The 3rd Indonesian Symposium on Heart Failure and Cardiometabolic Disease 2023

How to Manage Heart Failure in Chronic Coronary Syndrome

Irma Maghfirah
Department Cardiology and Vascular Medicine, Universitas Airlangga
Indonesian Heart Failure and Cardiometabolic Disease Working Group

Outlines

- Epidemiology
- Pathophysiology
- Management
- Integrated Cases

Introduction

- Coronary artery disease (CAD) is one of the most common cause of heart failure
- The absence of a history of myocardial infarction or angina is insufficient to rule out CAD as the etiology for HF.
- Identification of the etiology of HF has significant therapeutic and prognostic implications.

Goals of Therapy

- Prolong survival
- Improve quality of life
- Reduce the risk of cardiac and noncardiac complication
- Since, CAD >> potentially reversible cause of HF, >> improve ventricular function

Prevalence of CAD in HF trials

- In the 24 multicenter HF treatment trials
- Involving >> 43 000 patients,
- CAD was the underlying cause of HF in nearly ***65%*** of patients

Prevalence of CAD in Multicenter HF Trials Published in the *New England Journal of Medicine* From 1986 to 2005

Trial	Year	All Patients	CAD Patients
V-HeFT I	1986	642	282
CONSENSUS	1987	253	146
Milrinone	1989	230	115
PROMISE	1991	1088	590
SOLVD-T	1991	2569	1828
V-HeFT II	1991	804	427
SOLVD-P	1992	4228	3518
RADIANCE	1993	178	107
Vesnarinone	1993	477	249
CHF-STAT	1995	674	481
Carvedilol	1996	1094	521
PRAISE	1996	1153	732
DIG	1997	6800	4793
VEST	1998	3833	2230
RALES	1999	1663	907
DIAMOND	1999	1518	1017
COPERNICUS	2001	2289	1534
BEST	2001	2708	1587
Val-HeFT	2001	5010	2866
MIRACLE	2002	453	244
COMPANION	2004	1520	842
A-HeFT	2004	1050	242
SCD-HeFT	2005	2521	1310
CARE-HF	2005	813	309
Total	19 y	43 568	26 877(62%)

(*Circulation.* 2006;114:1202-1213.)

Overview of Management

- Treatment of Obstructive CAD ~ Revascularization Strategies for CCS
- Management of Symptoms (Angina, Congestion, Dyspnea)
- Long term therapy for CCS and HF (antiplatelet, GDMT, etc)

Case 1

- Mr. MH/55 yo/Patient was referred from Bangkalan to outpatient clinic
- Dyspnea on effort + on moderate activity, sometimes chest discomfort, atypical angina, palpitation once in a while, preferred sleeping with 2 pillows, PND (-)

Risk Factors

- HT + since 2015,
- CAD was denied, been admitted in 2015 for chest discomfort and dyspnea
- DM since Feb 2022, CVA infarct Feb 2022
- Smoking > 30 years,
- History of paroxysmal afib

Routine Medications

- Furosemide 1x40 mg po
- Ramipril 1x2.5 mg po
- ASA 1x100 mg po
- Spironolacton 1x25 mg po
- Bisoprolol 1x2.5 mg po
- Metformin 2x500 mg po

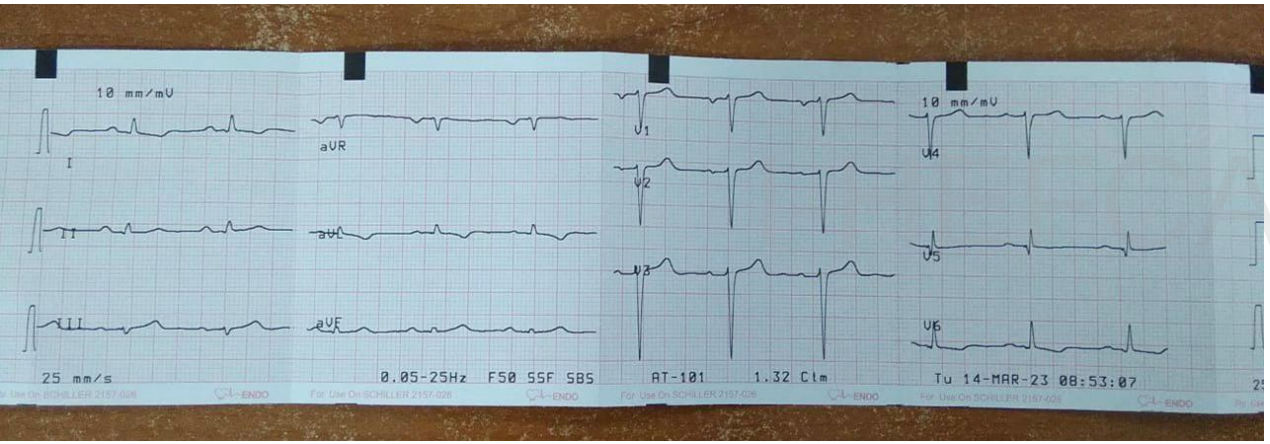
BB: 75 kg
TB: 163 cm
BMI: 29.3 (overweight)

Vital Signs
BP : 97/61
HR : 74 x/m, regular
RR : 20 x/I
SaO2 : 97% room air

Physical exam
- JVP R+2 cmH20
- Rhales (-/-)
- Minimal ankle edema both legs

Labs
- Hb/Ht/Leu/plt: 13.2/39.1/9.26/208,000
- GDS: 192
- BUN/Cr: 19/0.84
- Na/K/Cl: 135/3.5/101
- Chol total/LDL/HDL/TG: 224/174/30/142

Case 1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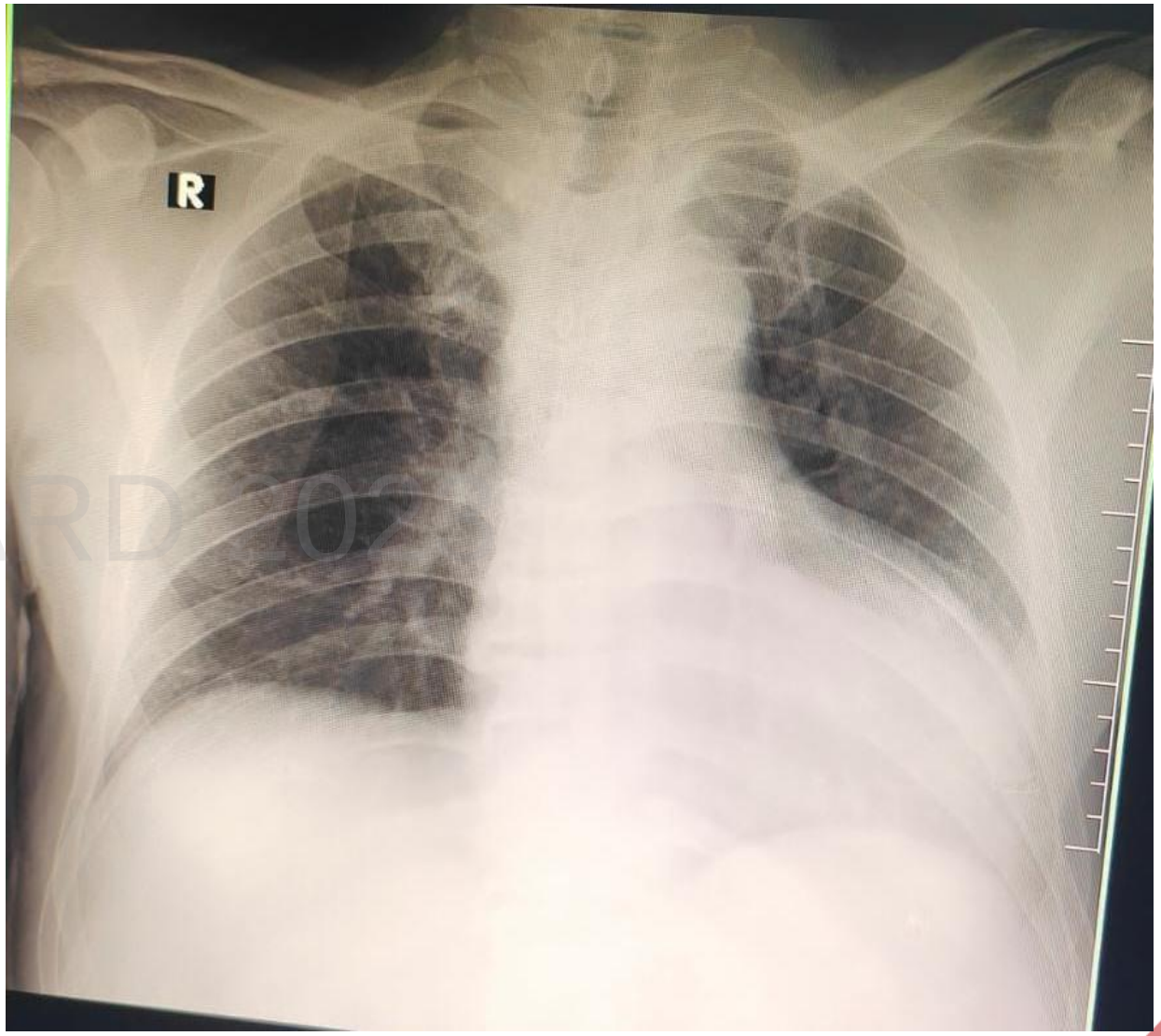

R

Echocardiography

- Reduced LVEF, EF 38%
- Wall motion: RWMA (+) septal (A), inferior (A), hipokinetik di segmen anterior (B-M-A), anteroseptal (B-M), inferoseptal (B-M), inferior (B-M), lateral (A)
- Dyastolic dysfunction grade 1: E'Sept 0.04 m/s; E'Lat 0.10 m/s; MV E Vel 0.49 m/s; E/A 1.38; E/E' AVG 7.45; LAVI 30.91 ml/m2
- Dimension heart chamber: LVIDd 5.9 cm, eccentric LVH
- Valves: MR trivial
- Normal contractility of RV (TAPSE 2.2 cm)

CAG

- CAD TVD LM DISEASE (MEDINA 1-1-1), CTO DI PROX RCA, CRITICAL STENOSIS 99% DI D1, CRITICAL STENOSIS 99% DI OSTEAL LCX

What should we do next?

- History of CAD unclear, Optimalization medical therapy for HF only
- Consider the need of revascularization

Revascularization Strategies

Who should undergo revascularization?

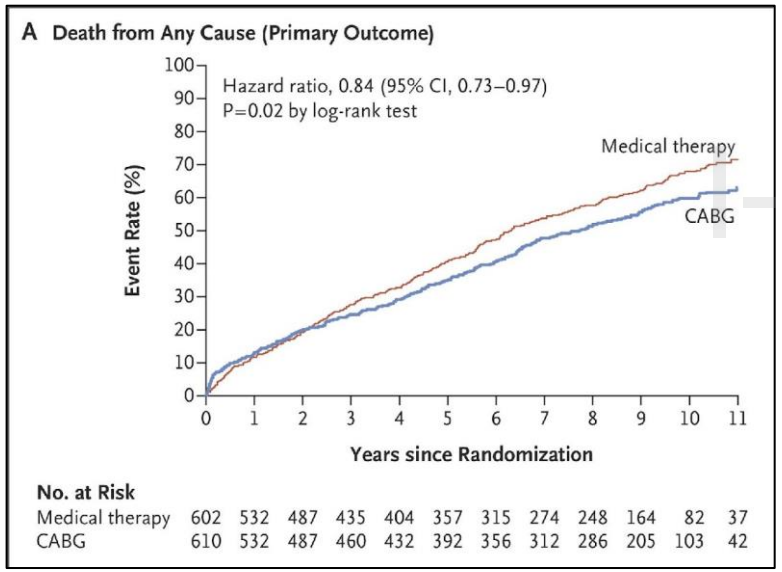
Who should undergo revascularization?

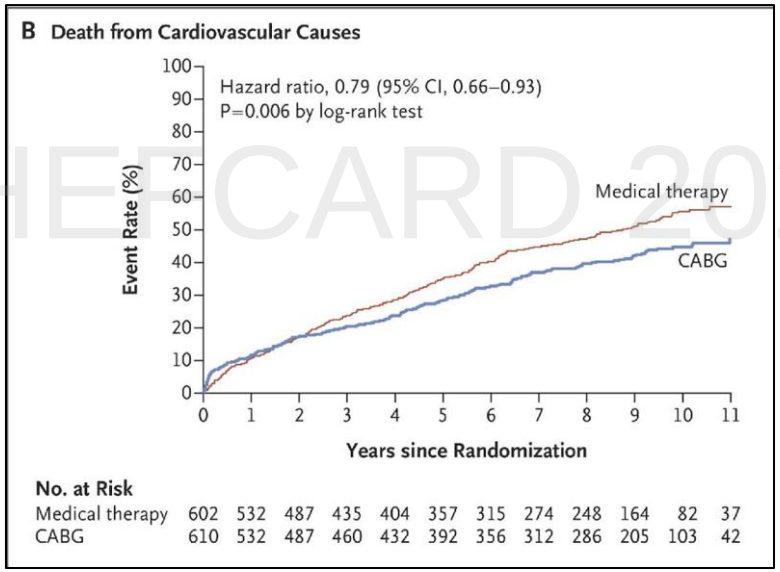
- All patients with HFrEF alongside CCS should undergo evaluation for revascularization.
- In combination with optimal medical therapy revascularization has the potential to improve survival in patients with HF and CCS despite the increased risks associated with revascularization

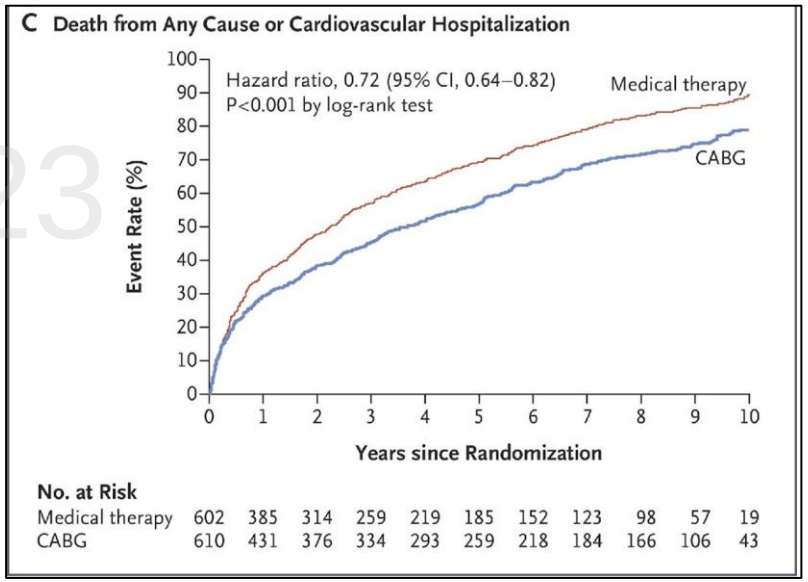
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 APRIL 21, 2016 VOL. 374 NO. 16

Coronary-Artery Bypass Surgery in Patients with Ischemic Cardiomyopathy







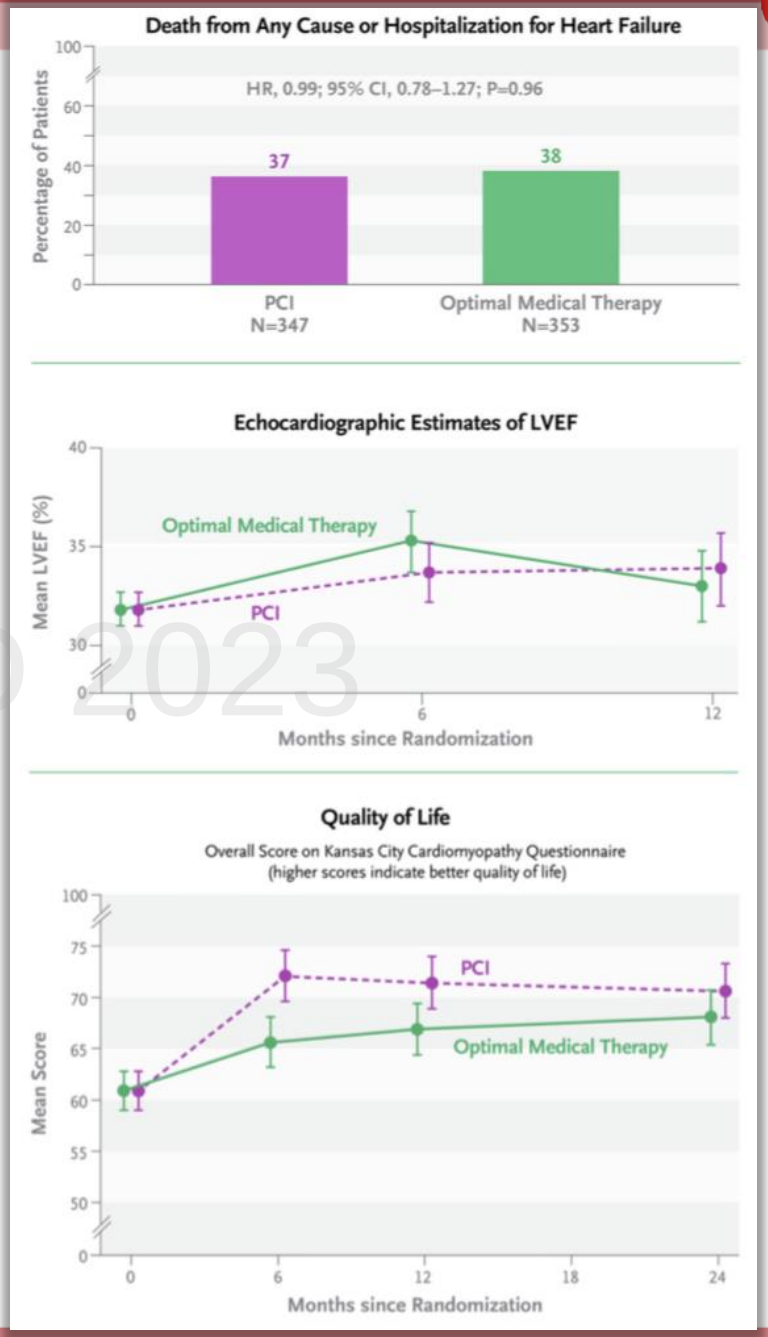
n engl j med 374;16

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 OCTOBER 13, 2022 VOL. 387 NO. 15

Percutaneous Revascularization for Ischemic Left Ventricular Dysfunction

Among patients with severe ischemic left ventricular systolic dysfunction who received optimal medical therapy, revascularization by PCI did not result in a lower incidence of death from any cause or hospitalization for heart failure.

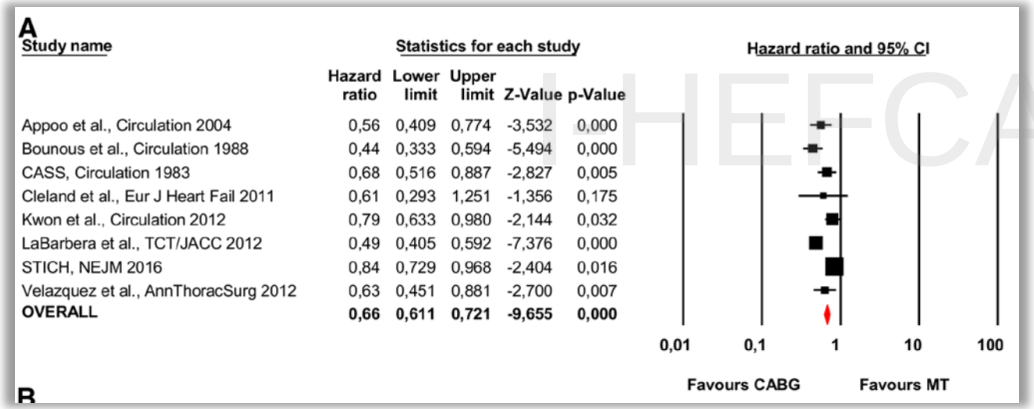


n engl j med 387;15

Treatment of Obstructive CAD

Survival Benefits of Invasive Versus Conservative Strategies in Heart Failure in Patients With Reduced Ejection Fraction and Coronary Artery Disease

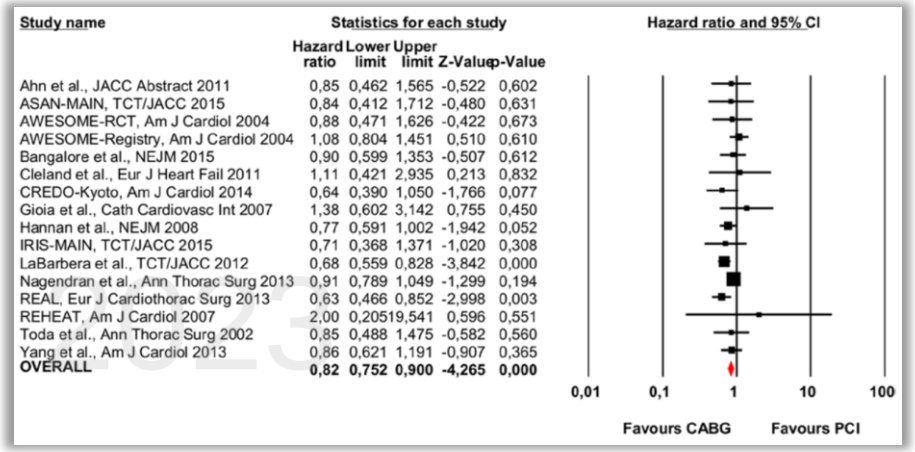
A Meta-Analysis



A

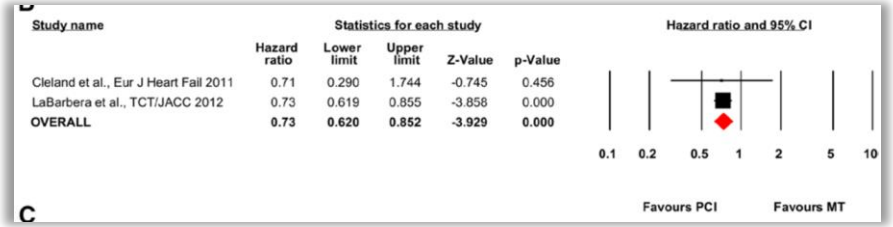
Study name	Hazard ratio	Lower limit	Upper limit	Z-Value	p-Value
Appoo et al., Circulation 2004	0,56	0,409	0,774	-3,532	0,000
Bounous et al., Circulation 1988	0,44	0,333	0,594	-5,494	0,000
CASS, Circulation 1983	0,68	0,516	0,887	-2,827	0,005
Cleland et al., Eur J Heart Fail 2011	0,61	0,293	1,251	-1,356	0,175
Kwon et al., Circulation 2012	0,79	0,633	0,980	-2,144	0,032
LaBarbera et al., TCT/JACC 2012	0,49	0,405	0,592	-7,376	0,000
STICH, NEJM 2016	0,84	0,729	0,968	-2,404	0,016
Velazquez et al., AnnThoracSurg 2012	0,63	0,451	0,881	-2,700	0,007
OVERALL	**0,66**	**0,611**	**0,721**	**-9,655**	**0,000**

B



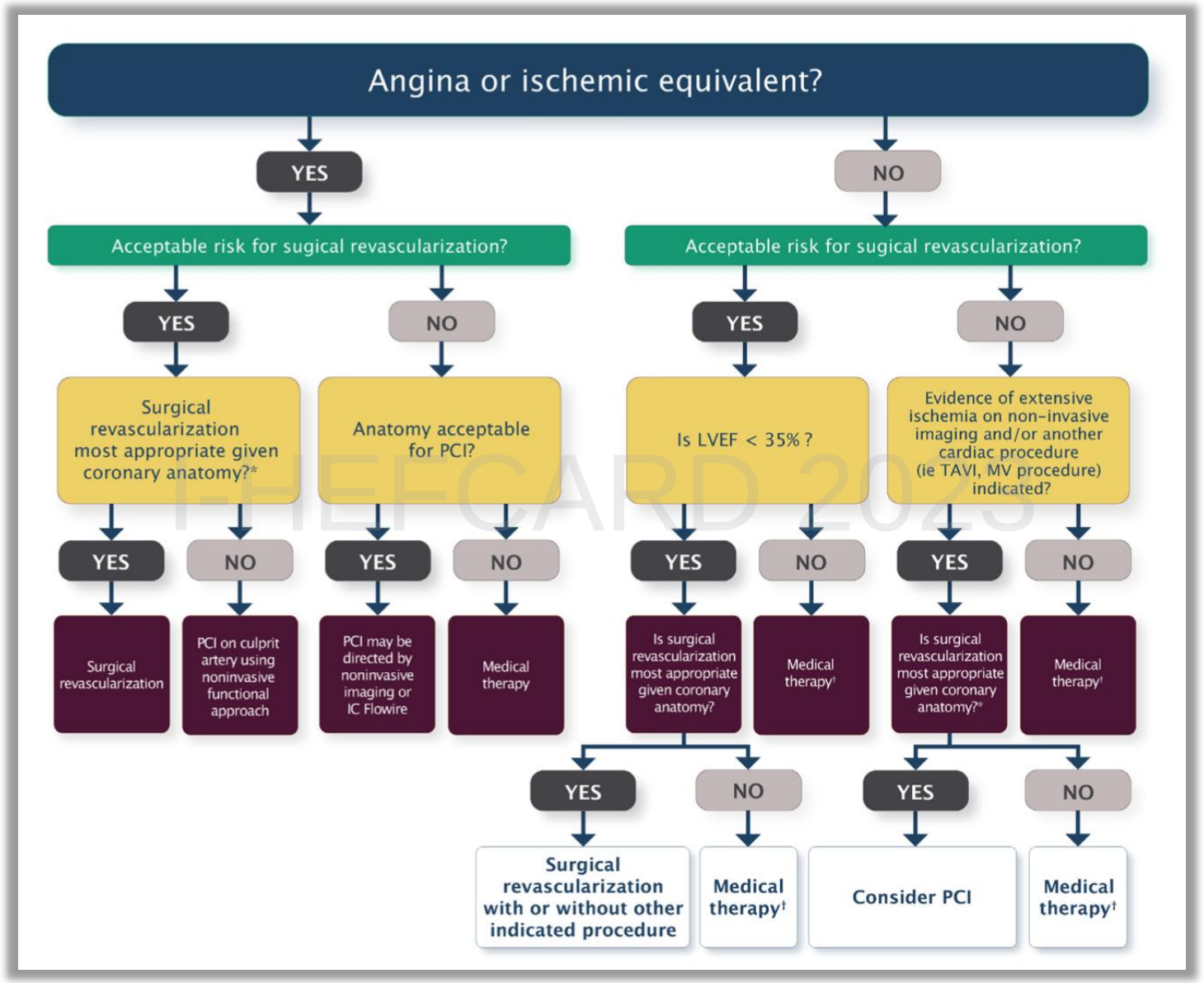
Study name	Hazard ratio	Lower limit	Upper limit	Z-Value	p-Value
Ahn et al., JACC Abstract 2011	0,85	0,462	1,565	-0,522	0,602
ASAN-MAIN, TCT/JACC 2015	0,84	0,412	1,712	-0,480	0,631
AWESOME-RCT, Am J Cardiol 2004	0,88	0,471	1,626	-0,422	0,673
AWESOME-Registry, Am J Cardiol 2004	1,08	0,804	1,451	0,510	0,610
Bangalore et al., NEJM 2015	0,90	0,599	1,353	-0,507	0,612
Cleland et al., Eur J Heart Fail 2011	1,11	0,421	2,935	0,213	0,832
CREDO-Kyoto, Am J Cardiol 2014	0,64	0,390	1,050	-1,766	0,077
Gioia et al., Cath Cardiovasc Int 2007	1,38	0,602	3,142	0,755	0,450
Hannan et al., NEJM 2008	0,77	0,591	1,002	-1,942	0,052
IRIS-MAIN, TCT/JACC 2015	0,71	0,368	1,371	-1,020	0,308
LaBarbera et al., TCT/JACC 2012	0,68	0,559	0,828	-3,842	0,000
Nagendran et al., Ann Thorac Surg 2013	0,91	0,789	1,049	-1,299	0,194
REAL, Eur J Cardiothorac Surg 2013	0,63	0,466	0,852	-2,998	0,003
REHEAT, Am J Cardiol 2007	2,00	0,205	19,541	0,596	0,551
Toda et al., Ann Thorac Surg 2002	0,85	0,488	1,475	-0,582	0,560
Yang et al., Am J Cardiol 2013	0,86	0,621	1,191	-0,907	0,365
OVERALL	**0,82**	**0,752**	**0,900**	**-4,265**	**0,000**

C



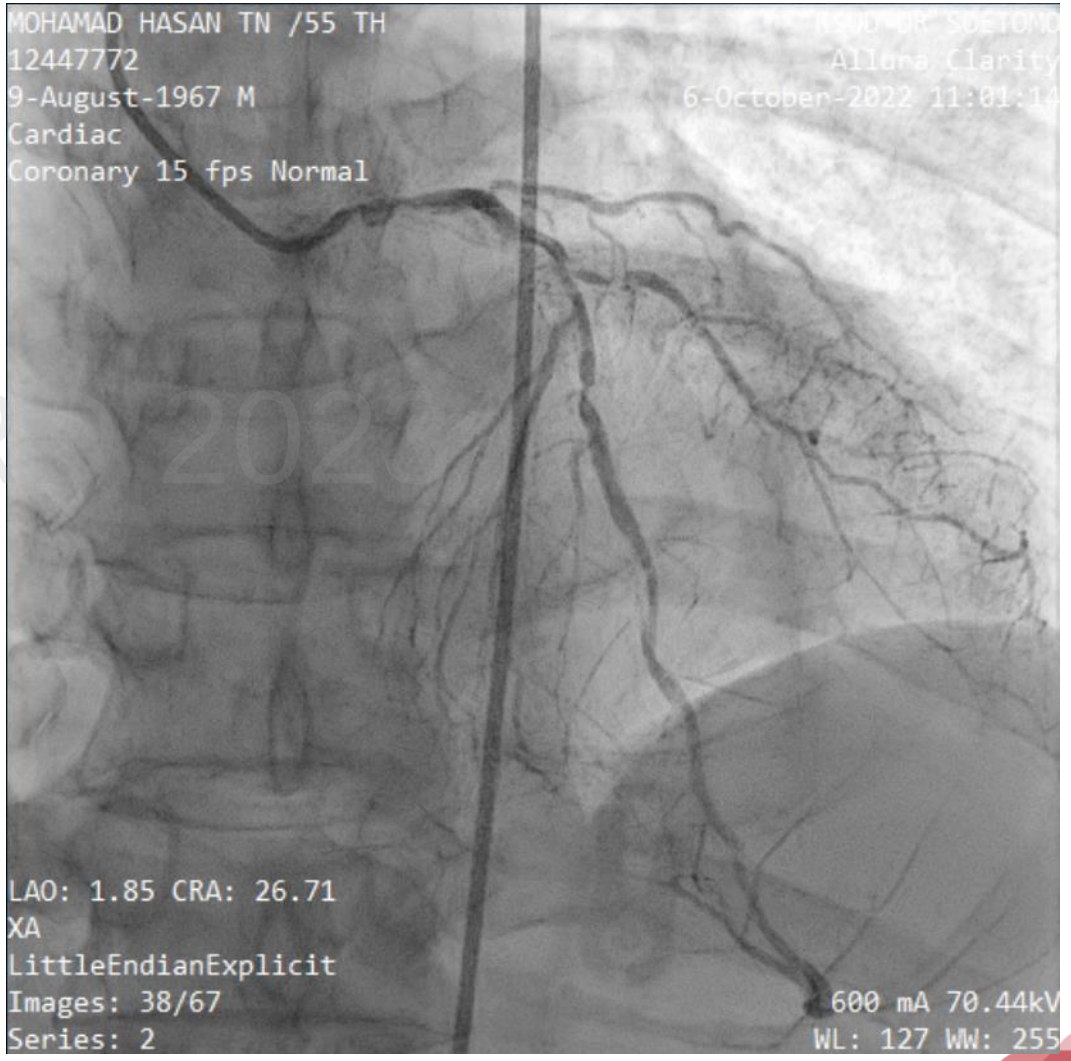
Study name	Hazard ratio	Lower limit	Upper limit	Z-Value	p-Value
Cleland et al., Eur J Heart Fail 2011	0.71	0.290	1.744	-0.745	0.456
LaBarbera et al., TCT/JACC 2012	0.73	0.619	0.855	-3.858	0.000
OVERALL	**0.73**	**0.620**	**0.852**	**-3.929**	**0.000**

Circ Heart Fail. 2017;10:e003255



Patient was then referred to the cathlab

- CAD TVD LM DISEASE (MEDINA 1-1-1), CTO DI PROX RCA, CRITICAL STENOSIS 99% DI D1, CRITICAL STENOSIS 99% DI OSTEAL LCX



Pretreatment evaluation

- Clinical assessment
- Echo
- Surgical Risk Estimation (general assessment and Risk Score estimate)

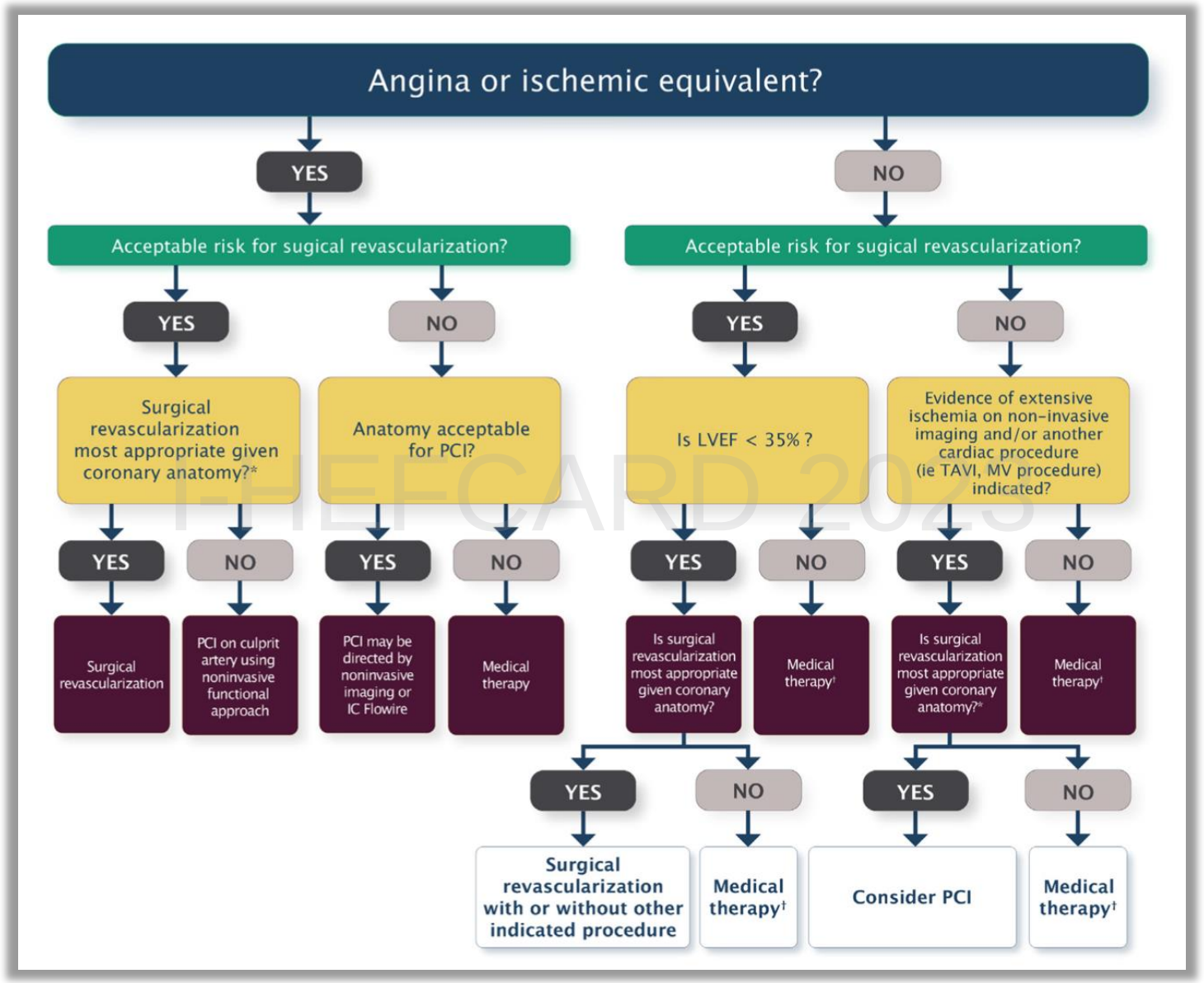
Heart Team Multidisciplinary Discussion

- CABG
- LIMA to Distal LAD
- SVG to D1
- SVG to RPLB

Recommendations for myocardial revascularization in patients with heart failure with reduced ejection fraction

Recommendations for myocardial revascularization in patients with heart failure with reduced ejection fraction

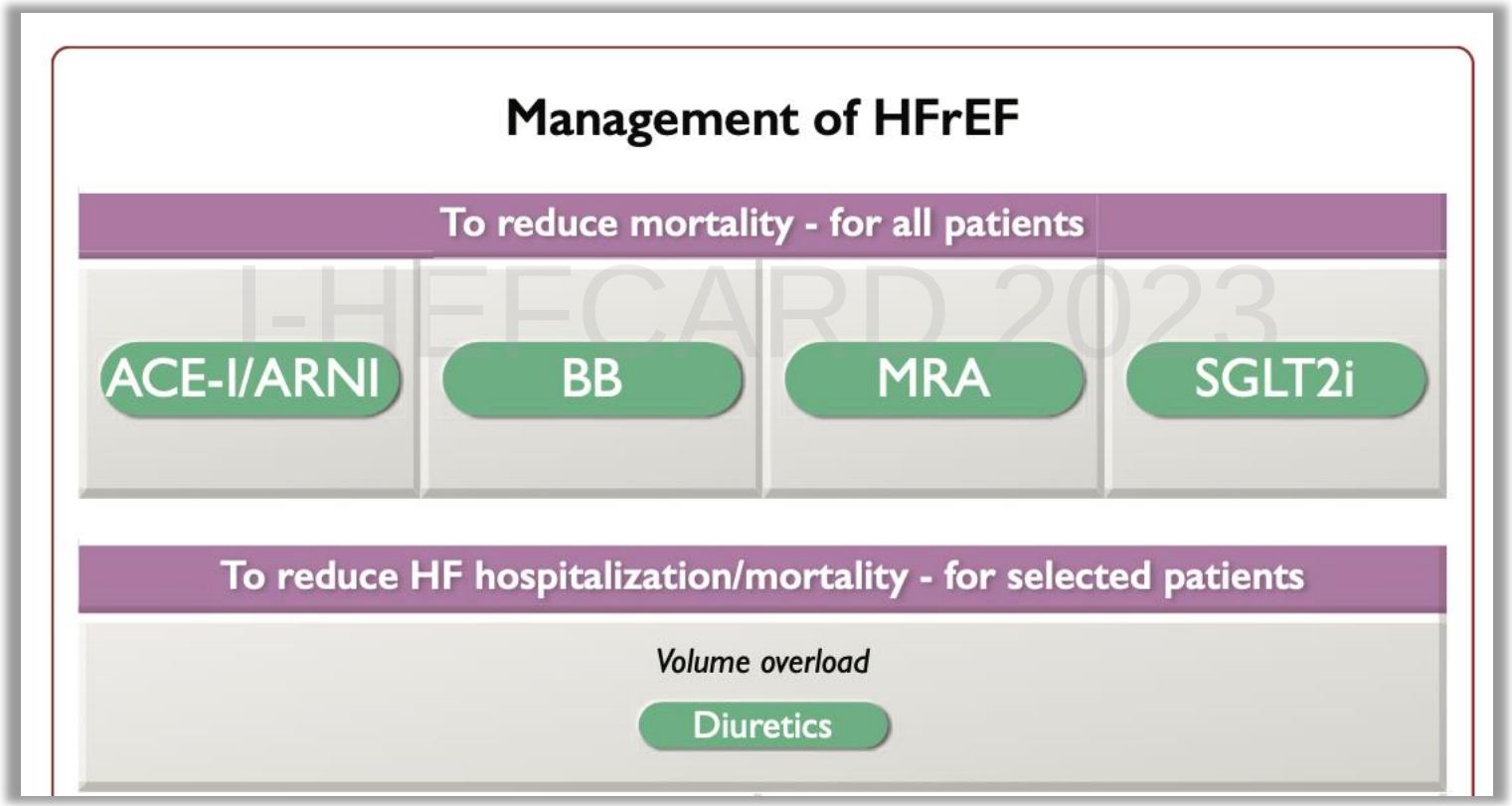
Recommendations	Class[a]	Level[b]
CABG should be considered as the first-choice revascularization strategy, in patients suitable for surgery, especially if they have diabetes and for those with multivessel disease.[581,587,588,590]	IIa	B
Coronary revascularization should be considered to relieve persistent symptoms of angina (or an angina-equivalent) in patients with HFrEF, CCS, and coronary anatomy suitable for revascularization, despite OMT including anti-anginal drugs.	IIa	C
In LVAD candidates needing coronary revascularization, CABG should be avoided, if possible.	IIa	C
Coronary revascularization may be considered to improve outcomes in patients with HFrEF, CCS, and coronary anatomy suitable for revascularization, after careful evaluation of the individual risk to benefit ratio, including coronary anatomy (i.e. proximal stenosis >90% of large vessels, stenosis of left main or proximal LAD), comorbidities, life expectancy, and patient's perspectives.	IIb	C
PCI may be considered as an alternative to CABG, based on Heart Team evaluation, considering coronary anatomy, comorbidities, and surgical risk.	IIb	C



While waiting for CABG, what you should do for the pt?

- Continue the regiment
- Re-evaluate GDMT
- Add anti anginal medication

Management of HFrEF
Re-evaluate GDMT



Post CABG

Chest discomfort were reduced, patient was sent home with regimen

- ASA 1x100 mg
- Salc/Val 2x50 mg
- Bisoprolol 1x5 mg
- Empagliflozin 1x10 mg
- Spironolacton 1x25 mg
- Furosemide 1x40 mg
- ISDN 5 mg prn

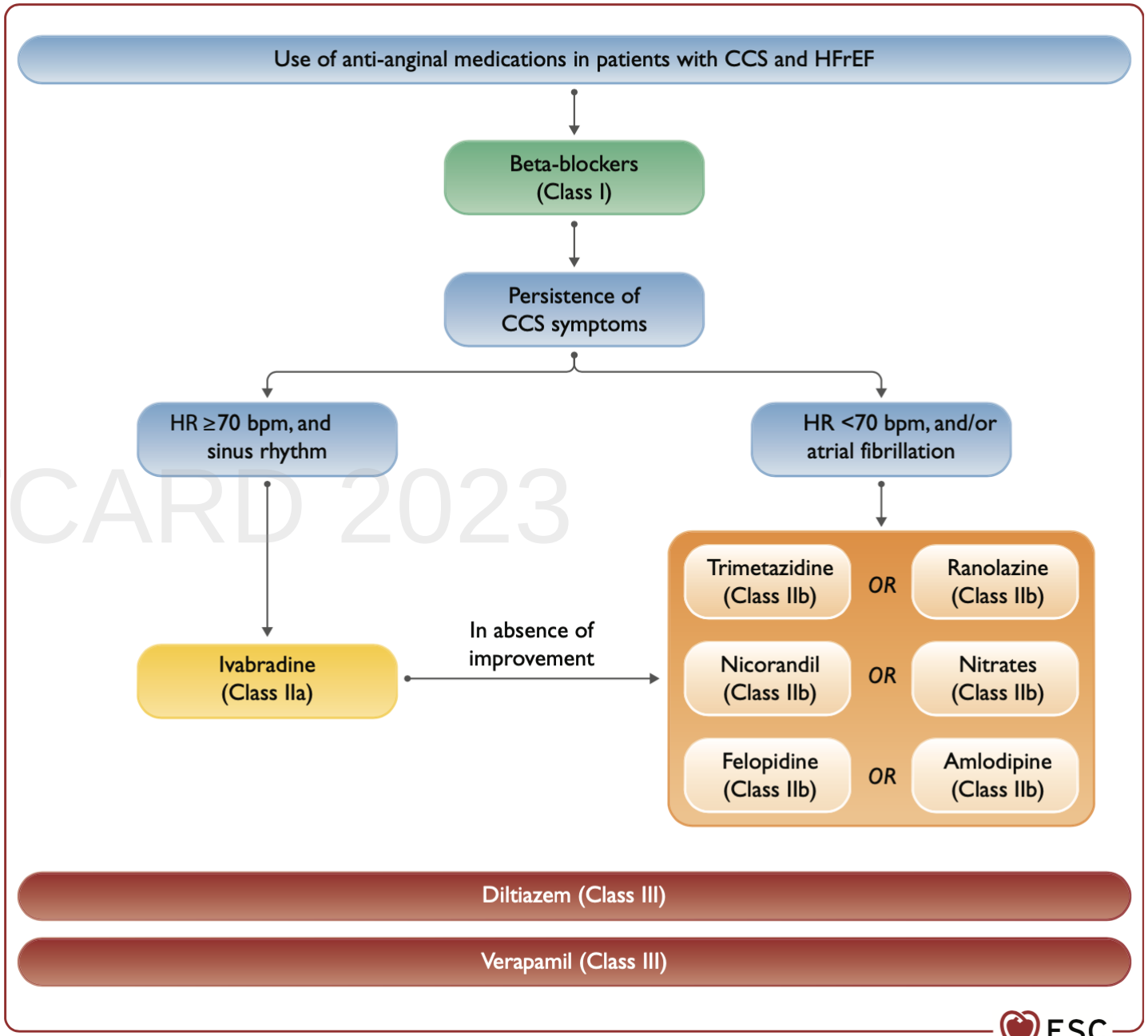
Outpatient Setting, BP 108/75, HR 81, sinus rhythm, sometimes DOE + chest discomfort,

What's your choice of treatment?

- Escalate beta blocker dose
- Add short acting nitrate

Management of Symptoms

Angina



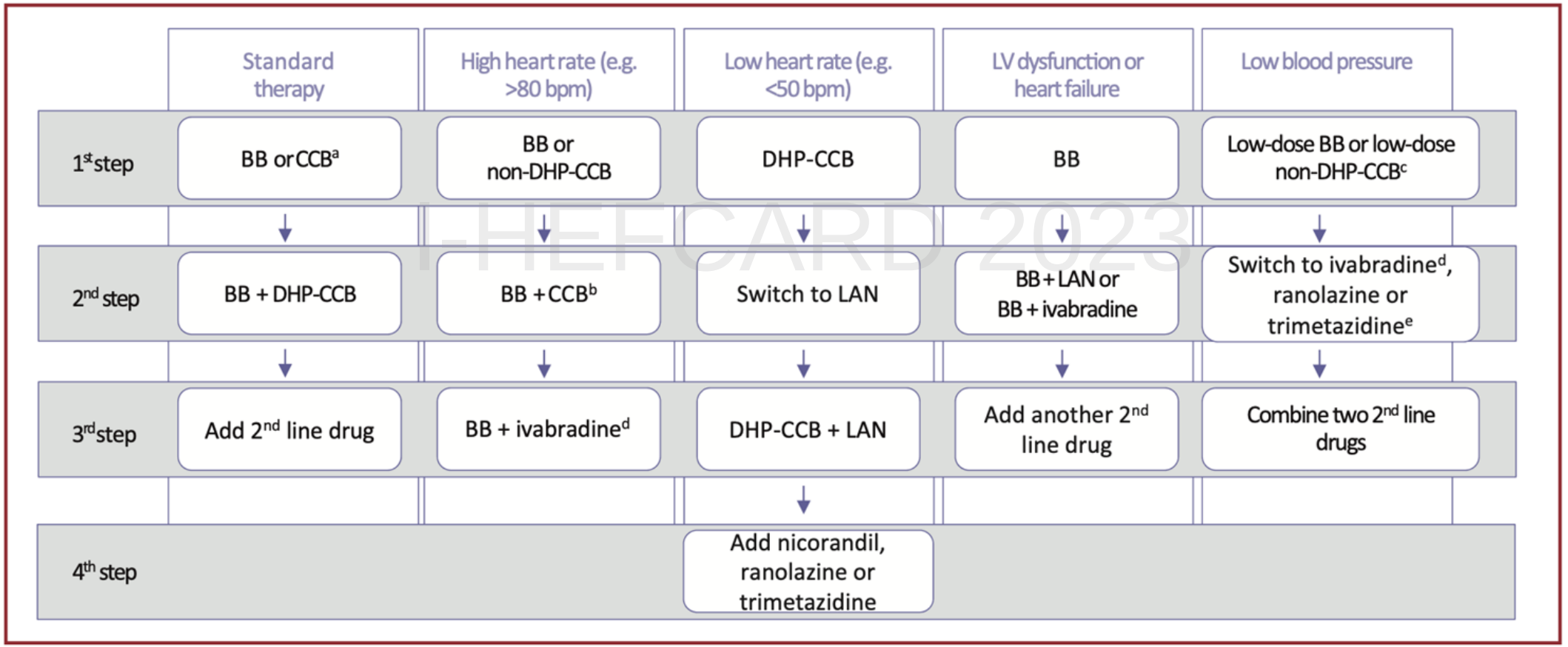
- He’s still complaining chest discomfort, with the current regiment. What will you do next?

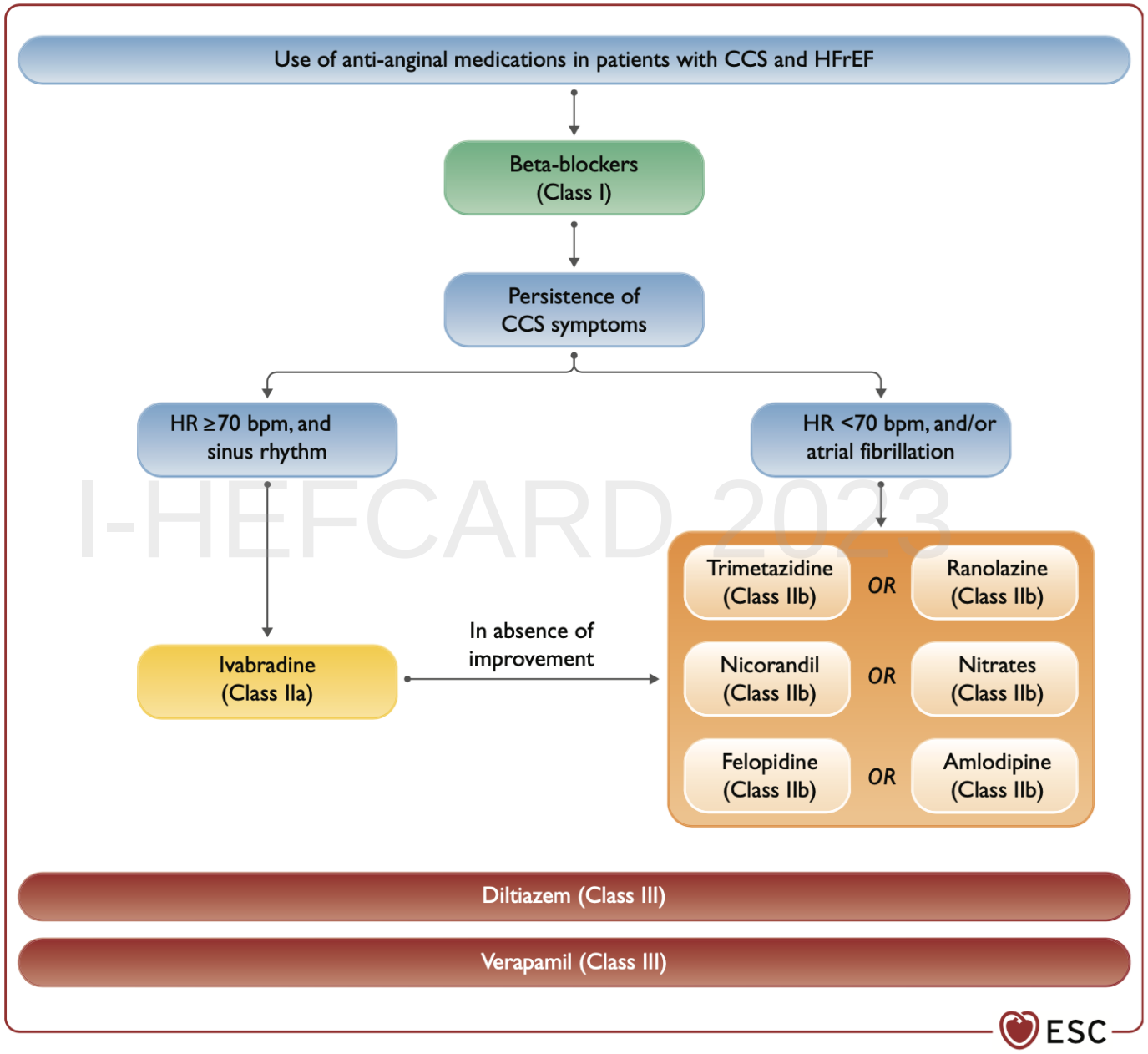
a. Add on Nitrate short acting

b. Increase Beta blocker dose

c. Add 2nd line therapy of antianginal

d. give ivabradin





Then, what about HFpEF

HFpEF in CCS…

ESC European Society of Cardiology

European Journal of Heart Failure (2020) **22**, 804–812
doi:10.1002/ejhf.1827

RESEARCH ARTICLE

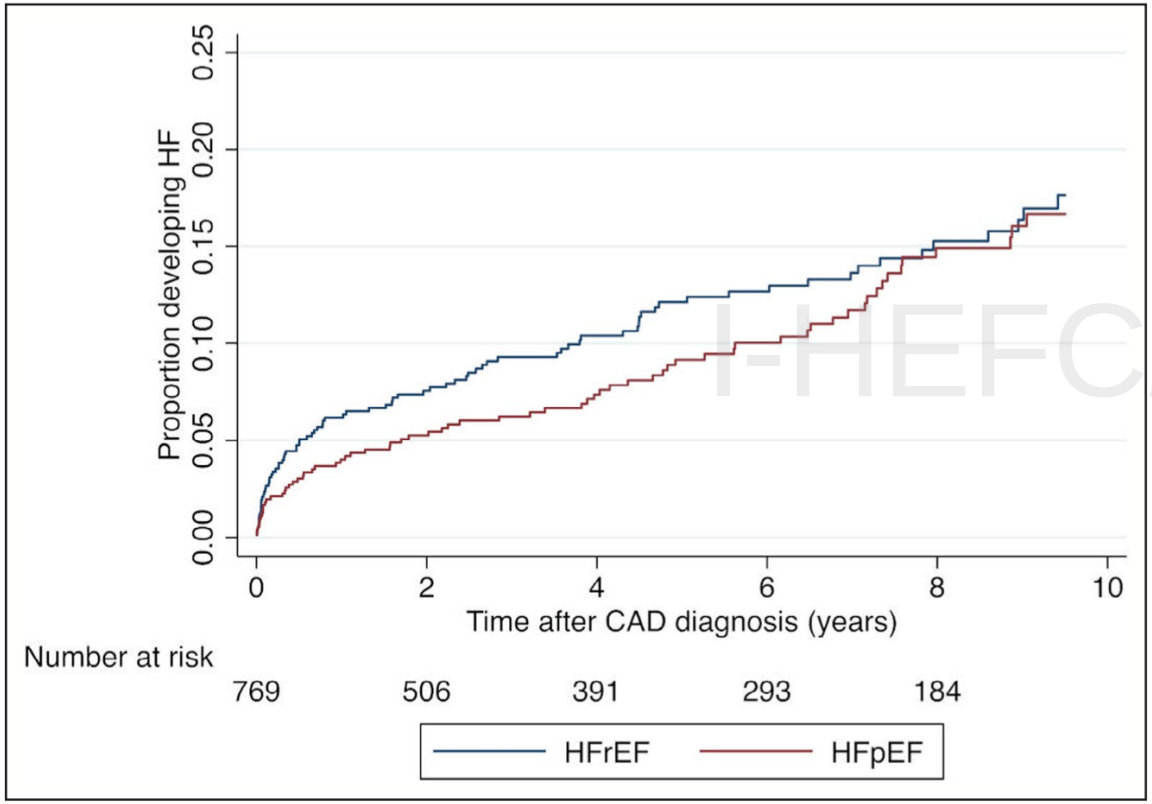
Incident heart failure in outpatients with chronic coronary syndrome: results from the international prospective CLARIFY registry

Table 1 Patient characteristics at baseline

Parameter (no. of patients with data available)	Total (*n* = 26 769)	Primary outcome (*n* = 4393)	No primary outcome (*n* = 22 376)
LV ejection fraction, % (*n* = 26 769)			
>50	13 190 (49.3)	1913 (43.5)	11 277 (50.4)
40–50	3640 (13.6)	879 (20.0)	2761 (12.3)
<40	824 (3.1)	290 (6.6)	534 (2.4)
Not available	9115 (34.1)	1311 (29.8)	7804 (34.9)

European Journal of Heart Failure (2020) **22**, 804–812

Coronary Artery Disease and Heart Failure With Preserved Ejection Fraction: The ARIC Study



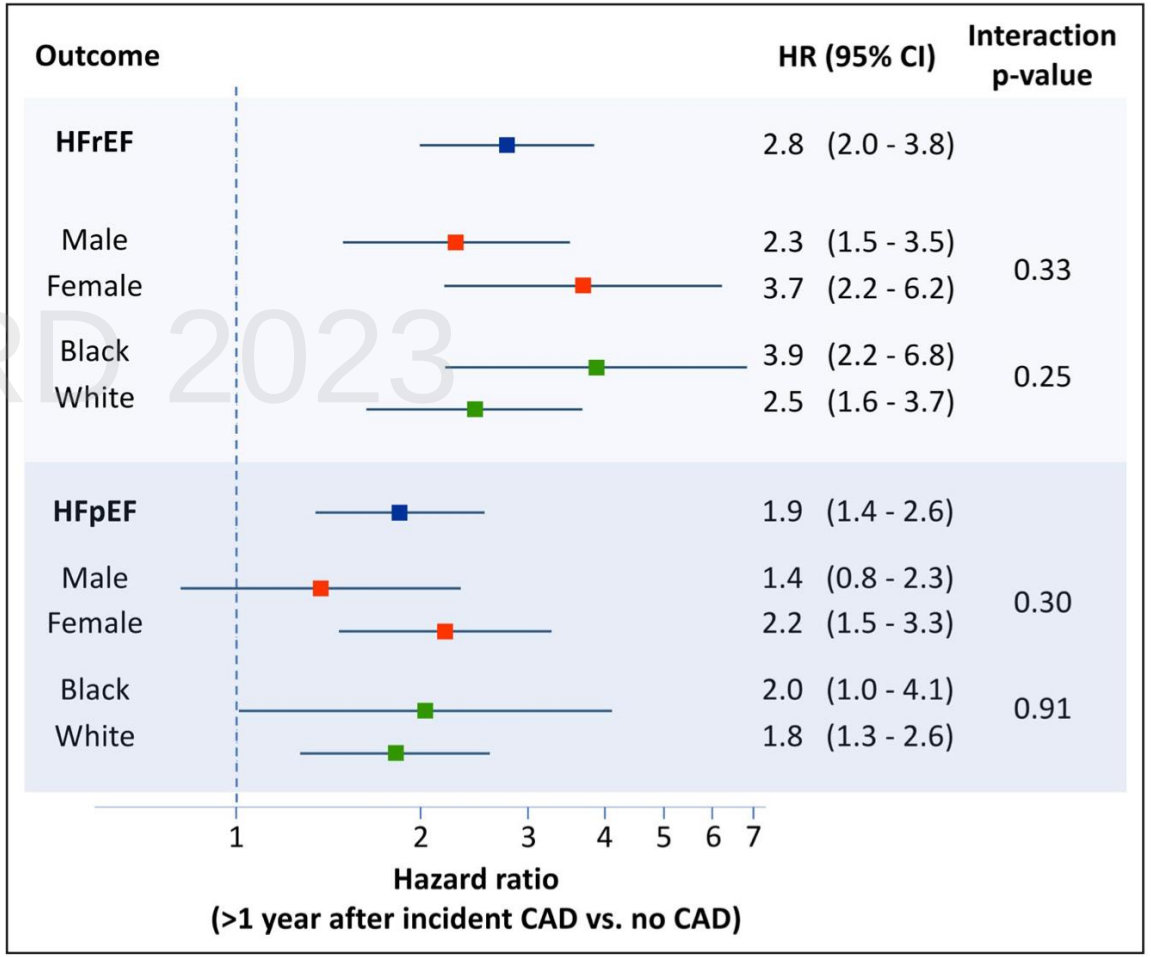
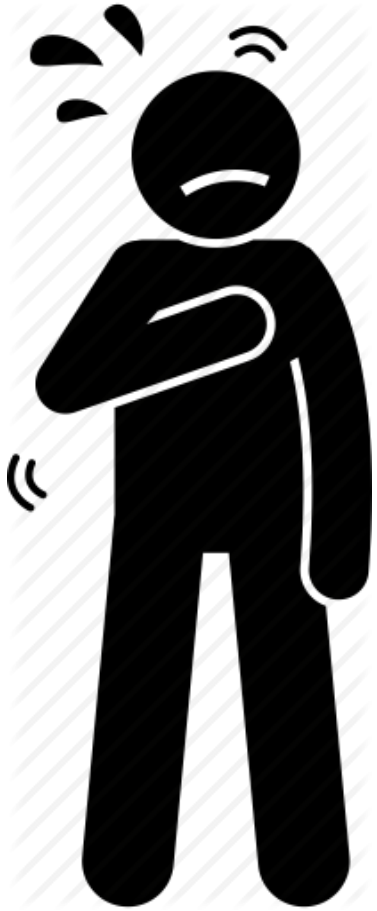


Figure 2. Incidence of HFrEF and HFpEF following CAD event.
Cumulative incidence of HFrEF (blue) and HFpEF (red) after CAD diagnosed by MI or revascularization. CAD indicates coronary artery disease; HF, heart failure; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; and MI, myocardial infarction.

J Am Heart Assoc. 2022;11:e021660

Case 3: Mr. MA, 53 yo,



Referred from district hospital
Chief Complaint: DOE, chest discomfort,

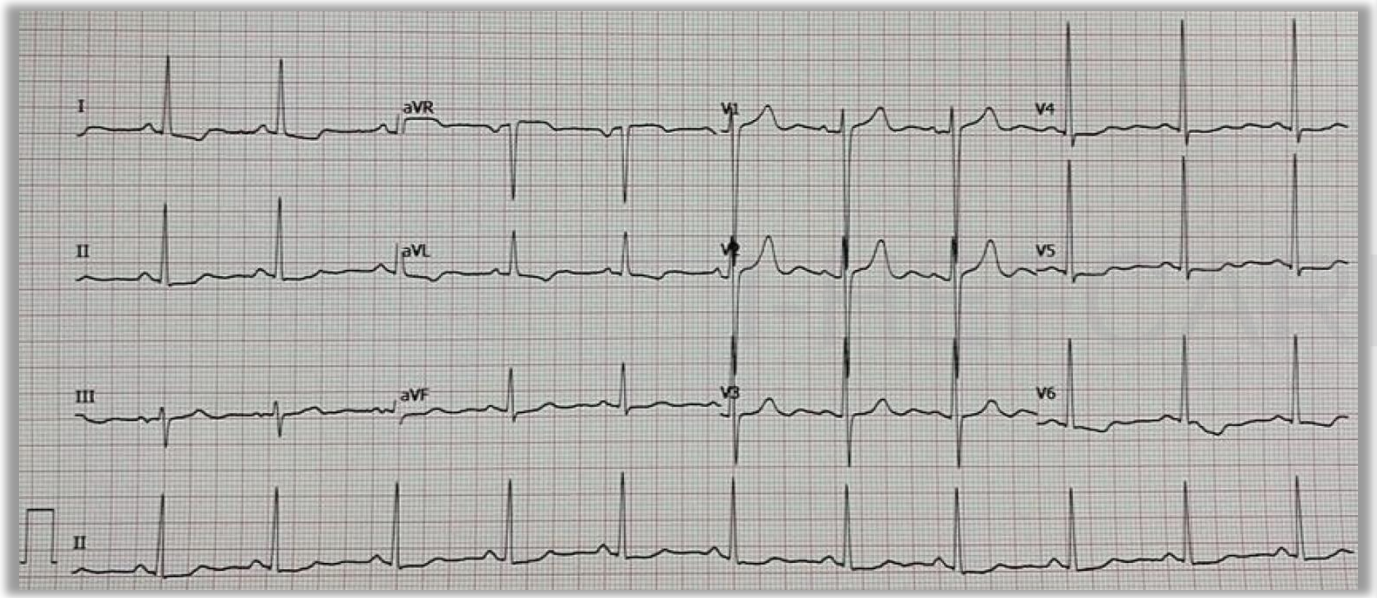
- No palpitation
- Minimal leg swelling

Medical History

- Ischemic Stroke 2022
- HT > 10 years

Current Medication

- ASA 1x100 mg po
- Isorbid mononitrat 1x60 mg po
- Concor 1x5 mg po
- Candesartan 1x8 mg po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V3
V6
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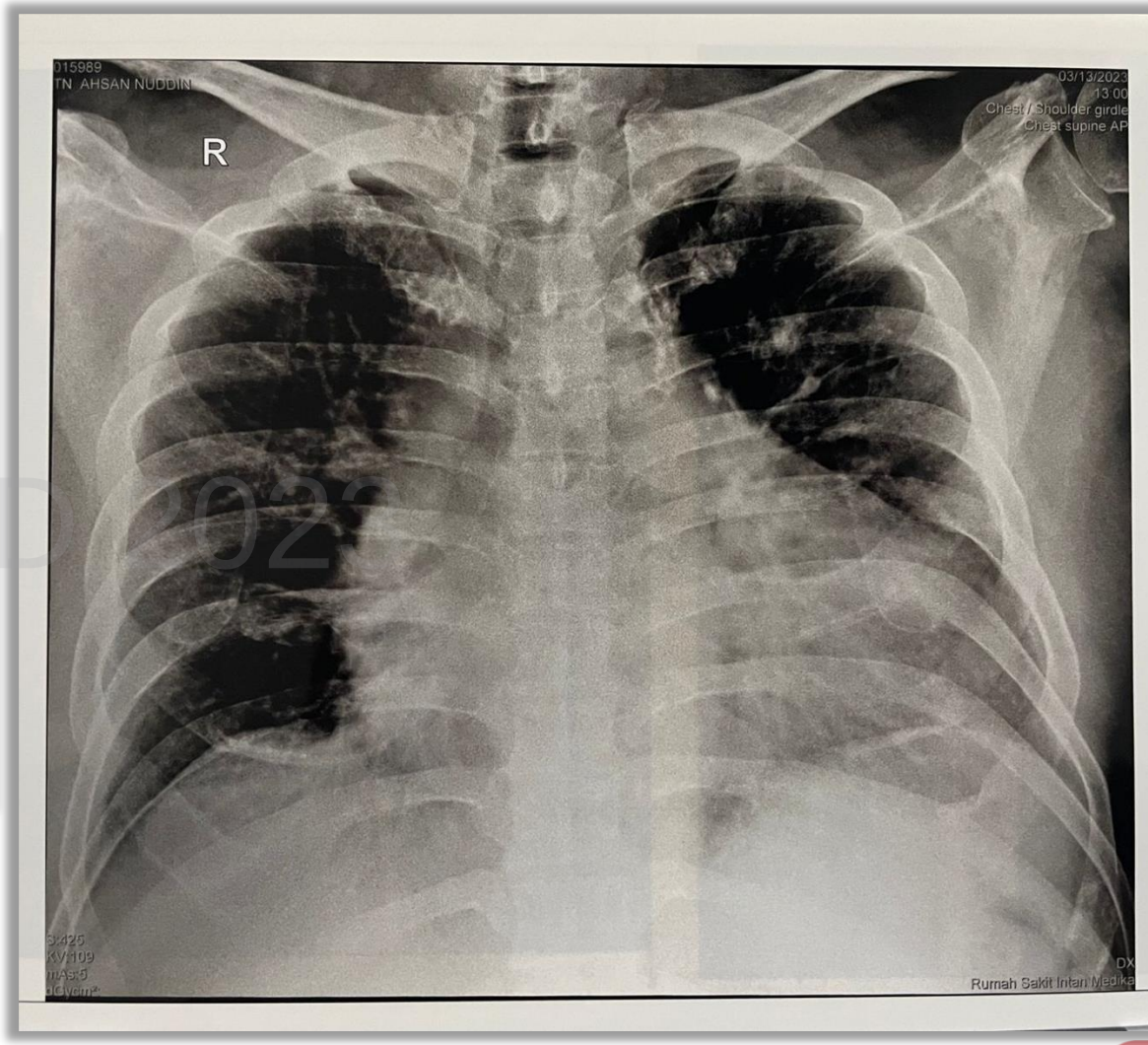
015989
TN. AHSAN NUDDIN
03/13/2023
13:00
Chest / Shoulder girdle
Chest supine AP
R
DX
Rumah Sakit Infani Medika

BB: 90 kg
TB: 171 cm
BMI: 31 (Obesity Grade 1)

Vital Signs
BP : 154/95
HR : 82 x/m
RR : 20 x/l
SaO2 : 98% room air

Physical exam
- JVP R+2 cmH20
- Rhales (-/-)
- Minimal ankle edema both legs

Labs
- Hb/Ht/Leu/plt: 9.8/28.9/9.77/311,000
- GDS: 130
- BUN/Cr: 29/1.21 (CrCl 62.7 l.min)
- Na/K/Cl: 136/4.2/111
- Chol total/LDL/HDL/TG: 92/63/24/69
- NT Pro BNP: 252 pg/ml

Echocardiography

- Preserved LVEF, EF 68%
- Wall motion: RWMA (-)
- Dyastolic dysfunction grade E'Sept 0.06 m/s: E'Lat 0.08 m/S; MV E Vel 1.07 m/s; E/A 2.52 ; E/E' AVG 12.92 ; LAVI 31.38 ml/m2; TR VMax 3.56 m/s
- Dimension heart chamber: consentric LVH
- Valves: mild MR, mild-moderate TR
- Normal contractility of RV (TAPSE 1.9 cm)

CCTA

- Significant stenosis 80% at proximal-mid LAD
- Significant stenosis at distal LCx
- CAD 2 VD

Diagnosis

- HFpEF (HFA-PEFF score 5)
- Anemia (HGB 9.8)
- Post ischemic stroke (I64)
- CAD

What Should you do next?

Unclear symptoms, optimization medical therapy for HFpEF

Consider revascularization

Revascularization in HFpEF

There are no prospective trials to determine the impact of revascularization on symptoms or outcomes specifcally among individuals with HFpEF

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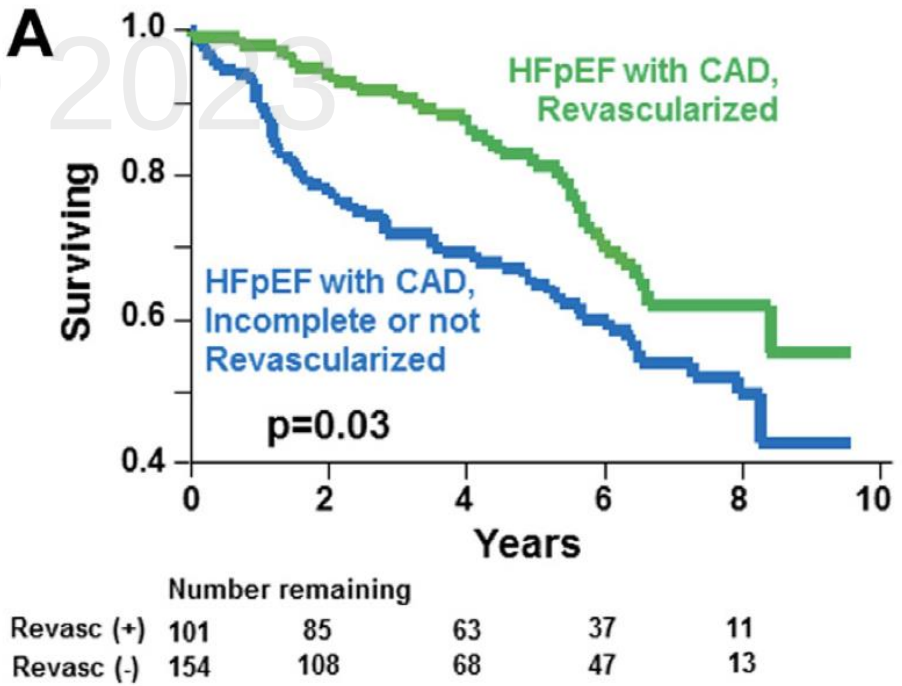
Heart Failure

Implications of Coronary Artery Disease in Heart Failure With Preserved Ejection Fraction

Seok-Jae Hwang, MD, PhD,*† Vojtech Melenovsky, MD, PhD,*‡ Barry A. Borlaug, MD*
Rochester, Minnesota; Jinju, Republic of Korea; and Prague, Czech Republic



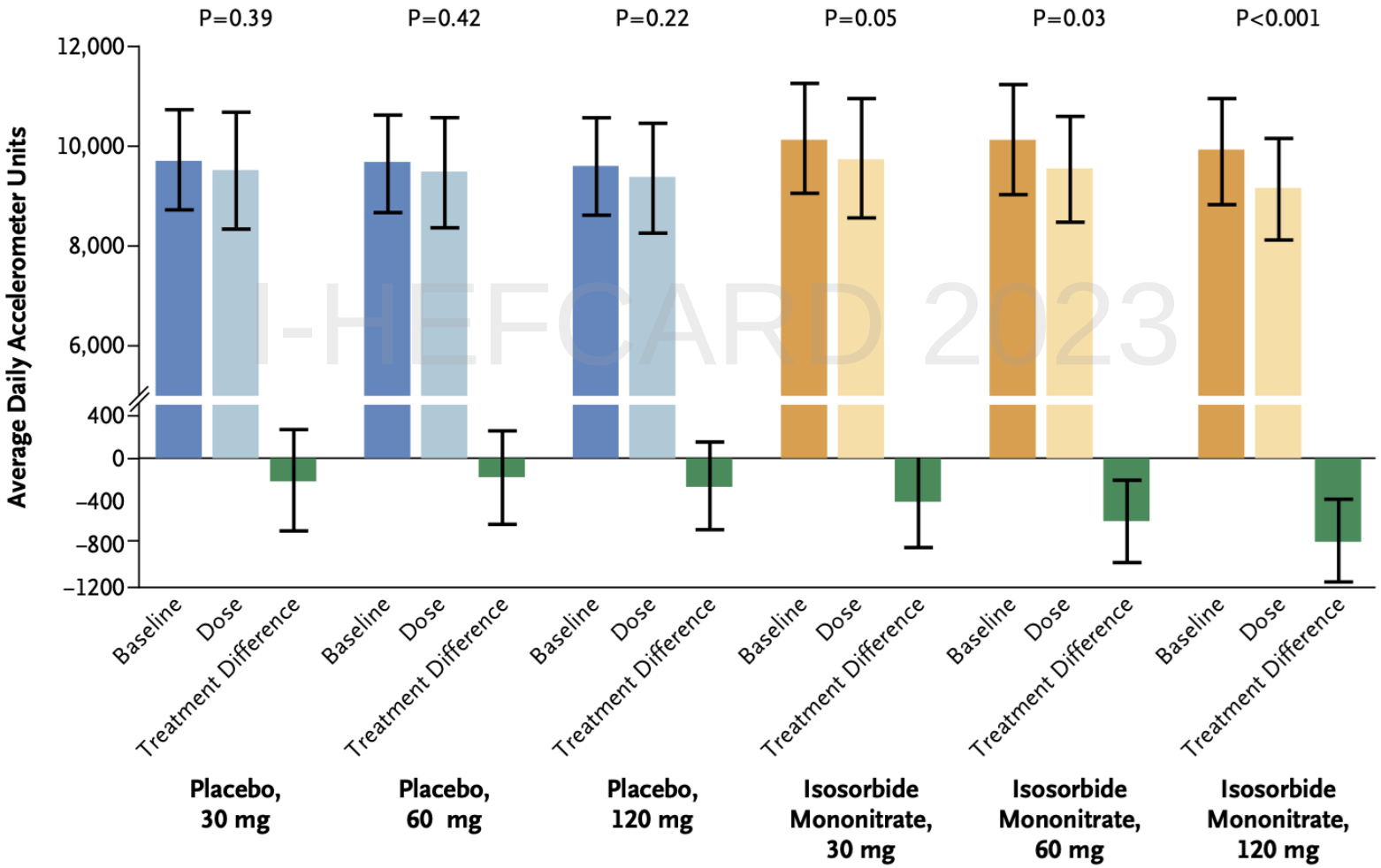
Patient was then referred to interventional cardiologist

Undergone PCI at proximal LAD, TIMI Flow III

Patient was on nitrate in daily basis, what's your take on this?

- Continue the nitrate to control angina
- Choose another agent to control angina

Isosorbide Mononitrate in Heart Failure with Preserved Ejection Fraction



n engl j med 373;24

AHA/ACC/HFSA CLINICAL PRACTICE GUIDELINE

2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

Circulation. 2022;145:e895–e1032

7.7.1. HF With Preserved Ejection Fraction

Recommendations for HF With Preserved Ejection Fraction* Referenced studies that support the recommendations are summarized in the Online Data Supplements.

COR	LOE	Recommendations
1	C-LD	1. Patients with HFpEF and hypertension should have medication titrated to attain blood pressure targets in accordance with published clinical practice guidelines to prevent morbidity.[1–3]
2a	B-R	2. In patients with HFpEF, SGLT2i can be beneficial in decreasing HF hospitalizations and cardiovascular mortality.[4]
2a	C-EO	3. In patients with HFpEF, management of AF can be useful to improve symptoms.
2b	B-R	4. In selected patients with HFpEF, MRAs may be considered to decrease hospitalizations, particularly among patients with LVEF on the lower end of this spectrum.[5–7]
2b	B-R	5. In selected patients with HFpEF, the use of ARB may be considered to decrease hospitalizations, particularly among patients with LVEF on the lower end of this spectrum.[8,9]
2b	B-R	6. In selected patients with HFpEF, ARNi may be considered to decrease hospitalizations, particularly among patients with LVEF on the lower end of this spectrum.[10,11]
3: No-Benefit	B-R	7. In patients with HFpEF, routine use of nitrates or phosphodiesterase-5 inhibitors to increase activity or QOL is ineffective.[12,13]

EXPERT CONSENSUS DECISION PATHWAY

2023 ACC Expert Consensus Decision Pathway on Management of Heart Failure With Preserved Ejection Fraction

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recommendation.[14] Given this, for patients with HFpEF and angina, other antianginal agents may be preferred. Dihydropyridine calcium-channel blockers would be beneficial if there is concomitant need to treat hypertension. Ranolazine may be used if heart rate or blood pressure are limiting.

Patient was with HT alongside HFpEF, what's your supposed regimen for this pt

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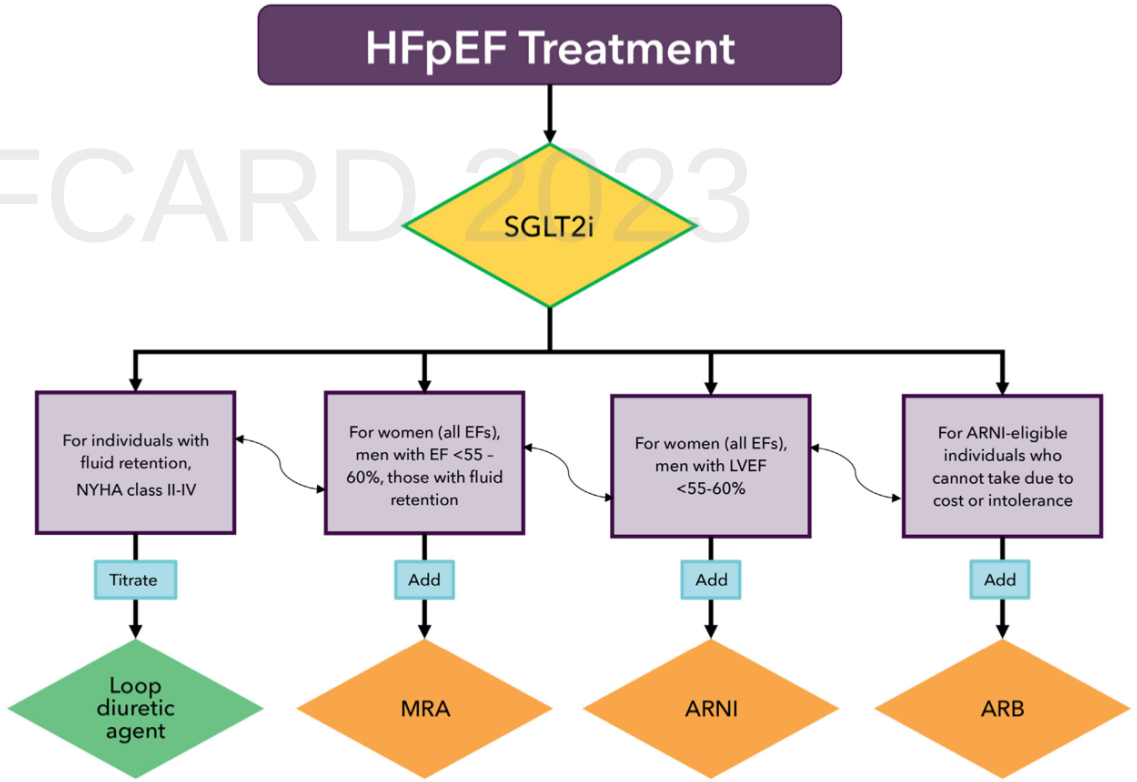
FIGURE 9 Treatment Algorithm for Guideline-Directed Medical Therapy in HFpEF*



Regiment

- **Add on Empagliflozin 10 mg**
- ASA 1x100 mg po
- **Stop Isorbid mononitrat 1x60 mg po**
- Concor 1x5 mg po
- Atorvastatin 0-0-40 mg po
- Candesartan 1x8 mg po
- **Add on amlodipine 1x5 mg po**
- Furosemide prn

Patient was then sent home

1st outpatient visit ~2 wks after

- Reduced episode of chest pain and DOE
- Referred to cardiac rehabilitation

Thank you