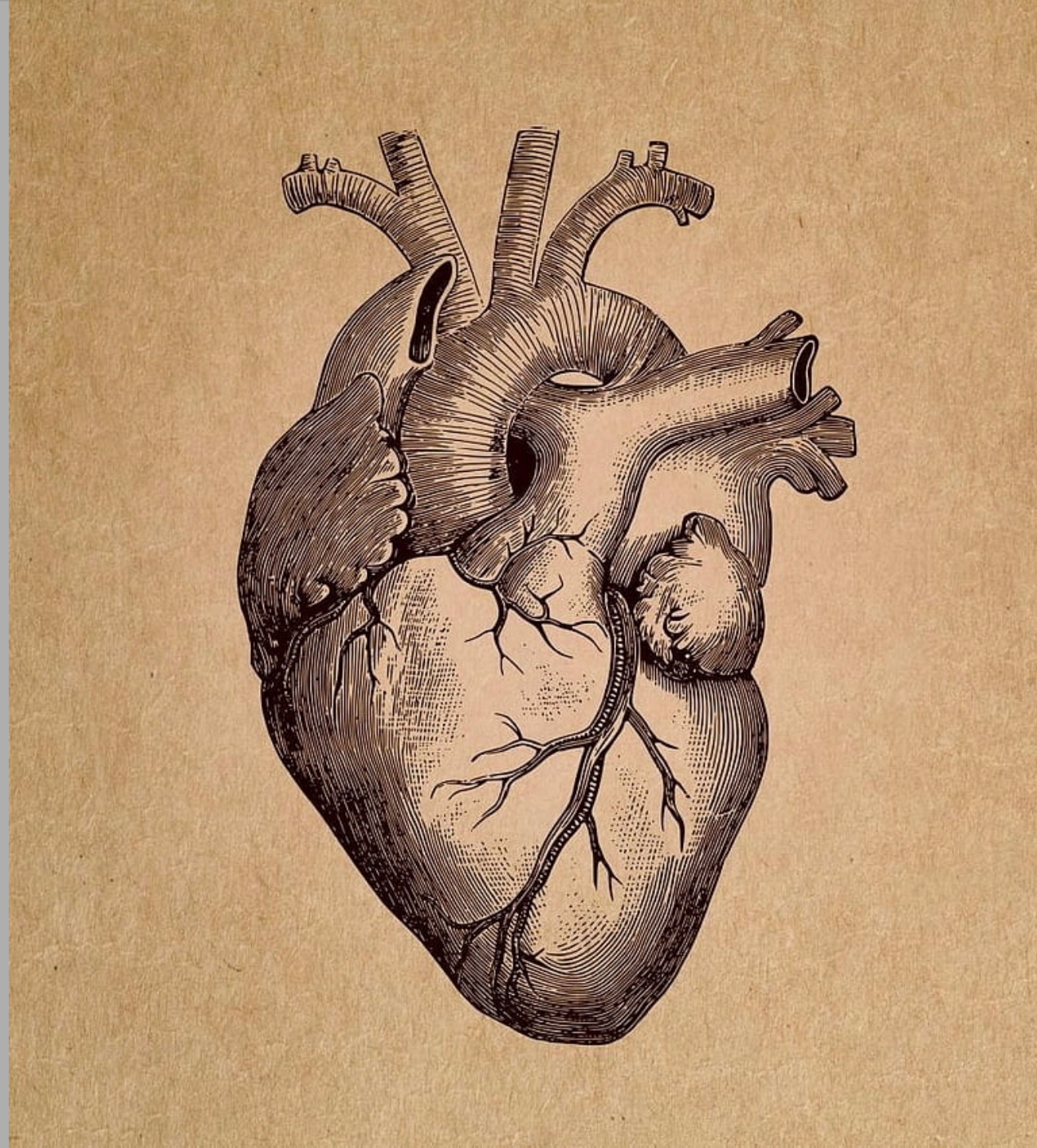
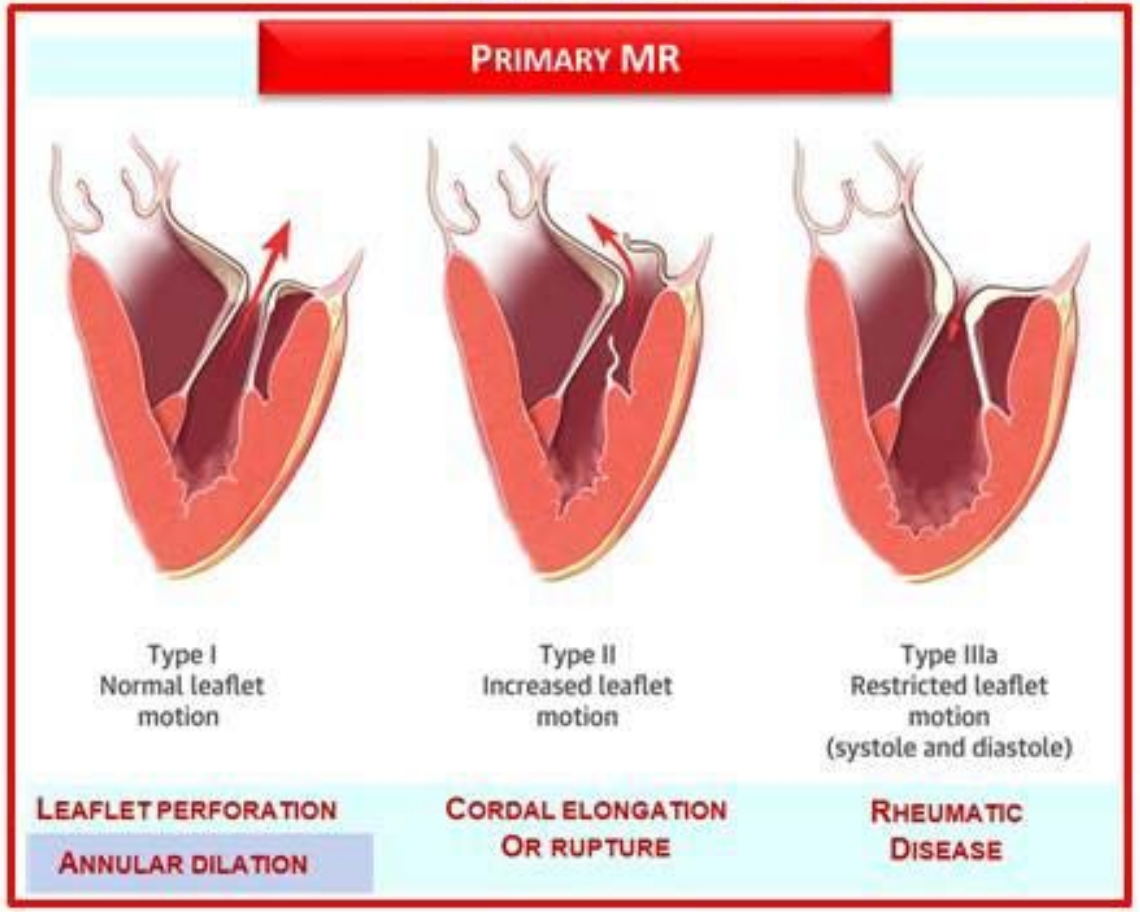
AŞAĞI EF VƏ CİDDİ MÇ CƏRRAHİ?

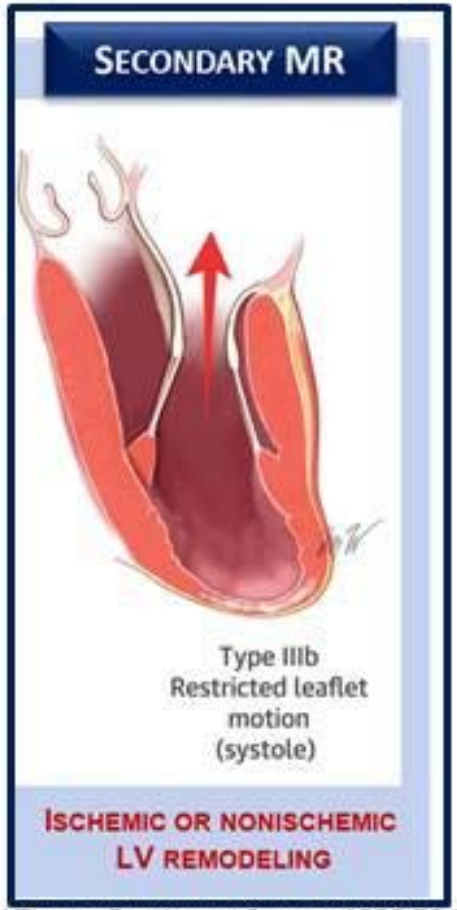
T.E.D. Dr. Rəşad Mahmudov
Dr. Fidan Abdullayeva



KLASSİFİKASİYA

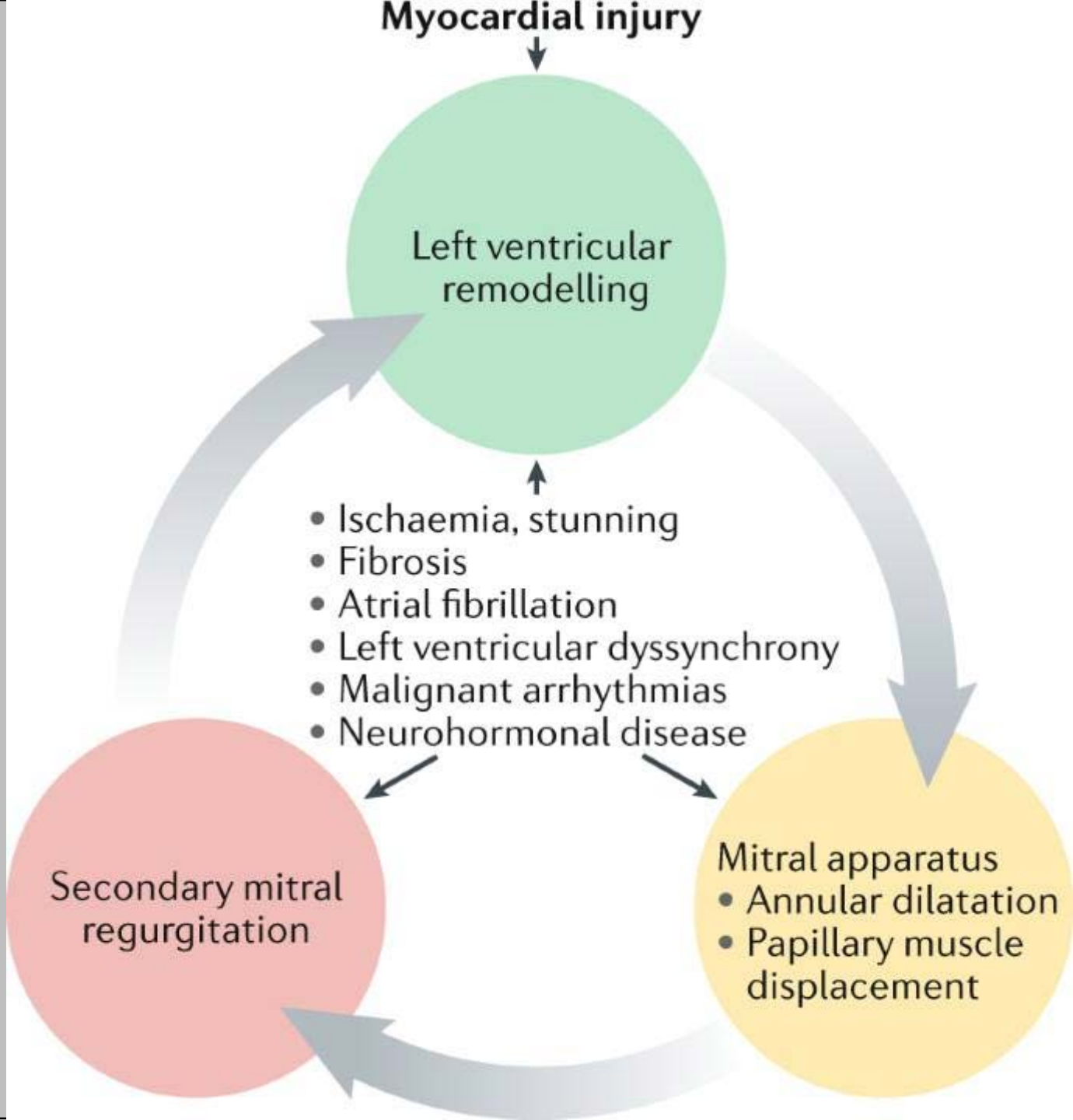
Carpentier Classification of Mitral Regurgitation

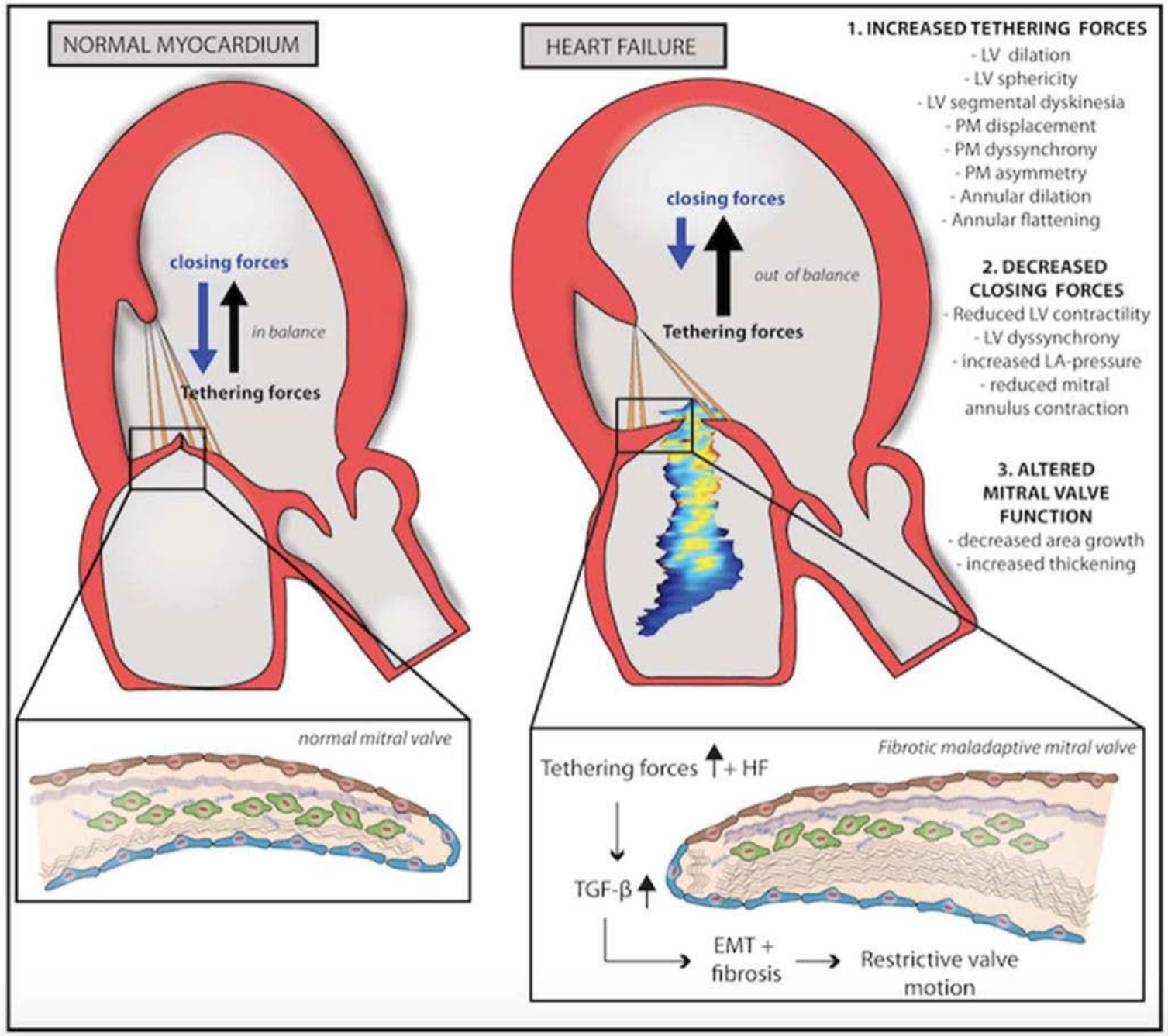




Carpentier et al *J Thorac Cardiovasc Surgery* 1980;79:338-348

PATOFİZİOLOGİYA



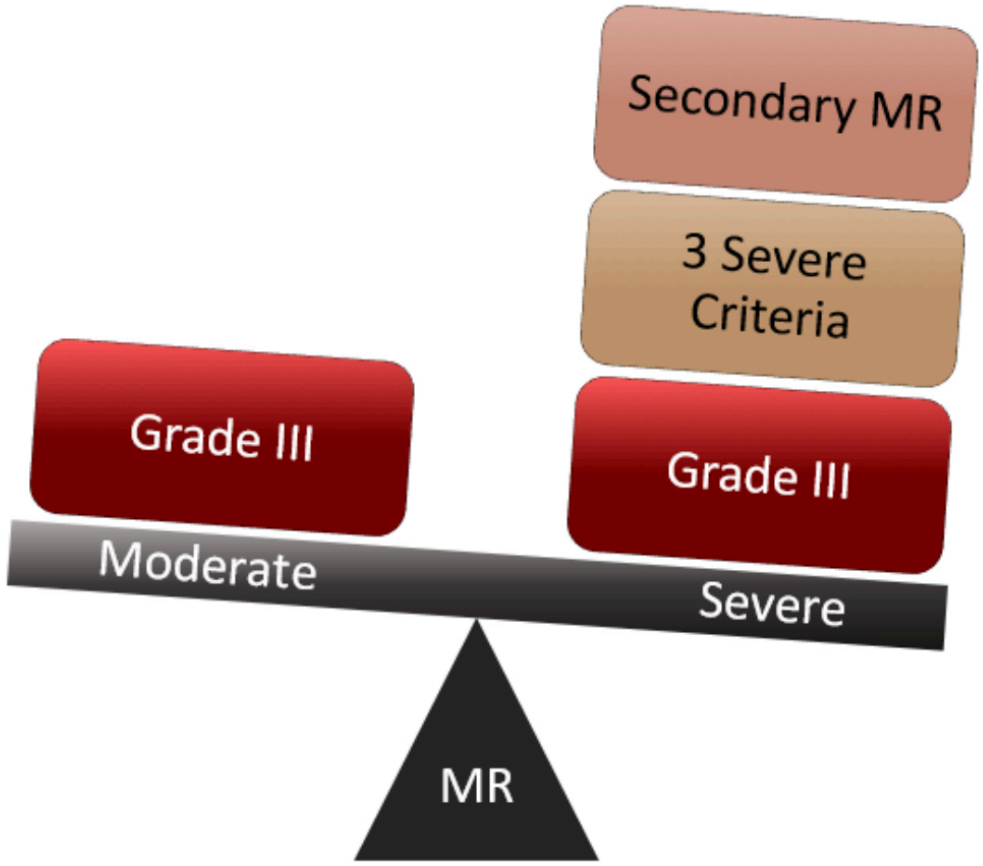

NORMAL MYOCARDIUM
HEART FAILURE
1. INCREASED TETHERING FORCES
- LV dilation
- LV sphericity
- LV segmental dyskinesia
- PM displacement
- PM dyssynchrony
- PM asymmetry
- Annular dilation
- Annular flattening
2. DECREASED CLOSING FORCES
- Reduced LV contractility
- LV dyssynchrony
- increased LA-pressure
- reduced mitral annulus contraction
3. ALTERED MITRAL VALVE FUNCTION
- decreased area growth
- increased thickening
closing forces
in balance
Tethering forces
closing forces
out of balance
Tethering forces
normal mitral valve
Fibrotic maladaptive mitral valve
Tethering forces + HF
TGF-β
EMT + fibrosis
Restrictive valve motion

DƏRƏCƏLƏNDİRMƏ

Measure	Grade I	Grade II	Grade III		Grade IV
	Mild	Moderate	Moderate	Severe	Severe
EROA (cm^2)	< 0.20	0.2 – 0.29	0.3 – 0.39	0.3 – 0.39*	≥ 0.4
RVol (mL)	< 30	30 – 44	45 – 59	45 – 59*	≥ 60
RF%	< 30	30 – 39	40 – 49	40 – 49*	≥ 50

*3 specific severe criteria **or** secondary MR

MR QUANTIFICATION



Mitral Regurgitation

Severe Criteria
Flail leaflet
Central large jet > 50% area
VCW ≥ 0.7cm
Flow convergent radius ≥ 1.0 cm
Pulmonary vein flow reversal
Enlarged LV with normal function

≥ 4 Criteria

↓

SEVERE MR

Grade	Definition	Valve Anatomy	Valve Hemodynamics*	Associated Cardiac Findings	Symptoms
A	At risk of MR	• Normal valve leaflets, chords, and annulus in a patient with coronary disease or cardiomyopathy	• No MR jet or small central jet area <20% LA on Doppler • Small vena contracta <0.30 cm	• Normal or mildly dilated LV size with fixed (infarction) or inducible (ischemia) regional wall motion abnormalities • Primary myocardial disease with LV dilation and systolic dysfunction	• Symptoms due to coronary ischemia or HF may be present that respond to revascularization and appropriate medical therapy
B	Progressive MR	• Regional wall motion abnormalities with mild tethering of mitral leaflet • Annular dilation with mild loss of central coaptation of the mitral leaflets	• ERO <0.20 cm^2† • Regurgitant volume <30 mL • Regurgitant fraction <50%	• Regional wall motion abnormalities with reduced LV systolic function • LV dilation and systolic dysfunction due to primary myocardial disease	• Symptoms due to coronary ischemia or HF may be present that respond to revascularization and appropriate medical therapy
C	Asymptomatic severe MR	• Regional wall motion abnormalities and/or LV dilation with severe tethering of mitral leaflet • Annular dilation with severe loss of central coaptation of the mitral leaflets	• ERO ≥0.20 cm^2† • Regurgitant volume ≥30 mL • Regurgitant fraction ≥50%	• Regional wall motion abnormalities with reduced LV systolic function • LV dilation and systolic dysfunction due to primary myocardial disease	• Symptoms due to coronary ischemia or HF may be present that respond to revascularization and appropriate medical therapy
D	Symptomatic severe MR	• Regional wall motion abnormalities and/or LV dilation with severe tethering of mitral leaflet • Annular dilation with severe loss of central coaptation of the mitral leaflets	• ERO ≥0.20 cm^2† • Regurgitant volume ≥30 mL • Regurgitant fraction ≥50%	• Regional wall motion abnormalities with reduced LV systolic function • LV dilation and systolic dysfunction due to primary myocardial disease	• HF symptoms due to MR persist even after revascularization and optimization of medical therapy • Decreased exercise tolerance • Exertional dyspnea

*Several valve hemodynamic criteria are provided for assessment of MR severity, but not all criteria for each category will be present in each patient. Categorization of MR severity as mild, moderate, or severe depends on data quality and integration of these parameters in conjunction with other clinical evidence.

†The measurement of the proximal isovelocity surface area by 2D TTE in patients with secondary MR underestimates the true ERO due to the crescentic shape of the proximal convergence.

2D indicates 2-dimensional; ERO, effective regurgitant orifice; HF, heart failure; LA, left atrium; LV, left ventricular; MR, mitral regurgitation; and TTE, transthoracic echocardiogram.

Recommendations for Diagnosis of Secondary MR

Referenced studies that support the recommendations are summarized in Online Data Supplement 31.

COR	LOE	Recommendations
1	B-NR	1. In patients with chronic secondary MR (Stages B to D), TTE is useful to establish the etiology and to assess the extent of regional and global LV remodeling and systolic dysfunction, severity of MR, and magnitude of pulmonary hypertension.[1,2]
1	C-EO	2. In patients with chronic secondary MR (Stages B to D), noninvasive imaging (stress nuclear/PET, CMR, or stress echocardiography), coronary CT angiography, or coronary arteriography is useful to establish etiology of MR and to assess myocardial viability.
1	B-NR	3. In patients with chronic secondary MR with severe symptoms (Stage D) that are unresponsive to GDMT who are being considered for transcatheter mitral valve interventions, TEE is indicated to determine suitability for the procedure.[3–8]
1	C-EO	4. In patients with chronic secondary MR undergoing transcatheter mitral valve intervention, intraprocedural guidance with TEE is recommended.[4,7,9–13]

Synopsis

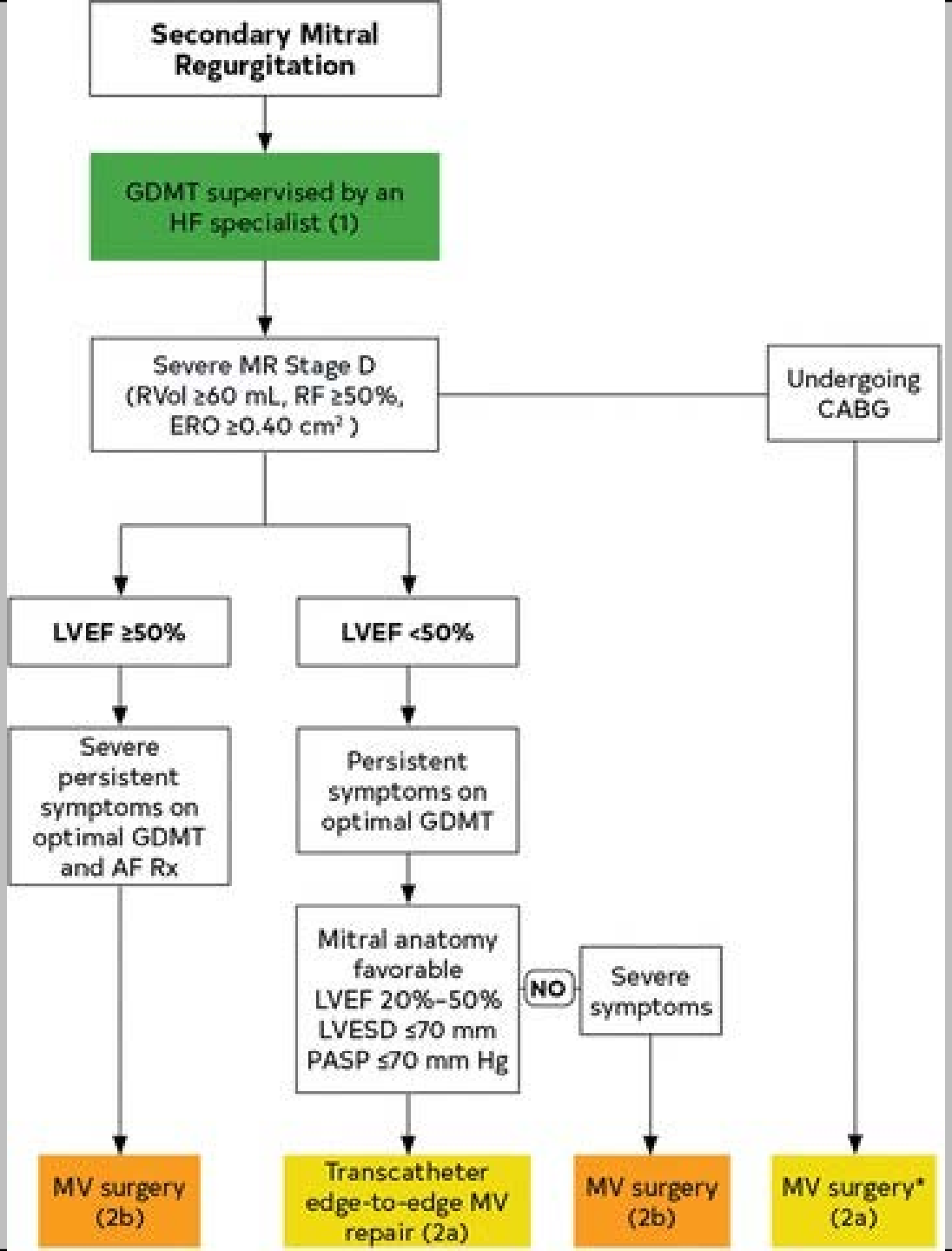
In symptomatic patients with chronic secondary MR, TTE is the initial diagnostic modality. Assessment of the coronary anatomy and myocardial viability may be helpful in management if ischemic MR is suspected. If transcatheter mitral valve intervention is contemplated, TEE determines suitability for the procedure and guides the procedure.[1]

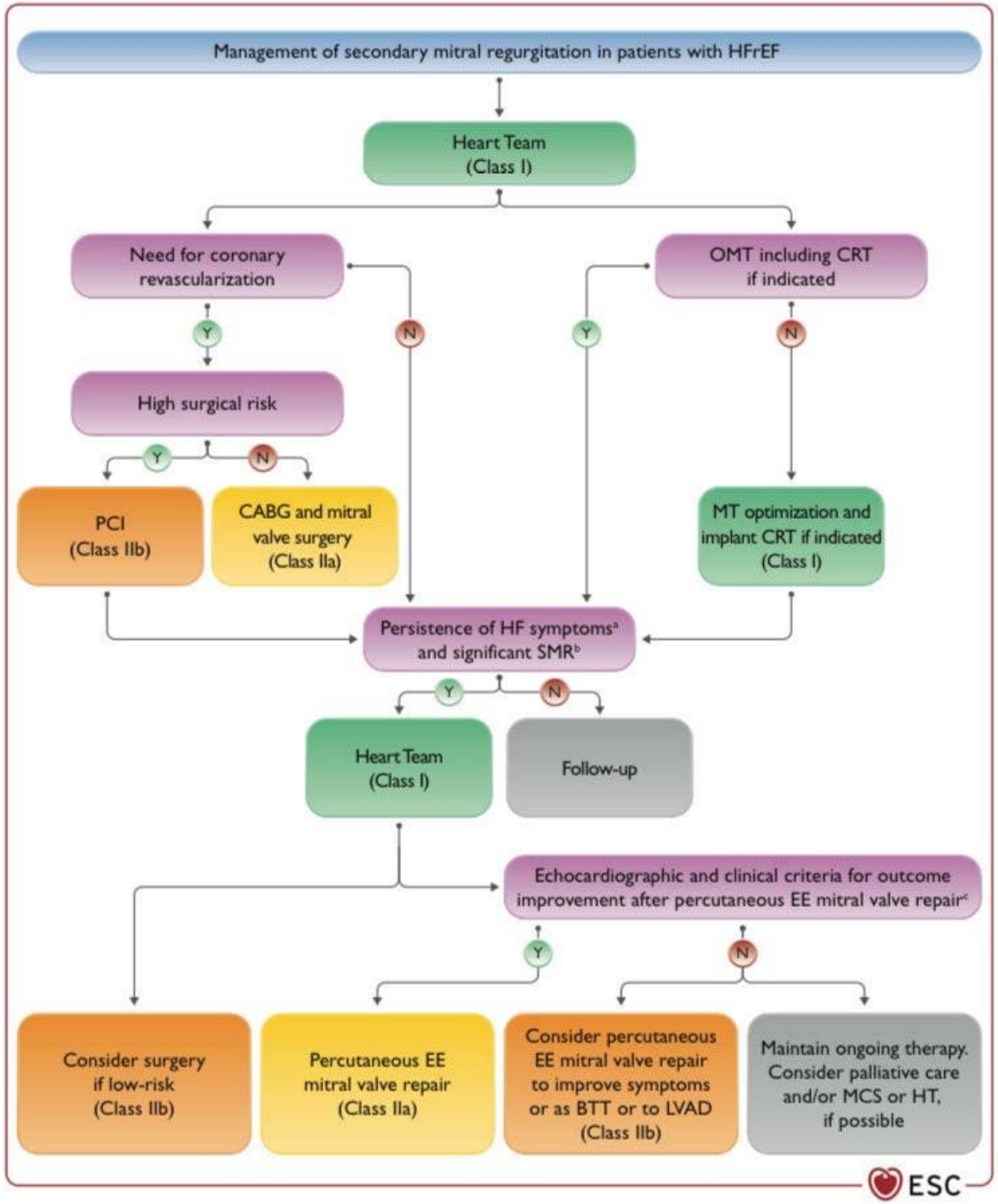
MÜALİCƏ

SIZE OF TREATMENT EFFECT

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT

	CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	CLASS IIa *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/administer treatment	CLASS IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	CLASS III *No Benefit* or CLASS III *Harm* Procedure/ Test / Treatment COR III: No benefit — Not Helpful — No Proven Benefit COR III: Harm — Excess Cost w/o Benefit or Harmful — Harmful to Patients
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	■ Recommendation that procedure or treatment is useful/effective ■ Sufficient evidence from multiple randomized trials or meta-analyses	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Sufficient evidence from multiple randomized trials or meta-analyses
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is useful/effective ■ Evidence from single randomized trial or nonrandomized studies	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Evidence from single randomized trial or nonrandomized studies
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	■ Recommendation that procedure or treatment is useful/effective ■ Only expert opinion, case studies, or standard of care	■ Recommendation in favor of treatment or procedure being useful/effective ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation's usefulness/efficacy less well established ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Only expert opinion, case studies, or standard of care
Suggested phrases for writing recommendations	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	COR III: No Benefit is not recommended is not indicated should not be performed/ administered/ other is not useful/ beneficial/ effective COR III: Harm potentially harmful causes harm associated with excess morbidity/mortality should not be performed/ administered/ other
Comparative effectiveness phrases†	treatment/strategy A is recommended/indicated in preference to treatment B treatment A should be chosen over treatment B	treatment/strategy A is probably recommended/indicated in preference to treatment B it is reasonable to choose treatment A over treatment B		


Secondary Mitral Regurgitation
GDMT supervised by an HF specialist (1)
Severe MR Stage D (RVol ≥60 mL, RF ≥50%, ERO ≥0.40 cm²)
Undergoing CABG
LVEF ≥50%
LVEF <50%
Severe persistent symptoms on optimal GDMT and AF Rx
Persistent symptoms on optimal GDMT
Mitral anatomy favorable LVEF 20%–50% LVESD ≤70 mm PASP ≤70 mm Hg
NO
Severe symptoms
MV surgery (2b)
Transcatheter edge-to-edge MV repair (2a)
MV surgery (2b)
MV surgery* (2a)


Management of secondary mitral regurgitation in patients with HFrEF
Heart Team (Class I)
Need for coronary revascularization
OMT including CRT if indicated
Y
N
Y
N
High surgical risk
Y
N
PCI (Class IIb)
CABG and mitral valve surgery (Class IIa)
MT optimization and implant CRT if indicated (Class I)
Persistence of HF symptoms[a] and significant SMR[b]
Y
N
Heart Team (Class I)
Follow-up
Echocardiographic and clinical criteria for outcome improvement after percutaneous EE mitral valve repair[c]
Y
N
Consider surgery if low-risk (Class IIb)
Percutaneous EE mitral valve repair (Class IIa)
Consider percutaneous EE mitral valve repair to improve symptoms or as BTT or to LVAD (Class IIb)
Maintain ongoing therapy. Consider palliative care and/or MCS or HT, if possible
ESC

Recommendations	Class[b]	Level[c]
Valve surgery/intervention is recommended only in patients with severe SMR who remain symptomatic despite GDMT (including CRT if indicated) and has to be decided by a structured collaborative Heart Team.[247,323,336,337]	I	B
Patients with concomitant coronary artery or other cardiac disease requiring treatment		
Valve surgery is recommended in patients undergoing CABG or other cardiac surgery.[329,330,333]	I	B
In symptomatic patients, who are judged not appropriate for surgery by the Heart Team on the basis of their individual characteristics,[d] PCI (and/or TAVI) possibly followed by TEER (in case of persisting severe SMR) should be considered.	IIa	C

Chronic Severe *Secondary* Mitral Regurgitation: Intervention

Recommendations	COR	LOE
MV surgery is reasonable for patients with chronic severe secondary MR (stages C and D) who are undergoing CABG or AVR	IIa	C
MV surgery may be considered for severely symptomatic patients (NYHA class III-IV) with chronic severe secondary MR (stage D)	IIb	B
MV repair may be considered for patients with chronic moderate secondary MR (stage B) who are undergoing other cardiac surgery	IIb	C

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American Heart Association.

Recommendations for Medical Therapy for Secondary MR

Referenced studies that support the recommendations are summarized in Online Data Supplement 31.

COR	LOE	Recommendations
1	A	1. Patients with chronic severe secondary MR (Stages C and D) and HF with reduced LVEF should receive standard GDMT for HF, including ACE inhibitors, ARBs, beta blockers, aldosterone antagonists, and/or sacubitril/valsartan, and biventricular pacing as indicated.[1–11]
1	C-EO	2. In patients with chronic severe secondary MR and HF with reduced LVEF, a cardiologist expert in the management of patients with HF and LV systolic dysfunction should be the primary MDT member responsible for implementing and monitoring optimal GDMT.[9,12]

Synopsis

GDMT for HF with reduced LVEF in patients with severe secondary MR should be provided, in conjunction with a cardiology expert, in the management of HF.

TƏMİR YOXSA REPLASMAN?

Results: There was a trend towards better perioperative survival in the RPR arm. However, the difference fell short of statistical significance [odds ratio (OR) (95% confidence interval [CI]): 0.66 (0.41-1.07), p = 0.09]. Patients submitted to RPR experienced a significantly higher MR recurrence rate when compared with their counterparts submitted to RPL [OR (95% CI): 16.8 (5.07-55.7, p = 0.00001)].

Conclusion: There is a trend towards lower perioperative mortality in RPR in comparison to RPL. On the other hand, RPL was associated with significantly lower recurrence rates.

TƏMİR YOXSA REPLASMAN?

'replacement'. The primary outcome measure was 30-day survival. The secondary outcome measures were MR recurrence and reoperation. Out of 310 articles, 18 fulfilled the inclusion criteria. A total of 3978 patients were included: 2563 (64%) MVRp cases and 1415 (36%) MVR cases. Operative techniques included annuloplasty for MVRp and subvalvular apparatus-sparing MVR techniques. Thirty-day mortality was lower after MVRp compared with MVR [OR 0.42; (95% CI 0.33-0.54; P = 0.0001)]. There was no difference in long-term survival ranging 1-5 years (HR 0.85, 95% CI 0.65-1.12). Recurrence of MR was significantly higher in the MVRp group (OR 4.26, 95% CI 2.52-7.22), as was the rate of reoperation (OR 2.03, 95% CI 1.49-2.77). Although MVR for ischaemic MR has a higher 30-day mortality rate compared with MVRp, MVRp is associated with the higher rate of MR recurrence and the need for reoperation. MVR remains an attractive option for ischaemic MR.

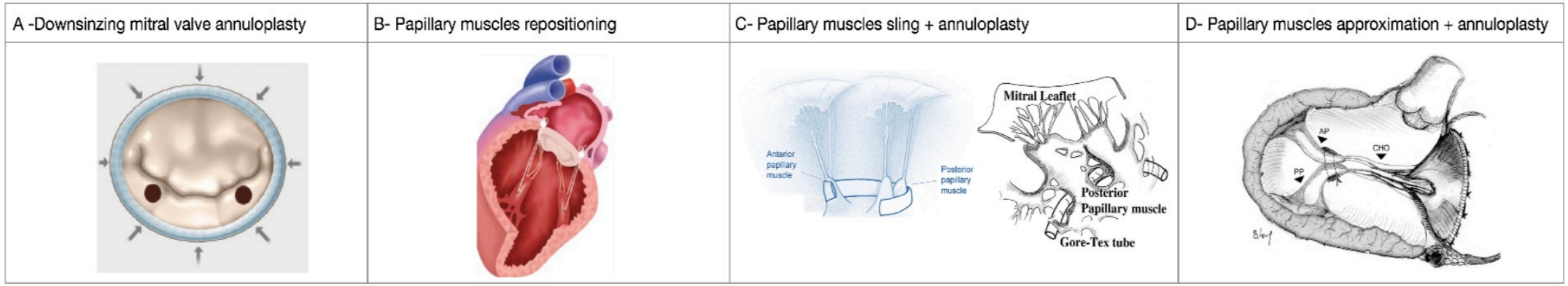

Fig. 2. Surgical techniques for mitral valve repair in secondary mitral regurgitation. (A) Downsing mitral valve annuloplasty. *Reproduced with permission from J. Yap et al.* [59]. (B) Papillary muscles repositioning + annuloplasty. PM realignment sutures are through the posteromedial papillary muscle and through the posterior mitral annulus in the P3 segment. *Reproduced with permission from E. Girdauskas et al.* [54]. (C) Papillary muscles sling using a 4 mm Gore-Tex tube encircling the bodies of posteromedial and anterolateral papillary muscles. *Reproduced with permission from F. Nappi et al.* [60] *and U. Hvass et al.* [58]. (D) Papillary muscle approximation. A U shaped 2-0 Gore-Tex suture reinforced by two patches of autologous pericardium is passed through the bodies of the posterior and anterior papillary muscles. *Reproduced with permission from A. Rama et al.* [57].

TABLE 3 Selected 1-Year Outcomes of MV Repair Versus Replacement for Severe Ischemic MR (From the Cardiothoracic Surgical Trials Network)

	MV Repair (n = 126)	MV Replacement (n = 125)	p Value
LVESVI (ml/m^2; primary endpoint)	54.6 ± 25.0	60.7 ± 31.5	0.18*
Recurrent moderate/severe MR	32.6%	2.3%	<0.001
Moderate	28.4%	2.3%	–
Severe	4.2%	0%	–
Death	14.3%	17.6%	0.45
MV reoperation	2.4%	0%	0.25
Major adverse cardiac events†	32.5%	33.6%	0.86
New York Heart Association functional class III/IV	9.0%	14.0%	0.28
Minnesota Living With Heart Failure score	24.5 ± 23.1	19.6 ± 19.4	0.12

Values are mean ± SD or %. *Adjusted for death. †Death, stroke, New York Heart Association functional class increase by ≥1 grade, heart failure rehospitalization, or mitral valve reoperation. Adapted with permission from Acker et al. (60).

LVESVI = left ventricular end-systolic volume index; MV = mitral valve.

KLİNİK HAL

R.İ. 1957

ŞİKAYƏTLƏR : TƏNGNƏFƏSLİK, SİNƏDƏ AĞRI (YENİ Mİ) TROPONİN YÜKSƏK

TRANSTORAKAL EXOKARDİOGRAFİYA

Adı	: Ramiz	Kart nömrəsi :	
Soyadı	: İbrahimov	Tarix	: 12.09.2023
Doğum tarixi	: 1957	Şöbə	: Kardiologiya
Cinsi	: k	Həkim	: Günay Hətəmova
			0502103357

ARD Aortanın kökü: N: 20-39mm	33	İVS Mədəciklərarası çəpər: (6-11 mm)	14.0
ACS Aorta qapağın açılması: N: 17-25 mm	20	LVPW Arxa Divar: (6-11 mm)	11.0
Sol Qulaqcıq: (20-40 mm)	36	EDV Son diastolik həcm: N: 70-156ml	
Sağ Qulaqcıq: Sağ Mədəcik (18-25 mm)	n	ESV Son sistolik həcm: N: 13-66 ml	
LVİDd Son diastolik ölçü: (37-56 mm)	46	EF Atım fraksiyası: (>50-55)	35-38%
LVİDs Son sistolik ölçü: (17-35 mm)	27	FS Qısalma faizi: (%)	

Mitral qapaq			**Aortal qapaq**	
Qapaq Sahəsi N: (4.0-6.0 sm²)	Trace	PHT	Qapaq Sahəsi: N: (2.0-4.0 sm²)	
E/A:		0.7/0.9	Aortal V max: (m/sn)	1.1
Max Gradient: (Pmax)			Max Gradient: (P max)	5
Orta Gradient: (Pmean)			Orta Gradient: (P mean)	

Trikuspid qapaq TÇ- I		**Pulmonar qapaq**	
Qapaq sahəsi:		Pulmonar V max: (m/sn)	1.1
Axın sürəti:	0.6	Max Gradient: (Pmax)	5
Max Gradient: (Pmax)		Pulmonar arteriya diametri:	
Orta Gradient: (Pmean)		Pulmonar sistolik təzyiq:	45

Şərh : Sol mədəciyin sistola diastolik ölçüləri normaldır, **sistolik funksiyası azalmışdır (LVEF-35-38%), relaksativ tip diastolik disfunksiyası və konsentrik hipertrofiyası qeyd edilir.**Sol qulaqcıq və sağ boşluqlar normaldır. Seqmentar divar hərəkət pozğunluğu (**septum ciddi hipokinetik, inferiorun midi ,bazalı ciddi hipo-akinetik**) qeyd edilir. **Qapaq aparatı fibrotikdir**. Aorta və pulmonar arteriya normaldır. **Pulmonar arteriya təzyiqi 45 mm c.s. ölçüldü.** Perikard boşluğu təmizdir.

Rəngli doppler ExoKQ-də: **TÇ- I , MÇ-orta-ciddi (işemik)** qeyd edilir .

TRANSTORAKAL EXOKARDİOGRAFİYA

Adı	: Ramiz	Kart nömrəsi :	
Soyadı	: İbrahimov	Tarix	: 23.09.2023
Doğum tarixi	: 1957	Şöbə	: Kardioloqiya
Cinsi	: k	Həkim	: Günay Hətəmova
			0502103357

ARD Aortanın kökü: N: 20-39mm	33	IVS Mədəciklərarası çəpər: (6-11 mm)	14.0
ACS Aorta qapağın açılması: N: 17-25 mm	20	LVPW Arxa Divar: (6-11 mm)	11.0
Sol Qulaqcıq: (20-40 mm)	36	EDV Son diastolik həcm: N: 70-156ml	
Sağ Qulaqcıq: Sağ Mədəcik (18-25 mm)	n	ESV Son sistolik həcm: N: 13-66 ml	
LVİDd Son diastolik ölçü: (37-56 mm)	46	EF Atım fraksiyası: (>50-55)	50-55%
LVİDs Son sistolik ölçü: (17-35 mm)	27	FS Qısalma faizi: (%)	

Mitral qapaq	**MÇ-I-II⁰**		**Aortal qapaq**		
Qapaq Sahəsi N: (4.0-6.0 sm²)	Trace	PHT	Qapaq Sahəsi: N: (2.0-4.0 sm²)		
E/A:		0.7/0.9	Aortal V max: (m/sn)	1.1	
Max Gradient: (Pmax)			Max Gradient: (P max)	5	
Orta Gradient: (Pmean)			Orta Gradient: (P mean)		

Trikuspid qapaq	**TÇ-min**	**Pulmonar qapaq**	
Qapaq sahəsi:		Pulmonar V max: (m/sn)	1.1
Axın sürəti:	0.6	Max Gradient: (Pmax)	5
Max Gradient: (Pmax)		Pulmonar arteriya diametri:	
Orta Gradient: (Pmean)		Pulmonar sistolik təzyiq:	N

AKŞ əməliyyatı sonrası vəziyyət.
Müayinə xəstənin məcburi vəziyyətində aparıldı.
Şərh : Sol mədəciyin sistola diastolik ölçüləri və sistolik funksiyası normaldır, **relaksativ tip diastolik disfunksiyası və konsentrik hipertrofiyası qeyd edilir.** Sol qulaqcıq və sağ boşluqlar normaldır. Seqmentar divar hərəkət pozğunluğu **(inferiorun bazalı zəif hipokinetik)** qeyd edilir. **Qapaq aparatı fibrotikdir**. Aorta və pulmonar arteriya normaldır. Pulmonar arteriya təzyiqi normaldır. Perikard boşluğu təmizdir.

Rəngli doppler ExoKQ-də: TÇ-min, **MÇ-I-II⁰** qeyd edilir .

Diqqətiniz Üçün Təşəkkür Edirik