5)	0	25 (32.5)	
Private	25 (38.5)	5 (41.7)	30 (39.0)	
Medicaid/Medi-Cal	14 (21.5)	7 (58.3)	21 (27.3)	
Federal	1 (1.5)	0	1 (1.3)	
Secondary Insurance				0.076
Yes	22 (33.8)	1 (8.3)	23 (29.9)	
No	43 (66.2)	11 (91.7)	54 (70.1)	

Table 2: Reasons for Insurance Authorization Denial

Reason for Insurance Denial	**Number of affected patients (%)**
No 4-week corticosteroid trial	3 (25%)
Automatic denial requiring peer to peer	3 (25%)
Thyroid labs collected over 30 days before request	3 (25%)
Recommended facility out of network	2 (16.7%)
CAS too low	2 (16.7%)
Labs not euthyroid	2 (16.7%)
Limited visual potential	1 (8.3%)
No endocrinology evaluation	1 (8.3%)
Unclear smoking status	1 (8.3%)
Active smoking at time of request	1 (8.3%)
Not medically necessary	1 (8.3%)

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1 The Acceleration of Cosmetic Pendulum as shown by Google Trends

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Introduction: The demand and popularity of oculofacial cosmetic procedures are influenced by various factors, including the state of the global economy and ever-changing social media trends. Some procedures appear to be consistently performed over time, and others have more of a fleeting penetrance. This study aims to understand the characteristics of each type.

Methods: This descriptive cross-sectional study utilized Google Trends to quantify search volumes for cosmetic procedures from May 27th 2018 to May 13th, 2023 in the United States. The data were downloaded on May 22, 2023. Outcome measures involved weekly changes in relative search volumes for the following 20 cosmetic procedures listed in alphabetical order: blepharoplasty, botulinum toxin, breast augmentation, breast lift, brow lift, buccal fat removal, chemical peel, face lift, face lift, filler, hair removal, hair transplant, lip filler, liposuction, masseter botulinum toxin, microneedling, otoplasty, photofacial, rhinoplasty, tear trough filler, tummy tuck. Procedures were divided into three categories, A) those with a change of public interest of 25% or less over a single week, B) 26-50%, and C) greater than 50%.

Results: Over the last five years, Google Trends data indicate an overall increase of public interest in most of the procedures (blepharoplasty, botulinum toxin, brow lift, buccal fat removal, chemical peel, face lift, filler, hair removal, hair transplant, lip filler, masseter botulinum toxin, microneedling, rhinoplasty, and tear trough filler). Certain procedures experienced significant spikes in interest of over 50% in one week. These procedures included brow lift, tear trough filler, lip filler, buccal fat removal, masseter botulinum toxin, and otoplasty. The largest spike was observed for lip filler with a 69% increase in public interest within a single week. Procedures that remained steady in public interest with a less than 25% change included filler, rhinoplasty, breast augmentation, breast lift, liposuction, chemical peel, microneedling, and tummy tuck. Those with a decreasing spike of greater than 50% over one week were tear trough filler and otoplasty.

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Conclusions: Physicians can recognize the shifting popularity of cosmetic procedures. Some procedures may experience rapid accelerations in public interest (brow lift, tear trough filler, lip filler, buccal fat removal, masseter botulinum toxin, and otoplasty), while others maintain steady interest (filler, rhinoplasty, breast augmentation, breast lift, liposuction, chemical peel, microneedling, and tummy tuck). Monitoring of trends and preferences can be a useful tool in recommending procedures that may have greater staying power.

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2 Treatment of Hyaluronic Acid Filler-Induced Soft-Tissue Necrosis with Hyperbaric Oxygen Therapy

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Introduction: Hyaluronic acid (HA) dermal fillers have become very popular in the past decade. Potentially devastating adverse events associated with HA fillers include tissue-necrosis. Various treatments have been recommended to treat this condition in the acute setting. Sporadic case reports of treatment with hyperbaric oxygen therapy (HBOT) have been reported. We present a large study of patients with filler-induced tissue necrosis treated with HBOT in a single center.

Methods: Nineteen patients suffering from soft-tissue necrosis secondary to HA dermal filler injection underwent HBOT in our center. Each session included 90 minutes of 100% oxygen at 2 ATA, with a 5 minute air break every 20 minutes. The oxygen was administrated through a special mask. The goal of the treatment was to restore tissue vitality. The average number days between HA filler injection and the first HBOT were 3.21±1.9. The average number of HBOT treatments was 7.57±5.11.

Results: All patients were female, and had undergone HA dermal filler injections to the face. Ages ranged from 19 to 54 with an average of 37. Six of the patients were smokers. Following HBOT, all patients had siginficant improvement of the necrotic areas. Two patients had complete resolution. The remainder had mild residual redness which resolved over time or with laser treatment. There were no complications during HBOT.

Conclusions: Hyperbaric oxygen therapy (HBOT) includes the inhalation of 100% oxygen at pressures exceeding 1 atmosphere absolute (ATA) which is used to enhance the amount of oxygen dissolved in the body tissues. During HBOT treatment, the arterial O_2 tension typically exceeds 2000 mmHg. In critical ischemic conditions, HBOT is thought to increase the oxygen delivery to the ischemic tissue until spontaneous or assisted reperfusion occurs. Acute critical ischemic conditions such as central retinal artery occlusion and ischemic flaps are currently an FDA-approved indication for HBOT. HBOT appears to be most effective when administered early, before full fulminant necrosis has developed. Our experience suggests that HBOT appears to be a safe and effective treatment for filler-induced tissue necrosis. This is the largest collection of HBOT-filler cases to date. It is difficult to study outcomes versus untreated controls, however, if available, we believe that this modality should be used as soon as possible in order to prevent potentially devastating sequelae.

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3 Full-Thickness Eyelid Wedge Replantation following Avulsion from a Human Bite

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Introduction: We describe a case of delayed replantation of a full-thickness wedge of avulsed eyelid tissue following a human bite.

Methods: Case report.

Results: An 18-year-old male with no significant past medical history presented with a full-thickness, right upper eyelid defect following a human bite approximately four hours prior to presentation. The avulsed wedge of eyelid margin tissue (Figure 1) – measuring 1.5 cm by 0.8 mm – had been wrapped in saline-moistened gauze and placed in a plastic bag atop ice by Emergency Medical Services. Visual acuity was 20/20 in both eyes. Pupil exam and intraocular pressures were normal. External examination demonstrated a right, lateral upper eyelid, full-thickness, wedge-shaped defect involving between one-third to one-half of the eyelid margin as well as a right, medial upper eyelid, canalicular-involving laceration (Figure 2). Slit lamp examination demonstrated mild injection of the right conjunctiva. Dilated examination was unremarkable.

Surgical repair was performed approximately five hours post-injury. The avulsed tissue was soaked in 5% povidone-iodine solution for one minute then in 1 mg/mL gentamicin solution for one minute in preparation for replantation. Replantation of the wedge autograft (Figure 3, left) was achieved at the medial aspect of the defect with placement of vertical mattress sutures through the meibomian gland orifices and at the lash follicles and partial-thickness, interrupted sutures through the anterior tarsal surface using polyglactin suture prior to simple interrupted sutures through the skin using Plain Gut suture (Figure 3, middle); the process was then repeated at the lateral aspect of the defect (Figure 3, right). Subsequently, the right upper eyelid punctum and the cut end of the superior canaliculus were identified and dilated. A mono-canalicular stent was placed through the punctum and advanced through the cut end of the canaliculus. Finally, the adjacent margin-involving canalicular laceration was repaired in a stepwise fashion, approximating the canaliculus and overlying skin.

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Immediately (Figure 4, top) and three days post-operatively (Figure 4, bottom), the patient had appropriate eyelid contour and closure. Six months post-operatively, the patient's eyelid form and function were preserved; notably, there were no cilia at the replant site (Figure 5).

Conclusions: Replantation is a well-described technique in the surgical literature, primarily as it pertains to the upper extremity. Timely replantation of appropriately preserved, traumatically avulsed, eyelid tissue has potential for a successful cosmetic and functional outcome; possible complications include graft necrosis, madarosis, eyelid retraction, and eyelid function compromise.[1-3] Application of these principles – specifically, the technique of autologous composite grafting using a full-thickness wedge of eyelid tissue – may offer promise for reconstruction of full-thickness, margin-involving eyelid defects using the contralateral eyelid as a donor site.

Figure 1

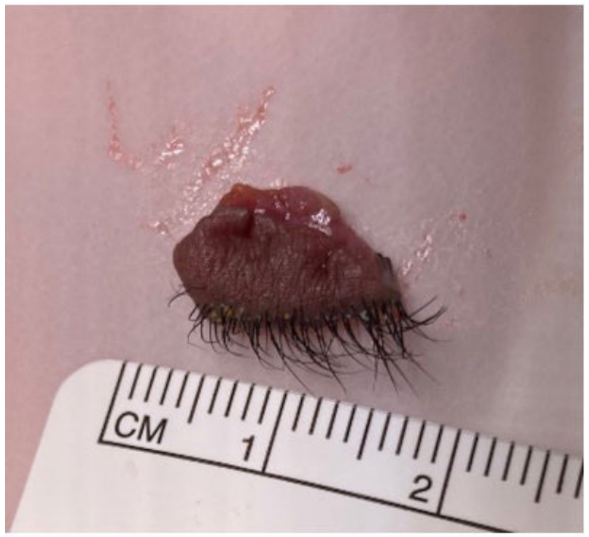

Figure 2

Figure 3

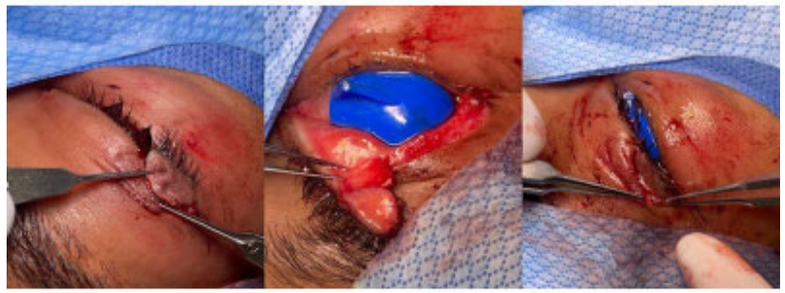

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Figure 4

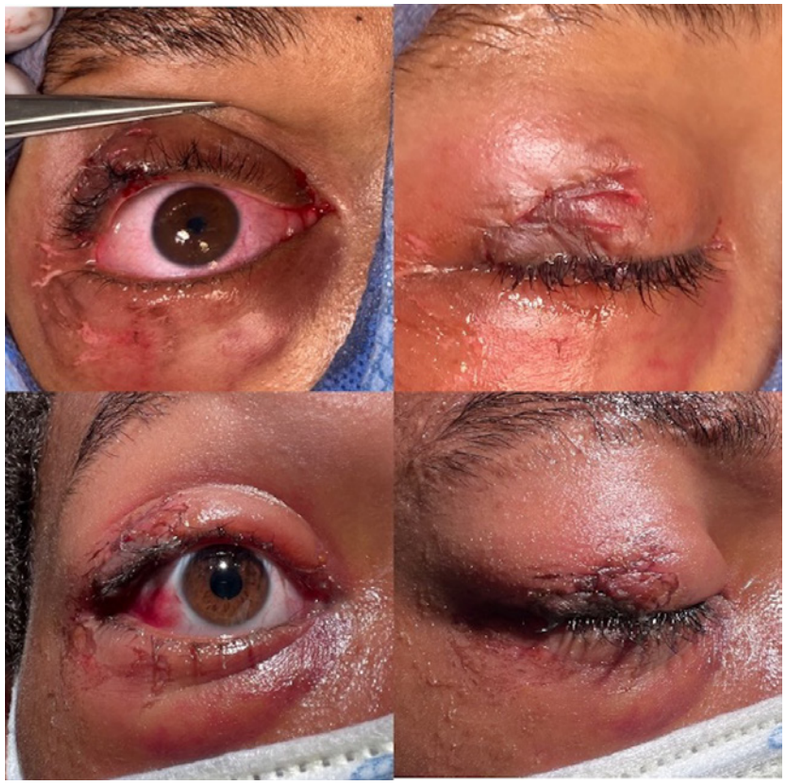

Figure 5

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5 Surgical Management of Overgrowth Syndrome with Vision Threatening Bilateral Ptosis

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Introduction: We describe the first case reported in ophthalmological literature of the surgical management of a patient with vision threatening ptosis, tarsomegaly, ectropion and euryblepharon secondary to suspected overgrowth syndrome.

Methods: We reviewed the literature by searching Pubmed for all cases of overgrowth syndrome with ophthalmological involvement using keywords including overgrowth syndrome AND ptosis, euryblepharon, ectropion, amblyopia, ophthalmology, eyelid, and oculoplastics. There is one well-documented case that did not detail whether the patient's ptosis was visually significant or whether surgical management was pursued.

Results: A 17 month full term twin male with normal developmental milestones, a history of de novo balanced reciprocal translocation 46,XY, t(3;6)(q25;p21.3), and phenotype consisting of skin and soft tissue overgrowth associated with skeletal dysplasia, dysmorphic features, and vascular lesions compromising the airway presented for evaluation of ptosis. Initial evaluation revealed binocular vision of 20/63, severe bilateral ptosis with MRD1 -1mm OD and -3mm OS, frontalis overuse, bilateral tarsomegaly and euryblepharon (Figure 1). Given concern for amblyopia, the patient underwent bilateral conjunctival mullerectomy with a tarsectomy to functionally lift eyelids and minimize postop lagophthalmos. Intraoperatively, the tarsus was thick and the upper eyelid tarsal height was 16mm bilaterally. 3.5mm of upper eyelid tarsus and 4.5mm of conjunctiva were resected bilaterally (Figure 1). One month post-operatively, he had functional improvement in eyelid height with MRD1 1.5mm OD and 1mm OS. He underwent two subsequent procedures to correct recurrent ptosis, tarsal kink, ectropion and euryblepharon (Table 1) first via levator resection (Figure 2), and second via frontalis flap advancement (Figure 3). Intraoperatively, his eyelids were noted to have abnormal thickness (Figure 3), and were fibrotic with fatty infiltration. Histopathology of the excised tarsus demonstrates prominent meibomian glands within an expanded, cellular and fibrous stroma surfaced by reactive conjunctival epithelium (Figure 4). Between his first and second surgery, there was tarsal regrowth of 4.5mm. Between the second and third surgery, there was eyelid regrowth as follows: right upper eyelid 5mm, right lower eyelid 14mm, left upper eyelid 1mm, left lower eyelid 4mm.

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Conclusions: A primary indication for surgical intervention for patients with ophthalmological characteristics of overgrowth syndrome is visually significant or vision threatening ptosis. While surgery may provide appropriate visual and aesthetic outcomes, challenges of surgical management include a) the natural growth of oversized tissue, which can be asymmetric and also may predispose patients to future procedures, and b) high likelihood of scarring, which can lead to disorganized post-operative tissue healing and difficult intraoperative anatomy in future procedures. Importantly, overgrowth syndrome involvement of critical structures such as the airway leads to difficult and risky intubations; surgical procedures requiring general anesthesia should be grouped to avoid unnecessary intubations in these high-risk patients. Ultimately, surgical intervention is encouraged primarily if vision is threatened and secondarily to achieve good cosmesis.

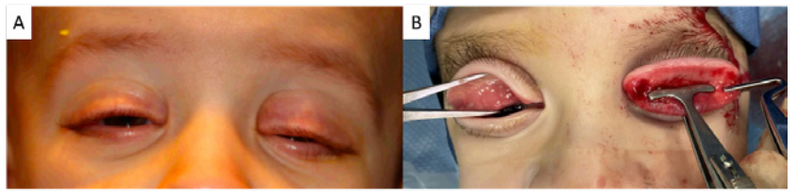

Figure 1. A. Procedure one pre-operative photograph demonstrating bilateral severe ptosis obstructing the visual axis, abnormal horizontal palpebral fissure length and euryblepharon. B. Intraoperative photograph demonstrating tarsomegaly and posterior approach used for tarsal conjunctival resection.

	Procedure 1	Procedure 2	Procedure 3
Procedure (*)	Bilateral conjunctival mullerectomy (0)	Bilateral levator resection, repair of bilateral upper eyelid ectropion, repair of RLL ectropion (4)	Bilateral frontalis flap advancement, repair of RUL, LUL and RLL ectropion (15)
Pre-op MRD 1 OS;OD	-1; -3	1.5; 1	2.5; 1
Post-op MRD 1 OS;OD	1.5; 1	3; 2.5	2.5; 2
RUL† (mm)	n/a	42 (10); 32	38 (5); 33
R upper tarsus‡ (mm)	16 (3.5); 12.5	17 (7); 10	n/a
RLL† (mm)	n/a	27 (4); 23	37 (5); 32
LUL† (mm)	n/a	39 (8); 31	32 (0); 32
L upper tarsus‡ (mm)	16 (3.5); 12.5	17 (7); 10	n/a
LLL† (mm)	n/a	27 (0); 27	31 (0); 31

Table 1. Details of three procedures performed to correct recurrent bilateral eyelid ptosis with tarsomegaly and euryblepharon. There was both tarsus and tissue regrowth between procedures.
MRD = marginal reflex distance (in mm), RUL = right upper eyelid, LUL = left upper eyelid, RLL = right lower eyelid, LLL = left lower eyelid, R = right, L = left
* Time from first procedure in months
† Eyelid horizontal length (amount removed); remaining eyelid horizontal length
‡ Tarsal height (amount removed); remaining tarsal height

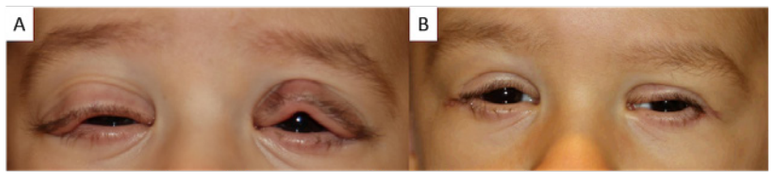

Figure 2. A. Procedure two pre-operative photograph demonstrating bilateral recurrent ptosis, left upper eyelid tarsal kinking and poor tarsal apposition to the globe. B. Procedure two post-operative month one photograph demonstrating improved eyelid height and contour bilaterally.

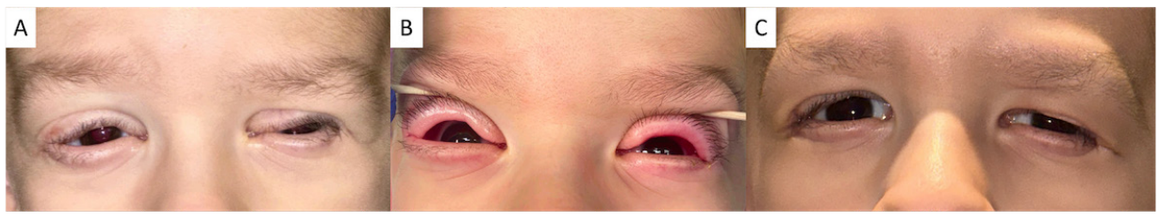

Figure 3. A. Procedure three preoperative photograph demonstrating bilateral recurrent ptosis, mild periorbital edema and recurrent euryblepharon. B. Intraoperative photograph demonstrating extensive eyelid thickness, tarsal regrowth and abnormal horizontal palpebral fissure length. C. 2.5 weeks post operative photograph demonstrating resolving periorbital edema and improved eyelid height and contour without frontalis use.

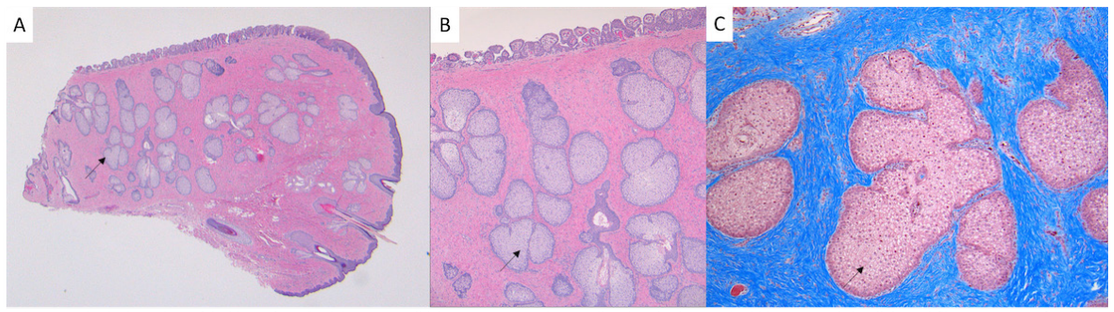

Figure 4. Histologic sections of the biopsy from the right upper eyelid demonstrates prominent meibomian glands arrows) within an expanded, cellular and fibrous stroma surfaced by reactive conjunctival epithelium (A, H&E 12.5x original magnification; B, H&E 50x original magnification; C, trichrome stains background fibrous tissue (100x original magnification). Similar findings were present within the right lower eyelid, right and left tarsal plates, left upper and lower eyelids.

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6 Anatomical Analysis of Lacrimal and Periorbital Structures as it Relates to Obstruction and DCR Outcomes

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Introduction: Nasolacrimal and periorbital anatomical measurements on imaging are important factors in understanding the likelihood of having obstruction and surgical outcomes post-dacryocystorhinostomy (DCR). The purpose of our study is to identify anatomical variables that correlated with Nasolacrimal duct obstruction (NLDO) and failure of DCR.

Methods: An IRB-approved retrospective review of medical records identified patients with NLDO with history of external and endoscopic DCR. NLD diameter were separated into 4 groups based on the mean [0.5cm]. NLD diameter, lacrimal fossa to middle turbinate (LFMT) distance, middle turbinate width (MTW), and other measurements were obtained using computerized tomography (CT) scan from Picture Archiving and Communication System (PACS) distance tool. Demographics (age, race, gender) and comorbidities (diabetes, hypertension, sinusitis, and prior trauma) were analyzed with respect to surgical failure. Adjusted odds ratios (OR) and 95% Confidence Intervals (CIs) were estimated using multivariable logistic regression. Bivariate and multivariate analysis for categorical variables were assessed using Chi-squared and Fischer's exact tests.

Results: Amongst 215 eyes, the OR of NLD diameter and obstruction was not statistically correlated in comparing all 4 NLD diameter groups (overall P = 0.860). Amongst 86 eyes, OR of failure between external versus endoscopic DCR was not statistically significant. Adjusted multivariate analysis showed a positive correlation between MTW and DCR failure (OR = 7.231, P = <0.001). Septal swell body diameter (SSBD) was also positively correlated with DCR failure (OR = 3.151, P = 0.039). Additionally, an observation was made between LFMT distance and DCR failure (P = <0.001), and a ratio of MTW divided by its surrounding space with DCR failure (P = <0.001) supported the trend of other surrounding measurements. Decreased peri-turbinate air space increases the likelihood of having a failed DCR, whether from a large septal swell body, middle turbinate, or proximity of the middle turbinate to the lacrimal fossa. All other independent variables did not show statistical correlation with DCR failure.

Conclusions: Our study identified MTW, SSBD, LFMT as novel imaging anatomical variables that correlated with failure of DCR. We also validated that NLD diameter and NLDO are not correlated. These findings may help steer surgical approach with respect to a patient's anatomy on CT.

7 Do Common Empirically Used Antibiotics Successfully Treat Dacryocystitis? A 10-Year Review

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Introduction: To assess the in-vitro efficacy of common antimicrobial agents used empirically for *Staphylococcus aureus* infections of the lacrimal system.

Methods: A retrospective survey of lacrimal system isolates with culture-positive *Staphylococcus aureus* (n=97) between 2013 and 2022 was performed. The antimicrobials susceptibility was compared between methicillin-resistant and susceptible isolates and the first five-year (n=65) and the second five-year (n=32) study period.

Results: The mean age of the patients was 56.6±25.1 (range, 1-108) years. The most common antibiotics used were polymyxin B/trimethoprim (34.0%) and amoxicillin/clavulanic acid (33.0%). Furthermore, 9 (9.3%) and 8 (8.2%) patients received amoxicillin/clavulanic acid and moxifloxacin as a single therapy, respectively. Of the total 97 isolates identified 41 (42.3%) were methicillin-resistant. Among the fluoroquinolones, the resistance rate was 38.2% for ciprofloxacin, 38.1% for levofloxacin, and 29.9% for moxifloxacin. The resistance rates for trimethoprim/sulfamethoxazole, vancomycin, and gentamicin were 6.25%, 1.0%, and 1.0%, retrospectively. The sensitivity for fluoroquinolones was significantly lower among methicillin-resistant *Staphylococcus aureus* (MRSA) compared to methicillin-sensitive *Staphylococcus aureus* (MSSA); for ciprofloxacin 31.7% and 83.9%; for levofloxacin 31.7% and 83.9%; and for moxifloxacin 41.5% and 91.1%, respectively. For trimethoprim/sulfamethoxazole, vancomycin, and gentamicin the sensitivity was not significantly different between MRSA and MSSA isolates. Antibiotic sensitivity and minimum inhibitory concentrations (MIC) are shown in Table 1. Overall, for most antibiotics, resistance increased during the second five-year study period; however, the change in antimicrobials sensitivity was not significant between the two periods (Fig 1). Susceptibility to methicillin decreased from 59.7% in the first five-year period to 54.3% in the second half of the study. During the second five years of the study duration, the highest resistance change was observed for fluoroquinolones, with ciprofloxacin increasing from 33.9% to 48.6%, levofloxacin increasing from 33.9% to 45.7%, and moxifloxacin increasing from 22.6% to 42.9%.

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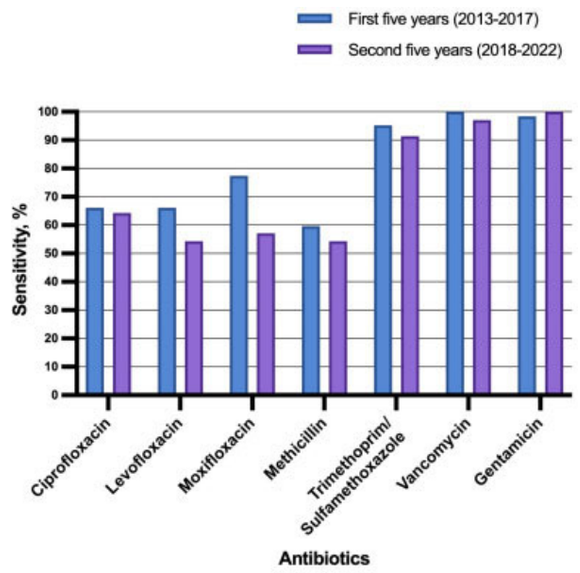
Table 1. Antibiotics sensitivity and minimum inhibitory concentration details.

	All Patients (n=97)				MSSA (n=56)				MRSA (n=41)				p-value
Antibiotics	**MIC Range**	**MIC_{50}**	**MIC_{90}**	**Sensitivity**	**MIC Range**	**MIC_{50}**	**MIC_{90}**	**Sensitivity**	**MIC Range**	**MIC_{50}**	**MIC_{90}**	**Sensitivity**	
Ciprofloxacin	0.5-8.0	0.5	8.0	61.8%	0.5-8.0	0.5	8.0	83.9%	0.5-8.0	8.0	8.0	31.7%	<0.001
Levofloxacin	0.12-8.0	0.25	8.0	61.9%	0.12-8.0	0.25	5.2	83.9%	0.12-8.0	4.0	8.0	31.7%	<0.001
Moxifloxacin	0.25-8.0	0.25	4.8	70.1%	0.25-8.0	0.25	2.0	91.1%	0.25-8.0	2.0	8.0	41.5%	<0.001
Methicillin	0.25-4.0	0.5	4.0	57.7%	0.25-1.0	0.5	0.5	100%	0.5-4.0	4.0	4.0	0.0%	<0.001
Trimethoprim/ Sulfamethoxazole	10.0-320.0	10.0	10.0	93.8%	10.0-320.0	10.0	10.0	98.2%	10.0-320.0	10.0	288.0	87.8%	0.047
Vancomycin	0.5-32.0	1.0	1.0	99.0%	0.5-2.0	0.1	0.1	100%	0.5-32.0	1.0	1.0	97.6%	0.577
Gentamicin	0.5-16.0	0.5	0.5	99.0%	0.5-1.0	0.5	0.5	100%	0.5-16.0	0.5	0.5	97.6%	0.423

MSSA, Methicillin-sensitive *Staphylococcus aureus; MRSA,* Methicillin-resistant *Staphylococcus aureus;* MIC, minimum inhibitory concentration.

Conclusions: In-vitro efficacy for commonly used antimicrobials such as beta-lactams and fluoroquinolones is less than 70% in our study. Thus, single-agent therapy with these antibiotics should be avoided.

Figure 1



8 Effect of Subcutaneous Tranexamic Acid on Hemostasis and Ecchymosis in Lacrimal Gland Biopsy: a Double-Blind, Placebo-Controlled, Randomized Trial

Giannis Moustafa[1], Roman Shinder[1,2]

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Introduction: Intraoperative bleeding can prolong surgical time, obscure exposure, increase cautery use with subsequent scarring, and necessitate using expensive hemostatic products. Postoperative bleeding may lead to delayed healing, patient discomfort, anxiety, and trips to the ER. Tranexamic acid (TXA) is a lysine analogue that acts as an antifibrinolytic by preventing plasminogen activation to plasmin. TXA has been used safely systemically and locally to reduce bleeding in periocular surgery, facelift, rhinoplasty, and other procedures. The senior author (RS) has previously found a significant difference in bleeding during upper blepharoplasty and DCR when TXA was used in the local anesthetic injection. The aim of this study was to assess the hemostatic effect of subcutaneous TXA during lacrimal gland biopsy (LGB).

Methods: Prospective, randomized, placebo-controlled, double-blind study of consecutive patients undergoing LGB by a single surgeon (RS) in an office-based procedure room between November 2020-January 2023. Exclusion criteria included a personal or family history of thromboembolic event, oral contraceptive use, factor V Leiden mutation, allergy to TXA, systolic blood pressure>200mmHg, prior history of orbital surgery or trauma, and follow-up <1 month. Antithrombotics were held seven days prior to surgery. Patients were randomized to either receive local anesthesia with or without TXA that was drawn up by a nurse. 2 ml of local anesthetic was injected in all cases subcutaneously to an extended eyelid crease area and the lacrimal fossa. The TXA solution contained 0.9ml of 1% lidocaine with epinephrine 1:100,000 + 0.9ml of 0.5% bupivacaine with epinephrine 1:200,000 + 0.2ml of 100 mg/ml TXA yielding a concentration of 10mg TXA/1ml local anesthetic (fig 1). The placebo solution replaced the TXA with 0.2ml normal saline. Patient and surgeon were blinded to which solution was being injected. LGB was performed under local anesthesia in typical fashion utilizing high temp handheld cautery when needed without any hemostatic agents. Operative and cautery time were recorded by nursing staff. Photos were taken at postoperative day (POD) 7. Two blinded oculoplastic surgeons scored ecchymosis using the 4-point Winker-Black bruising scale. Patients recorded the POD the ecchymosis resolved.

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Results: A summary of patient outcomes is illustrated in Table 1. Fifty-two patients, 33 (64%) of whom were female, had a mean age of 56.6 years (range 24-87). The two treatment groups were similar in terms of gender, age, medical history, and ultimate histopathologic diagnosis. Duration of cautery and surgery, ecchymosis grade on POD 7, and duration to ecchymosis resolution were all significantly less for the group treated with TXA. The mean differences were 16.8 seconds of cautery time, 3.5 minutes of surgical time, and 3.9 days until ecchymosis resolution. No complications including thromboembolic events were noted in the TXA group.

Conclusions: Subcutaneous TXA in local anesthetic proved safe and effective at reducing bleeding, surgical time, ecchymosis at POD 7, and a shorter overall duration of ecchymosis in this LGB cohort. Clinicians may wish to consider the use of TXA when performing LGB. Future studies are warranted to investigate ideal route and dose of TXA, utilization in patients taking anticoagulants, and for other oculofacial surgeries.

Figure 1

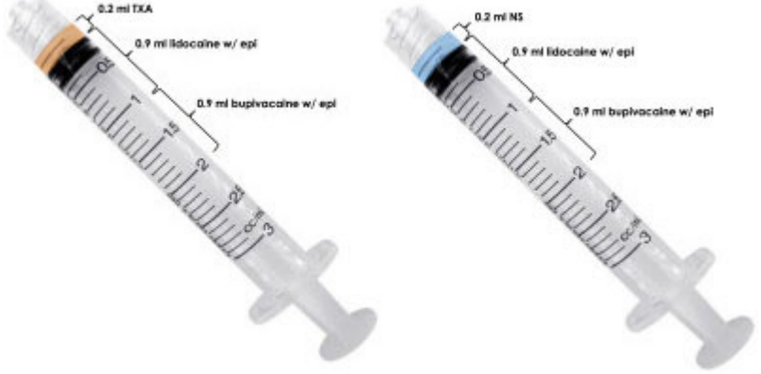

Figure 2

Table 1.

	TXA	Placebo	P-value
Duration of surgery (minutes)	22.8	26.6	0.02
Durations of cautery (seconds)	11.2	28.0	<0.01
POD 7 ecchymosis (0=none, 1=mild, 2=moderate, 3=severe	1.2	2.5	<0.01
Days until ecchymosis resolution	8.8	12.7	<0.01

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9 Utility of Computed Tomography – Dacryocystography (CT – DCG) in the Management of Traumatic Secondary Acquired Lacrimal Duct Obstruction (SALDO)

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Introduction: The purpose of this study is to evaluate the role of Computed Tomography – Dacryocystography (CT – DCG) in the Management of Traumatic Secondary Acquired Lacrimal Duct Obstruction (SALDO).

Methods: Retrospective interventional case series. Sixty-five lacrimal drainage systems (LDS) of 60 patients diagnosed with Traumatic SALDO, presenting to the Dacryology clinic at our tertiary center between January 2019 – December 2022, were analyzed. Only patients who underwent pre-operative CT-DCG were included. Lacrimal intervention included endoscopic dacryocystorhinostomy (DCR), external DCR, or dacryocystectomy (DCT), along with adjunct procedures as needed. Application of Mitomycin – C 0.04% and bicanalicular intubation were performed for all DCRs. Successful outcome was defined in terms of patent irrigation (anatomic success), and nil to minimal epiphora (functional success), or absence of discharge in cases of DCT at 1 month.

Results: The average age at presentation was 31.12 ± 14.67 years. Majority were males (55, 84.6%), with a male-female ratio of 11:2. Clinical findings included lacrimal swelling in 36 cases (55.38%), fistula in 7 cases (10.78%), lacrimal abscess in 1 case (1.54%), acute dacryocystitis in 8 (12.3%) cases, while 9 (13.8%) had prior history of acute attacks. Naso-orbital-ethmoid fractures were noted in 42 cases (64.6%) and orbital fractures in 44 cases (67.7%), medial wall fractures being the most common (27, 41.5%). Cribriform plate was damaged in 5 (7.6%) cases. Fractures involving the lacrimal fossa and nasolacrimal duct (NLD) were noted in 15 (23%) and 3 (4.6%) cases, respectively. CT – DCG revealed dilated sac in 52 (80%) cases of which 1 had fistulous communication with glabella, shrunken and fibrosed in 10 (15.38%), while the sac could not be visualized in 3 cases (4.6%). Of the 62 visualized sacs, 42 LDS (67.74%) were either displaced posteriorly (23, 37%), superiorly (11,16.9%), anteriorly (6, 9.6%), and inferiorly (2, 3.2%). Four LDS (6.1%) had diverticulae. Hyperostosis or callus formation was noted in 24 (36.9%) cases. Of 43 cases with prior maxillofacial repair, five lacrimal sacs of 4 patients were directly penetrated by either screw or implant and were diagnosed as Hardware – associated SALDO. Lacrimal surgery was performed in 48 (73.85%) cases with endoscopic DCR as the most common procedure (23, 47.9%), followed by external DCR (16, 33.3%), and DCT (17, 14.6%). Prior lacrimal intervention was noted in 5 cases who subsequently underwent external DCR (n=2), endoscopic DCR (n=2), and DCT (n=1). Of the 48 cases, CT – DCG findings corroborated with surgical findings in 46 (95.83%) cases. A successful outcome was achieved in 47 cases (98%) including the ones with prior intervention (n=5), while 1 patient underwent revision endoscopic DCR.

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Conclusions: CT – DCG is effective in gauging the relationship of the lacrimal sac from the surrounding structures, as well as determining its size and position. Associated sac diverticula, fossa fractures, and callus formation can alter the course of surgery as well as prognosis and could be clearly delineated. A pre-operative CT – DCG in Traumatic SALDO facilitates surgical planning and anticipates intra-operative challenges, thereby helping in yielding successful outcomes.

Figure 1

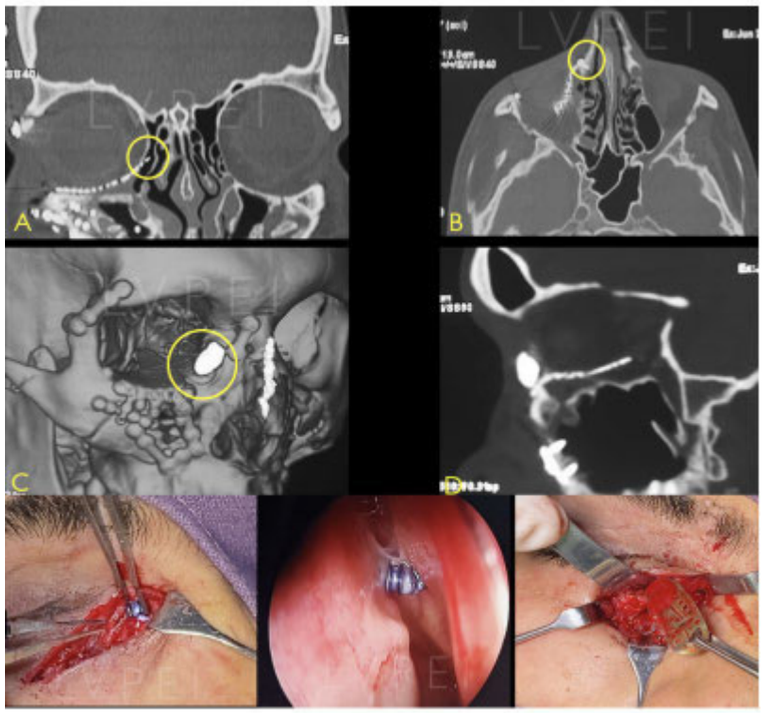
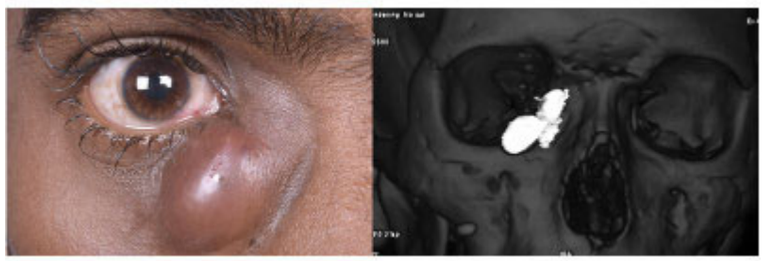


Figure 2



10 Staged Periocular Reconstruction for Severe Trigeminal Trophic Syndrome

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Introduction: Trigeminal trophic syndrome is an uncommon entity that typically presents as a classic triad of anesthesia, paresthesia, and persistent ulceration of the lateral nasal ala after damage to the trigeminal nerve. Ulceration occurs and persists due to self-manipulation or skin-picking behaviors in response to paresthesia. Involvement of the periocular region is rare. This report describes an unusually severe case of trigeminal trophic syndrome with significant involvement of the V1 dermatome that required staged periocular reconstruction.

Methods: Case report

Results: A 48-year-old woman with a history of recent varicella zoster infection was referred for eyelid evaluation. She endorsed decreased vision, dryness, and irritation of the left eye. She described an evolving vesicular rash over her left face with associated left eyelid swelling for the preceding two months. On evaluation, visual acuity of the left eye was limited to hand motion. External exam demonstrated a 6 x 13 cm open skin ulceration extending from the cranial vertex to the left upper eyelid, with severe upper lid retraction and lagophthalmos. A large corneal ulcer with hypopyon were present on slit lamp exam and corneal sensation was absent.

Per consultation with facial plastic surgery, the patient's forehead ulceration was left to heal by secondary intent. Short term management of her exposure and neurotrophic keratopathy required multiple amniotic membrane grafts and tarsorrhaphy. Periocular reconstruction was determined necessary to prevent further progression of her keratopathy. Intraoperatively, she was found to have an intact posterior lamella that was retracted behind the superior orbital rim. The posterior lamella was mobilized and a full thickness skin graft to the anterior lamella from a preauricular donor site was placed. Complete correction of the lid retraction and lagophthalmos was seen in the early postoperative period. However, at 7 weeks follow-up, progressive contraction of the forehead skin was noted to have caused recurrent upper lid retraction and lagophthalmos. Scar release and reconstruction of the brow with a transpositional paramedian forehead flap was performed. Visual acuity improved to 20/50 and exam demonstrated good lid closure with minimal residual lagophthalmos and upper lid retraction at 6 months follow-up. Surgical treatment of the standing cutaneous deformity at the base of the paramedian forehead flap was offered, but the patient declined.

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M&M/TOUGH CASE

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Conclusions: Trigeminal trophic syndrome can cause severe eyelid retraction and lagophthalmos with resultant corneal complications. A multidisciplinary approach and timely staged periocular reconstruction may be required to prevent vision loss or even loss of the eye.

Figure 1

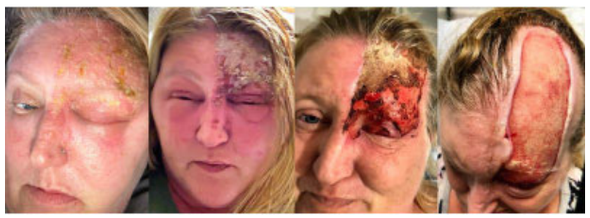

Figure 2

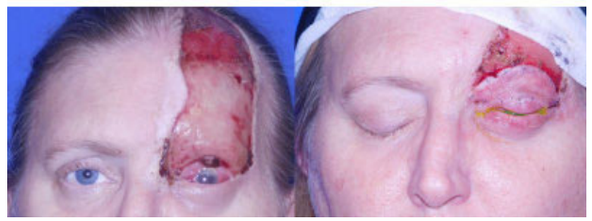

Figure 3

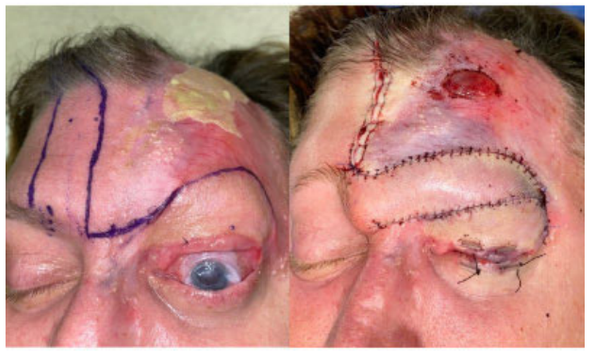

Figure 4

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11 Eyelid and Periorbital Cutaneous Melanoma Treated with Mohs Micrographic Surgery

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Introduction: Malignant melanoma is rare among eyelid cutaneous malignancies. Prior studies have described outcomes of wide local excision and "slow Mohs" for periocular melanoma.[1,2] Mohs surgery with immunohistochemistry has recently been included in consensus treatment guidelines,[3] and allows for maximum tissue preservation and same-day confirmation of negative margins, which facilitates coordination of oculoplastic reconstruction. Outcomes of Mohs surgery for periocular melanoma have not been previously described.

Methods: All cases of invasive cutaneous melanoma affecting the eyelids or periorbital region treated at a single academic center with Mohs micrographic surgery over a 10-year period (2008-2018) were reviewed. Clinicopathologic characteristics, reconstructive details, and outcomes were recorded and compared between tumors that clinically involved the eyelids, and those in the periorbital region (cheek, nasal sidewall, temple, brow).

Results: 39 cases with complete records were identified. Of those, 28 tumors were located in the periorbital region, and 11 on the eyelid skin (Figure 1). Breslow depth was <1mm in 34 tumors (87.2%), 1-2mm in 2 (5.1%) and >2mm in 3 (7.7%). There was one local recurrence (2.5%) and one nodal metastasis (2.5%). Mean defect size was 11.9 cm^2 (±10.3 cm^2). Eyelid tumors were significantly more likely to require more than 1 Mohs stage for clearance ($p=0.03$), result in a defect with lid margin involvement ($p<0.01$), and require an oculoplastic surgeon for reconstruction ($p<0.01$). More than half of cases required high complexity repair techniques (20/39). Ocular complications such as ectropion, lagophthalmos and chronic lid edema occurred in 9 cases (23.1%), 4 of those (10.3%) required revision surgery.

Conclusions: Mohs micrographic surgery for thin periocular cutaneous melanoma results in excellent outcomes with low rates of local recurrence and metastasis. Defect size is considerably larger than average sizes published for defects after Mohs excision of non-melanoma eyelid skin cancer.[4] Repair by an oculoplastic surgeon should be planned for tumors that clinically involve the eyelid skin, and large defect size with need for complex reconstructive techniques must be anticipated.

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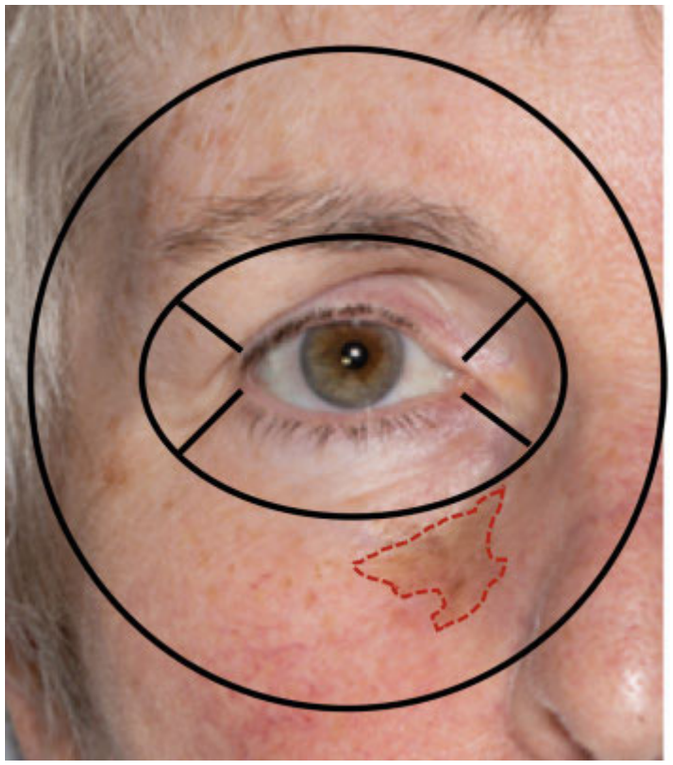
Figure 1



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12 Ipilimumab/Nivolumab Offers Fast, Effective Treatment for Malignant Conjunctival Melanoma

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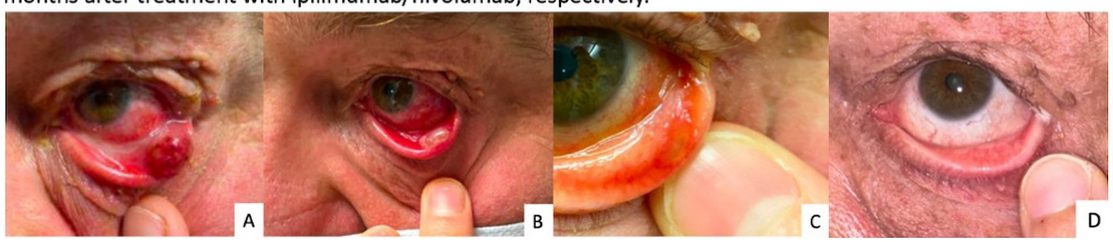
Introduction: We present one of the first cases of ipilimumab/nivolumab as an effective first-line standalone therapy for metastatic malignant conjunctival melanoma.[1-3]

Methods: Case Report

Results: A 59-year-old man presented to the emergency department with a rapidly growing left lower palpebral conjunctival lesion for two weeks. Incisional biopsy of the palpebral lesion was consistent with malignant melanoma, and additional map biopsies of the bulbar conjunctiva were negative. Initial staging scans showed metastases in the lungs, which were also biopsy-confirmed. Treatment with ipilimumab/nivolumab resulted in gross resolution of local disease after only one month (2 cycles), and no recurrence was observed by seven months follow-up (Figure 1). Distant metastatic sites in the lungs also decreased in size based on 3-month follow-up CT imaging. The patient tolerated treatment well without any adverse effects. He completed four cycles of ipilimumab/nivolumab and is currently receiving nivolumab alone every four weeks.

Conclusions: Ipilimumab/nivolumab may offer an efficient standalone therapy for conjunctival melanoma, which obviates the local toxicities associated with topical treatments such as mitomycin C. This case is notable for our patient's favorable response to treatment in the absence of any additional/supplementary therapies. To our knowledge, this is the first reported case of a patient with conjunctival melanoma exclusively involving the palpebral conjunctiva that resolved with ipilimumab/nivolumab.

Figure 1. External photograph at presentation demonstrates an 8 mm x 8 mm well-circumscribed left lower palpebral conjunctival lesion (A). The second image (B) shows the lesion 3 weeks after incisional biopsy but before systemic immunotherapy was initiated. The remaining photos (C, D) show the lesion one and seven months after treatment with ipilimumab/nivolumab, respectively.



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13 Residual Masses after Treatment in Orbital Lymphoma: Incidence, Risk Factors, and Clinical Outcomes

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Department of Ophthalmology, Asan medical center, Seoul, Korea, Republic of

Introduction: To evaluate the characteristics of a residual mass (RM) after treatment in primary orbital lymphoma (OL) and assess the prognostic factors for local recurrence (LR) or systemic relapse (SR).

Methods: We analyzed data from 100 OL patients. Response to treatment was assessed at 12 weeks, 24 weeks, and last contact after first-line treatments. Characteristics of RM and risk factors associated with relapse were evaluated.

Results: At 12 weeks after treatment, 73 of 100 patients showed RMs. RM was associated with tumor size ($p<0.001$) and locations, including the posterior orbit, extraocular muscle, lacrimal system, and optic nerve (each $p < 0.05$). LR during follow-up was associated with Ann-Arbor stages 3, 4, and AJCC T 3-4 stage (each $p < 0.05$) in patients with RM. SR was associated with histopathologic subtypes, including diffuse large B-cell and mantle-cell lymphomas ($p= 0.030$ and $p= 0.008$, respectively).

Conclusions: Large OLs involving posterior orbit or extraocular muscles could be associated with RM after treatment. RMs in patients with high-grade tumor stages or histopathologic subtypes should be treated more aggressively and followed up carefully for LR or SR.

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4 The Effect of COVID on Seasonal Trends of Orbital Cellulitis at a Large Tertiary Care Center

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Introduction: This study investigates the effect that COVID-19 had on seasonal trends of pediatric orbital cellulitis (OC) cases requiring hospital admission over a four-year period at a large tertiary care center in Colorado.

Methods: A retrospective chart review study was conducted at the a large tertiary care center in the US between 4/1/2018 and 3/31/2023. The study involved pediatric patients who were hospitalized for radiographically confirmed OC. Data collected included demographics, past medical history, presence of concomitant sinusitis, imaging impressions, culture results, and need for surgery. The charts were categorized into three groups based on admission dates: April 2018 to March 2020 (pre-COVID era), April 2020 to March 2022 (period when mask mandates were enforced in Colorado), and April 2022 to March 2023 (post-mask mandate removal period). Within these groups, statistical analysis was performed to compare the incidence of OC cases during the winter/flu season (October – March) and the summer/off season (April – September) before, during, and after the cessation of the COVID-19 mask mandate.

Results: Two-hundred and twelve cases of pediatric OC were identified from 4/1/2018 to 3/31/2023.. The average age of admitted patients was 8.5 years. The rates of admission per month are shown in Figure 1 and the seasonal influence of monthly admission rates are shown in Table 1. Before the COVID pandemic, the monthly average admissions for OC were significantly higher during flu season (October to March) as compared to the off season (April to September) ($p<0.05$). However, throughout the pandemic, that seasonal difference was no longer present. During both years of the pandemic, there were more admissions for OC during the off season than the flu season. After the mask mandate was lifted in March of 2022, the trend toward a seasonal increase in the winter months was once again apparent ($p=0.09$) (Table 1).

Conclusions: In conclusion, our study provides insights into the impact of COVID-19 on seasonal trends in pediatric orbital cellulitis (OC) admissions in Colorado. Pre-pandemic data showed increased OC admissions in the winter months, consistent with other reports of increased admissions during flu season.[1,2,3] However, during the pandemic, overall admission rates dropped significantly, and a "seasonal switch" occurred, with more admissions during off-seasons than flu seasons. This phenomenon was also observed in conditions like acute otitis media and non-COVID upper respiratory tract infections.[3,5] In the post-masking era, there was a dramatic increase in OC admissions along with the return of the pre-pandemic seasonality admission rates.

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This data highlights the influence of social behavior on OC infection rates. The “seasonal switch” observed coincided with changes in nonpharmaceutical interventions in Colorado throughout the pandemic. Strict social distancing, masking, and stay-at-home orders correlated with fewer OC admissions, likely due to reduced respiratory viruses transmission among children. In the second pandemic year, summer months re-introduced maskless, outdoor interactions, facilitating the spread of upper respiratory tract infection-causing viruses.

These findings highlight the COVID-19 pandemics disruption of traditional OC seasonality patterns, emphasizing the importance of continued infection control measures. Further research should investigate pandemic’s long-term effects and other external influences on pediatric eye health.

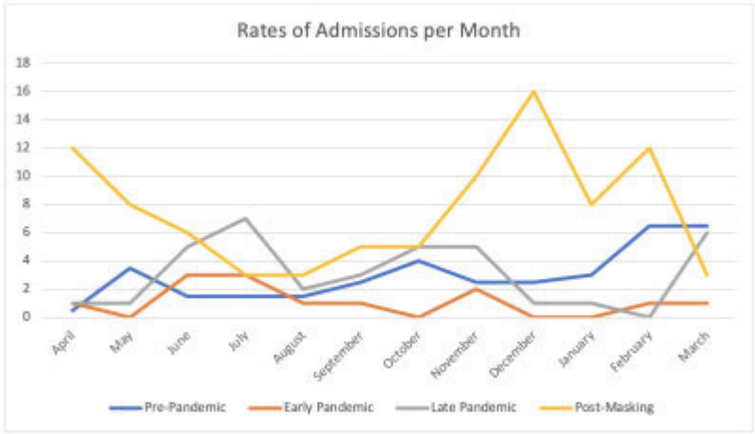
Figure 1

Table 1: Seasonal Influence of Monthly Admission Rates

	Pre-Pandemic	Early Pandemic	Late Pandemic	Post-Masking
April - September	1.8 (+/- 1.0)	1.5 (+/-1.2)	3.2 (+/- 2.4)	6.2 (+/- 3.4)
October - March	4.2 (+/- 1.1)	0.67 (+/- 1.4)	3 (+/-2.2)	9 (+/- 1.9)
p-value	<0.05	0.30	0.88	0.09

Pre-COVID-19 (April 1, 2018-March 31, 2020), COVID-19 Pandemic (April 1, 2020 – March 31, 2022), Post-masking (April 1, 2022 – March 31, 2023)

Figure 2



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14 Application of Mixed Reality in Oculoplastic Surgery

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Introduction: The aim of this study is to explore the potential use of mixed reality technology in the field of oculoplastic surgery with presurgical planning, and intraoperative navigation.

Methods: 14 cases with orbital pathology including various orbital tumors, thyroid eye disease and orbital fractures were evaluated for presurgical planning and intraoperative navigation using mixed reality. The headset used was HoloLens 2. Presurgical planning using DICOM images to create holographic representation, evaluated the location and visualization of the orbital tumors and their relation to vital structures using cloud based and a non-cloud-based platforms. Intraoperative navigation was performed in select cases with a non-cloud-based platform.

Results: Mixed reality facilitated 3D visualization and spatial view of orbital lesions and anatomical structures from multiple angles. Anatomical variations were easier to detect and conceptualize, including locating vascular structures. Intraoperative navigation with holographic representation of imaging was used in two modes. A detached mode and a superimposed mode were both explored depending on the surgical need. Navigation accuracy was within 2 mm in Euclidean error and 2 degrees of trajectory-based accuracy. Traditional navigation system was used as a back up to verify the accuracy of the holographic tracking. Mixed reality decreased the need to mentally reconstruct the 3D representation and develop a spatial understanding from 2D images. Sterility was easy to maintain while navigating virtual keyboard to access imaging.

Conclusions: This study offers proof of concept by testing the clinical feasibility of using mixed reality in oculoplastic surgery. Mixed reality facilitated presurgical planning. 3D visualization allowed for a superior spatial perspective compared to 2D visualization and better detection of the patient's anatomy and orbit anatomical variants. Intraoperative navigation using holographic visualization facilitated access to complex orbital lesions and offered multimodality of navigation. Mixed reality holds a promising future in the field of oculoplastics.

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15 Changes in Interpupillary Distance Before and After Orbital Fat Decompression for Thyroid Eye Disease

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Purpose: Thyroid eye disease poses a problem of deteriorating quality of life due to mental disorders associated with changes in facial disfigurement, in addition to deterioration of visual function. One of these changes is the elongation of the interpupillary distance. This presentation considers the changes in the interpupillary distance (IPD) before and after orbital fat decompression.

Methods: Changes in IPD before and after surgery were investigated in 98 eyes of 49 consecutive patients who underwent orbital fat decompression for binocular thyroid ophthalmopathy. The surgery was performed using a microscope via an inferior conjunctival approach to remove fat from the inferior nasal and lateral quadrants. The resected fat from both eyes' inferior nasal and lateral quadrants was collected in a syringe to measure the resected mass. IPD was measured with an auto-refractometer pre- and postoperative one month. The correlation with the fat mass resected at the time of surgery from the inferior nasal quadrants, inferior lateral quadrants, and total removed fat was analyzed.

Results: The average age of the subjects was 42±13 years, and the male-to-female ratio was 5:44. Postoperative IPD was shortened by an average of 1.53±1.19mm compared to preoperative IPD, and the pre- and postoperative IPD change significantly correlated with resected fat mass (average 5.7±2.4cc) ($r=0.36$, $P=0.01$). There was also a more significant correlation to nasal fat resection ($r=0.49$, $P=0.0004$) than lateral fat ($r = 0.20$, $P = 0.16$). No postoperative complication, such as new onset of diplopia or a visual impairment, were noticed in any of the patients.

Conclusions: Resection of orbital fat, especially nasal fat, are effective in shortening the IPD for correcting facial disfigurement in thyroid eye disease.

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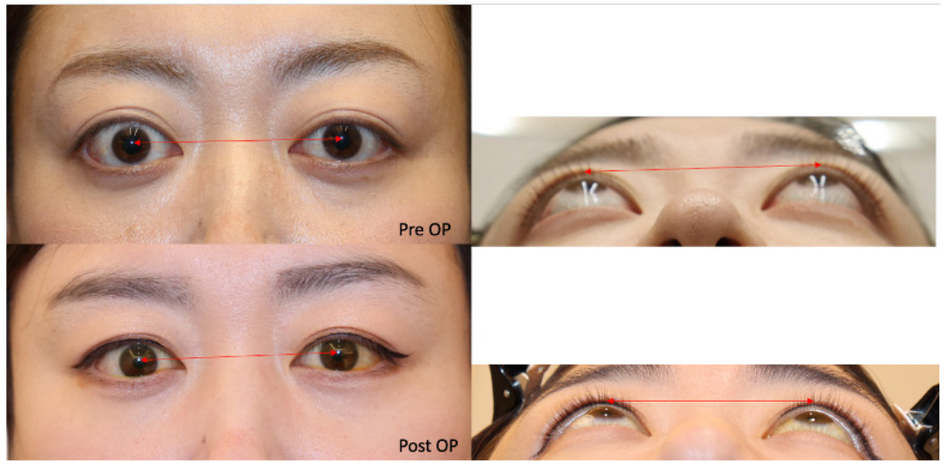

Figure1
Pre- and postoperative clinical photograph of thyroid eye disease patient underwent orbital fat decompression

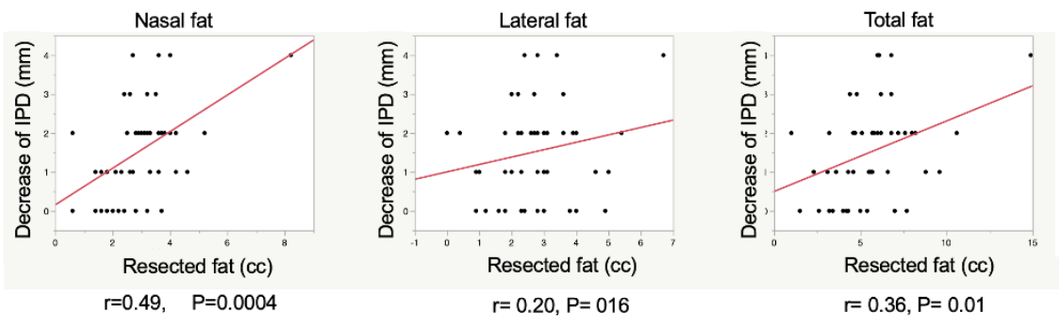

Figure 2
Graphs showing correlations between resected fat volume and change of interpupillary distance (IPD) pre- and postoperative

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16 Cost Effectiveness of Nylon Foil in Orbital Fracture Repair

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Introduction: Introduction: Orbital fractures are one of the most common facial injuries that can produce significant morbidity if not appropriately repaired.[1] Options for repair of symptomatic orbital fractures continue to expand and present challenges in management to minimize complications and maximize anatomic reconstruction at the lowest cost to the patient.[2,3] Choice of implant material]is an important factor, and highly dependent on surgeon experience and availability.[4] Nylon foil is an effective and inexpensive alloplastic implant choice in orbital fracture repair.[4-7] Recent research suggests lower cost implants may prove more cost-effective when implanted efficiently by surgeons and operating room staff familiar with their use.[3,7] The unit cost of 4x4cm nylon implant has been quoted at $9.13, or 38 times cheaper than combination high-density polyethylene and titanium mesh alternatives.[7]

Methods: A retrospective review of patients who underwent orbital fracture repairs from January 2011 to December 2021 was performed. The study outcomes were fracture type, choice of implant material, complications and reoperation rates. Patients were excluded who had no radiological results, incomplete first postoperative follow-up or fractures not involving orbital floor with or without medial wall. Chi- squared tests were used to assess for independence between categorical variables.

Results: Our 10-year retrospective review revealed 352 patients with orbital fractures involving the orbital floor. In our initial study cohort (n=100), 87% of patients were implanted with smooth nylon foil implant, most commonly 0.4mm thickness Supramid material. In patients who later developed complications, the majority were related to eyelid malposition, symptomatic epiphora or otherwise unrelated to the implant repair itself. Reoperation for implant removal was not significantly associated with implantation of nylon foil (p=0.45).

Conclusions: At our institution, Nylon foil implants are safely and effectively implanted at high volumes at lower cost to the patient than more expensive alternatives.

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17 Cryoablation for Orbital Desmoid-Type Fibromatosis with a Literature Review of Orbital Involvement

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Introduction: To report a rare case of an orbital desmoid-type fibromatosis (DF) in an infant, refractory to multiple chemotherapeutic agents, treated with cryoablation.

Methods: A comprehensive PubMed/Medline search was conducted to identify all articles reporting orbital DF.

Results: A 2-month-old male presented with a right orbital mass present since birth, not noticed on prenatal ultrasonography, with proptosis, optic neuropathy, and strabismus. Imaging revealed a large, infiltrative, poorly defined, intraconal mass with infiltration of the extraocular muscles, and bony erosion (Figure 1A-B). An initial biopsy suggested rhabdomyomatous mesenchymal hamartoma. An orbitotomy with tumor debulking was performed, with repeat pathology demonstrating a more cellular spindle cell proliferation, cytologically bland cells and densely collagenous stroma. Immunohistochemical staining revealed equivocal β-catenin nuclear staining. Additional testing with Next Generation Sequencing (NGS) demonstrated a mutation in the β-catenin (CTNNB1) gene with a S45F mutation, establishing a diagnosis of infantile DF. The patient failed several chemotherapeutic regimens before maintaining disease stability on Sorafenib for 3 years. Sorafenib was discontinued due to systemic side effects, after which imaging 1 year later demonstrated significant growth (Figure 1C-D). The patient underwent MR guided cryoablation of targeted tumor tissue and intralesional steroid injection and maintained disease stability at 1 year.

Twelve cases of orbital DF are included in this review, 9 occurring in the pediatric population. The mean age at diagnosis was 16 years (range 2 months – 73 years). A histologic misdiagnosis was observed in 33%. Common presenting signs were proptosis (75%), ptosis (42%), restrictive strabismus (42%), periorbital edema (33%), and optic neuropathy (25%). Tumor location was described in the intraconal space (33%) and superolateral quadrant (33%). Nuclear staining for β-catenin was observed in 57%, while DNA sequencing revealed the CTNNB1 mutation in 29%. An exenteration was performed in 25%. A subtotal resection was performed in 50% of patients, with local recurrence in 50%. Given the high recurrence rate, there is debate regarding the optimal treatment for orbital DF. The head and neck literature demonstrates that positive surgical margins do not affect recurrence or survival rate. Cryoablation has demonstrated a decrease in tumor volume when compared to medical or radiation therapy, and long-term disease control comparable to surgical

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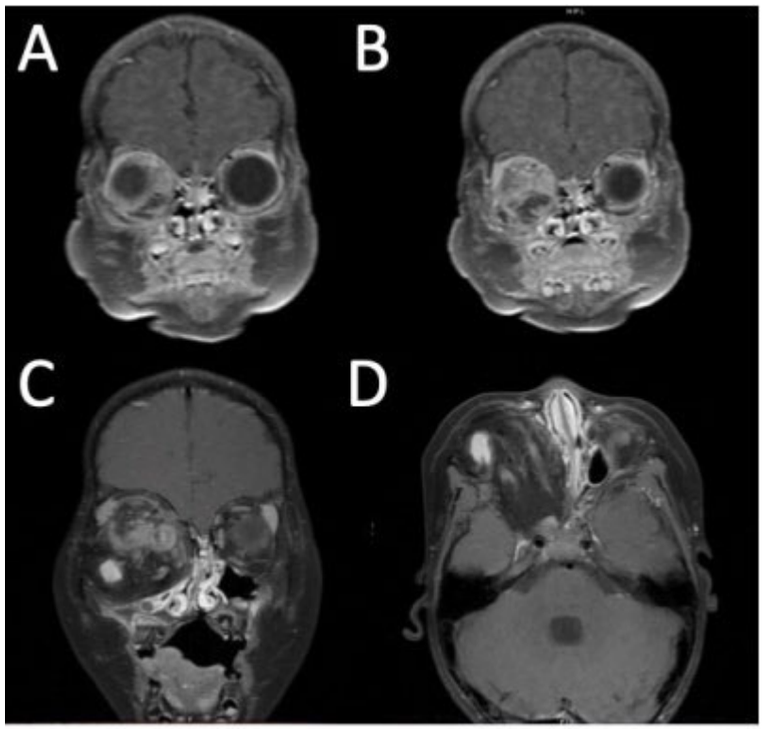
excision. High intensity intranuclear β-catenin staining is often observed in DF, but low intensity or equivocal staining is associated with higher recurrence. Molecular gene profiling with NGS demonstrates high specificity for CTNNB1, with higher recurrences and poor outcomes observed with S45F mutations.

Conclusions: Orbital DF is a rare entity with diagnostic and therapeutic challenges. Accurate diagnosis and understanding of treatment modalities are crucial. DNA sequencing should be performed with low or equivocal intranuclear β-catenin staining. If complete resection is not feasible, adjuvant treatments should be considered. This is the first report demonstrating the use of cryoablation for orbital DF. Cryoablation should be considered as a treatment option for recalcitrant DF, though more studies are needed to assess the long-term efficacy of this treatment option for orbital disease.

Figure 1



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18 Effects of Teprotumumab on Intraocular Pressure in Patients with Different Types of Thyroid Eye Disease

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Introduction: Thyroid Eye Disease (TED) patients often present with elevated intraocular pressure (IOP), especially with upgaze due to inferior rectus muscle restriction. Proposed mechanisms of IOP elevation include elevation of episcleral venous pressure, mucopolysaccharide deposition within the trabecular meshwork, restrictive myopathy, steroid-induced glaucoma, and secondary glaucoma. Improvement of IOP is seen with orbital decompression, but there is limited data on the effect of teprotumumab on IOP. We herein examine the IOP changes in TED patients who completed teprotumumab treatment for different types of thyroid eye disease.

Methods: A multicenter retrospective cohort study of patients completed a full course of teprotumumab between February 2020 and January 2023 was conducted at four tertiary referral centers. Demographics, IOP, types of TED (acute vs. chronic, type I and type II, treatment naïve vs. prior surgical decompression), proptosis, and clinical activity score were reviewed at baseline and at the post treatment visit. Primary outcome measure was change in IOP, while secondary outcome measures included changes in proptosis and clinical activity score for different types of TED.

Results: 101 patients (27:74) were included with a mean age of 50.9 (SD of 11.7 years). 70 patients had acute TED (≤ 12 months of TED symptoms), and 31 patients had chronic TED (> 12 months of TED symptoms). Of the acute TED with baseline imaging, 9 were of type I, 20 were type II. Of the chronic TED with baseline imaging, 13 were type I, 11 were type II. 6 patients had prior orbital decompression surgery. The mean baseline IOP was 17.7 mmHg (range 11-40), and the mean baseline clinical activity score was 4.8 (range 2-8). The mean post treatment IOP was 15.2 mmHg (range 8-28), and mean IOP reduction was -2.5 mmHg ($p<0.0001$). Among acute TED patients, mean IOP reduction was -2.28 mmHg (range -11 to +8). Type I acute TED patients had -1.22 mmHg (range -8 to +8) reduction of IOP, while Type II acute TED patients had -2.75 mmHg (range -11 to +3) reduction of IOP ($p<0.0001$). In chronic TED patients, IOP reduction was -2.54 mmHg (range -15 to +6). The reduction of IOP in type I chronic TED patients was -2.35 mmHg (range -9 to +6), and IOP reduction in chronic type II TED patients was -2.77 mmHg (range -15 to +4) ($p = 0.748$). (Table 1) The mean baseline proptosis was 22.4 mm (range 13-28). The mean

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post treatment exophthalmometry measurement was 19.4 mm (range 12-25), after 8 infusions (p<0.0001). Among acute TED patients, proptosis reduction was -2.86 mm (range -8 to +1). Type I acute TED patient had -2.03 mm (range -8 to +1) proptosis reduction, while Type II acute TED patients had -3.24 mm (range -8 to 0) proptosis reduction (p = 0.054). In chronic TED patients, proptosis reduction was -2.15 mm (range -7 to 2). The proptosis reduction in type I chronic TED patients was -1.33 mm (range -6.5 to 0), and proptosis reduction in chronic type II TED patients was -3.11 mmHg (range -6 to 0) (p<0.001). (Table 1)

Conclusions: IOP improvement was seen in patients completed teprotumamab for different types of TED, and the reduction is similar to that of orbital decompression. Teprotumumab treatment is associated with a higher reduction of IOP in patients with acute type II TED patients and of proptosis in chronic type II TED patients.

Table 1

N = 101 (70 acute TED: 31 chronic TED)	Mean (SD / range)	P value
Age (years)	50.9 (+/- 11.7)	
Gender (27 Male, 74 Female)		
Baseline proptosis (mm)	22.4 (13-28)	
Post Treatment Proptosis (mm)	17.7 (11-40)	
Baseline IOP (mmHg)	17.7 (11-40)	
Post Treatment IOP (mmHg)	15.2 (8-28)	
IOP Reduction (mmHg)	-2.5	**<0.0001** (Baseline vs Post Treatment)
Acute TED	-2.28	**<0.0001** (Type I vs Type II)
Type I	-1.22	
Type II	-2.75	
Chronic TED	-2.54	0.748 (Type I vs Type II)
Type I	-2.35	
Type II	-2.77	
Proptosis reduction (mm)	-3.00	**<0.0001** (Baseline vs Post Treatment)
Acute TED	-2.86 (-8 to +1)	0.054 (Type I vs Type II)
Type I	-2.03 (-8 to +1)	
Type II	-3.24 (-8 to 0)	
Chronic TED	-2.15 (-7 to 2).	**<0.001** (Type I vs Type II)
Type I	-1.33 (-6.5 to 0)	
Type II	-3.11 (-6 to 0).	
CAS improvement	-4.41	**<0.0001** (Baseline vs Post Treatment)
Acute TED	-4.41	0.428 (Type I vs Type II)
Type I	-4.78	
Type II	-4.25	
Chronic TED	-4.39	0.132 (Type I vs Type II)
Type I	-4.04	
Type II	-4.82	

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19 Epidemiology and Characterization of Orbital Floor Fractures: A Large National Data Sample Analysis

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Introduction: Orbital floor fractures (OFF) constitute a large proportion of periocular trauma that presents to Emergency Departments (ED). This study aims to establish the epidemiology of OFF using a national database.

Methods: A cross-sectional study of OFF identified from the National Trauma Data Bank 2007-015 using International Classification of Diseases, Clinical Modification codes was designed. Patient age, cause of injury, associated ocular injuries, and mortality were analyzed and compared with the Chi-square test using SAS Release 3.8.

Results: From 747,589 ocular trauma cases included in the study period, 160,493 (21.5%) OFF were identified, predominantly in the age group 21-40 (34.3%), and observed least among ages 0-20 (14.0%), p<0.001. Males comprised 81.1% of the group 21-40, while there were more females than males older than 65, p<0.0001. The 0-20 year old group more frequently suffered severe fractures than those >65 (22.6% severe GCS score vs 13.2%, respectively, p<0.0001). Fall was the leading cause of OFF in ages >65 (78.7%), assault in ages 21-40 (35.9%), and motor vehicle (57.6%) and sports (9.1%) in ages 0-20, p<0.0001. Home was the most frequent injury location for ages >65 (49.4%), while ages 0-20 most often sustained OFF on the street and in recreational facilities (49.9% and 12.6% respectively, p<0.0001). OFF was work-related for the active group 21-65 in only 3.1% to 4.1% of cases. Assault was most frequent in ages 21-40 (38.5%) while least represented in ages >65 (3.9%), p<0.0001. Age >65 represented the highest proportion hospitalized (60.2%) and the lowest sent to the OR (3.2%), while ages 21-40 comprised the largest proportion sent to the OR (24.7%), p<0.0001. Age >65 suffered the highest number of reported deaths and transfers to skilled nursing homes, while 0-20 were most likely discharged home, p<0.0001. Substance misuse was involved in the largest proportion in ages 21-40, while least in ages >65, p<0.0001. Ages 21-40 had the highest percentages of concurrent eye rupture (36.9%), open wound of periocular area (36.3%), superficial injury of eye (33.2%) and optic and cranial nerves III, IV, VI, and VII injury (38.9%). Ages >65 were least likely to have concurrent trauma. In the study period, OFF incidents increased sharply for the >65 group from 1650 (5.5%) to 4372 (14.5%), while incidents in both age groups 21-40 and 41-65 increased moderately from 7% to 12%, p<0.0001.

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Conclusions: OFF constituted over one-fifth of ocular trauma admitted to EDs during the study period and is most commonly seen in male patients between 21 and 40. Patients age 21-40 were most likely to suffer concurrent eye trauma from assault. Fall at home was the leading cause for seniors >65, who were most frequently hospitalized and suffered higher mortality rate. The sharp increasing trend of incidents for seniors >65 is concerning and warrants further study.

Figure 1

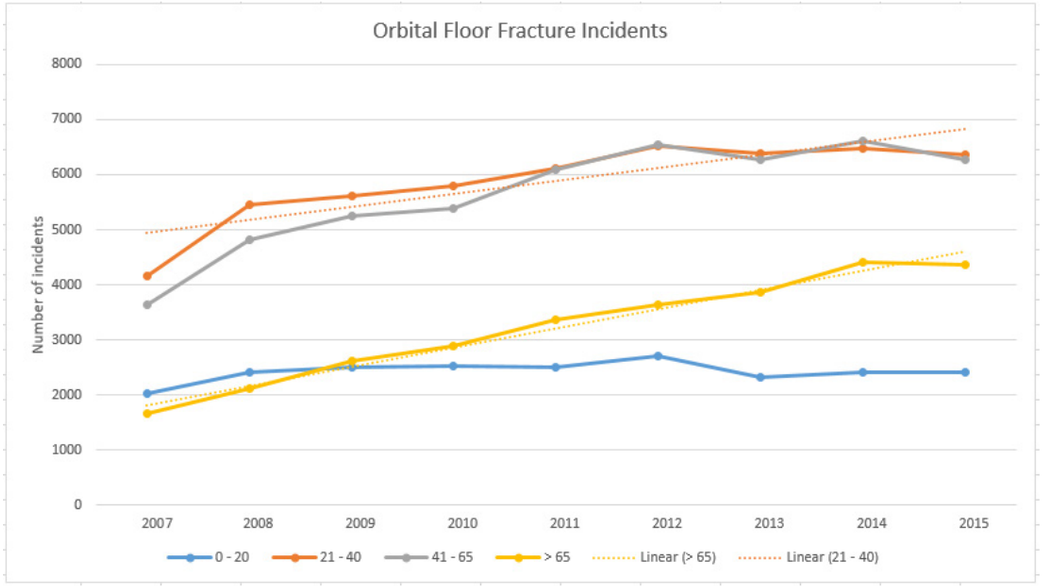

Figure 2

Orbital Floor Fracture

Age, year	0 - 20	21 - 40	41 - 65	> 65	Total	p value
	N %	N %	N %	N %		
N	22444	54971	52851	30227	160493	p<0.001
	14.0%	34.3%	32.9%	18.8%		
2007 - 2015						p<0.0001
2007	2015	4162	3628	1650	11455	
	9.00	7.59	6.88	5.47		
2008	2400	5465	4816	2106	14787	
	10.72	9.96	9.13	6.98		
2009	2492	5614	5243	2612	15961	
	11.13	10.23	9.94	8.65		
2010	2513	5789	5393	2881	16576	
	11.22	10.55	10.22	9.54		
2011	2503	6111	6089	3363	18066	
	11.18	11.14	11.54	11.14		
2012	2705	6515	6547	3631	19398	
	12.08	11.88	12.41	12.03		
2013	2325	6381	6272	3855	18833	
	10.38	11.63	11.89	12.77		
2014	2407	6481	6618	4413	19919	
	10.75	11.81	12.55	14.62		
2015	2420	6374	6276	4372	19442	
	10.81	11.62	11.90	14.48		
Gender						p<0.0001
Female	6339	10217	11752	16784	45092	
	28.24	18.59	22.24	55.53		
Male	16048	44571	40939	13358	114916	
	71.5	81.08	77.46	44.19		
Race						p<0.0001
American Indian	219	879	475	65	1638	
	0.98	1.6	0.9	0.22		
Asian	426	895	859	665	2845	
	1.9	1.63	1.63	2.2		
Black or African American	3676	10109	8904	1760	24449	
	16.38	18.39	16.85	5.82		
Native Hawaiian or Other Pacific Islander	63	152	92	34	341	
	0.28	0.28	0.17	0.11		
Other Race	2792	7251	4185	1204	15432	
	12.44	13.19	7.92	3.98		
White	13882	32408	35862	25263	107415	
	61.85	58.95	67.85	83.58		
Ethnicity						p<0.0001
Hispanic or Latino	3220	8455	4549	1109		
	11.1%	12.2%	7.0%	3.5%		
Not Hispanic or Latino	12981	31863	33857	18480		
	44.8%	46.1%	51.7%	58.5%		
ISS						p<0.0001
MINOR	6909	16250	13826	8763	45748	

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Figure 3

	32.18	30.88	27.31	30	
MODERATE	6571	16797	16753	10485	50606
	30.6	31.92	33.09	35.9	
SEVERE	4341	10916	11921	6604	33782
	20.22	20.74	23.55	22.61	
VERY SEVERE	3651	8659	8126	3354	23790
	17.00	16.46	16.05	11.48	
GCS					p<0.0001
MILD	16486	40513	40562	25223	122784
	73.45	73.70	76.75	83.45	
MODERATE	892	2442	2129	1021	6484
	3.97	4.44	4.03	3.38	
SEVERE	5066	12016	10160	3983	31225
	22.57	21.86	19.22	13.18	
Injury Mechanism					p<0.0001
FALL	1794	4576	11981	22582	40933
	9.00	9.60	26.28	78.66	
FIREARM	745	2096	1106	279	4226
	3.74	4.40	2.43	0.97	
MOTOR VEHICLE ACCIDENT	11485	22885	18914	4493	57777
	57.63	48.00	41.48	15.65	
STRIKE BY, AGAINST	4099	17111	13155	1255	35620
	20.57	35.89	28.85	4.37	
SPORT	1806	1006	441	98	3351
	9.06	2.11	0.97	0.34	
Location					p<0.0001
Home	3235	7095	11550	14936	36816
	14.41	12.91	21.85	49.41	
Industry	109	1220	1570	156	3055
	0.49	2.22	2.97	0.52	
Other	1109	3381	2983	1338	8811
	4.94	6.15	5.64	4.43	
Public Building	1042	3777	3007	2424	10250
	4.64	6.87	5.69	8.02	
Recreation	2818	2596	1818	540	7772
	12.56	4.72	3.44	1.79	
Residential Institution	166	1538	1331	2488	5523
	0.74	2.8	2.52	8.23	
Street	11192	26310	22971	6037	66510
	49.87	47.86	43.46	19.97	
Work related					
Yes	162	2155	2689	304	
	0.6%	3.1%	4.1%	1.0%	
No	18725	45785	43299	22600	
	64.6%	66.2%	66.2%	71.6%	
Intention					p<0.0001
Assault	4024	20989	14943	1175	41131
	18.07	38.49	28.48	3.92	
Self-inflicted	236	958	861	233	2288
	1.06	1.76	1.64	0.78	

Figure 4

Unintentional	17923	32108	36274	28453	114758
	80.49	58.88	69.12	95.01	
ED disposition					P<0.0001
Died in ED	117	295	260	202	
	0.32%	0.35%	0.33%	0.54%	
Floor bed admission	7543	18719	18122	9293	
	20.9%	22.0%	22.8%	24.8%	
ICU	6946	16504	17309	9038	
	19.3%	19.4%	21.7%	24.1%	
Step down	922	3228	3963	3040	
	2.6%	3.8%	5.0%	8.1%	
OR	2448	5621	4612	1192	
	11.2%	24.7%	18.8%	3.2%	
Transfer	1111	1819	1730	907	
	0.7%	1.1%	1.1%	2.4%	
Home discharge	1550	3883	2609	760	
	4.3%	4.6%	3.3%	2.1%	
Hospital disposition					p<0.0001
Deceased/Expired	596	1578	2091	1885	6150
	2.66	2.87	3.95	6.23	
Discharge/Transferred to home care	16026	38713	34619	13964	103322
	71.4	70.42	65.5	46.2	
Discharged/Transferred to Skilled Nursing Facility	152	929	2478	6614	10173
	0.68	1.69	4.69	21.88	
Discharged/Transferred to a short-term general hospital	349	776	864	499	2488
	1.55	1.41	1.63	1.65	
Discharged/Transferred to an Intermediate Care Facility	430	972	1201	793	3396
	1.92	1.77	2.27	2.62	
Discharged/Transferred to rehabilitation or long term care	1650	3947	4721	3157	13475
	7.35	7.18	8.94	10.44	
Hospital admission					p>0.1
ED days	1.04	1.02	1.02	1.1	
ICU days	4.5	5.1	5.5	6.3	
Hospital days	6.9	6.3	5.9	7.1	
Substance abuse					p<0.0001
Alcohol	2609	18284	15324	2159	38376
	11.62	33.26	28.99	7.14	
Drug	2554	10763	8023	900	22240
	11.38	19.58	15.18	2.98	
Concurrent Dx					p<0.0001
Open globe injury (eye rupture)	1984	3996	3457	1399	10836
	18.31	36.88	31.9	12.91	
Open wound of periocular area	29099	48785	40074	16313	134271
	21.67	36.33	29.85	12.15	
Contusion of eye and adnexa	36777	69350	74843	52090	233060
	15.78	29.76	32.11	22.35	
Superficial injury of eye and adnexa	14748	24596	23331	11449	74124
	19.9	33.18	31.48	15.45	
Optic and cranial nerves 3, 4, 6, 7th injury	5750	10027	7832	2147	25756
	22.32	38.93	30.41	8.34	

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20 Inter-surgeon Variability in Proptosis Reduction after Orbital Decompression for Thyroid Eye Disease: Does Decompression by One Surgeon Equal Decompression by Another?

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Introduction: Orbital decompression surgery is an effective procedure to address exophthalmos due to thyroid eye disease (TED). While several studies have reported its efficacy,[1,2] no comparative studies have assessed variability in outcomes between surgeons in performing the same decompression technique. This study aims to assess inter-surgeon variability in proptosis reduction after orbital decompression surgery to answer the question: does decompression by one surgeon equal decompression by another?

Methods: This multi-center retrospective chart review compared outcomes of patients who underwent orbital decompression for thyroid eye disease (TED). Orbital decompression was performed by eight experienced oculoplastic surgeons at seven institutions using similar established techniques.[3] Patient demographics, including age, gender, smoking history, preoperative and post-operative exophthalmometry, clinical activity score (CAS), and orbital decompression technique were reviewed. Data was analyzed by de-identified surgeon and surgical decompression technique. Data was included if ≥2 surgeons had performed ≥10 of a single technique to allow for meaningful statistical comparison. Patients with fewer than 3 months of follow-up were excluded. The primary outcome was post-operative change in exophthalmos. Multiple ANOVA and chi-squared testing were used, and a multivariable logistic regression was generated.

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Results: 621 orbits met inclusion criteria. Five different decompression techniques were analyzed: 1-wall: medial wall (n= 28), fat+lateral wall (n=111); 2 wall: medial wall+floor (n=123), fat+lateral wall+medial wall (n=142); and 3-wall: fat+lateral wall+medial wall+floor (n=217). Ages and gender were similar between all groups for all procedures (Tables 1-5). There was no statistically significant difference in change in exophthalmos for medial wall surgery (Surgeon E 1.4 ± 2.06 mm, Surgeon G 2.54 ± 1.51 mm, p=0.11), fat+lateral wall (Surgeon A 2.95 ± 2.44 mm, Surgeon D 2.17 ± 0.44 mm, Surgeon E 3.14 ± 1.45 mm, p=0.15): medial wall+floor (Surgeon F 2.73 ± 1.42 mm, Surgeon G 3.48 ± 1.29 mm, Surgeon H 3.20 ± 1.79 mm, p=0.13), fat+lateral wall+medial wall (Surgeon A 3.31 ± 2.43 mm, Surgeon B 3.97 ± 1.96 mm, Surgeon D 3.83 ± 1.07 mm, Surgeon E 3.54 ± 2.71 mm, p=0.48); and 3-wall: fat+lateral wall+medial wall+floor (Surgeon A 5.06 ± 2.58 mm, Surgeon B 4.95 ± 2.56, Surgeon D 5.0 ± 1.76 mm, Surgeon E 4.95 ± 1.99 mm, p=0.99; Table 1, Figure 1).

Conclusions: Through comparing multiple surgeons at various institutions performing similar procedures, our study demonstrates that outcomes for proptosis reduction after orbital decompression for TED did not vary significantly among surgeons. To our knowledge, this comparison has not been studied before. This also lends statistical validity to multicenter clinical studies evaluating orbital decompression with surgeons using similar techniques.

Table 1. Comparison of Post-operative Change in Exophthalmos (mm) after Decompression Among Surgeons

		Surgeon identity							
Decompression Technique	**n**	A	B	D	E	F	G	H	p-value
Medial wall	28				1.4 (2.06)		2.54 (1.51)		0.112
Fat + lateral wall	111	2.95 (2.44)		2.17 (0.44)	3.14 (1.45)				0.148
Medial wall + floor	123					2.73 (1.42)	3.48 (1.29)	3.2 (1.79)	0.13
Fat + lateral + medial wall	142	3.31 (2.43)	3.97 (1.96)	3.83 (1.07)	3.54 (2.71)				0.481
Fat + lateral wall + medial wall + floor	217	5.06 (2.58)	4.95 (2.46)	5 (1.76)		4.95 (1.99)			0.992

Data represents post-operative change in exophthalmos (mm) expressed in mean (SD)

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Figure 1

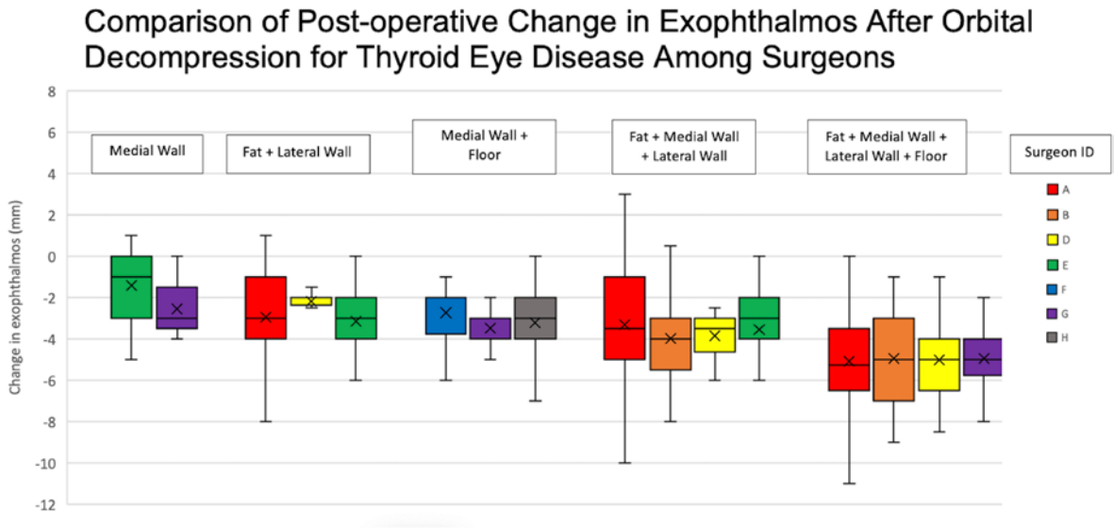

Table 2. Multivariate Model for Factors Affecting Change in Exophthalmos

	Effect size (CI)	p-value
Pre-operative exophthalmos	1.49 (1.42, 1.56)	**p <0.001***
Clinical Activity Score	0.96 (0.88, 1.06)	0.422
Age	1.004 (0.99, 1.02)	0.456
Orbital Area	1.03 (0.94, 1.14)	0.489
Follow-up Duration	0.99 (0.99, 10.1)	0.508
Gender	1.07 (0.73, 1.56)	0.74
Smoking History	1.042 (0.74, 1.47)	0.816

CI: confidence interval, * denotes statistical significance

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21 Intraocular Pressure Decrease in Patients Receiving Teprotumumab for the Treatment of Thyroid Eye Disease: A Short-Lived Effect

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Introduction: Thyroid eye disease (TED) is an autoimmune disease with characteristic inflammatory orbital changes during the active phase, manifesting in clinical findings including proptosis, extraocular motility restriction, and possible optic nerve compression[1]. Intraocular pressure (IOP) elevation in TED is common and theorized to be related to intraorbital compression of the globe[2]. The monoclonal antibody, teprotumumab, has been shown to significantly reduce proptosis, and in two retrospective case series has additionally been shown to reduce IOP during and soon after completion of treatment[2,3]. To our knowledge, no long-term IOP data exists for patients who have completed a standard treatment course of teprotumumab. Herein, we retrospectively evaluated the intra-treatment, first visit post-treatment, and when available, 1-year post-treatment IOP measurements in the largest cohort to date of TED patients receiving teprotumumab.

Methods: A retrospective review of the electronic medical records of adult patients with TED who received teprotumumab between January 2018 and December 2022 at the Medical College of Wisconsin was performed. Baseline demographics, ocular co-morbidities, Clinical Activity Score (CAS), exophthalmometry measurements, and IOP measurements at pre-, intra-, and post-treatment visits, were recorded. When available, 1-year post-treatment IOP measurements were additionally obtained. Paired T-tests were performed for statistical analysis of relevant measured outcomes.

Results: A total of 75 patients were recommended for treatment of TED with teprotumumab during the study period. Of these, sixty-three (84% / 125 eyes; 1 blind hypertensive eye was excluded) patients received treatment with teprotumumab while 12 (16% / 24 eyes) patients did not receive treatment due to patient preference (n=8), co-morbidities precluding treatment (n=3), and health insurance denial (n=1). For patients receiving treatment, the mean age was 56.5 years and 53 (82%) were female. The mean pre-treatment IOP was 18.03 (range 11-26) mmHg, the mean intra-treatment IOP was 15.72 mmHg ($p < 0.001$), and the mean first post-treatment visit IOP was 15.51 ($p < 0.001$). Compared to pre-treatment recordings, both exophthalmometry measurements ($p < 0.001$) and the CAS ($p <0.001$) were reduced at the initial post-treatment visit. Thirty-two (50.8%) patients undergoing treatment with teprotumumab had 1-year post-treatment IOP measurements. Within this subset of patients, the mean pre-treatment IOP was 17.17 mmHg and the 1-year mean IOP was 17.39 mmHg

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(p = 0.73). Of the 12 patients not undergoing treatment with teprotumumab, the mean IOP at baseline was 18.91 mmHg and at 6-month follow-up was 17.85 mmHg (p = 0.24).

Conclusions: Here we present the largest retrospective study to date evaluating IOP in TED patients receiving treatment with teprotumumab. Two case reports, consisting of 9 and 17 patients respectively, described IOP lowering during and/or within 4 months following treatment[2,3]. We similarly noted a statistically significant decrease in IOP during teprotumumab treatment and at the first visit following treatment completion. However, this IOP-lowering effect appeared to be transient and was not significant at 1-year post-treatment. Long-term IOP reduction should thus not be considered an additional long-term beneficial effect of teprotumumab.

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22 Is Sirolimus an Effective Alternative for vascular Anomalies of the Orbit?

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Introduction: The management of orbital vascular lesions can be challenging, often requiring multi-modal treatment. A phase II clinical trial of the use of sirolimus for systemic vascular anomalies outside of the orbit, including mixed lymphatic, venous, and arterial malformations has shown promising results, with partial response in 83% of patients.[1,2,3] Herein, we describe the results of sirolimus for complex vascular anomalies involving the orbit.

Methods: Retrospective case series of 5 pediatric patients, age range 14 months to 11 years, with orbit-involving lymphovenous malformations (4/5) and infantile hemangioma (1/5) treated with oral sirolimus. Response rate, duration of treatment, time to first response, recurrence rate, and side effects/tolerability were evaluated.

Results: All patients in the cohort had extensive orbital involvement and 3/5 had trans-spatial expansion into adjacent facial structures (cheek, sinuses, intraosseous). In 3/5 patients, sirolimus was started due to failure or recurrence after prior treatment modalities, including sclerosant, surgical debulking, and medical treatment. Sirolimus was started as primary treatment in 2/5 patients. Treatment continued until clinical or radiologic evidence of stability. Patients were followed with regular laboratory monitoring.

Average follow up time was 27.4 months (range 12.4 to 58.5 months). At last follow-up, 5/5 (100%) of patients had partial response: 5/5 with clinical improvement on exam, 3/3 with radiologic evidence, and 3/3 with improvement in symptoms and quality of life (figure 1). Average time to documented clinical response was 3.6 months (range: 1 -7.8 months). At last follow up, 3/5 pts completed treatment (average 16.7 months). 1 patient with LVM had recurrence after 13 months, and restarted sirolimus. Medication was well-tolerated with side effects including mouth sores (grade 1, 2 patients), gastrointestinal distress (grade 1, 1 patient), none requiring cessation of therapy.

Conclusions: Ideal treatment strategies should target pathologic mechanisms in vascular lesions. Mutations in the Akt/mTOR and associated pathways for several types of vascular tumor and malformations provided the genetic basis for sirolimus FDA-approval of use in those lesions. Our case series adds to the existing literature on the effectiveness of sirolimus on orbit-involving vascular lesions of mixed lymphatic and venous origin, and suggests effectiveness in lesions of arterial origin as well[4]. Additional molecular studies would help target treatment options for these complex orbital conditions.

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Figure 1

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23 No 'Rhino' in Rhino-Orbital-Cerebral Mucormycosis: Atypical Cases and Pathways of Disease Spread - A Series

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Introduction: Rhino-Orbital-Cerebral Mucormycosis (ROCM) is a potential fatal and aggressive, invase fungal disease. Prompt diagnosis and aggressive surgical intervention with long term anti-fungal medical is the treatment of choice. A nasal endoscopic examination to visualise the nasal mucosal involvement and to procure a sample for diagnosis confirmation is the first step in management. The traditional understanding of this disease is that it begins in the nasal mucosa, progresses to the paranasal sinuses, and then into the orbit and finally to the orbital apex and then by contiguous extention — into the brain. In this series, the authors present cases of ROCM where the clinical presentation and routes of spread of the disease were atypical and not conforming to previously known disease mechanisms and pathways of progression.

Methods: A retrospective single centre study was conducted of 88 cases of ROCM diagnosed at a single centre between August 2020 and September 2021. All cases were post-COVID ROCM or CAM (Covid-19 Associated Mucormycosis) The inclusion criteria incluses confirmed histopathological/microbiological confirmation of the disease and a minimum of 4 months follow up. Based on the inclusion criteria, 57 patients were included. Imaging in the form of CT / MRI was performed for all patients. Nasal endoscopic assessment was done in patients at presentation. The parameters documented included clinical presentations, imgaing features, intervention measures and clinical outcomes.

Results: 6/57 (11%) patients were found to have evidence of ROCM but had normal nasal mucosa. No nasal eschar / necrosis or ulceration was seen in these cases. Of these, 2 patients had limited orbital disease, 2 cases had extensive orbital disease, 2 cases had apical orbital disease. In terms of management - all patients underwent debridement and debulking of the involved locations; however, 3 patients underwent orbital exenteration. At final follow up life salvage was 100%. Imaging showed that paranasal sinus involvement without nasal mucosal involvement was seen in 5 cases; one case had orbital and apical involvement without nasal mucosal or paranasal sinus involvement. 5/6 patients had edema and enhancing soft tissue around pterygopalatine fossa.

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Conclusions: ROCM does not always progress and spread in the presumed anatomical step ladder pattern. Perineural invasion and extension; spread through the pterygopalatine fossa without nasal mucosal involvement are other routes of disease progression. Factors that may be associated with atypical disease spread would be severely decreased host immunity along with compromised local immunity - both of which are seen in a 'post-Covid-19' phase. None of the classification systems include radiological features in the staging of ROCM, which requires redressal. Atypical spread of disease must be borne of in mind while treating patients with ROCM.

Figure 1

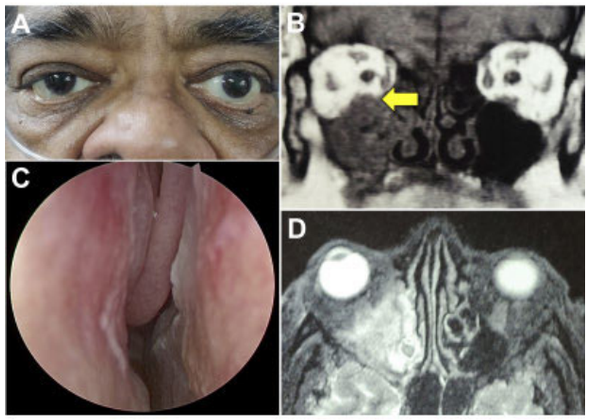
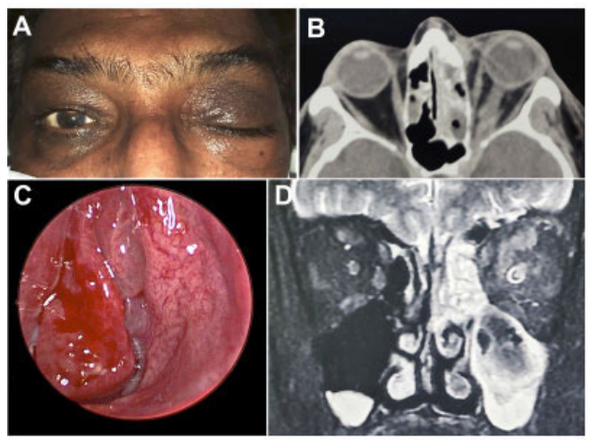


Figure 2



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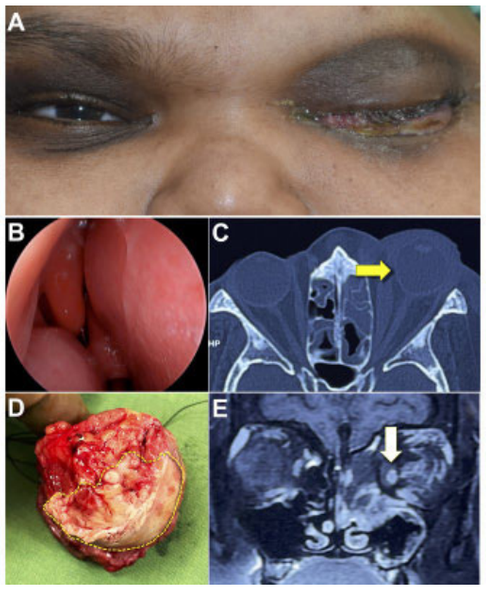
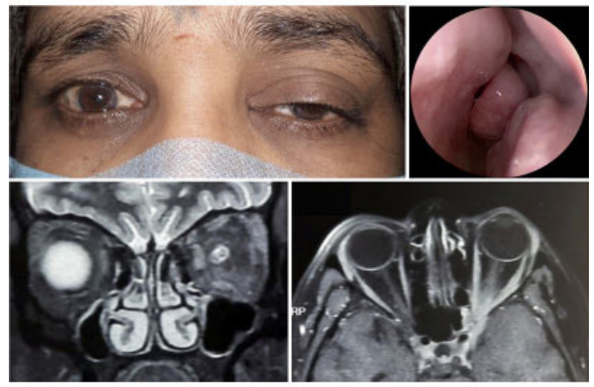


Figure 4



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24 Outcomes of Strabismus Surgery After Teprotumumab Therapy

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Introduction: Teprotumumab was approved for use in Thyroid Eye Disease (TED) in January 2020. Teprotumumab reduces the incidence of symptomatic diplopia in TED by 90%. To date, no reports have appeared in the literature regarding the results of patients requiring surgical treatment for symptomatic strabismus in TED following teprotumumab. Thus, it is unknown if prior treatment with teprotumumab affects extraocular muscles in such a way as to change the outcome of surgical treatment for symptomatic diplopia in patients with TED.

Methods: We report 22 patients who had surgery for symptomatic diplopia after teprotumumab by 8 surgeons at 7 different academic centers. Variables analyzed include elapsed months from last teprotumumab dose to the date of surgery, history of previous orbital decompression, primary preoperative horizontal and vertical deviation, surgical procedure, and 2-month postoperative results.

Results: To date, analysis reveals that the mean age in this series was 58 years (range, 39-87 years), and 81% were female. 31% of patients had orbital decompressions prior to strabismus surgery. The mean elapsed time from last teprotumumab treatment to surgery was 7 months (range, 2-21 months). The mean elapsed time from orbital decompression to strabismus surgery was 23 months (range, 8-114 months). 56% of patients received horizontal muscle surgery, 81% received vertical surgery, and 38% received combined horizontal and vertical surgery. 38% of patients had adjustable sutures. The mean preoperative deviation for patients undergoing surgery for esotropia was 26 prism diopters (PD) (range, 4-60 PD). For patients undergoing vertical muscle surgery, the average vertical deviation was 24 PD (range, 5-45 PD). At the 2-month postoperative visit, mean deviation for patients undergoing horizontal surgery was 8 PD (range, 0-30 PD) horizontally and 7 PD (range, 0-30 PD) of vertical deviation for patients undergoing vertical muscle surgery. Surgeons in this series reported that the muscles encountered at surgery after teprotumumab seemed more elastic/less fibrotic than most muscles encountered in TED patients in equal proportions to surgeons who reported very fibrotic, restricted muscles. 50% of patients were

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diplopia-free after 1 surgery. One patient had intermittent diplopia after 1 surgery and was satisfied with their result. Two patients chose prism spectacles to correct residual diplopia and another used head posture to fuse and were considered treatment successes after 1 surgery. Two underwent further surgery and were diplopia-free 2 months postoperatively. Success rate after 1 surgery was 75%, and after 2 surgeries was 88%.

Conclusions: Patients requiring strabismus surgery for symptomatic strabismus following teprotumumab achieve good outcomes when following standard protocols for TED strabismus treatment developed before teprotumumab. Surgeons did not alter their surgical plan or experience unexpected outcomes for the patients in this series because of prior treatment with teprotumumab . Success rates in this series were similar to the success rates reported in similar series before teprotumumab was available.

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25 Radiologic and Clinical Predictors of Orbital Decompression Outcomes

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Introduction: Up to 20% of patients with thyroid eye disease (TED) undergo orbital decompression surgery.[1] Despite the prevalence of this procedure, a wide range of postoperative outcomes are reported, even for similar techniques.[2] This study aims to evaluate if certain radiographic or clinical characteristics can predict surgical outcomes.

Methods: Institutional databases were queried to identify patients with TED who underwent orbital decompression surgery by two senior oculoplastic surgeons. Patients were excluded if they did not have available orbital computerized tomography (CT) scans prior to surgery, if they had multiple decompression surgeries in the affected eye, or if they had fat decompression surgery only. For patients undergoing bilateral decompression surgery, a random side was included in the analysis. Clinical data (including exophthalmometry, extraocular motility (EOM), diplopia) was collected at baseline and at the last postoperative visit. Operative reports were reviewed, details of surgical procedures performed were collected. Preoperative CT scans were reviewed, and systematic measurements were made including extra ocular muscle diameter, orbit area, trigone area, ethmoid width and ethmoid area (Figure 1). The softwares used for radiologic measurement were Epic (Verona, WI, USA) and Image J (NIH, Bethesda, MD, USA). ANOVA and linear regression analyses were used to compare preoperative and postoperative data.

Results: Of the patients screened, 62 patients met inclusion criteria and were included in the analysis. Forty-three patients were female (77.4%) and the average age was 48.3 years. Thirty-two patients (51.6%) underwent lateral wall decompression, 7 (11.3%) medial decompression and 23 (37.1%) three-wall decompression. The mean (SD) follow-up time was 11.3 (13.66) months. At baseline, the mean (SD) exophthalmometry was 23.9 (3.89), which decreased to 19.3 (3.08) at the postoperative visit ($p<0.01$).

There was no significant relationship between trigone area and change in exophthalmometry. This was the case for both the full sample and when only lateral decompression cases were considered. There was additionally no significant association between ethmoid width or area and change in exophthalmometry for medial or three-wall decompression.

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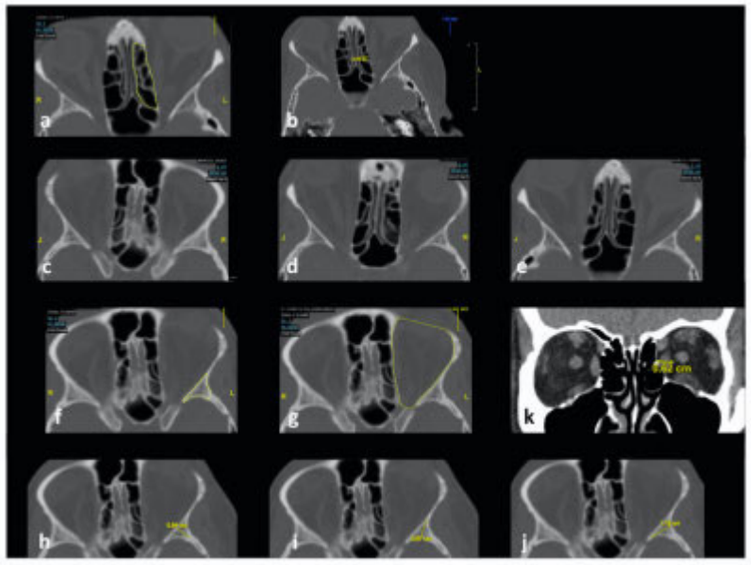
Total extraocular muscle diameter ($p < 0.05$) and largest muscle diameter ($p < 0.01$) were positively associated with reduction in exophthalmometry after surgery (Figure 2). Greater preoperative total EOM limitation was also positively associated with reduction in exophthalmometry ($p < 0.01$) (Figure 3). Four patients experienced either no change or worsening of proptosis with surgery, none of these patients had EOM limitation preoperatively. No significant predictors were identified for this group.

Conclusions: Bony radiologic characteristics were poorly predictive of proptosis reduction following orbital decompression. Interestingly, greater clinical EOM limitation, and the radiologic corollary of larger muscle diameter, were both associated with greater proptosis reduction after decompression. It is evident that the variability in bony anatomy is not great enough to account for variations in surgical outcome. Physiologic characteristics of the disease process are likely more important in the determination of proptosis change.

Figure 1



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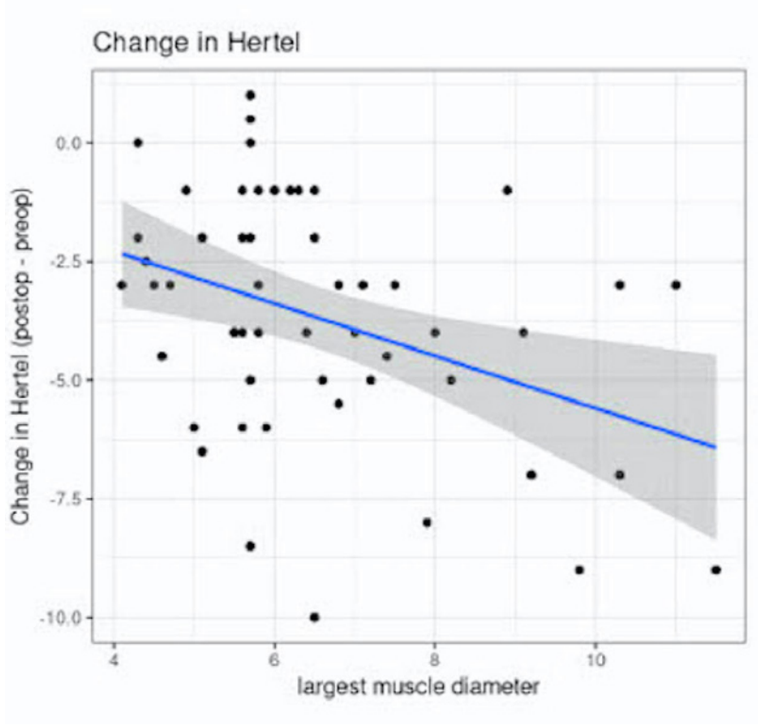

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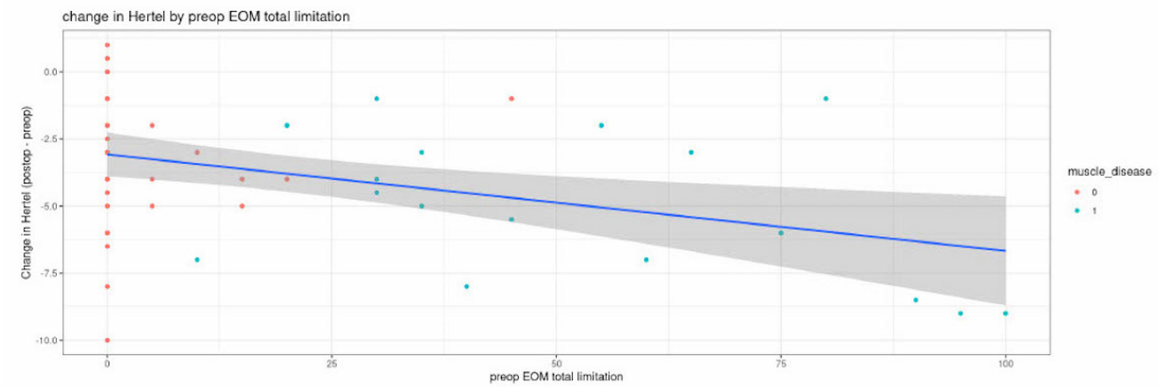
Figure 3



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26 Teprotumumab as Monotherapy for Dysthyroid Optic Neuropathy: A Multicenter Study

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In 5-9% of patients with thyroid eye disease (TED), expansion of orbital fat and/or muscles leads to dysthyroid optic neuropathy (DON) which can result in permanent vision loss. Conventional treatment options for DON include orbital decompression, systemic glucocorticoids, and radiotherapy, all of which have limitations. Teprotumumab is a human monoclonal antibody to the insulin-like-growth-factor-I-receptor approved by the FDA for the treatment of TED. It has been shown to decrease extraocular muscle size on radiography and been reported for the use of DON in patients who failed conventional treatment. In a pilot study, the senior author (RS) reported favorable outcomes when teprotumumab was used as first-line monotherapy in DON patients. This study aims to expand the investigation to include the experience of multiple centers.

Methods: Retrospective multi-institutional interventional case series of DON patients treated with teprotumumab monotherapy. DON was diagnosed based on history, exam, visual field testing and orbital radiography. Patients received infusions of teprotumumab (10mg/kg for the first infusion followed by 20mg/kg for subsequent infusions) every three weeks for eight total infusions. All patients were screened with best-corrected visual acuity (BCVA), pupil and dilated exam, color vision, and automated static automated perimetry visual field before and at regular intervals during and after therapy. Exclusion criteria included age <18years, contraindications to teprotumumab, prior TED/N treatment, progressive visual function decline while awaiting infusion, inability to obtain 1st infusion in under 4 weeks, failure to finish all infusions, and follow-up less than three months after final infusion. Baseline and post-treatment values were compared.

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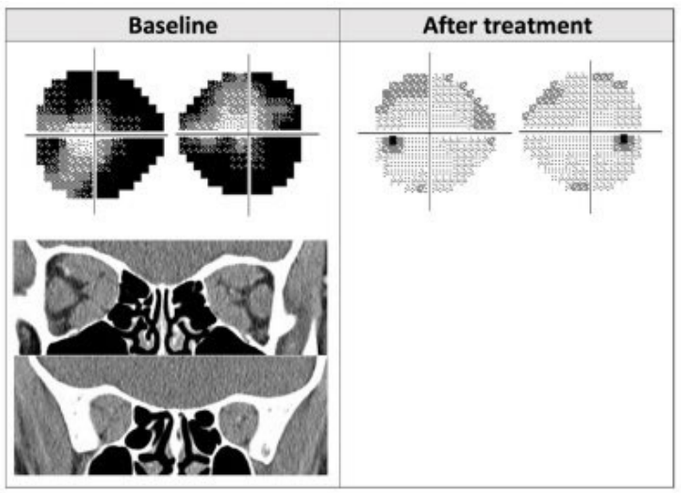
Results: 30 orbits of 21 patients with a mean age of 64.3 (range 47-85) years were included. 11 (52.4%) patients were female, 3 (14.2%) were smokers, and 9 (42.8%) had bilateral DON. All patients had a known diagnosis of Graves' disease and none had prior radioactive iodine treatment. All patients were in active phase disease with CAS>3. Mean and median duration of TED at DON diagnosis were 21.5 and 3 (range 1-360) months, respectively. Average time between the diagnosis of DON and first infusion was 2.9 (1-4) weeks. 73.3% of patients showed improvement in BCVA. Mean initial logMAR BCVA was 0.6 (0.1-2.2) and mean logMAR BCVA after treatment completion was 0.1 (0-0.48, P=0.02). The absolute HVF mean deviation decreased from 13.2 (0.42-29.9) db prior to treatment to 1.8 (0-3.92) after treatment completion (P=0.002, Figures 1-2). The average recognized color plates improved from 5(0-15)/15 to 14.9(13-15)/15 (P<0.001). Normalization of RAPD was seen in all patients who presented with this finding (P<0.001). Statistically significant improvements in all clinical parameters were noted after the 2nd infusion. No patients required surgical decompression, steroids, or radiotherapy. Mild adverse events included seven (33.3%) patients with muscle cramps, 3 (14.2%) gastrointestinal disturbances and fatigue, and 2 (10%) with hyperglycemia. Two (9.5%) patients demonstrated recurrence 1 year after treatment completion. Mean follow-up was 14 (range 3-35) months after the final infusion.

Conclusions: Teprotumumab used as monotherapy resulted in drastic and rapid improvement/resolution of DON in the majority of study patients. Adverse events were all mild, and there were two instances of disease reactivation. Clinicians may wish to consider teprotumumab monotherapy as a treatment option for nonprogressive DON when timely infusion is possible. Prospective studies to compare teprotumumab with conventional treatment strategies are warranted to assess superiority.

Figure 1



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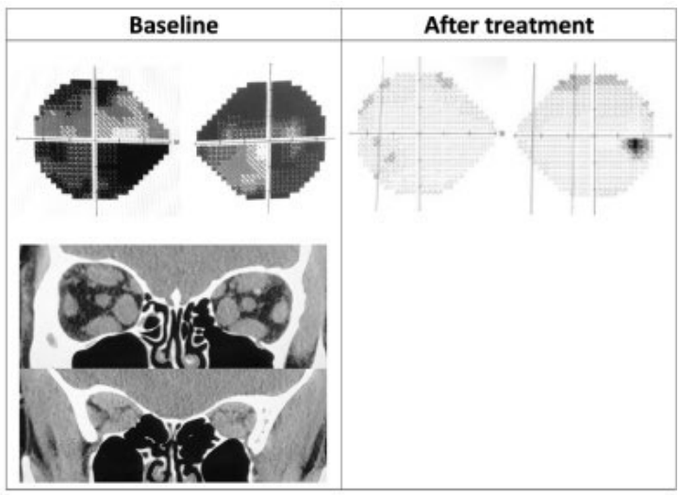

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27 The Algorithmic Role of Critical Radiographic Features in the Treatment of Angioinvasive Fungal Sinusitis

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Introduction: Angioinvasive fungal sinusitis (AIFS) is a rapidly progressive, highly morbid infection. It is often challenging to obtain an early diagnosis, but intervention in the acute period is crucial for prognosis. Previous literature has identified numerous radiographic features with high sensitivity and specificity for AIFS, even in early disease. Bedside nasal endoscopy can substantiate the diagnosis but can also yield false negative results. Initially these patients may present to the ophthalmologist with subtle preseptal findings, such as periocular swelling and conjunctival injection, prior to swift onset of orbital invasion manifesting as proptosis, chemosis and cranial neuropathy. Thus, to avoid visual and potentially life threating complications, subtle clinical signs in conjunction with suspicious radiographic features must be promptly recognized by the ophthalmologist and escalated appropriately. The authors aim to review common radiographic features of AIFS for the ophthalmic community and incorporate radiographic findings into a decision-making algorithm for diagnostic workup and management (Figure 1).

Methods: A literature search was conducted using a comprehensive key word search in the Pubmed and Embase databases. English studies from 1988-2022 describing the radiographic features of AIFS, including the recently described entity COVID-19 associated mucormycosis (CAM), were included. The authors collected the most frequently reported indicators of AIFS.

Results: The authors review four radiographic findings that are frequently associated with AIFS, including in early stages of disease. (1) Loss of contrast enhancement (LoCE) in the nasal turbinate and maxilla (i.e. "black turbinate and maxillary sign"), best appreciated on contrast enhanced MRI, is associated with hyphae induced infarct and coagulation necrosis (Figure 2, asterix and arrow). LoCE is not seen in bacterial sinusitis, as necrosis is not a typical feature.[1,2] (2) Periantral involvement seen as changes in density, fat stranding or obliteration of the anterior, retromaxillary or retroantral fat planes on CT, has been described as one of the earliest indicators of AIFS. It represents initial departure of disease from the sinuses (Figure 3, solid arrowheads).[3-5] (3) Tissue invasion *without* bony erosion should heighten concern for a fungal process given the propensity for fungi to spread via blood vessels or nerves (Figure 3).[6-8] (4) Hypointense T2W sinonasal secretions on MRI are seen in fungal sinusitis due to high quantities of iron and magnesium needed for fungal growth. Although less specific, this finding is frequently cited as an early indicator of AIFS and is an important ancillary finding in the appropriate clinical context (Figure 4, arrow).[7]

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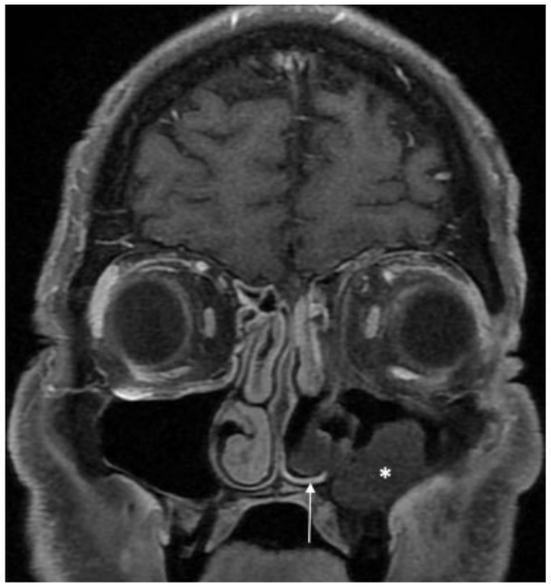
Conclusions: The radiographic signs highlighted herein should heighten suspicion for AIFS in the appropriate clinical setting, prompting urgent medical and/or surgical intervention regardless of nasal endoscopy findings.

Figure 1



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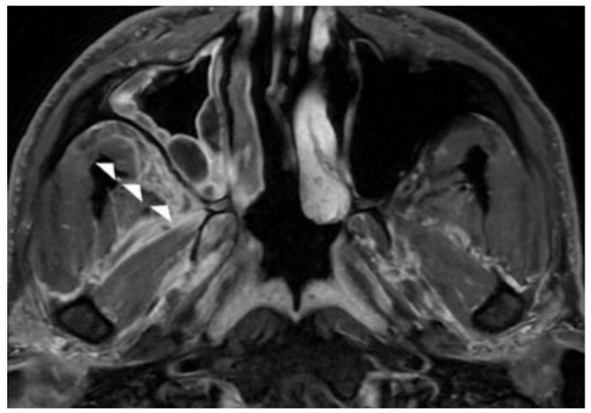

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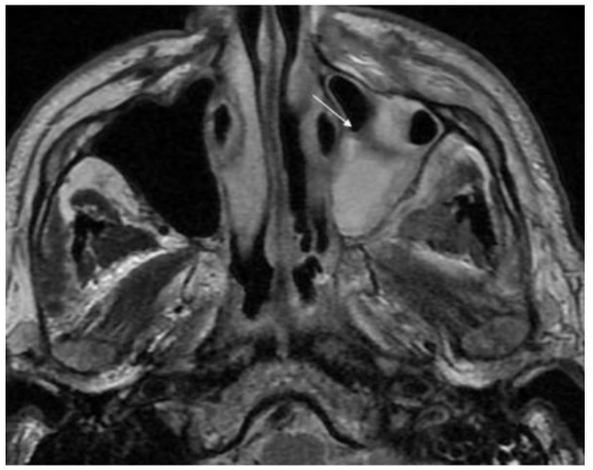

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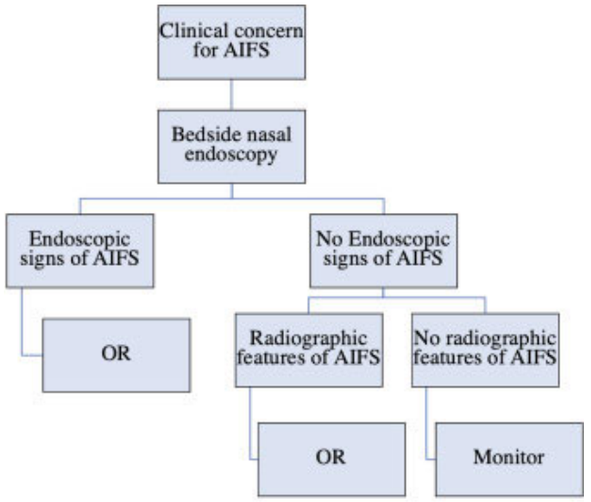

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28 Evaluating Social Vulnerability Index and Clinic No Show Visits in an Urban Oculoplastic Clinic Facilitated by Epic SlicerDicer

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Introduction: Considering the social aspects of patient care and implementing strategies to modulate these factors can result in service improvement.[1] The social vulnerability index (SVI) is a nationhood-level index based on 2018 U.S. Census data was used to determine relative social vulnerability of each census tract.[2,3] The index values are calculated from 4 themes and 15 social factors with a vulnerability rank reported as nationwide percentiles (Figure 1). With advances in electronic medical records, novel tools provide the ability to conduct studies evaluating the impact of social factors on patient care. The goal of this study in to evaluate the relationship of CDC-defined zip-code-based SVI with office visit compliance in an urban oculoplastic clinic.

Methods: A single center retrospective study was conducted from Jan 2020 to Apr 2023. Data was extrapolated using the EPIC SlicerDicer to collect the patients' age, gender, race/ethnicity, and having a no-show appointment and SVI Percentiles (SVIP). Based on the CDC-defined zip-code, additional SVIP were derived from SlicerDicer for the four themes (thematic SVI) and 15 social factors (social factors SVI). A greater SVIP indicates higher social vulnerability. Statistical analysis was performed with SPSS 29.0. Categorical variables were compared with Chi-Square and Bonferroni post-hoc test. Three separate binary regression analysis based on age, sex and overall, or themes', or social factors' SVIPs were performed to look at factors associated with having no-show appointment.

Results: The final analysis included 3218 patients with a mean age of 52±21 years old and 60% females. The zip-code distribution of visited patients in the study period is illustrated in Figure 2. Mean overall SVIP was 66% (range 2% - 99%). An overall SVIP >74% was seen in 1653 patients (51%). The racial distribution of SVIP >74% were Black (40%), Hispanic (36%), White (9%), Asian (2%) and not-specified (14%). In the study period, 1857 patients (58%) failed to show up to at least one appointment. Differences existed between the racial distribution of patient no-show appointments were different among races (Table 1, $p<0.001$). Figure 3 presents the percentage of patients with a no-show visit compared to those that attended all the appointments categorized based on the overall SVIP. The overall SVIP>74% was associated with an increased likelihood of no-show visits as the outcome (OR 3.6, 95% CI 2.9 – 4.5, $p<0.001$) independent of age, and sex (Table 2). The thematic factor of minority status and language percentile >74% (OR 3.3, 95% CI, 1.1-10.9, $p=0.048$) and social factors such as minority status percentile >74% (OR 3.1, 95% CI, 2.3-4.1, $p<0.001$) had a higher risk of having a no-show appointment.

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Conclusions: Our analysis indicates that the Epic SlicerDicer tool can help identify patients at risk of no-shows. Being categorized in high percentiles of minority population is a major factor identified in poor follow-up visit compliance. Providing insights into patients' vulnerability can address social disparities in oculoplastics and inform targeted care strategies as seen in other surgical fields.[4]

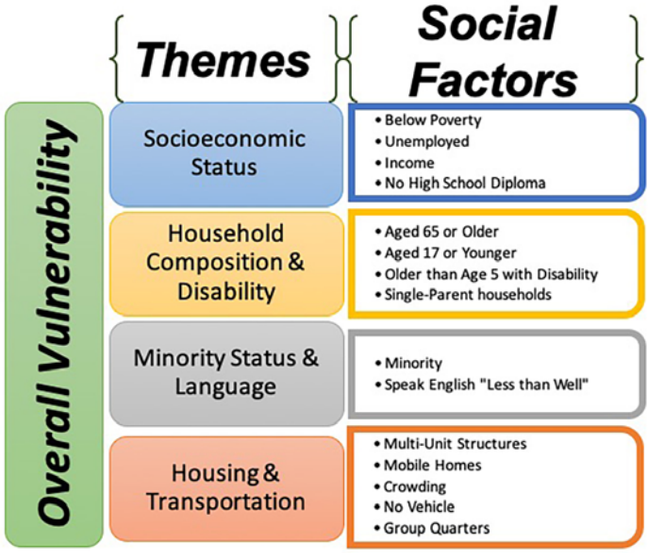

Figure 1: The Social Vulnerability Index (SVI) as defined by the 2018 U.S. Census data to determine relative social vulnerability of each census tract including each zip code.[3] A total of 4 themes and 15 social factors are taken into account. The overall vulnerability encompasses all themes and social factors.

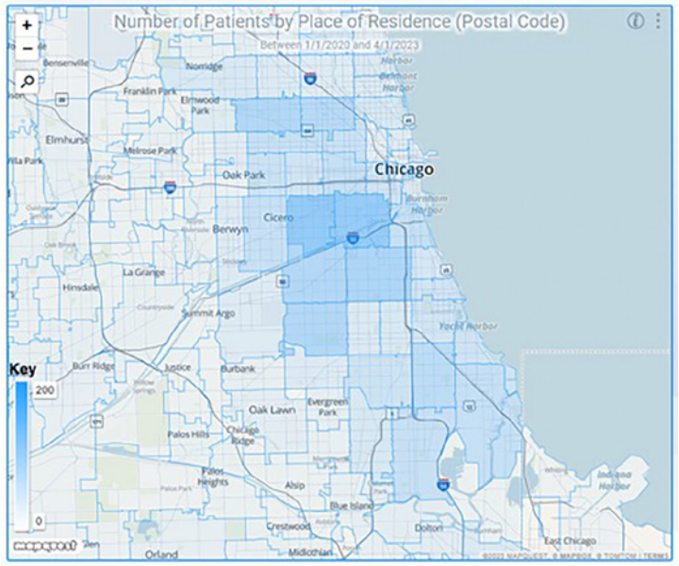

Figure 2: Distribution map of number of patients visited in oculoplastic clinic from Jan 2020 to Jan 2023 based on place of residence (Zip Code) extracted directly form EPIC SlicerDicer.

	Attended All Appointments (N= 1361)	Had No-Show Appointments (N=1857)	p-value
Age (y), mean±SD	52.5±21	51.6±21	0.692
Gender (n, %)			
Male	532 (39.1)	771 (41.5)	0.161*
Female	829 (60.9)	1086 (58.5)	0.161*
Race/Ethnicity (n, %)			
Asian/Non-Latinx	77 (5.7)	62 (3.3)	0.001†
Black Non-Latinx	211 (15.5)	659 (35.5)	<0.001†
Hispanic/Latinx	323 (23.7)	543 (29.2)	<0.001†
White/Non-Latinx	494 (36.3)	339 (18.3)	<0.001†
Multiracial Non-Latinx	15 (1.1)	21 (1.1)	0.936†
Native American/Pacific Islander Non-Latinx	2 (0.1)	3 (0.2)	0.92†
Non-Specificed	239 (17.6)	230 (12.4)	<0.001†
Overall SVI Percentile (n, %)			
<24%	280 (20.6)	164 (8.8)	<0.001‡
24-49%	271 (19.9)	244 (13.1)	<0.001‡
49-74%	288 (21.2)	318 (17.1)	0.004‡
>74%	522 (38.3)	1131 (60.9)	<0.001‡

Table 1. Summary of demographic data of patients and CDC-defined zip-code overall social vulnerability index percentile included in this study separated by those who attended all clinic visits and those with at least one no-show appointment. Statistical analysis performed with Chi-Square and Bonferroni post-hoc test. The p-values are adjusted for each row. The adjusted reference p-values are *0.0125, †0.0036, and ‡0.0062. Key: SVI – social vulnerability index.

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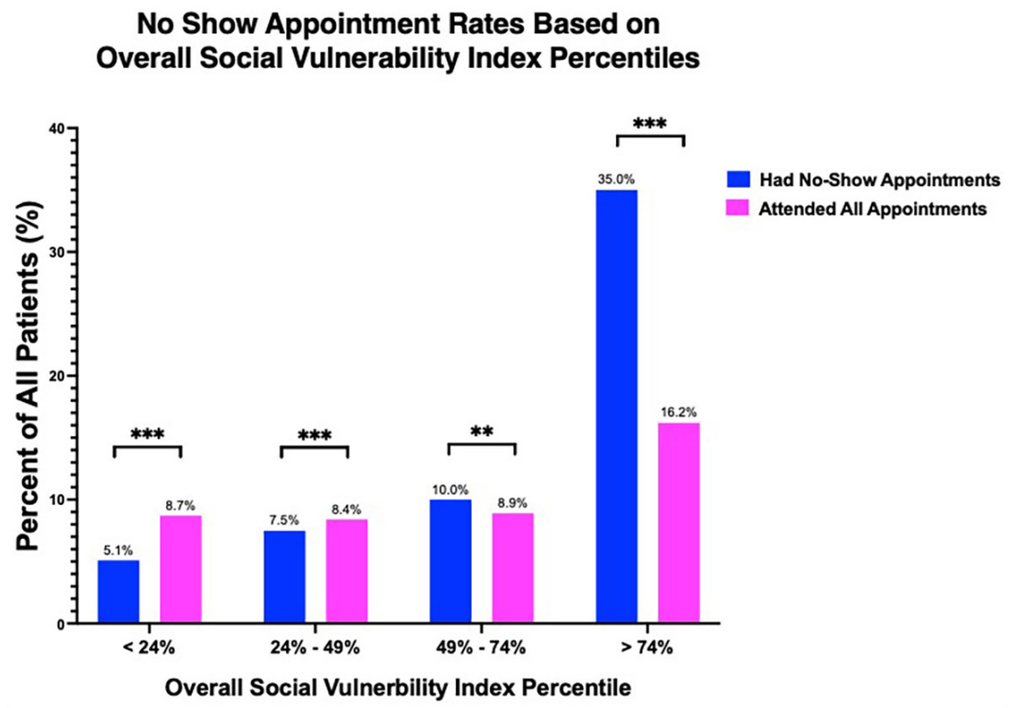

Figure 3: Percentage of population having a no-show visit or those who attended all appointments categorized with overall SVI percentile ranges. By increasing the overall SVI percentile, the percentage of patients having a no-show appointment is significantly increased compared to percentage of patients whom attended all the appointments. ***p<0.001, ** p<0.01

		OR (95% CI)	p-value
Logistic Regression Model I:			
Age		0.99 (0.99-1.00)	0.676
Gender		1.1(0.95-1.28)	0.168
Overall SVI Percentile			
<24%		Ref	Ref
24-49%		1.53(1.18-1.98)	0.001
49-74%		1.88 (1.46-2.41)	<0.001
>74%		3.69 (2.96-4.59)	<0.001
Logistic Regression Model II:			
Age		0.99 (0.99-1.00)	0.692
Gender		0.894 (0.77-1.03)	0.14
Thematic SVI Percentile	**Socio-economic status**		
	<24%	Ref	Ref
	24-49%	1.24 (0.95-1.62)	0.107
	49-74%	1.39 (1.04-1.84)	0.023
	>74%	2.24 (1.61-3.12)	<0.001
	Household composition and disability		
	<24%	Ref	Ref
	24-49%	1.03 (0.82-1.3)	0.782
	49-74%	1.33 (1.03-1.72)	0.028
	>74%	1.72 (1.27-2.32)	<0.001
	Minority status and language		
	<24%	Ref	Ref
	24-49%	1.9 (0.54-6.7)	0.314
	49-74%	2.67 (0.8-8.82)	0.107
	>74%	3.32 (1.01-10.96)	0.048

		OR (95% CI)	p-value
Logistic Regression Model III:			
Age		0.99 (0.99-1.00)	0.704
Gender		0.86 (0.74-1.00)	0.06
Social Factors Estimated SVI Percentile	**Below poverty**		
	<24%	Ref	Ref
	24-49%	1.51 (1.17-1.93)	0.001
	49-74%	0.60 (0.05-6.78)	0.683
	Unemployed		
	<24%	Ref	Ref
	24-49%	2.28 (1.00-5.20)	0.05
	Minority		
	<24%	Ref	Ref
	24-49%	1.55 (1.2-2.02)	<0.001
	49-74%	1.65 (1.26-2.17)	<0.001
	>74%	3.12 (2.33-4.17)	<0.001
	Multi-unit structures		
	<24%	Ref	Ref
	24-49%	0.75 (0.58-0.97)	0.033
	49-74%	0.88 (0.57-1.36)	0.575
	>74%	0.64 (0.32-1.24)	0.19

Table 2. Summary of the results of the performed binary logistic regressions. Three separate regression models were performed. All of them adjusted for age and gender. Model I, II, and III included the overall SVI percentile, the thematic SVI percentiles, and the social factors estimated SVI percentiles, respectively. Key: SVIP – social vulnerability index percentile; OR – odds ratio; CI – confidence interval

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29 Characteristics of Orbital Inflammatory Disease in a Primarily Black Patient Population

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Introduction: Orbital inflammatory disease (OID) remains an elusive disease with a broad range of clinical presentations. Given its rarity, investigative efforts have been limited to Caucasian populations. This study investigates demographics, presentation, workup, treatment, and outcomes of OID in a primarily Black patient population.

Methods: Retrospective observational study at two academic medical centers in Brooklyn, NY from July 2005-May 2022. Patients included met diagnostic criteria for the following OID conditions: non- specific orbital inflammation (NSOI), nonbacterial dacryoadenitis, Tolosa-Hunt syndrome, IgG4- related ophthalmic disease, and orbital myositis. Patients who did not self-identify as Black and cases with incomplete data were excluded. Data analyzed includedDescriptive statistics of clinicodemographic characteristics, OID labs, imaging, pathology, and treatment plans were reported. Patients were considered successfully treated if, at the end of follow-up, had stable or improved vision, no evidence of diplopia, ptosis, proptosis, scarring, strabismus, no evidence of recurrent flare, and absence of extraocular movement (EOM) limitations and pain. Subgroups were compared using the Fisher exact test.

Results: Out of 39 patients who met inclusion criteria, 64.1% were female and 7.7% had a comorbid autoimmune condition. Patients were frequently diagnosed under the age of 50, with 28.2% younger than 25 and 43.6% between 25-49. More than half were diagnosed with NSOI, 33.3% with dacryoadenitis, 7.7% with IgG4-related ophthalmic disease, 2.6% with orbital myositis, and 2.6% with Tolosa-Hunt syndrome. On presentation, 79.5% of patients complained of ocular pain and/or pain with EOM and 56.4% of lid swelling; 84.6% had clinical evidence of periorbital edema and 38.8% demonstrated conjunctival erythema. Less than half of patients presented within one week and 76.9% within a month from the onset of symptoms. All but one patient received imaging. Biopsies were performed in 54.6% of cases of dacryoadenitis, 66.7% in IgG4, and 33.3% in NSOI41.2% of OID patients. Nine in ten patients were treated with systemic steroids, and 12.8% needed maintenance with steroid-sparingimmunomodulatory agents. Insured patients had higher rates of adherence to both treatment and follow-up (p<0.05). A successful outcome was seen in 86.1% of patients.

Conclusions: This is the first study to describe OID in a predominantly Black patient population. Compared to other populations, our cohort had a similar demographic profile and clinical presentation with females more affected than males, a widely distributed age at diagnosis, and pain and edema as the most common form of presentation. Of note, myositis was less frequently seen in our study. Most patients had a successful outcome.

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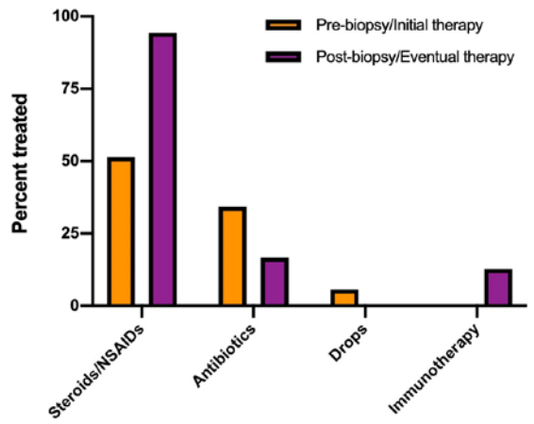
Figure 1

	Total, n (%)	Dacryoadenitis, n (%)	Orbital myositis, n (%)	IgG4-related disease, n (%)	Tolosa-Hunt syndrome, n (%)	Unspecified NSOI, n (%)
Total	39	13	1	3	1	21
Age, years						
<25	11 (28.2)	6 (46.2)	0 (0)	0 (0)	0 (0)	5 (23.8)
25-49	17 (43.6)	5 (38.5)	1 (100)	2 (66.7)	0 (0)	9 (42.9)
≥50	11 (28.2)	2 (15.4)	0 (0)	1 (33.3)	1 (100)	7 (33.3)
Gender						
Female	25 (64.1)	6 (46.2)	1 (100)	1 (33.3)	0 (0)	6 (28.6)
Male	14 (35.9)	7 (53.9)	0 (0)	2 (66.7)	1 (100)	15 (71.4)
Insurance						
Private	12 (30.8)	3 (23.1)	1 (100)	0 (0)	0 (0)	8 (38.1)
Public	15 (38.5)	8 (61.5)	0 (0)	2 (66.7)	1 (100)	4 (19.1)
Uninsured	12 (30.8)	2 (15.4)	0 (0)	1 (33.3)	0 (0)	9 (42.9)
Employment						
Employed	32 (82.1)	11 (84.6)	1 (100)	2 (66.7)	1 (100)	17 (53.1)
Unemployed	7 (17.1)	2 (15.4)	0 (0)	1 (33.3)	0 (0)	4 (19.1)
Autoimmune disease						
Present	3 (7.7)	2 (15.4)	0 (0)	0 (0)	0 (0)	1 (4.8)
Not present	36 (92.3)	11 (84.6)	1 (100)	3 (100)	1 (100)	20 (95.2)
Symptom onset to presentation, days						
<7	19 (48.7)	6 (46.2)	1 (100)	1 (33.3)	0 (0)	11 (52.4)
7-29	11 (28.2)	3 (23.1)	0 (0)	1 (33.3)	1 (100)	6 (28.6)
≥30	9 (23.1)	4 (30.8)	0 (0)	1 (33.3)	0 (0)	4 (19.1)
Initial visual acuity						
Better than 20/40	32/37 (86.5)	11/12 (91.7)	1 (100)	3 (100)	1 (100)	16/20 (80.0)
20/40 or worse	5/37 (13.5)	1/12 (8.3)	0 (0)	0 (0)	0 (0)	4/20 (20.0)
Final visual acuity						
Better than 20/40	33/37 (89.2)	12 (100)	1 (100)	2 (66.7)	0 (0)	18 (90.0)
20/40 or worse	4/37 (10.8)	0 (0)	0 (0)	1 (33.3)	1 (100)	2 (10.0)
Visual acuity change						
Improved	5/35 (14.3)	1/10 (10.0)	0 (0)	0 (0)	0 (0)	4/20 (20.0)
Stable	27/35 (77.1)	9/10 (90.0)	1 (100)	2 (66.7)	1 (100)	14/20 (70.0)
Deteriorated	3/35 (8.6)	0/10 (0)	0 (0)	1 (33.3)	0 (0)	2/20 (10.0)
Imaging						
Performed	36/37 (97.3)	12/12 (100)	1 (100)	3 (100)	1 (100)	19/20 (95.0)
Not performed	1/37 (2.7)	0/12 (0)	0 (0)	0 (0)	0 (0)	1/20 (5.0)
Biopsy						
Performed	14/34 (41.2)	6/11 (54.6)	0 (0)	2 (66.7)	0 (0)	6/18 (33.3)
Not performed	20/34 (58.8)	5/11 (45.5)	1 (100)	1 (33.3)	1 (100)	12/18 (66.7)
Specialty consultation						
Required	14 (35.9)	5 (38.5)	1 (100)	2 (66.7)	0 (0)	6 (28.6)
Not required	25 (64.1)	8 (61.5)	0 (0)	1 (33.3)	1 (100)	15 (71.4)
Immunomodulatory agents	5 (12.8)	3 (23.1)	0 (0)	0 (0)	0 (0)	2 (9.5)
Prescribed	34 (87.2)	10 (76.9)	1 (100)	3 (100)	1 (100)	19 (90.5)
Not prescribed						
Length of follow-up, days						
<30	11 (28.2)	5 (38.5)	0 (0)	0 (0)	0 (0)	6 (54.5)
30-179	10 (25.6)	3 (23.1)	1 (100)	2 (66.7)	0 (0)	4 (19.1)
≥180	18 (46.2)	5 (38.5)	0 (0)	1 (33.3)	1 (100)	11 (52.4)
Adherence to treatment						
Yes	23/38 (60.5)	7/12 (58.3)	1 (100)	3 (100)	1 (100)	11 (52.4)
No	15/38 (39.5)	5/12 (41.7)	0 (0)	0 (0)	0 (0)	10 (47.6)
Adherence to follow-up						
Yes	19 (48.7)	7 (53.9)	1 (100)	1 (33.3)	1 (100)	9 (42.9)
No	20 (51.3)	6 (46.2)	0 (0)	2 (66.7)	0 (0)	12 (57.1)
Outcome						
Successful	31/36 (86.1)	10/11 (90.9)	1 (100)	3 (100)	1 (100)	16/20 (51.6)
Unsuccessful	5/36 (13.9)	1/11 (9.1)	0 (0)	0 (0)	0 (0)	4/20 (20.0)

Figure 2



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30 Hospital Utilization and Cost Associations for Inpatient Acute Dacryocystitis Management in the United States: 2016 through 2020

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Introduction: Acute dacryocystitis (AD) is commonly treated medically on an outpatient basis but may require hospital level of care in severe infections. Inpatient management may include surgical intervention, which has been shown to hasten recovery and shorten length of stay.[1-3] Hospital costs generated from inpatient AD management and factors influencing its degree of financial burden in the United States (US) have not been described to the best of the authors' knowledge. Previous studies assessing hospital costs from pediatric sinogenic orbital infections reported surgical intervention as a significant contributor to total cost.[4, 5] The present study aimed to investigate the financial burden of inpatient AD treatment in the US and assess clinical factors that may influence its magnitude.

Methods: The present study was a retrospective comparative cohort study using data extracted from the National Inpatient Sample database from 2016 through 2020. All patients admitted with a diagnosis of AD were identified using ICD-10-CM code H04.32. Patients were categorized into three cohorts–AD alone, AD with orbital cellulitis (OC), and AD with sinusitis. Variables assessed included demographic and clinical data. Surgical procedures were identified using ICD-10-PCS codes (081X, 081Y, 089X, and 089Y), which described lacrimal duct drainage or bypass, and lacrimal passage dilations alone (ICD-10-PCS 087) were excluded. Kruskal-Wallis and linear regression tests were used with an alpha of 0.05 to indicate statistical significance. Means were reported with standard deviation (SD). Medians were reported with interquartile ranges (IQR).

Results: There were 470 patients with AD in the NIS database, which extrapolated to a weighted total of 2,510 hospitalizations nationally over the five years. The mean age was 46.1 years (SD 32.2 years), and there were 1,625 (64.7%) female patients. A total of 410 (16.3%) patients had concomitant OC, 105 (4.2%) had concomitant sinusitis, and 1,995 (79.5%) had neither. A total of 430 (17.1%) patients underwent same-hospitalization surgery, of whom 105 (24.4%) patients had OC, 10 (2.3%) patients had sinusitis, and 315 (73.3%) had neither (p=0.299).

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The median cost of hospitalization was $5,291 (IQR: $3,510-$8,699). Further breakdown demonstrated sinusitis was associated with significantly higher cost (median $8,129; IQR: $4,690-$15,698) compared to OC (median $5,902; IQR: $4,193-$9,096) and to AD alone ($5,022; CI: $3,337-$8,393) (p<0.001). Costs were significantly greater for patients who underwent surgical intervention (median $7,278; IQR: $4,592-$12,141) compared to those treated medically (median $4,961; IQR: $3,336-$8,158; p<0.001). Factors independently associated with higher total cost included surgical intervention, increasing age, and the presence of diabetes mellitus, OC, or sinusitis (all p<.001).

Conclusions: Inpatient AD treatment in the US imposes a wide range of total cost that may be influenced by clinical factors and management type. Concurrent sinusitis, diabetes mellitus, or OC; as well as older age; may increase the total financial burden. Surgical intervention appears to be a significant driver of cost, warranting further research to elucidate when trial of nonsurgical management may be appropriate and when surgery can optimize outcomes.

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Enhancing Transposition Lower Blepharoplasty Results with a Mingled Central-Lateral Fat Pedicle

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Introduction: Lower blepharoplasty with transposition of orbital fat is a well described technique to efface the nasojugal fold in patients with lower eyelid fat herniation and a prominent orbicularis retaining ligament.[1-18] In transposition lower blepharoplasty, the nasal and central lower fat pads are draped over the orbital rim and secured in the preperiosteal or subperiosteal plane. The lateral fat pad can either be transposed over the orbital rim or be resected to achieve desired contour. Often a combination of resection and transposition of one or more fat pads is performed to address symmetry and contour concerns. The goal of transposition blepharoplasty is to efface the tear trough deformity and create a smooth junction between the lower eyelid and cheek. In patients with poor malar projection and a tight lateral orbicularis retaining ligament, transposition of the lateral fat pad into this space can help efface the lateral tear trough deformity and provide malar volume. The authors propose creation of a combined pedicle of the central and lateral fat pads in patients with malar volume deficiency and prominent lateral tear trough deformity.

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Methods: This is a retrospective observational review. Patient charts were reviewed for demographic data, complications, and outcomes. Patients with history of midfacial trauma, cancer reconstruction, or previous lower blepharoplasty were excluded. Postoperative photos were graded by blinded observers for (1) inferolateral orbital-malar groove effacement, (2) malar augmentation, and (3) effacement of bulging lateral fat pad using the following 0-4 scale: no improvement, mild improvement, moderate improvement, or substantial improvement. Patients also reported their subjective opinion on improvement using the same 4-point scale. Transposition lower blepharoplasty was performed using a described protocol[19]. In addition to the previously described technique, the central fat pad is dissected free from the inferior oblique muscle and orbital rim. The lateral fat pad is also dissected from the orbital rim while maintaining adhesions to the central fat pad via intact intervening septum. The combined central and lateral fat are draped over the orbital rim as a contiguous aggregated fat pedicle (Figure 1). The pedicle is secured with externalized plain gut suture at its medial and lateral extent, and occasionally at the midpoint.

Results: A total of 15 patients underwent the study technique by a single surgeon (TN). The average patient age was 57 years old. 12 patients were female and 3 patients were male. There was no incidence of postoperative infection, lower eyelid retraction or diplopia. All patients expressed “moderate” or “substantial” improvement. Blinded reviewers noted “moderate” or “substantial” improvement of lateral malar augmentation, effacement of the lateral orbital rim-malar depression as well as reduction of the lateral fat pad prominence compared to preoperative photographs.

Conclusions: A combined pedicle of the central and lateral lower eyelid fat pads offers a safe and effective approach to uniform volume augmentation of the nasojugal fold with extended benefit to the lateral orbital rim-malar interface.

Figure 1

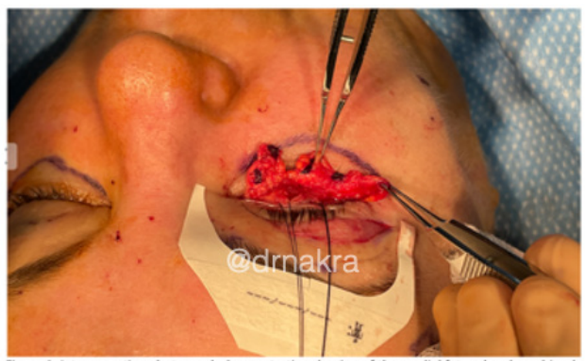

Figure 1. Intraoperative photograph demonstrating draping of the medial fat pad and combined central and lateral fat pedicle over the orbital rim. The forceps grasp the co-mingled central the lateral fat pad.

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Modified Deep-Plane Lip Lift Technique

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Introduction: The surgical lip lift has been utilized by facial surgeons for decades, for enhancement of lip fullness and contour, to shorten the philtrum, to restore the natural teeth show that is lost with age, and for facial feminization surgery.[1-20] However, subnasal lip lifting can poorly affect on lower nasal aesthetic contour and cause a visible subnasal scar. Variations on the gullwing subnasal resection have been the mainstay procedure with the above inherent limitations, but more recent deep plane approaches have offered a more robust lift with reduced tension in the subdermal plane. However even these modern approaches can result in a visible subnasal scar.[17] In this study we present a modified deep-plane lip lift surgery technique that enhances outcomes and mitigates risks to nasal and scar cosmesis through modified incision design, enhanced deep plane tissue management, modified SMAS fixation technique, and minimized skin tension during closure.

Methods: This a retrospective review of a single surgeon's cases of modified deep-plane lip lift in a private practice. Patients with previous oral or subnasal surgery were excluded. Using a 4 point scale, blinded graders reviewed pre and postoperative photos for scar visibility, lip rotation, teeth show, enhanced philtral contour, and overall aesthetic outcome. Subjective satisfaction was reviewed using a 4-point scale at final follow-up. Patient charts were reviewed for demographic information, as well as complications, infections, and postoperative interventions. The modified deep-plane lip lift is performed after local anesthetic injection, followed by a standard gullwing incision that extends to the most lateral aspect of the alar-cheek junction. Subnasally, the incision follows the alar contour cephalad into the nasal sill, and then medially along the columellar-philtral junction. Generally, a 6-7mm skin resection is planned, with a V-U incision design in the sub-collumellar skin. Care is taken to explant the skin and subcutaneous tissue completely, leaving orbicularis oris fully exposed. A subnasal ellipse of orbicularis oris is resected with cutting cautery, exposing the sub-SMAS midline potential space. 4-0 polyglactin suture on a taper needle is used paracentrally and laterally along the piriform aperture, anchored to periosteum to vertically displace the cut end of orbicularis oris, advancing the lip SMAS cephalad. Deep closure of the dermis is performed with interrupted 5-0 polydioxanone, and superficial skin closure with a running locking 5-0 polypropylene suture. On a case-by-case basis, lateral commissure lift was performed by skin-only elliptical excision and closure with deep 5-0 polydioxanone, and superficial skin closure with 5-0 polypropylene. Superficial polypropylene sutures are removed between 5-7 days postop.

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Results: 39 patients were identified who underwent this modified deep-plane lip lift technique. Average follow-up was 5 months (range 2 months – 12 months.) 38 patients were female and 1 male. Average patient age was 59 years. Blinded graders reviewed lip rotation, teeth show, enhanced philtral contour, and overall aesthetic outcome to be "moderately improved" or "substantially" improved for all measures. Subjectively, patients judged their overall aesthetic outcome to be "moderately improved" or "substantially" improved. There were no cases of clinical scarring or infection. There was one case of extended postoperative suture granulomatous inflammation which resolved with conservative treatment. Figure 1 is a representative photograph of a patient who underwent lip lift via this technique.

Conclusions: The modified deep-plane lip lift offers a comprehensive and effective solution to treating aging changes of the upper lip. The incision design offers a camouflaged scar, and the multi-point deep plane SMAS fixation after resection allows for powerful lift with ideal tension-free skin closure and healing.

Figure 1

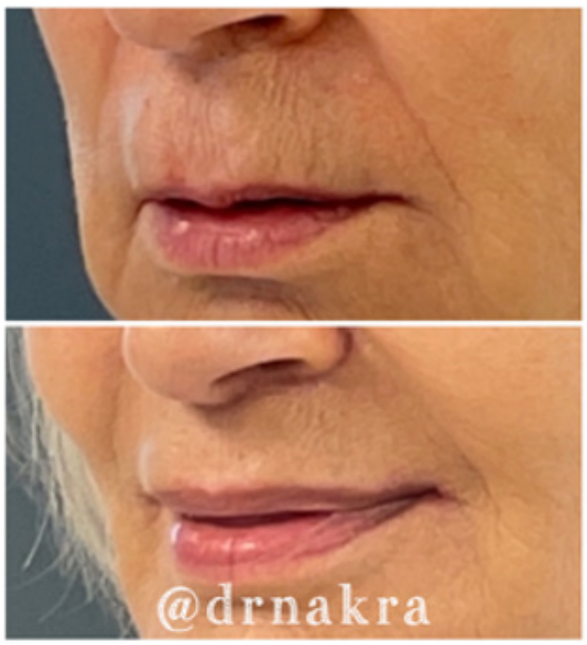

Figure 1. Preoperative (top) and postoperative (bottom) photograph of a patient who underwent lip lift via the described technique.

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Three-Dimensional Photography and Its Uses in Oculoplastic Surgery – A Review of the LiveViz Imaging System

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Introduction: Three dimensional photography systems have been introduced to the medical market in the last few years. As oculofacial plastic surgeons, we and our patients, can benefit from using such systems including gathering data for research and quantifying pre and post surgical changes.

Methods: The LifeViz imaging system will be reviewed, including the technology used, and what tools the software provides. Real life examples of patients before and after procedures will be reviewed to see the utility of this system in our daily professional practices.

Results: The LifeViz 3D imaging systems can help in skin analysis for: Wrinkles . Pores . Oiliness . Evenness . Vascularization . Pigmentation. These systems also have the capability to visualize in three dimensions, while also being able to compare photos of patients before and after any proceudre or surgery. They can aid in surgical outcome simulation, and also track measurements, such as volume and lifting effects

Conclusions: Three dimensional imaging systems can be a great tool to help in patient education, progress documentation, as well as a great tool to gather data help advance our own specialty.

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Transblepharoplasty Corrugator Excision with Nasal Fat Pedicle Transposition: A Novel Technique

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Introduction: Transblepharoplasty corrugator excision is an effective method for glabellar rhytid reduction.[1-13] However direct resection via upper blepharoplasty incision can result in post-surgical glabellar volume depletion and contour irregularity. There are differing preferences for fat augmentation in this region post-resection or deferring volume replacement.[1-6] Fat may be placed into the corrugator space post resection to replace volume to avoid postoperative contour depression. Option for free grafting sources include fat excised during upper blepharoplasty as well as more distant sites, such as the abdomen.[3-4] Analogous to transposition lower blepharoplasty, transposition of the upper eyelid fat pads has been used to enhance upper eyelid contour in the setting of involutional volume loss as well as volume augmentation of the orbitoglabellar groove.[15-18] In this study we present a novel approach to fat grafting in the setting of transblepharoplasty corrugator excision: transposition of the nasal fat pad to the transected corrugator space as a vascularized pedicle to prevent volume loss and corrugator muscle readherence.

Methods: This is a retrospective observational review of patients undergoing corrugator excision as an adjunct to upper blepharoplasty and a novel approach of direct volume transfer of the nasal fat pad as a vascularized pedicle. Patient charts were reviewed for demographic data, complications, and outcomes. Postoperative photos were graded by blinded observers for glabellar elevation and contour improvement using the following 0-4 scale: no improvement, mild improvement, moderate improvement, or substantial improvement.

Surgical technique – During routine upper blepharoplasty blunt trans-septal dissection was used to expose the nasal fat pad, which was then dissected from surrounding connective tissue to develop a mobile, vascularized fat pedicle. Dissection was then carried out superomedially in the sub-septal plane to the superomedial orbital rim. The mid-belly of the corrugator muscle was identified, dissected from surrounding attachments and isolated using a curved hemostat. The central portion of the muscle was then transected with monopolar cautery. Hemostasis was obtained. The nasal fat pedicle was then transposed superomedially into the corrugator space and secured using an externalized 4-0 plain gut suture (Figure 1). The remainder of upper blepharoplasty was completed. The transposition suture was removed one week after surgery.

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Results: Ten patients were identified. There were no complications noted in the study cohort, including no cases of infection, hemorrhage, poor wound healing, or diplopia. All patients reported satisfaction with the glabellar contour and reported subjective improvement in corrugator rhytids at their postoperative appointment. Postoperative photos graded by blinded observers were deemed to have "substantial" or "moderate" glabellar elevation and contour improvement in all cases. Figures 2 and 3 demonstrates patients with representative outcomes from this technique.

Conclusions: Transblepharoplasty resection of corrugator muscle can lead to glabellar contour deformity. Grafting the fat excised during upper blepharoplasty into the corrugator space may result in volume preservation, however fat uptake can be limited due to graft ischemia & necrosis. Injected fat harvested from elsewhere on the body can also suffer from fat ischemia but importantly does not help prevent adherence of the corrugator muscle cut ends. In patients undergoing transblepharoplasty corrugator excision to address glabellar rhytids, transposition of the neighboring nasal fat pad to the corrugator space provides an efficient, safe and effective vascularized source of fat volume augmentation to prevent contour deformity and decrease likelihood of preserved corrugator function.

Figure 1

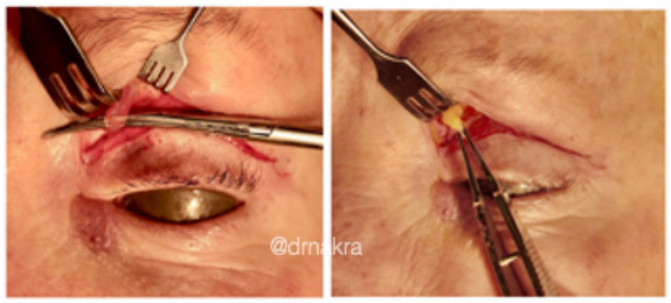

Figure 1. Intraoperative view demonstrating identification and isolation of the corrugator muscle (left) and transposition of the nasal fat pedicle into the corrugator space after excision of the midbelly (right).

Figure 2

Figure 2. Preoperative photograph (left) and 1-month postoperative photograph (right) after bilateral upper eyelid blepharoplasty with left corrugator excision and left nasal fat transposition into the corrugator space. The corrugator rhytids are notably less prominent in the postoperative photograph.

Figure 3

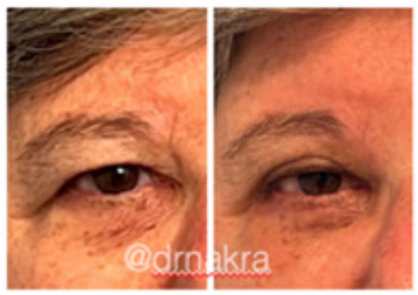

Figure 3. Preoperative photograph (left) and 1-month postoperative photograph (right) after bilateral upper eyelid blepharoplasty with right corrugator excision and right nasal fat transposition into the corrugator space. The corrugator rhytids are notably less prominent in the postoperative photograph.

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Switching Levator Aponeurosis to address Poor Levator Function Ptosis and Poor Bell's Phenomenon - A Graft (Stone) Lifting Two Lids (Birds)

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Introduction: In this video, we repurposed the resected levator aponeurosis to elevate the lower lid while correcting upper eyelid ptosis in a patient with poor Bell's phenomenon. We follow a case of a 65 year old gentleman, who underwent bilateral muller muscle conjunctival resection, tarsectomy and later bilateral levator resection elsewhere for recurrent ptosis. He presented to us with bilateral recurrent ptosis (MRD1=0, MRD2=5) with poor levator function at 5 mm, poor Bell's phenomenon and severe frontalis overaction.

Methods: The surgery follows a sequential operative approach adopted by anterior levator resection adjusting the MRD1 to 3 mm while having the patient sit-upright, intraoperatively. The resected levator aponeurosis (5-6mm) was inserted as a posterior lamellar graft to the lower tarsal border and the transconjunctivally recessed lower lid retractor to elevate the MRD2 thus keeping a stable palpebral fissure height (5mm).

Results: At 3-month postoperatively, MRD1 = 2mm, MRD2 = 3mm with <1mm lagophthalmos.

Conclusions: We described a novel "levator switch" technique elevating both MRD1 and MRD2 to correct poor levator function ptosis while limiting post-operative corneal exposure. It builds on the "tarsal switch procedure" yet preserves the tarsus and meibomian glands while maintaining eyelid stability and contour.

Transconjunctival Lower Lid Recession and Frost suture for Acquired lower lid Epiblepharon and Severe Exposure Keratopathy in a Patient with Fixed Hypotropia Due to Progressive TED

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Department of Ophthalmology and Visual Sciences, The Chinese University of Hong Kong, Hong Kong, SAR, Hong Kong (Greater China)

Introduction: A simple surgical technique involves recessing the lower lid retractor and pulling the lower lid up by frost sutures simultaneously corrects corneal exposure, lagophthalmos and acquired lower lid epiblepharon in a fixed hypotropic eye secondary to progressive TED.

Methods: A 37-year-old gentleman, known thyroid eye disease with right restrictive hypotropia developed progressive corneal thinning complicated by microbial keratitis and hypopyon due to severe exposure keratopathy, acquired lower lid epiblepharon and inverse Bell's reflex. Instead of performing a paramedian tarsorrhaphy, we used a subtarsal transconjunctival incision to maximally recess the lower lid retractor complex towards the inferior orbital rim. Once the posterior lamella was maximally recessed, the lower lid could then be pulled to cover the whole cornea using 2 pairs of 4-0 silk marginal frost sutures taped to the forehead.

Results: Follow-up visit revelaed adequate lower lif coverage of the cornea. The instillation of topical antibiotics and autologous serum allowed for the resolution of the microbial keratitis and corneal epitheliopathy secondary to exposure.

Conclusions: By combining transconjunctival lower eyelid recession with temporary frost sutures, we are able to correct three anatomical problems causing corneal breakdown while keeping regular access to the cornea for serial monitoring.

You Don’t Have to Hughes It: Lower Eyelid Reconstruction with Free Tarsal Graft and Myocutaneous Flap

Harry Marshak
Palm Desert, California, United States

Introduction: Large full-thickness lower eyelid defects often require a Hughes tarso-conjunctival flap and skin graft. This requires visual occlusion for several weeks and a second stage procedure to incise the conjunctival flap. Direct closure of large defects with Tenzel type flaps alone create difficulty in anchoring the lateral eyelid to the orbital rim, leading to horizontal shortening of the fissure, lateral canthal dystopia or ectropion. The technique presented here involves closure of lower eyelid defects by mobilizing the lateral eyelid combined with a Tenzel myocutanous flap and a free tarsal graft placed laterally to connect the lateral native tarsus to the lateral orbital rim. This allows for a one stage reconstruction and good reformation of the lateral canthal angle. This technique can be performed on defects up to at least 15mm.

Methods: A Tenzel myocutaneous rotational flap is created by incising the skin along a curvilinear line extending lateral from the lateral canthus. The inferior canthal tendon is incised. The flap is undermined in the pre-periosteal plane. The myocutaneous flap and lateral eyelid are advanced medially. The medial and lateral cut edges of tarsus are sutured together with 6-0 polyglactin partial thickness sutures. The orbicularis is closed over the tarsus with 6-0 polyglactin buried sutures. The margin is reformed with two 6-0 polyglactin sutures. The skin is closed with 5-0 plain interrupted sutures.

The distance from the lateral edge of the lower eyelid to the lateral orbital rim is measured. A 4mm wide section of superior tarsus measuring the required length is excised from the upper eyelid and placed in the newly created posterior defect in the lateral lower lid. The graft is sutured to the lateral edge of native tarsus with two 6-0 polyglactin partial thickness sutures. The lateral edge of the graft is sutured to the periosteum of the lateral orbital rim with two 5-0 polyglactin sutures.

The rotated myocutaneous flap is sutured to the periosteum lateral to the lateral orbital rim with 4-0 poliglecaprone 25 sutures. The flap is sutured to the superior border of the tarsal graft with 6-0 polyglactin buried sutures. The lateral angle is reformed by passing a 5-0 polyglactin suture through the lateral aspect of the upper lid and the corresponding portion of the rotated flap, the tarsal graft and the periosteum. The lateral canthal wound and donor sites are closed with 4-0 poliglecaprone 25 buried sutures. The skin of the lateral canthus and donor site is closed with 5-0 plain running suture. No traction sutures were used.

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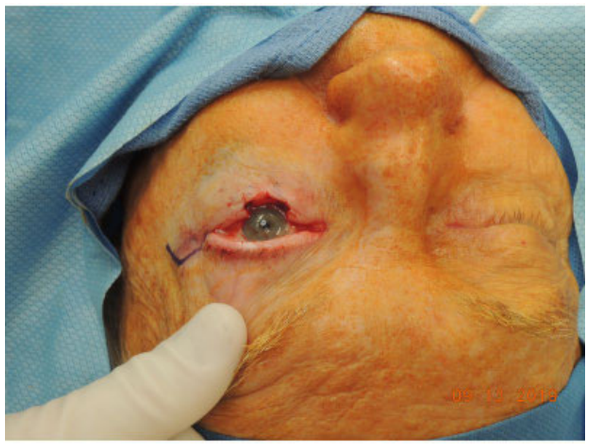
Results: 72 patients underwent this technique for reconstruction after skin cancer excision with Mohs surgery or frozen sections. Primary defects measured between 10-20mm (average=13mm) and were located centrally or medially. All patients had good healing of the flap and graft. Patients overall had good cosmesis. 3 patients developed lateral canthal dystopia requiring revision. One patient developed notching of the eyelid margin.

Conclusions: Closure of large full-thickness lower eyelid defects with myocutaneous flap and free tarsal graft provides one stage closure with good functional results and cosmesis.

Figure 1



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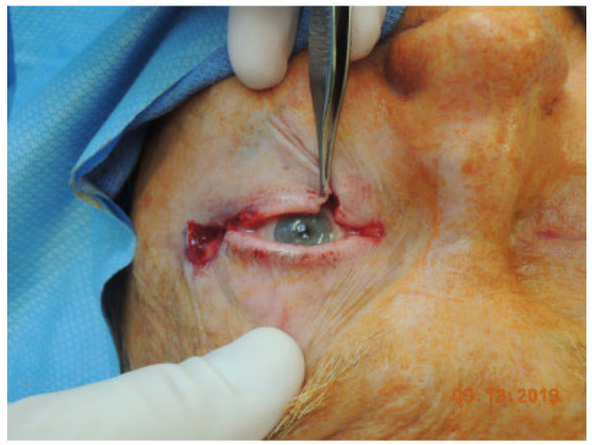

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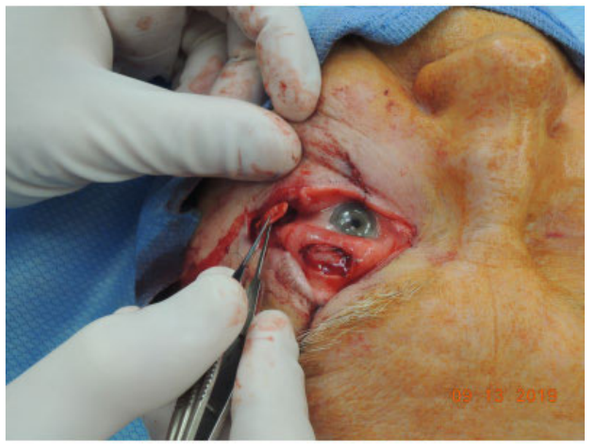

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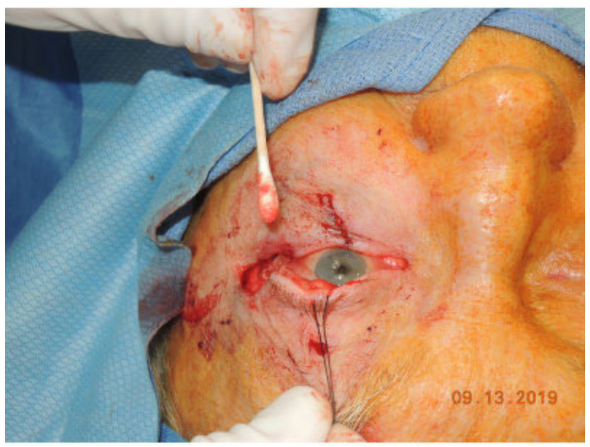

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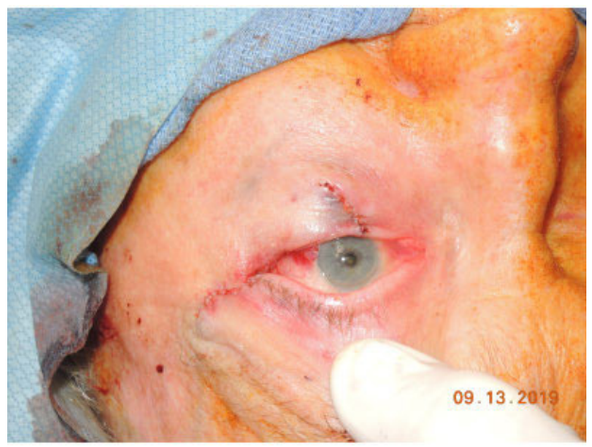

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The Reverse Serve: Hughes Tarsoconjunctival Flap for Upper Lid Reconstruction

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Centre for Sight, Centre for Sight, Banjara Hills, India

Introduction: To describe surgical management of large upper eyelid defects using reverse Hughes tarsoconjunctival flap

Methods: Video illustrating pearls in the management of eyelid defects and reconstruction describing in detail modified reverse Hughes tarsoconjunctival flap

Results: This video describes in brief the nomogram utilized for eyelid reconstruction and describes in detail management of upper eyelid defects highlighting tips and tricks of a Hughes tarsoconjunctival flap which can be modified to be utilized for upper lid. We describe the advantages and outcomes in cases where it was successfully utilized.

Conclusions: Eyelids play an important role in protecting the globe. Defects in the eyelids can occur as part of congenital anomalies, surgical resection of tumors or traumatic injuries. A thorough knowledge of the eyelid anatomy can help in eyelid reconstruction that can provide gratifying results by restoring the lid as close to pre-surgery state as possible. Extensive upper eyelid defects have been repaired traditionally by Cutler-Beard procedure, which is a full thickness advancement bridge flap. It is a skin muscle flap wherein tarsus is left behind. Hughes flap is a tarsoconjunctival flap traditionally used for repairing lower eyelid defects. However, a modified technique called reverse Hughes procedure can be utilized and can have certain advantages over the traditional Cutler-Beard procedure for adequately reconstructing extensive upper eyelid defect giving the advantage of a good tarsal support to the eyelid.

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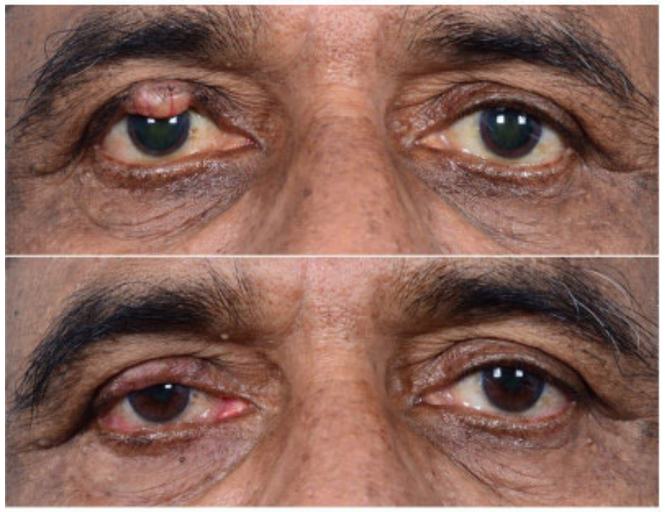
Figure 1



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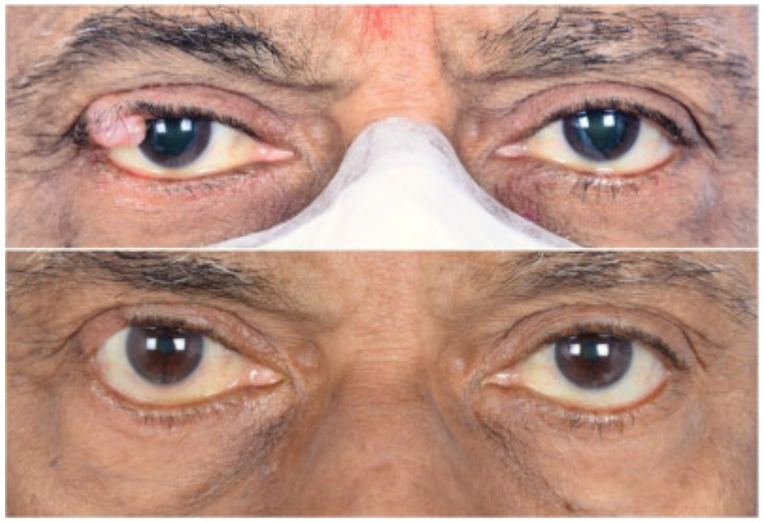

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Deep Conjunctival Fornix Augmentation using Acellular Dermal Allograft in Severe Anophthalmic Socket Contraction

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Introduction: In oculoplastic surgery, we often perform various tissue implantation and grafting to contracted sockets to cover augmented area.
Author performed deep fornix augmentation until orbital rim using acellular dermal allograft.
This video shows Deep conjunctival fornix augmentation procedure and results using acellular dermal allograft implantation.

Methods:

1. Acellular dermal matrix was used in 12 eyes of 12 anophthalmic socket contracted patients by one surgeon with a minimum of six months follow-up.
2. Standard canthotomy and cantholysis were performed.
3. A subconjunctival incision was done inferiorly to the tarsal border.
4. Release of all adhesive tissue was performed in advance. Blunt and sharp dissections were performed inferiorly in a preseptal plane until orbital rim. Then lower lid retractors were excised.
5. Acellular dermal matrix was fashioned into a suitable size and applied to make the fornix. The graft was oriented with the dermal side onto the wound bed and sutured into place with 5–0 polypropylene interrupted sutures.
6. In case of severe contracture, buccal mucosa or retro-auricular partial skin was grafted from incised bulbar conjunctiva to orbital rim.
7. The canthus was usually repaired with lateral tarsal strip procedure.
8. 2 or 3 conformer was placed vertically into the socket for several weeks to maintain deep fornix.
9. Temporary tarsorrhaphy or frost sutures by 5-0 polypropylene were performed.
10. The sutures were released after 8 weeks.

Results: It takes more than 12 weeks for the conjunctiva to completely cover. Conjunctival growth seems to be calm and stable and the prosthetic eye is well maintained into the deep fornix.

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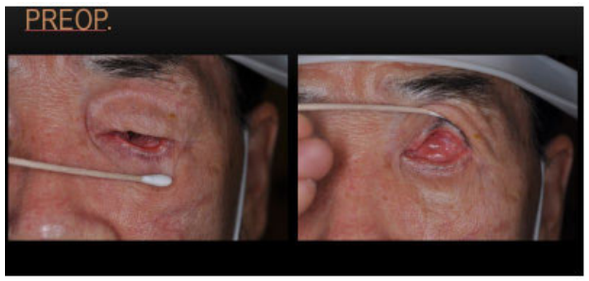
The lower eyelid looks thick, due to the volume of allograft. But it becomes natural when the swelling disappears.

Conclusions: Deep Fornix augmentation using Acellular dermal allograft seems to be an excellent grafting for patients with severe anophthalmic contracted socket.

Figure 1



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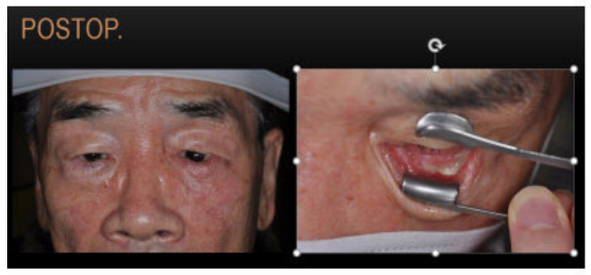

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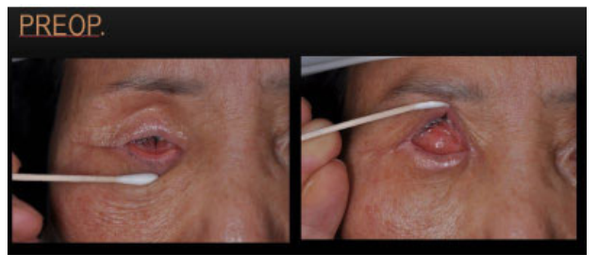

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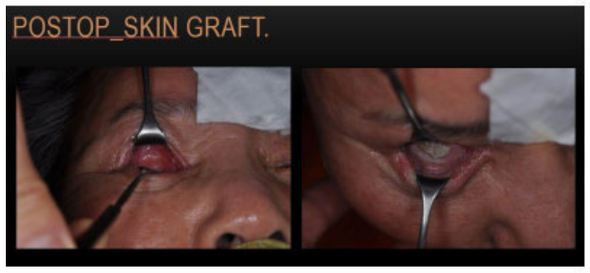

Efficiency of Lateral Wall Decompression for Thyroid Eye Disease: Enhancing Final Decompression Results through Modified Steps

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Introduction: The purpose of this study was to evaluate the efficiency of lateral wall decompression using modified steps for the treatment of Thyroid Eye Disease (TED). Previous reports have demonstrated up to 6 mm reduction in proptosis following lateral decompression. With the implementation of our modified steps, we were able to achieve more than 10 mm reduction in proptosis.

Methods: In comparison to previous lateral wall decompression surgeries, we introduced several modifications. These included extending the bony windows to reach the superior orbital fissure, or at least removing the enlarged portion of the greater wing of the sphenoid bone. We created additional space for the swollen lacrimal gland, removed all thickened lateral periosteum, and selectively removed fat located within the intraconal space.

Results: By employing these modified steps, we observed a reduction in proptosis of more than 10 mm in TED patients, surpassing the findings of previous reports. Potential complications associated with this procedure include cerebrospinal fluid (CSF) leakage resulting from dural tear, pupil dilation, bleeding in the apex region, and numbness in the temporal region.

Conclusions: Compared to alternative approaches for decompression, our modified lateral decompression technique offers a safer and more efficient method. It is associated with a lower incidence of new onset diplopia and achieves maximal reduction in proptosis.

Graded, Guarded and Guided Apical Decompression for Dysthyroid Optic Neuropathy

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Department of Ophthalmology and Visual Sciences, The Chinese University of Hong Kong, Hong Kong, SAR, Hong Kong (Greater China)

Introduction: In this video, we performed a personalized endoscopic apical decompression through a 3G approach: that is, graded towards the extent of decompression. Guarded against complication with a maxillary antrostomy and guided by endoscopic endonasal and orbital anatomy with navigation.

Methods: We follow a case of a 61-year old female, with bilateral dysthyroid optic neuropathy, who showed limited improvement to pulsed high-dose intravenous glucocorticoids, radiotherapy and mycophenolate.

Endoscopic manual uncinectomy then maxillary antrostomy were performed to prevent postoperative sinusitis. As posterior maxillary wall locates the apex, navigation helps to show the skull base (fovea ethmoidalis) and optic canal. The posterior ethmoidomaxillary strut was gradually removed with the posterior floor, extending laterally to the inferior orbital fissure, inferiorly to orbital process of palatine bone and posteriorly to optic canal. Lamina papyracea was removed. The retrobulbar periorbita was opened as a sling to minimize postoperative esotropia while maximizing apical body decompression.

Results: The patient was evaluated 1 day, 1 week, 3 weeks, and 1.5 months post-operatively, and noted gradual improvement of clinical (visual acuity, color vision and proptosis) and radiological parameters.

Conclusions: The 3Gs (Graded, Guarded, Guided) approach orbital decompression ascertains adequate inferomedial decompression by targetted bone removal, addressing potential complications and ensuring safety while maximizing apical decompression and avoiding potential post-operative complications (sinusitis and esotropia).

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Orbital Biopsy - The Right Approach

Subhav Pershad, Rolika Bansal, Santosh G Honavar
Centre for Sight, Banjara Hills, Hyderabad, India

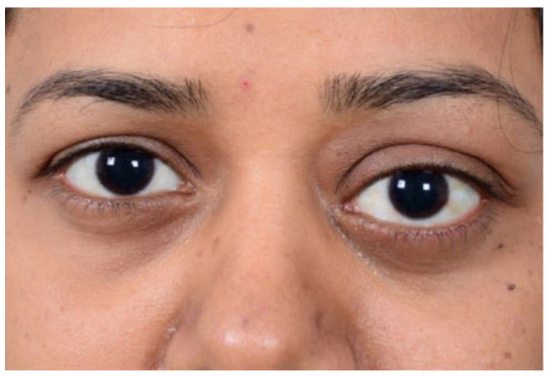
Introduction: Orbital lesions owing to their heterogenous clinical presentation may pose a diagnostic dilemma, warranting tissue sampling for definitive diagnosis. In this video, we display a scientific basis in our approach to the area of interest, type of biopsy performed, diagnosis, management, functional and aesthetic outcomes in cases with an orbital mass

Methods: The biopsy techniques in orbital lesions include excision, incision, core and fine needle aspiration. All patients following a comprehensive clinico-radiological evaluation were broadly categorised on lesion characteristics and relation to adjacent anatomical structures wherein anteriorly located, well encapsulated or delineated lesions were completely excised while posterior, diffuse or infiltrating and poorly defined lesions were dealt with multi-level incision biopsy thus providing optimal tissue for histo-pathological examination, special staining techniques and confirmation of diagnosis.

Results: Patients demonstrated good functional and aesthetic outcomes following biopsy and appropriate management.

Conclusions: Orbital lesions owing to their heterogenous clinical presentation may pose a diagnostic dilemma, warranting tissue sampling for definitive diagnosis. An understanding of the lesion characteristics, its relation to crucial structures is paramount in not only addressing the primary pathology but also to achieve optimal outcomes.

Figure 1



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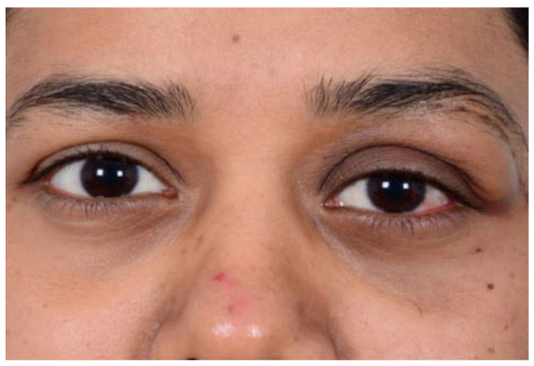

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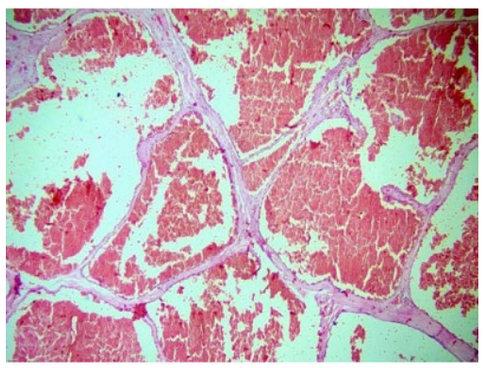

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Repair of Combined Orbital Floor and Medial Wall Fractures through Inferior Transconjunctival Approach

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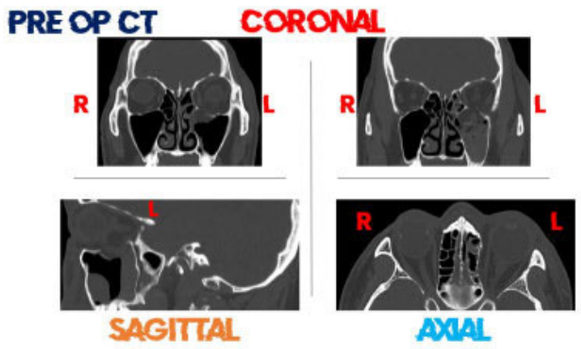
Introduction: Orbital floor and medial wall fractures are commonly encountered in practice, either as a single wall or combined presentation. Combined orbital fractures present as a surgical challenge in relation to access to fracture, implant placement and postoperative recovery.

Methods: We present our step-by-step video on repair of combined orbital floor and medial floor fractures.

Results: Patient presented with a unilateral significantly displaced combined orbital floor and medial orbital fracture secondary to a road traffic accident. For symptoms of diplopia and restriction of ocular motility and clinically significant enophthalmos he underwent an Open Reduction & Internal Fixation (ORIF) with prebent titanium anatomic prefabricated implant through an inferior transconjunctival incison without disinsertion of the inferior oblique. The medial wing of the implant is bent according to the Angle of Inferiomedial Orbital Strut (AIOS) measurements of the contralateral orbit. Implant was satisfactorily placed with both intraoperative and postoperative image verification. Diplopia and preoperative enophthalmos resolved post operatively with restoration of normal ocular motility.

Conclusions: Combined orbital fractures pose significant anatomic and functional consequences to patients. Timely diagnosis, clinical and radiologic correlation in tandem with proper surgical planning with minimally invasive approach with prebent prefabricated implant yields satisfactory results.

Figure 1



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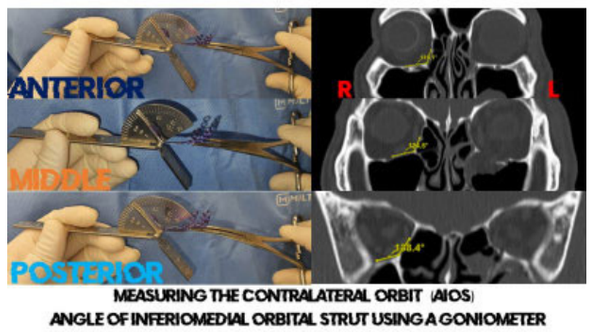

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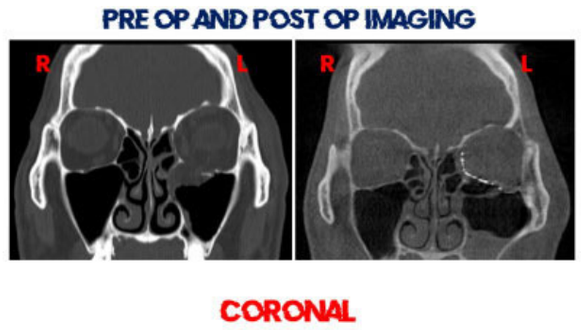

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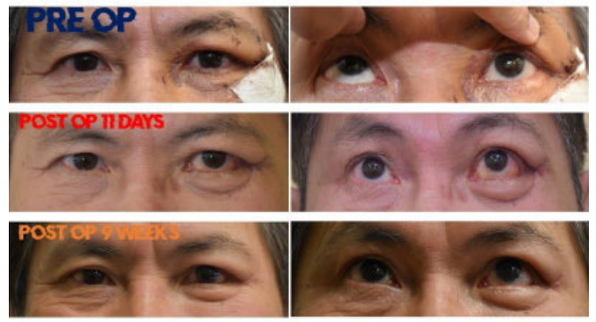

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The Third Hand - How to be an Efficient Assistant in Surgeries of the Orbit

Sumer Doctor, Tarjani Dave
Ophthalmic Plastic Surgery and Ocular Oncology, Hariram Motumal Nasta & Renu Hariram Nasta Ophthalmic Plastic Surgery Centre, Kallam Anji Reddy Campus, LV Prasad Eye Institute, Hyderabad, India

Introduction: Orbital surgery is a unique blend of ophthalmic and general surgery. To be a good orbital surgeon, one must learn to embody the speed and alertness of a general surgeon as well as the dexterity and grace that come with being an ophthalmic surgeon.

With the complexity of the orbit come its various difficulties. A small working area, improper illumination, too many hands in the field, frequent inaccessible bleeders and having to keep a constant awareness of the eyeball and safe distance from the optic nerve are a few of the challenges a surgeon would face.

Methods: An efficient second surgeon works as a third hand for the orbital surgeon and helps ease the surgical process thus improving the surgical efficiency and outcome. In this video abstract, I would like you to describe the characteristics of a reliable surgical assistant and highlight a few ways in which one can aid a smooth surgery.

Results: The topics covered would be on the lines of a comprehensive understanding of orbital anatomy, anticipating the intraoperative changes and the surgeons' needs, clear and effective communication, skilful and precise manipulation of surgical instruments, maintaining visualization during orbital surgery and the tools and tricks to enhance visibility as well as being abreast with operating technology that is synergistic to the technique.

Teamwork makes the dream work. Teamwork, collaboration and fostering continuous learning and professional development are key principles in the operating room for the assistant as well as the surgeon.

Conclusions: Complex surgeries of the orbit have and will require a solid team backing the primary surgeon, and if the role of an assistant is carried out well one can ensure the best outcomes for their patients and train the next generation of Oculoplasty surgeons in the process.

(continued)

(continued)

Figure 1

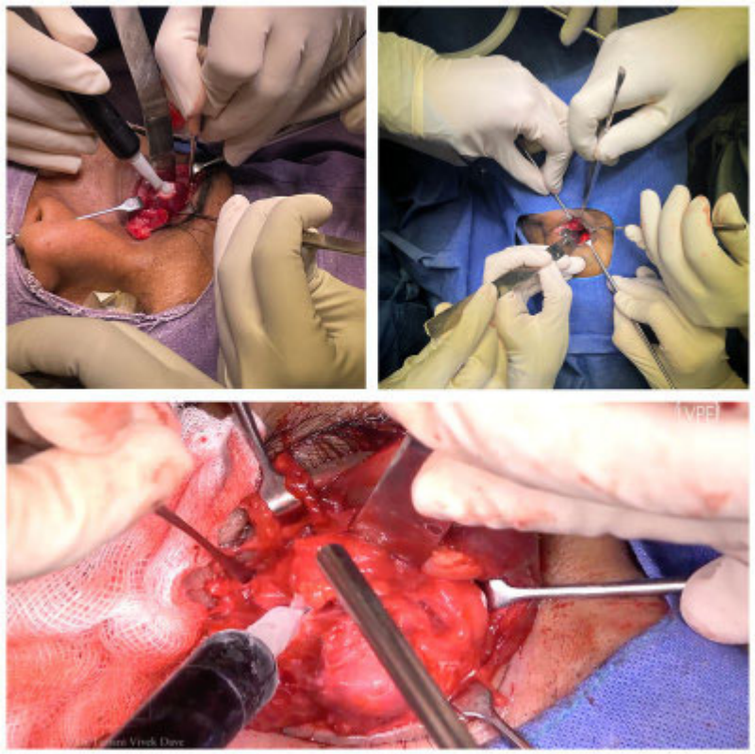

Figure 2

Two-Step Surgery for Severe Cases of Distensible Orbital Venous Malformations

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Introduction: The excision of severe cases of distensible venous anomalies poses a challenge for orbital surgeons, especially after embolization alone. In this study, we evaluated a two-step surgical approach for the excision of severe cases, incorporating external neck compression.

Methods: The first surgery involved embolization using n-butyl-2-cyanoacrylate glue (Glubran2) in patients with distensible venous anomalies, while applying neck compression technology during the embolization procedure. Patients who underwent the first surgery underwent radiographic assessment using orbital CT and postoperative external neck compression to determine the presence of residual lesions. The second surgery, performed one to three months later, entailed complete resection of the embolized lesion.

Results: By mapping the lesions through embolization, we achieved total resection of all severe cases without the risk of bleeding. Following the two-step surgery, symptoms were resolved, and signs of distensible lesions were not clinically evident during Valsalva maneuver.

Conclusions: The two-step surgery approach proved to be a safe and efficient method for treating severe cases of distensible orbital venous malformations. The interval of 1-3 months between surgeries allows for persistent inflammation, ensuring sufficient embolization and enabling the surgeon to evaluate the residual lesion using orbital CT. External neck compression serves as a useful adjunct technology for both diagnosis and treatment of orbital distensible venous anomalies. When combined with the two-step surgery approach of embolization followed by excision, it yields favorable outcomes with minimal complications.

The Surgeon Who 'Sees': Surgical Loupes in Oculoplasty

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Introduction: Apart from the operating microscope, surgical loupes are widely used in the surgical specialty af oculofacial plastic surgery. Fellows and residents are often confused about the perfect loupe for themselves, and may have adjustment issues. They may often purchase expensive loupes, to be best equipped to participate in and perform surgical procedures. Owing to lack of time and information, many would make this decision to purchase this important piece of equipment simply on what other surgeons are using. Easily accessible sound knowledge of optical principles of surgical loupes would be very useful to make the right choice.

Methods: This video aims to explain simple optical terminology and present a concise description of the surgical loupes available on the market today. It would also add practical tips while choosing loupes, and choices for surgical illumination.

Results: Various types of magnification systems, like simple loupes, compound lenses, and prismatic loupes are described. Optical features such as working distance, field of view, depth of field, working angle, and wide-angle lenses are explained. Practical options for illumination of the surgical field are also explained.

Conclusions: The video aims to serve as a starter kit and a practical guide to choose the right surgical loupe for a budding oculofacial plastic surgeon.

Figure 1

Figure 2

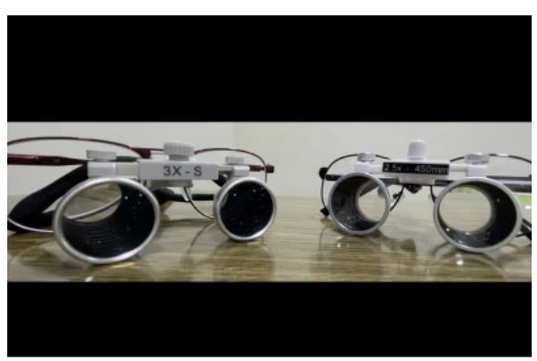

Figure 3

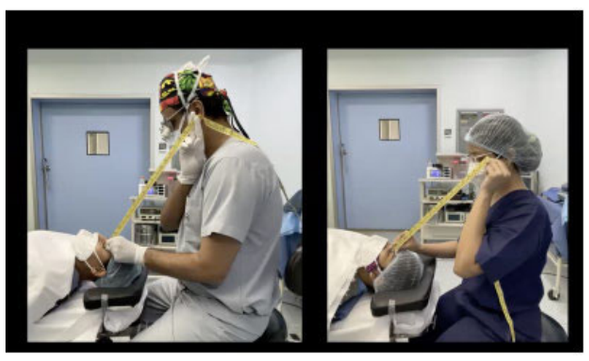

Figure 4

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