



GÖĞÜS KALP DAMAR ANESTEZİ  
VE YOĞUN BAKIM DERNEĞİ

27. *Ulusal*  
*Kongresi*

24 - 25 Eylül 2021 Wyndham Grand İzmir Özdilek



Mitral yetersizlik tedavisinde 2020  
yılı uzlaşması ve anestezi

**Onat Bermede**







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# Mitral Yetersizlik Tedavisinde 2020 yılı Uzlaşması ve Anestezi

**Dr. Onat BERMEDE, DESAIC**

Ankara Üniversitesi Tıp Fakültesi  
Anesteziyoloji ve Reanimasyon AD





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**EXPERT CONSENSUS DECISION PATHWAY**

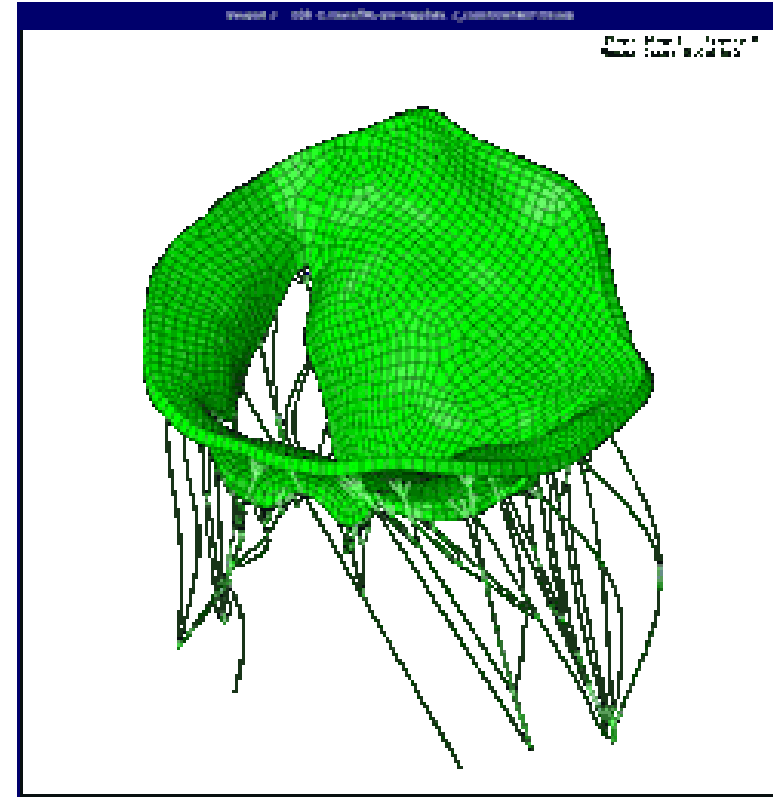
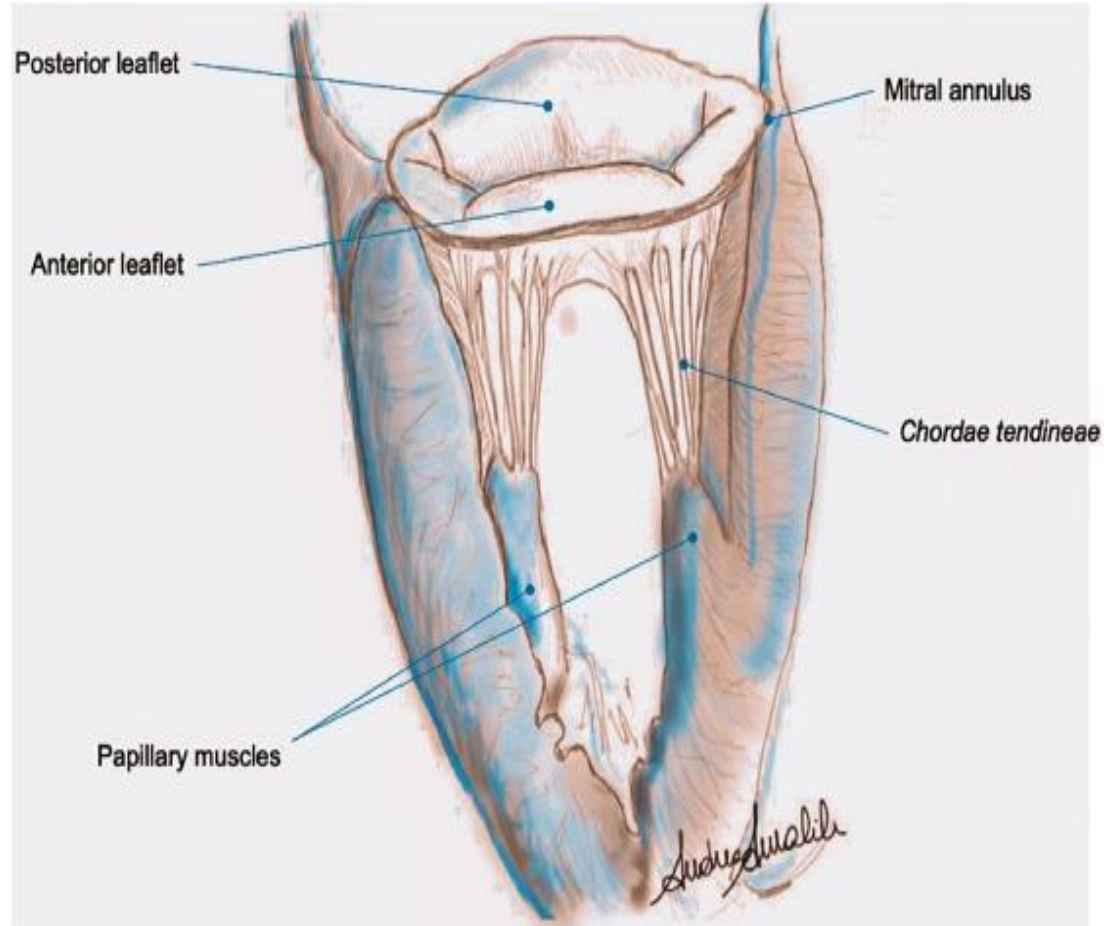
# 2020 Focused Update of the 2017 ACC Expert Consensus Decision Pathway on the Management of Mitral Regurgitation



A Report of the American College of Cardiology Solution Set Oversight Committee

# Mitral Kapak

- EĞER şeklinde
- Ant. ve post. leaflet
- Fibröz anulus
- Korda tendinea
- Papiller kaslar
- LV duvarı

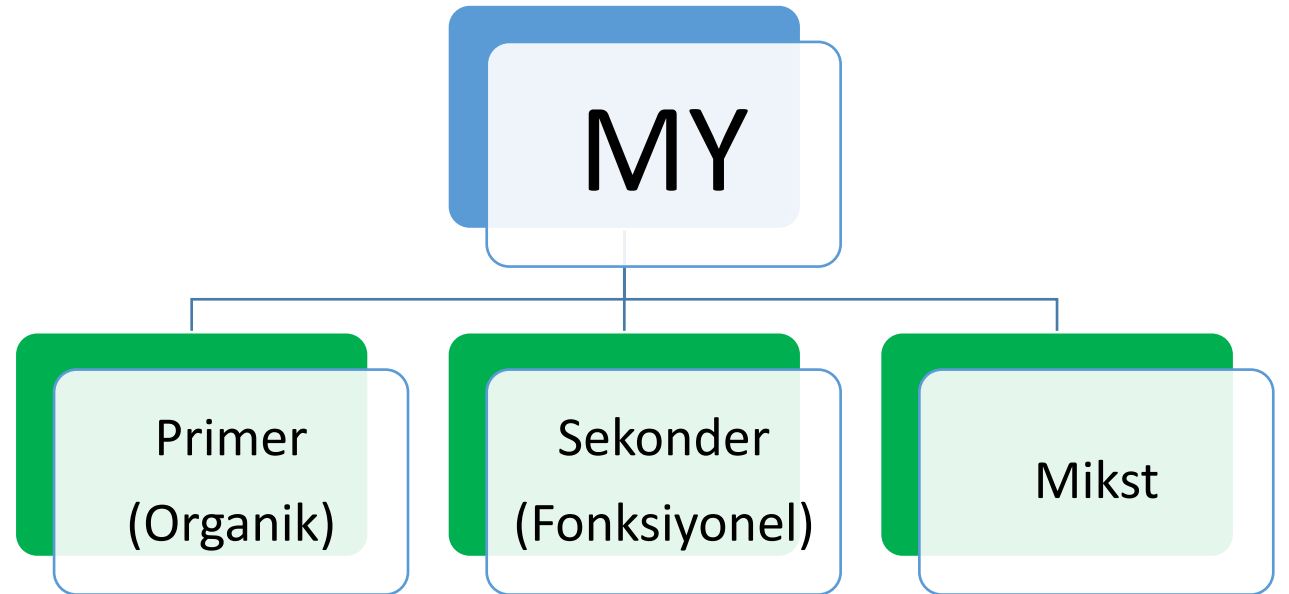
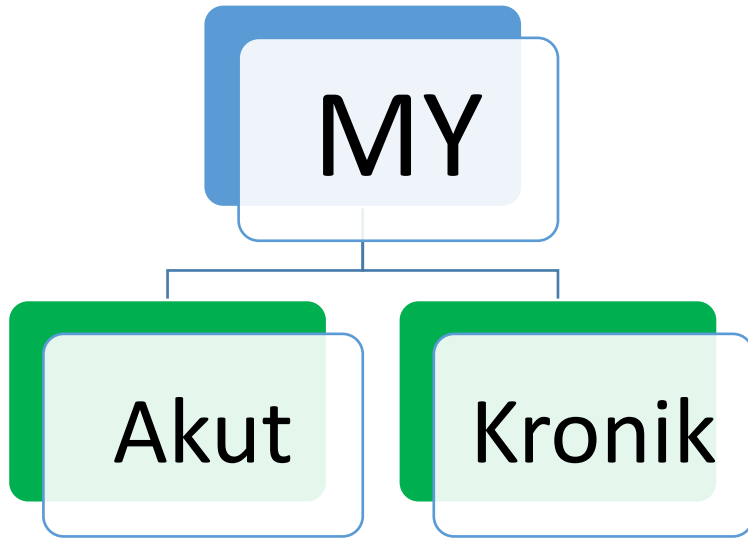


# Mitral Yetmezlik







- ABD'de en sık, Avrupa'da 2. sırada
- Yaşlanma ile 2030'da 5 milyon hasta
- Tanıda EKO altın standart
- MRI



# Mitral Yetmezlik



# Carpentier Sınıflaması

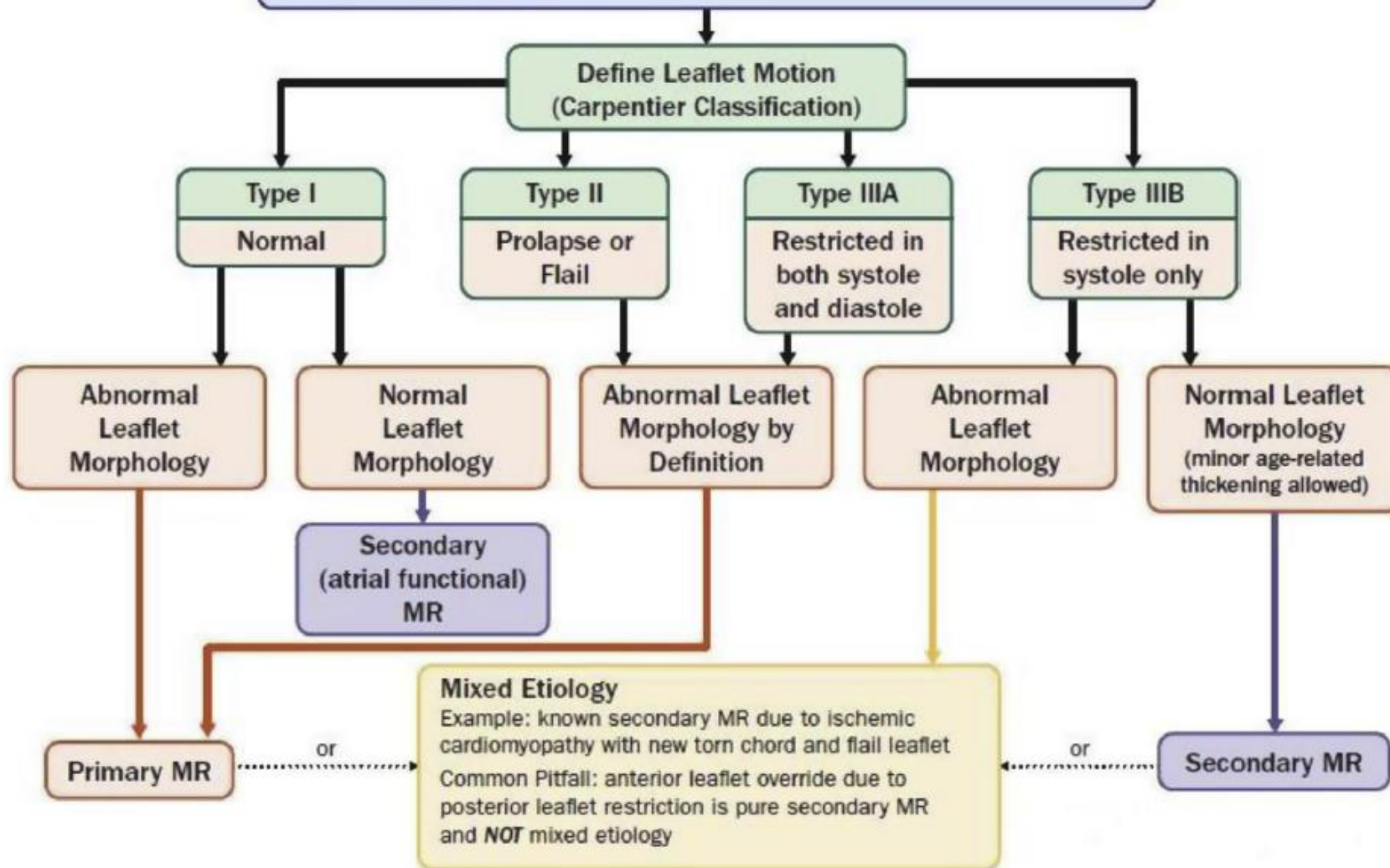
	Carpentier Type I	Carpentier Type II	Carpentier Type IIIa	Carpentier Type IIIb
	(normal leaflet motion and position)	(excess leaflet motion)	(restricted leaflet motion in systole and diastole)	(restricted leaflet motion in systole)
PRIMARY MR	 <p>Leaflet Perforation Cleft</p>	 <p>Mitral Valve Prolapse</p>	 <p>Rheumatic Valve Disease Mitral Annular Calcification Drug Induced MR</p>	
SECONDARY MR	 <p>Atrial MR</p>  <p>Nonischemic Cardiomyopathy</p>			 <p>Ischemic Cardiomyopathy</p>

El Sabbagh, A. et al. J Am Coll Cardiol Img. 2018;11(4):628-43.



### Evaluate mitral valve morphology, LV size and function, LA size

- Trace or mild MR is common in normal subjects and does not need to be further classified if above are normal.
- Dilated LV/abnormal LVEF or dilated LA could be cause or consequence of MR.
- An isolated inferolateral or posterobasal wall motion abnormality (e.g., following an MI) with globally preserved LV function can result in secondary MR.
- Dilated LV with normal LVEF suggests severe MR.
- Flail leaflet is highly specific for severe MR.



## AHA/ACC Guideline

### 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Grade	Definition	Valve Anatomy	Valve Hemodynamics*	Hemodynamic Consequences	Symptoms
A	At risk of MR	<ul style="list-style-type: none"> <li>Mild mitral valve prolapse with normal coaptation</li> <li>Mild valve thickening and leaflet restriction</li> </ul>	<ul style="list-style-type: none"> <li>No MR jet or small central jet area &lt;20% LA on Doppler</li> <li>Small vena contracta &lt;0.3 cm</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
B	Progressive MR	<ul style="list-style-type: none"> <li>Severe mitral valve prolapse with normal coaptation</li> <li>Rheumatic valve changes with leaflet restriction and loss of central coaptation</li> <li>Prior IE</li> </ul>	<ul style="list-style-type: none"> <li>Central jet MR 20%–40% LA or late systolic eccentric jet MR</li> <li>Vena contracta &lt;0.7 cm</li> <li>Regurgitant volume &lt;60 mL</li> <li>Regurgitant fraction &lt;50%</li> <li>ERO &lt;0.40 cm<sup>2</sup></li> <li>Angiographic grade 1–2+</li> </ul>	<ul style="list-style-type: none"> <li>Mild LA enlargement</li> <li>No LV enlargement</li> <li>Normal pulmonary pressure</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
C	Asymptomatic severe MR	<ul style="list-style-type: none"> <li>Severe mitral valve prolapse with loss of coaptation or flail leaflet</li> <li>Rheumatic valve changes with leaflet restriction and loss of central coaptation</li> <li>Prior IE</li> <li>Thickening of leaflets with radiation heart disease</li> </ul>	<ul style="list-style-type: none"> <li>Central jet MR &gt;40% LA or holosystolic eccentric jet MR</li> <li>Vena contracta ≥0.7 cm</li> <li>Regurgitant volume ≥60 mL</li> <li>Regurgitant fraction ≥50%</li> <li>ERO ≥0.40 cm<sup>2</sup></li> <li>Angiographic grade 3–4+</li> </ul>	<ul style="list-style-type: none"> <li>Moderate or severe LA enlargement</li> <li>LV enlargement</li> <li>Pulmonary hypertension may be present at rest or with exercise</li> <li>C1: LVEF &gt;60% and LVESD &lt;40 mm</li> <li>C2: LVEF ≤60% and LVESD ≥40 mm</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
D	Symptomatic severe MR	<ul style="list-style-type: none"> <li>Severe mitral valve prolapse with loss of coaptation or flail leaflet</li> <li>Rheumatic valve changes with leaflet restriction and loss of central coaptation</li> <li>Prior IE</li> <li>Thickening of leaflets with radiation heart disease</li> </ul>	<ul style="list-style-type: none"> <li>Central jet MR &gt;40% LA or holosystolic eccentric jet MR</li> <li>Vena contracta ≥0.7 cm</li> <li>Regurgitant volume ≥60 mL</li> <li>Regurgitant fraction ≥50%</li> <li>ERO ≥0.40 cm<sup>2</sup></li> <li>Angiographic grade 3–4+</li> </ul>	<ul style="list-style-type: none"> <li>Moderate or severe LA enlargement</li> <li>LV enlargement</li> <li>Pulmonary hypertension present</li> </ul>	<ul style="list-style-type: none"> <li>Decreased exercise tolerance</li> <li>Exertional dyspnea</li> </ul>

\*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.

ERO indicates effective regurgitant orifice; IE, infective endocarditis; LA, left atrium/atrial; LV, left ventricular; LVEF, left ventricular ejection fraction; LVESD, left ventricular end-systolic dimension; and MR, mitral regurgitation.

## 2017 ESC/EACTS Guidelines for the management of valvular heart disease

The Task Force for the Management of Valvular Heart Disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

	Aortic regurgitation	Mitral regurgitation		Tricuspid regurgitation
Qualitative				
Valve morphology	Abnormal/flail/large coaptation defect	Flail leaflet/ruptured papillary muscle/ large coaptation defect		Abnormal/flail/large coaptation defect
Colour flow regurgitant jet	Large in central jets, variable in eccentric jets <sup>a</sup>	Very large central jet or eccentric jet adhering, swirling, and reaching the posterior wall of the LA		Very large central jet or eccentric wall impinging jet <sup>a</sup>
CW signal of regurgitant jet	Dense	Dense/triangular		Dense/triangular with early peaking (peak <2 m/s in massive TR)
Other	Holodiastolic flow reversal in descending aorta (EDV >20 cm/s)	Large flow convergence zone <sup>a</sup>		—
Semiquantitative				
Vena contracta width (mm)	>6	≥7 (>8 for biplane) <sup>b</sup>		≥7 <sup>a</sup>
Upstream vein flow <sup>c</sup>	—	Systolic pulmonary vein flow reversal		Systolic hepatic vein flow reversal
Inflow	—	E-wave dominant ≥1.5 m/s <sup>d</sup>		E-wave dominant ≥1 m/s <sup>e</sup>
Other	Pressure half-time <200 ms <sup>f</sup>	TVI mitral/TVI aortic >1.4		PISA radius >9 mm <sup>g</sup>
Quantitative		Primary	Secondary <sup>h</sup>	
EROA (mm <sup>2</sup> )	≥30	≥40	≥20	≥40
Regurgitant volume (mL/beat)	≥60	≥60	≥30	≥45
+ enlargement of cardiac chambers/vessels	LV	LV, LA		RV, RA, inferior vena cava



# 2021 ESC/EACTS Guidelines for the management of valvular heart disease

**Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)**

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**ESC Clinical Practice Guidelines Committee (CPG):** listed in the Appendix.

**EACTS Council:** listed in the Appendix.

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**Table 7** Severe mitral regurgitation criteria based on 2D echocardiography

	Primary mitral regurgitation	Secondary mitral regurgitation
<b>Qualitative</b>		
Mitral valve morphology	Flail leaflet, ruptured papillary muscle, severe retraction, large perforation	Normal leaflets but with severe tenting, poor leaflet coaptation
Colour flow jet area	Large central jet (>50% of LA) or eccentric wall impinging jet of variable size	Large central jet (>50% of LA) or eccentric wall impinging jet of variable size
Flow convergence	Large throughout systole	Large throughout systole
Continuous wave Doppler jet	Holosystolic/dense/triangular	Holosystolic/dense/triangular
<b>Semiquantitative</b>		
<i>Vena contracta</i> width (mm)	≥7 (≥8 mm for biplane)	≥7 (≥8 mm for biplane)
Pulmonary vein flow	Systolic flow reversal	Systolic flow reversal
Mitral inflow	E-wave dominant (>1.2 m/s)	E-wave dominant (>1.2 m/s)
TVI mitral/TVI aortic	>1.4	>1.4
<b>Quantitative</b>		
EROA (2D PISA, mm <sup>2</sup> )	≥40 mm <sup>2</sup>	≥40 mm <sup>2</sup> (may be ≥30 mm <sup>2</sup> if elliptical regurgitant orifice area)
Regurgitant volume (mL/beat)	≥60 mL	≥60 mL (may be ≥45 mL if low flow conditions)
Regurgitant fraction (%)	≥50%	≥50%
<b>Structural</b>		
Left ventricle	Dilated (ESD ≥40 mm)	Dilated
Left atrium	Dilated (diameter ≥55 mm or volume ≥60 mL/m <sup>2</sup> )	Dilated

# MITRAL REGURGITATION ASSESSMENT

## Suggested Qualitative and Quantitative Parameters for Standardized Echo Reporting\*

### HEMODYNAMIC AND RHYTHM PARAMETERS

- Blood Pressure
- Heart Rate
- Rhythm

### QUALITATIVE PARAMETERS

#### Leaflet Morphology:

- Structurally normal
- Nonspecific thickening
- Focal calcific or nodular thickening
- Diffusely calcified
- Myxomatous
- Vegetations
- Tumor
- Clefts
- Perforation

#### Chordal Morphology:

- Ruptured chordae:
  - AML
  - PML
- Redundant chordae:
  - AML
  - PML

#### Annulus Size and Morphology (commissure-commissure and anterior-posterior measurements)

- Normal
- Dilated
- Calcified (location and extent)

#### Leaflet Mobility:

- Normal
- Redundant, no prolapse
- Systolic anterior motion (SAM)
  - AML
  - PML
- Flail
  - Anatomic localization:
    - A1
    - A2
    - A3
    - P1
    - P2
    - P3
  - Posteromedial commissure
  - Anterolateral commissure

#### • Prolapse

- Anatomic localization:
  - A1
  - A2
  - A3
  - P1
  - P2
  - P3
- Posteromedial commissure
- Anterolateral commissure

#### Restricted or Tethered Leaflets

- AML
- PML
- Both

#### Mitral stenosis

- Rheumatic
- Degenerative
- Other

#### Carpentier Classification

- Normal leaflet motion (**Type I**) may be seen in primary MR due to endocarditis, perforation, or clefts, or in secondary MR due to pure annular dilation.
- Excessive leaflet motion (**Type II**) is most commonly seen with mitral valve prolapse or flail leaflet.
- Restricted leaflet motion (**Type III**): subclassified into
  - **III A:** restriction during both systole and diastole
  - **III B:** restricted during systole only (e.g., ischemic etiology)

#### Submitral morphology:

- Thickening
- Calcification
- Retraction
- Tumor
- Vegetation

#### MR Mechanism:

- Primary
- Secondary
  - Dilated Cardiomyopathy
  - Ischemic Cardiomyopathy
  - Other
- Mixed

#### MR Jet Duration (CW Doppler and frame-by-frame analysis of color flow Doppler):

- Holosystolic
- Early systolic
- Midsystolic
- Late systolic
- Bimodal
- CW Doppler density

#### MR Jets:

- Single
- Multiple

#### MR Jet Direction:

- Centrally directed
- Eccentric
  - Posteriorly directed
  - Posterolaterally directed
  - Laterally directed
  - Anteriorly directed
  - Anteromedially directed
  - Medially directed



# MITRAL REGURGITATION ASSESSMENT

Suggested Qualitative and Quantitative Parameters for Standardized Echo Reporting\*

## QUANTITATIVE PARAMETERS

### Vena Contracta:

- Vena contracta width: mm
- Vena contracta area (cm<sup>2</sup>)

### Threshold values specific for severe MR

- EROA >0.4cm<sup>2</sup>
- Regurgitant volume >60 mL/beat
- Regurgitant fraction >50%

### Left Atrial Size:

- Left atrial dilation
- Left atrial volume index: mL/m<sup>2</sup>

### Mitral Valve Area: cm<sup>2</sup>

*cm<sup>2</sup> (for patients with coexisting rheumatic or degenerative mitral stenosis or for planning edge-to-edge clip)*

- 2D planimetry (biplane)
- 3D planimetry (multiplanar Reconstruction)
- Pressure half-time
- Continuity equation
- PISA
- Mean transmitral Doppler gradient:  
mm Hg @ heart rate (input HR concurrently recorded during CW Doppler acquisition)

### Left Ventricular Function:

- Ejection fraction (normal > 60%)
- Global LV dysfunction
- Regional LV dysfunction (detail wall motion)

### Left Ventricular Size:

- End diastolic LV dimension
- End systolic LV dimension
- and/or*
- End diastolic volume/volume index
- End systolic volume/volume index

### Right Ventricular Size

*(tricuspid annular and midventricular measurements)*

- Normal
- Dilated

### Right Ventricular Systolic Function:

- Normal
- Impaired

### Tricuspid Annulus:

- Normal
- Dilated

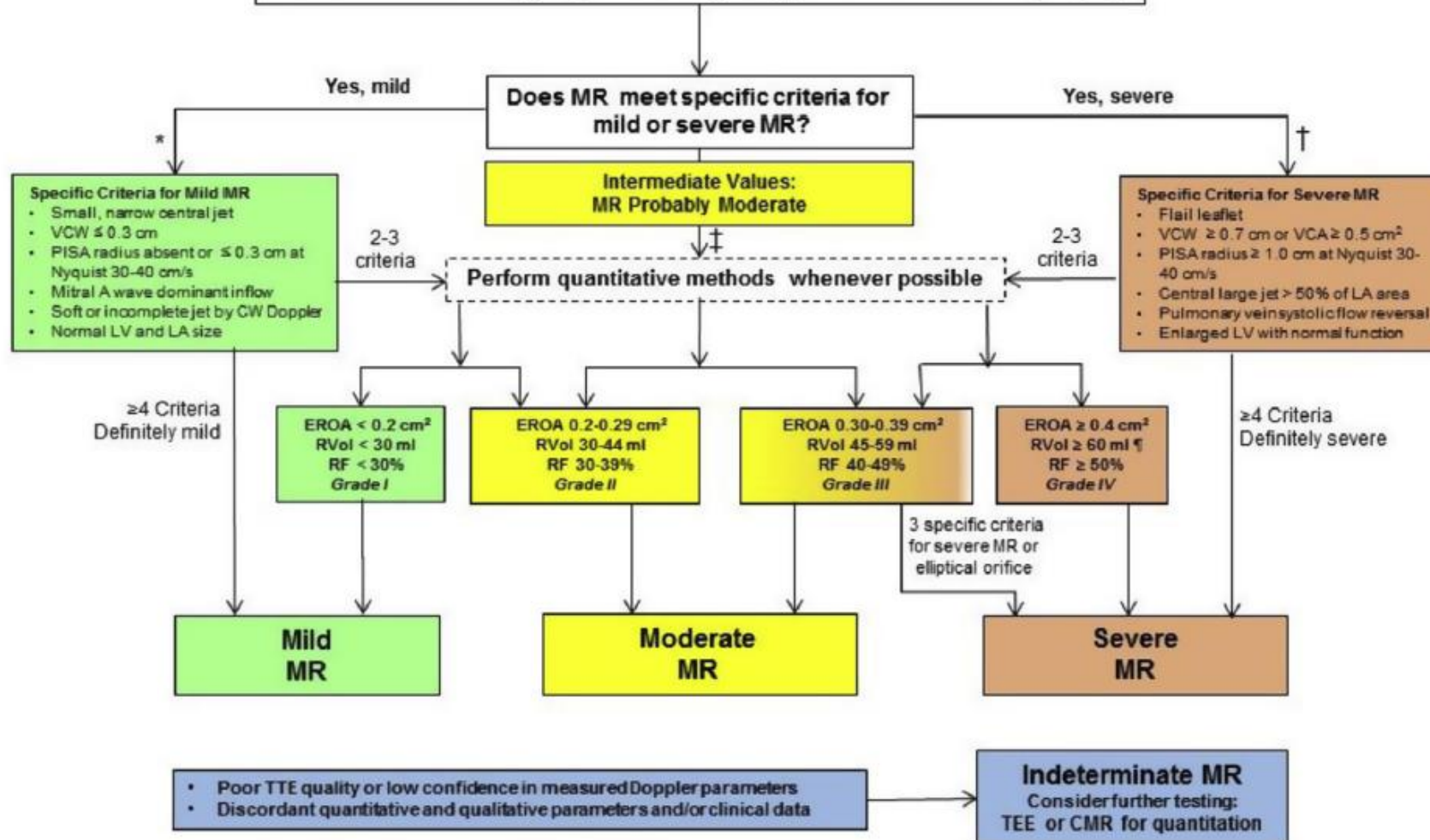
### Tricuspid Valve Regurgitation:

- Mild
- Moderate
- Severe

**PA Systolic Pressure: mm Hg**

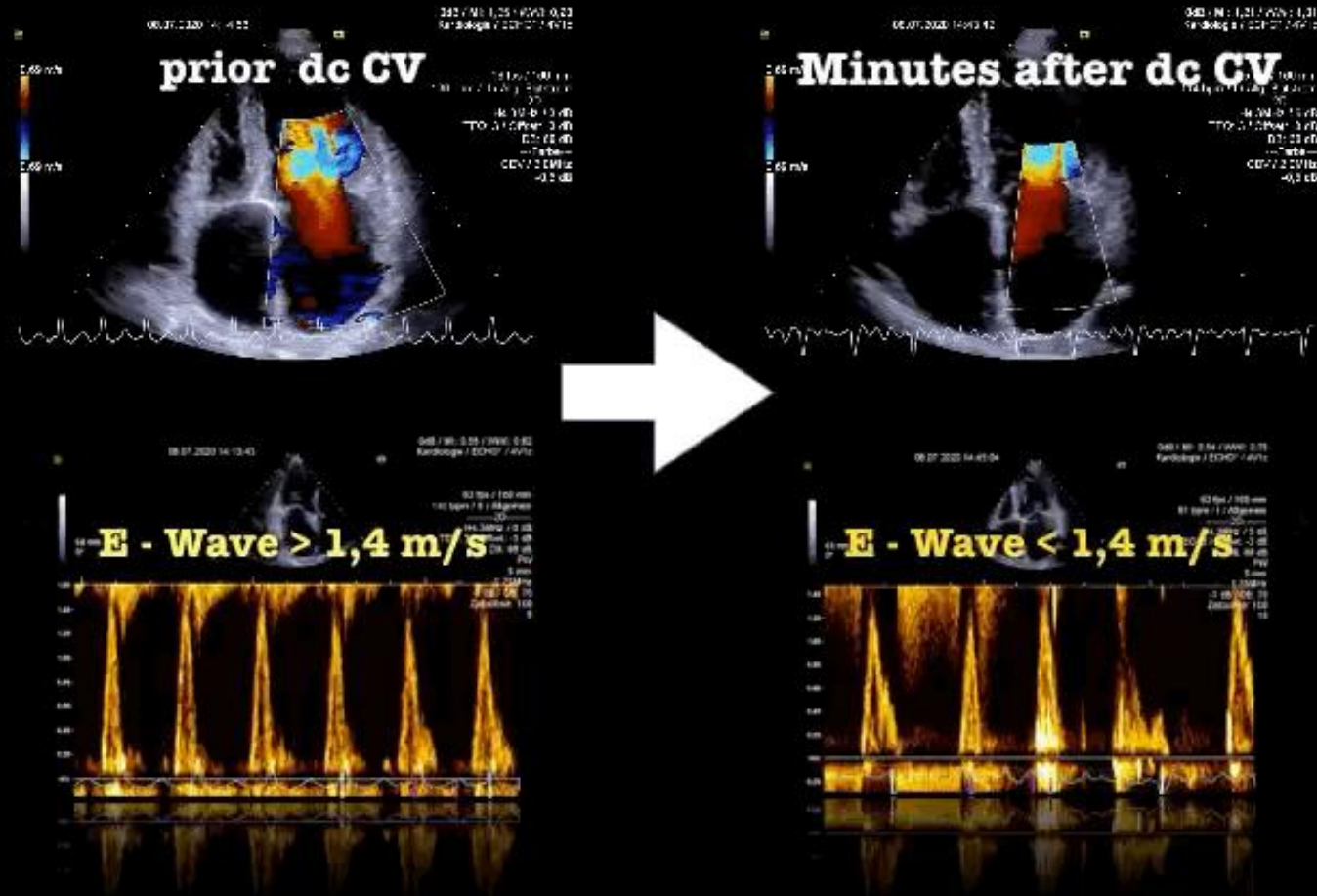
**Estimated RA pressure: mm Hg**

## Chronic Mitral Regurgitation by Doppler Echocardiography



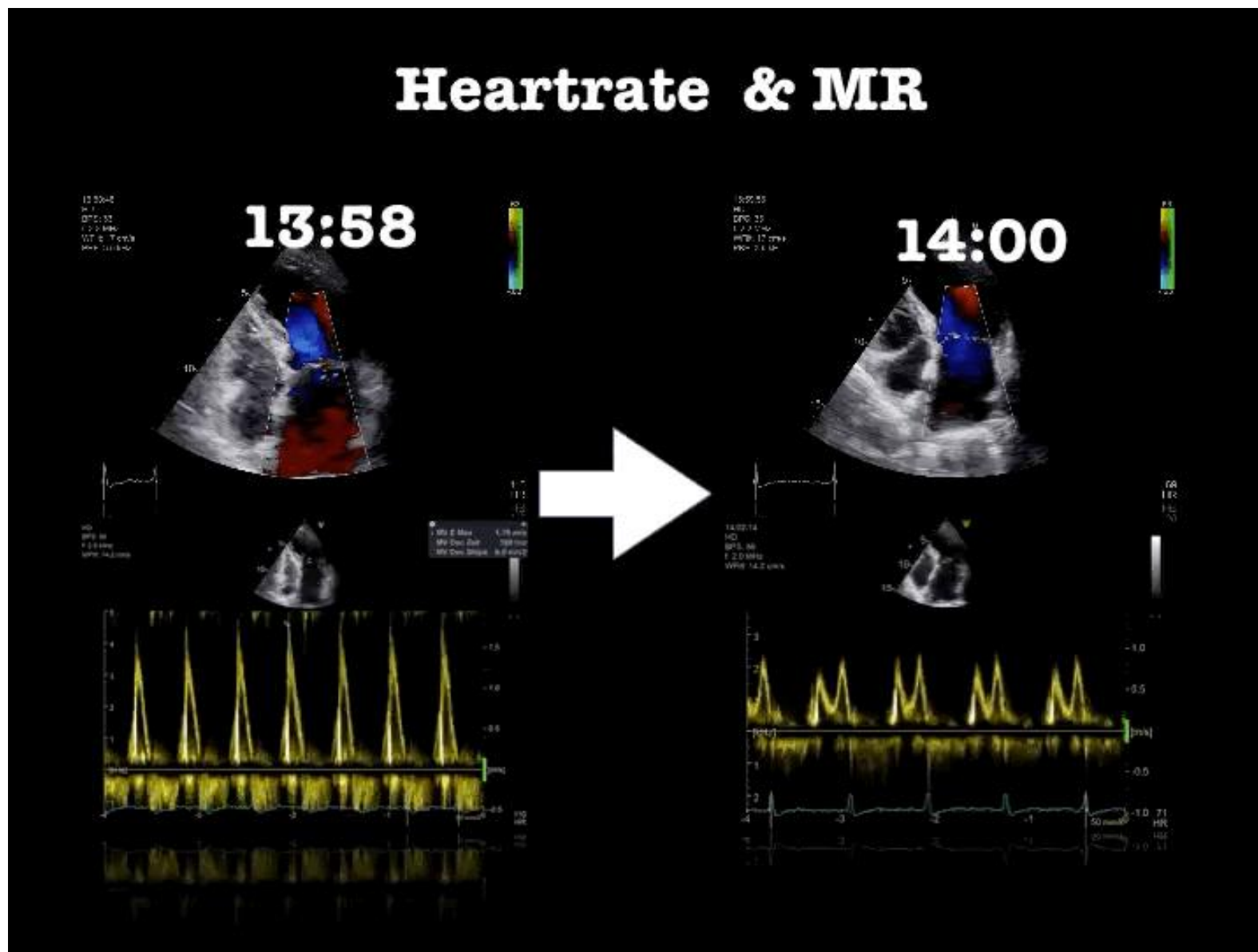
*	Beware of underestimation of MR severity in eccentric, wall impinging jets; quantitation is advised.
†	All values for EROA by PISA assume holosystolic MR; single frame EROA by PISA, VCW, and VCA overestimate non-holosystolic MR.
‡	Regurgitant volume for severe MR may be lower in low flow conditions.

# Rhythm & MR

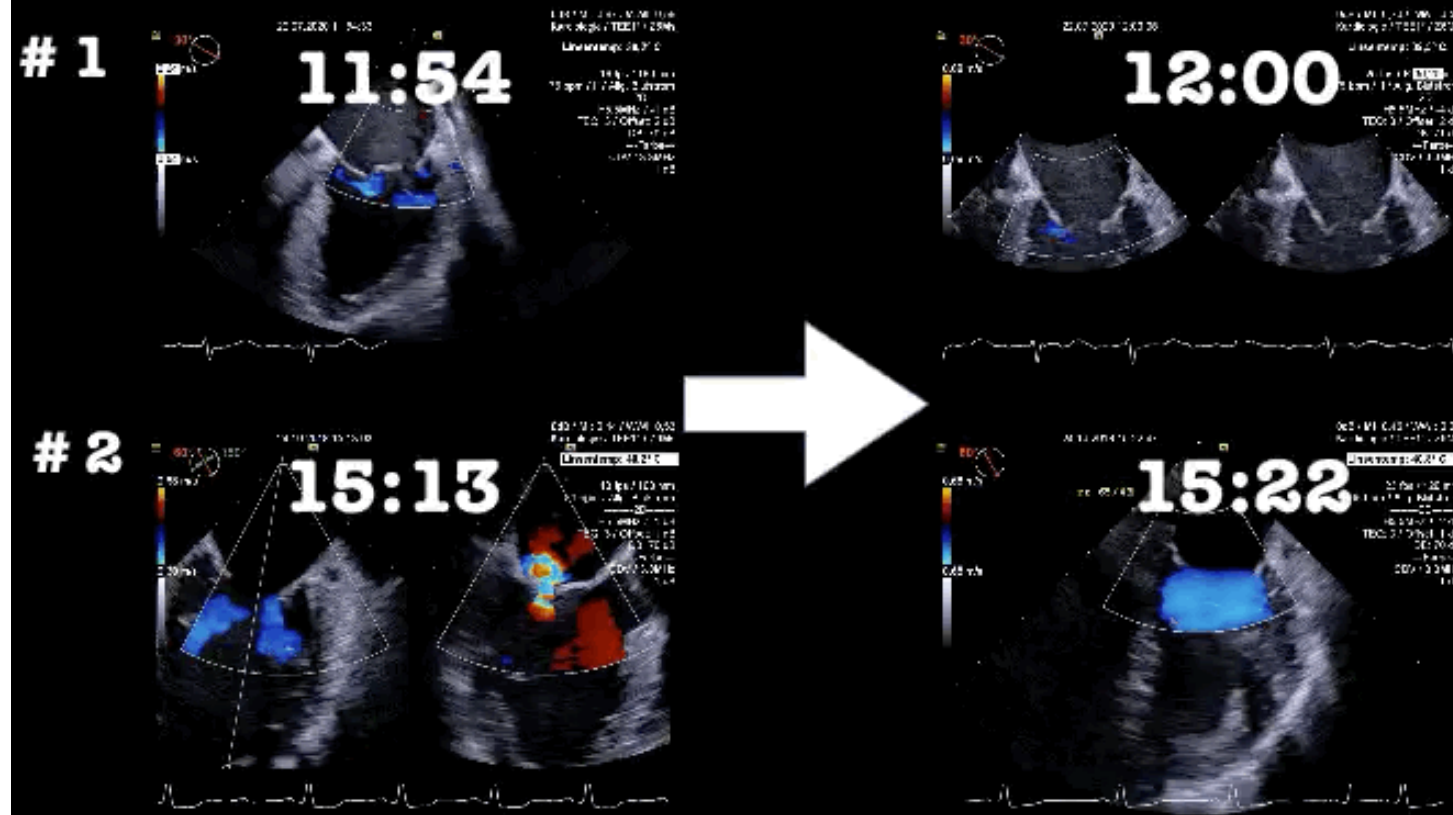




# Heartrate & MR

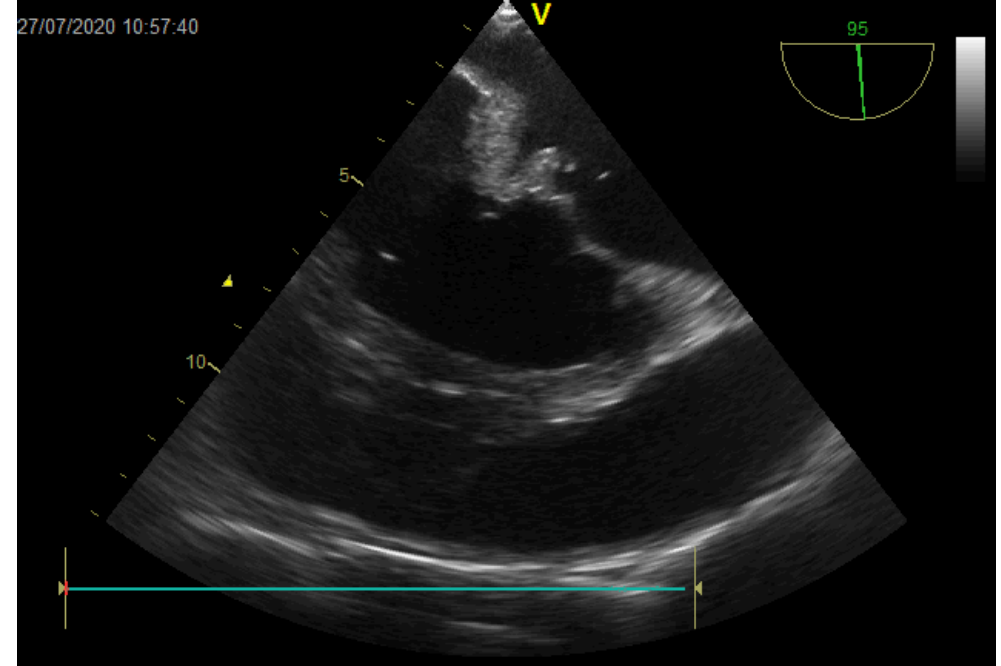


# Blood pressure & MR



# Primer (organik) MY

- En sık etyoloji miksomatöz dejenerasyon
  - Prolaps, flail, Barlow
- Liflet perforasyonu veya cleft
- Liflet hareket kısıtlılığı
  - Romatizma, ilaç, radyasyon..
- Yaşlılarda mitral anüler kalsifikasyon
- Endokardit ??
- Erken tanı



European Society  
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doi:10.1093/eurheartj/ehab395

ESC/EACTS GUIDELINES

## 2021 ESC/EACTS Guidelines for the management of valvular heart disease

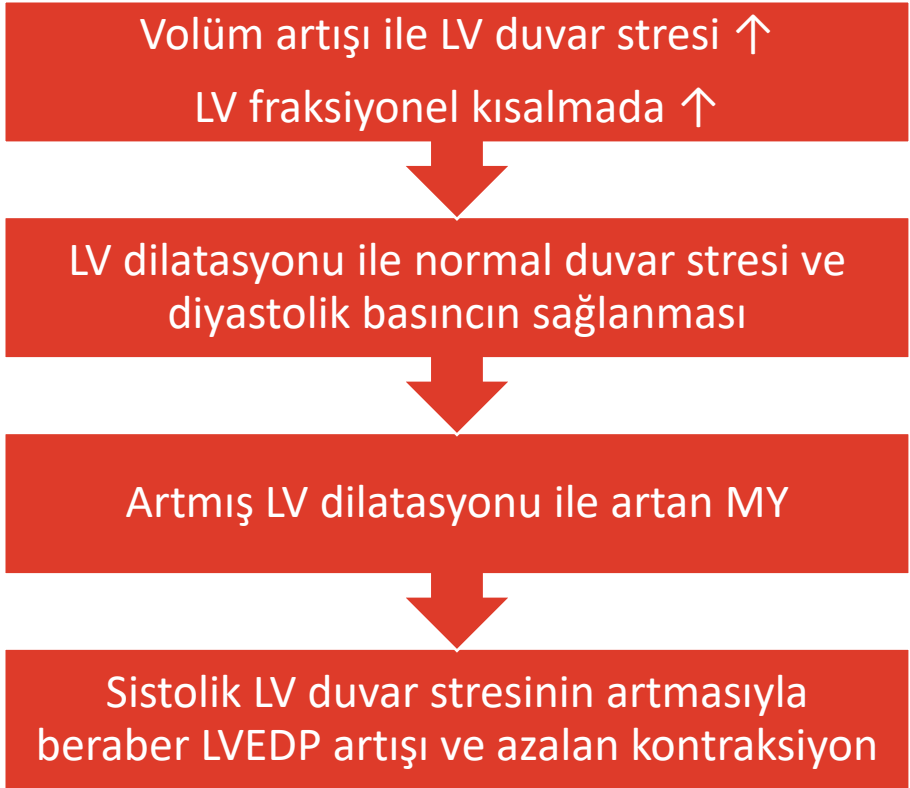
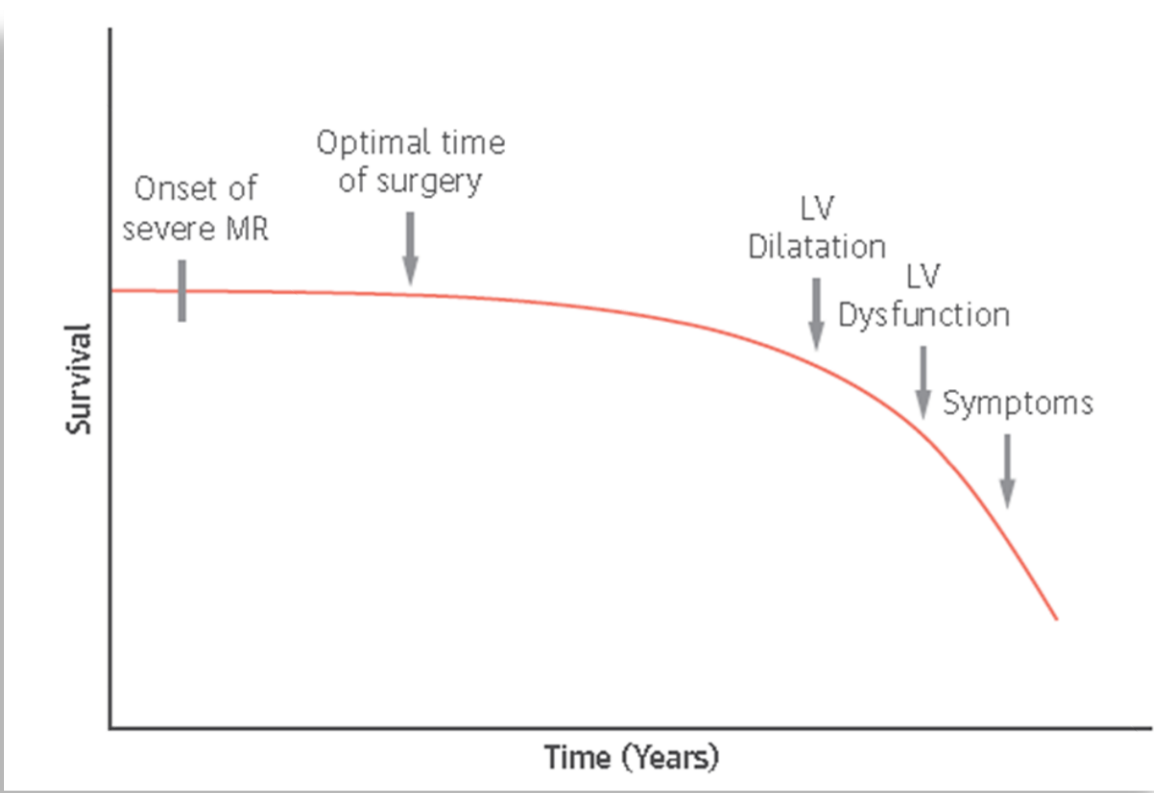
Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)



# Mitral Valve Regurgitation in the Contemporary Era

## Insights Into Diagnosis, Management, and Future Directions

Abdallah El Sabbagh, MD, Yogesh N.V. Reddy, MBBS, Rick A. Nishimura, MD



# EKOKARDİYOĞRAFI

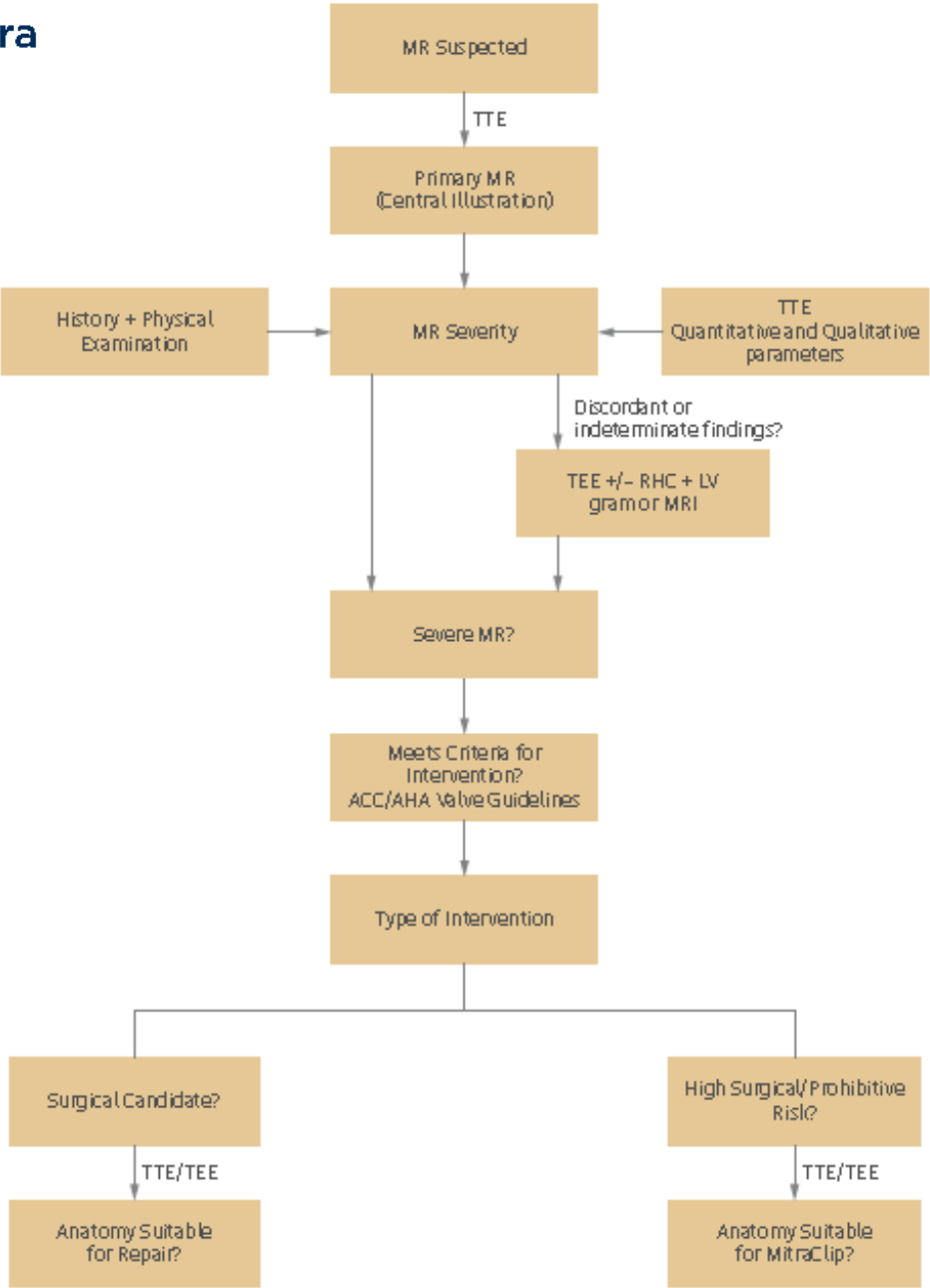
- MY etyolojisi
- MY ciddiyeti
- LV'nin volüm cevabı
- Olası tamir seçeneđi



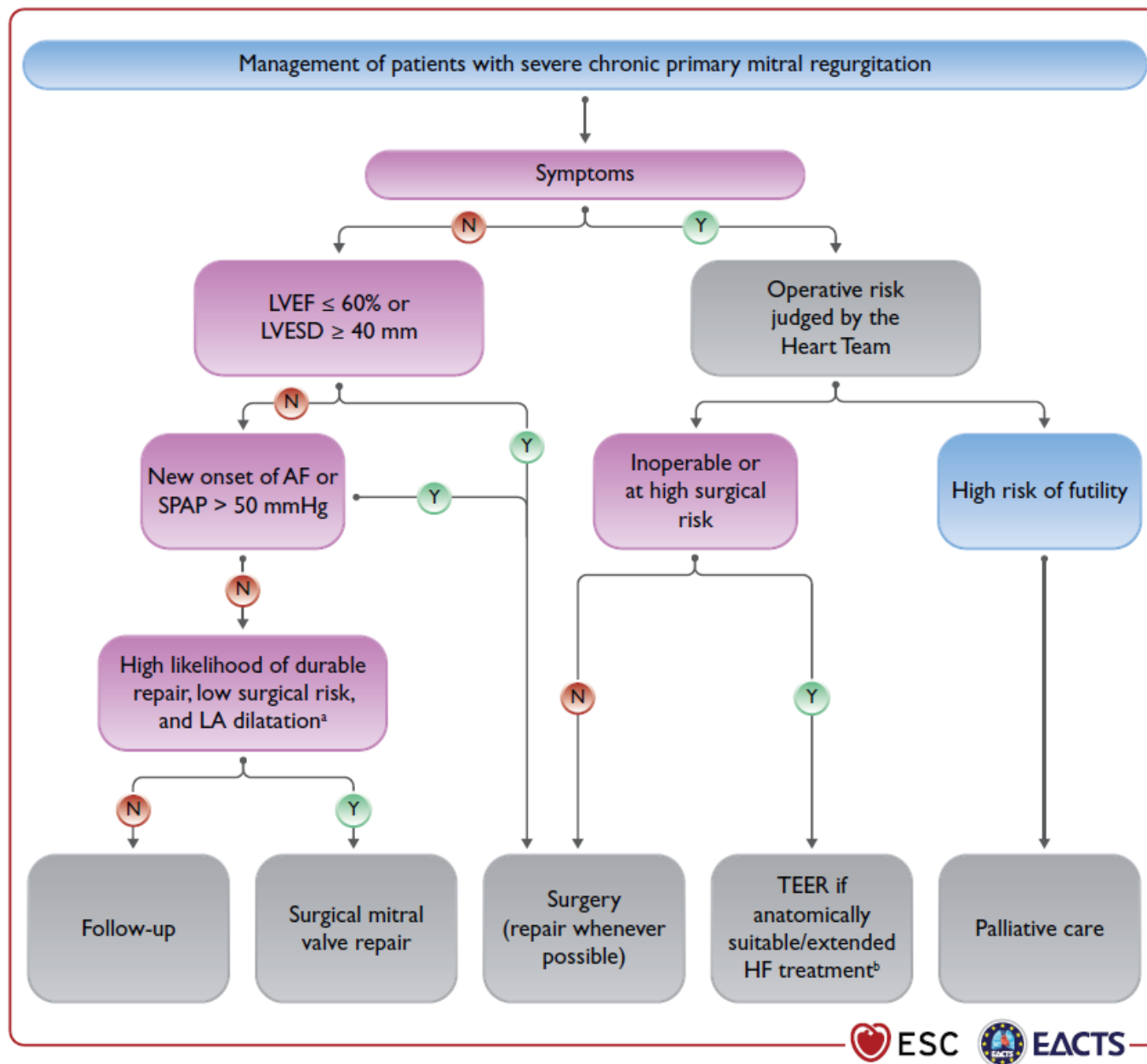
# Mitral Valve Regurgitation in the Contemporary Era

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**Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)**

Revised

Surgery is indicated in asymptomatic patients with LV dysfunction (LVESD  $\geq 45$  mm and/or LVEF  $\leq 60\%$ ).

**I**

Surgery is recommended in asymptomatic patients with LV dysfunction (LVESD  $\geq 40$  mm and/or LVEF  $\leq 60\%$ ).

**I**

## 2021 ESC/EACTS Guidelines for the management of valvular heart disease

Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

New or Revised	Recommendations in 2017 version	Class	Recommendations in 2021 version	Class
Revised	Surgery should be considered in asymptomatic patients with preserved LV function (LVESD <45 mm and LVEF >60%) and AF secondary to mitral regurgitation or pulmonary hypertension (SPAP at rest >50 mmHg).	<b>IIa</b>	Surgery should be considered in asymptomatic patients with preserved LV function (LVESD <40 mm and LVEF >60%) and AF secondary to mitral regurgitation or pulmonary hypertension (SPAP at rest >50 mmHg).	<b>IIa</b>
Revised	Surgery should be considered in asymptomatic patients with preserved LVEF (>60%) and LVESD 40–44 mm when a durable repair is likely, surgical risk is low, the repair is performed in a Heart Valve Centre and at least one of the following findings is present: <ul style="list-style-type: none"> <li>● flail leaflet or;</li> <li>● presence of significant LA dilatation (volume index <math>\geq 60</math> mL/m<sup>2</sup> BSA) in sinus rhythm.</li> </ul>	<b>IIa</b>	Surgical mitral valve repair should be considered in low-risk asymptomatic patients with LVEF >60%, LVESD <40 mm and significant LA dilatation (volume index $\geq 60$ mL/m <sup>2</sup> or diameter $\geq 55$ mm) when performed in a Heart Valve Centre and a durable repair is likely.	<b>IIa</b>





ESC

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New

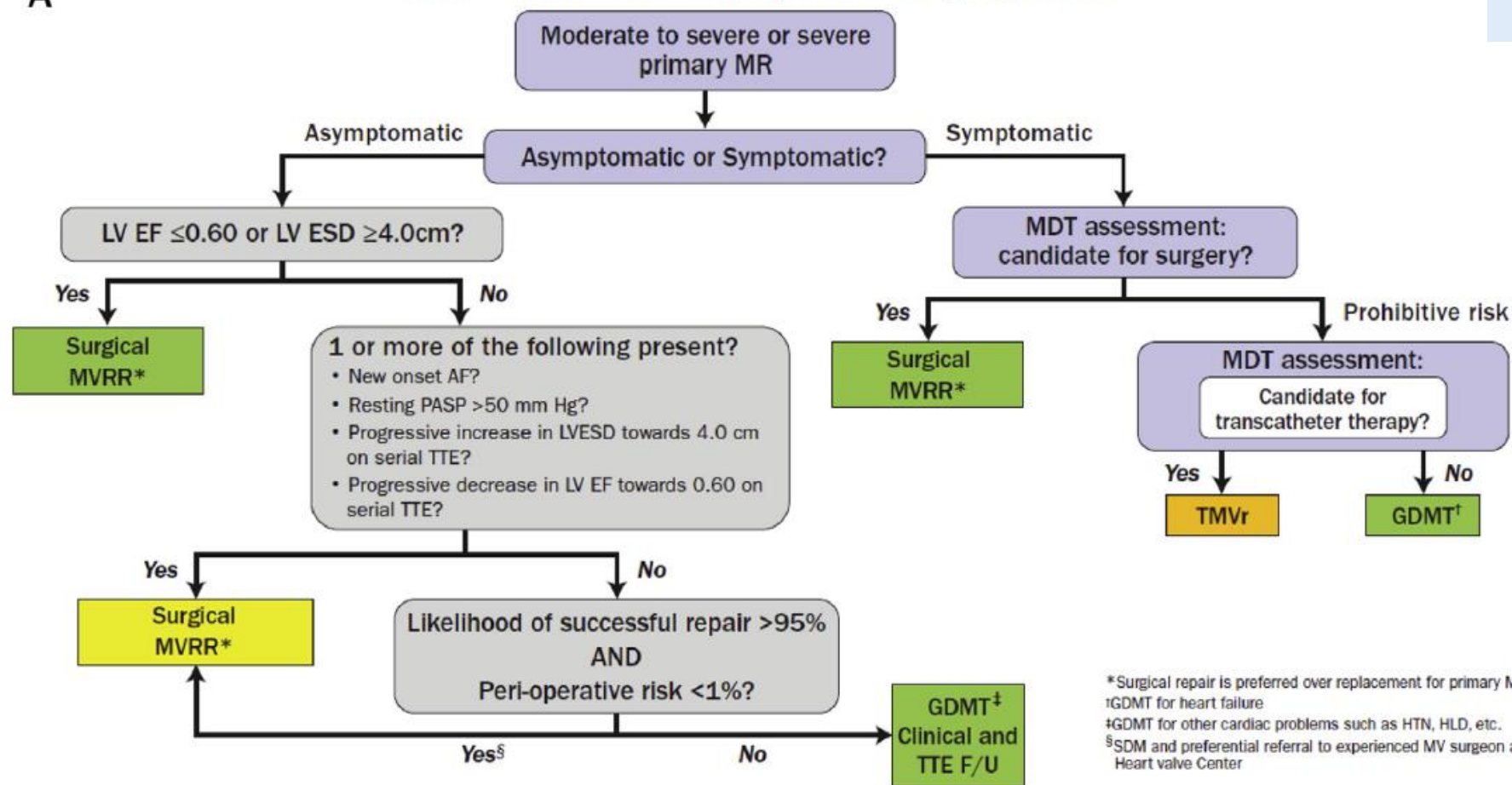
Valve surgery/intervention is recommended only in patients with severe SMR who remain symptomatic despite GDMT (including CRT if indicated) and has to be decided by a structured collaborative Heart Team.

I



A

## Intervention for Primary Mitral Regurgitation



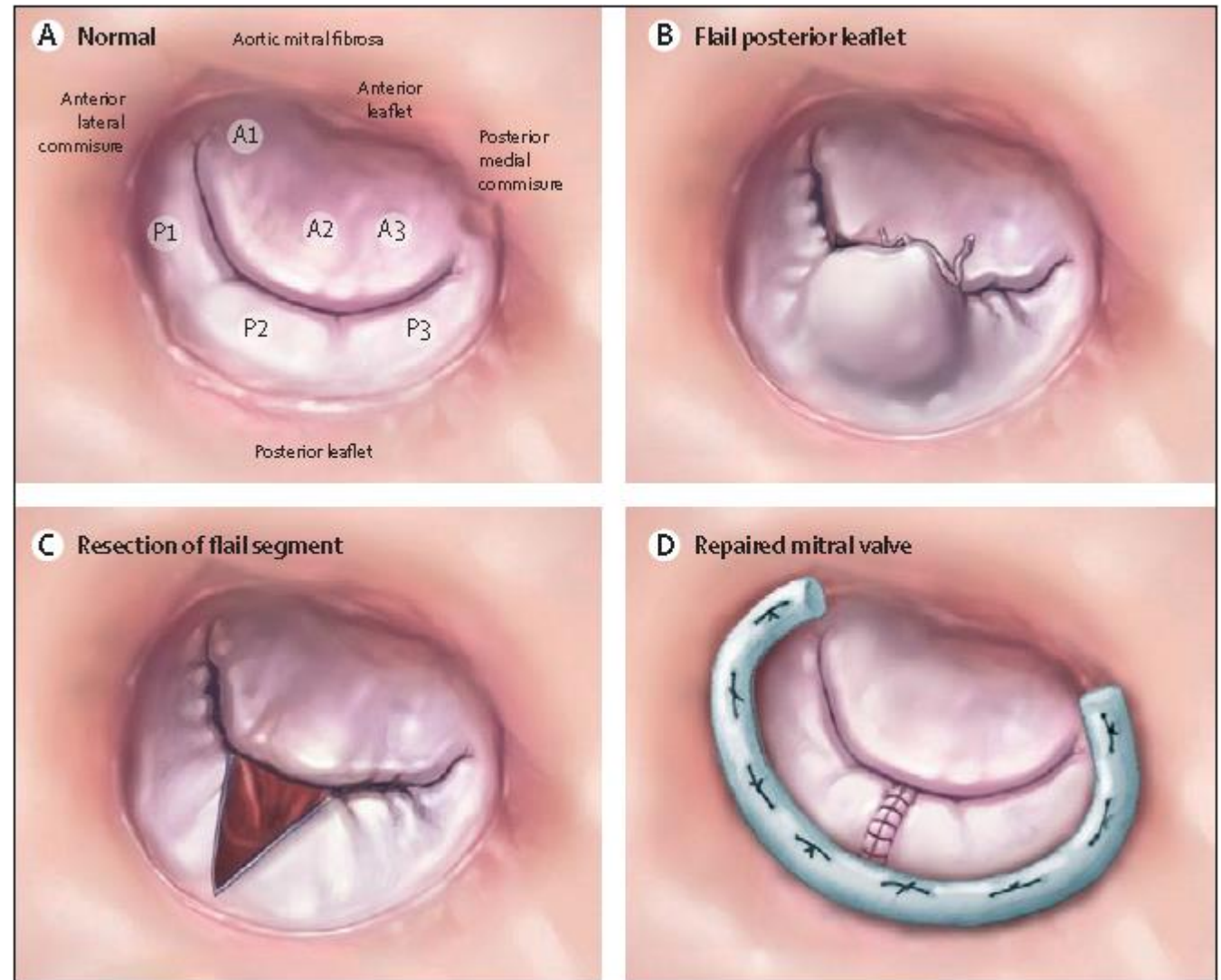
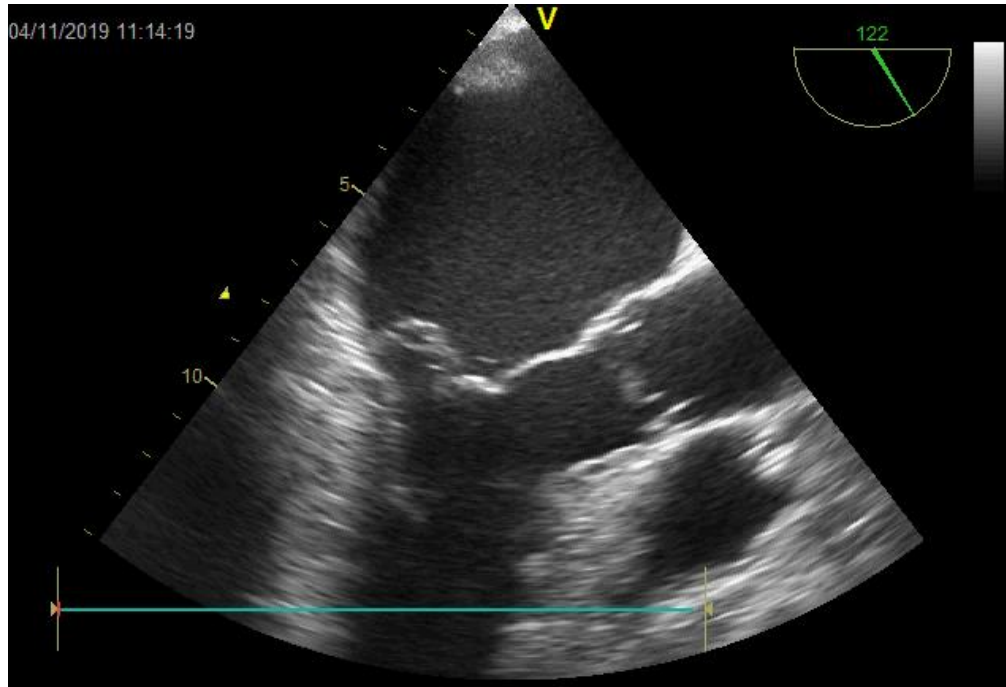
\*Surgical repair is preferred over replacement for primary MR

†GDMT for heart failure

‡GDMT for other cardiac problems such as HTN, HLD, etc.

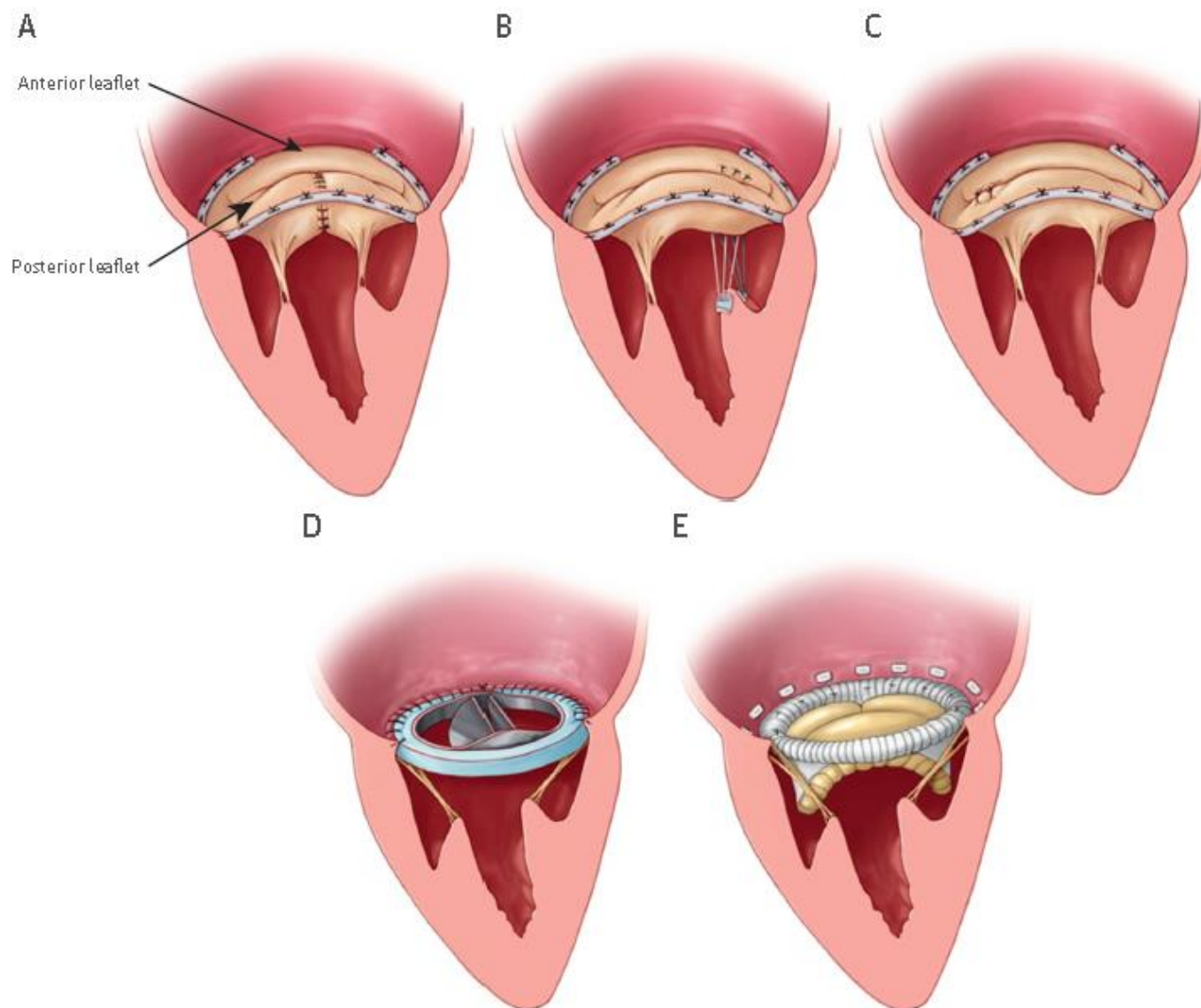
§SDM and preferential referral to experienced MV surgeon at Heart valve Center

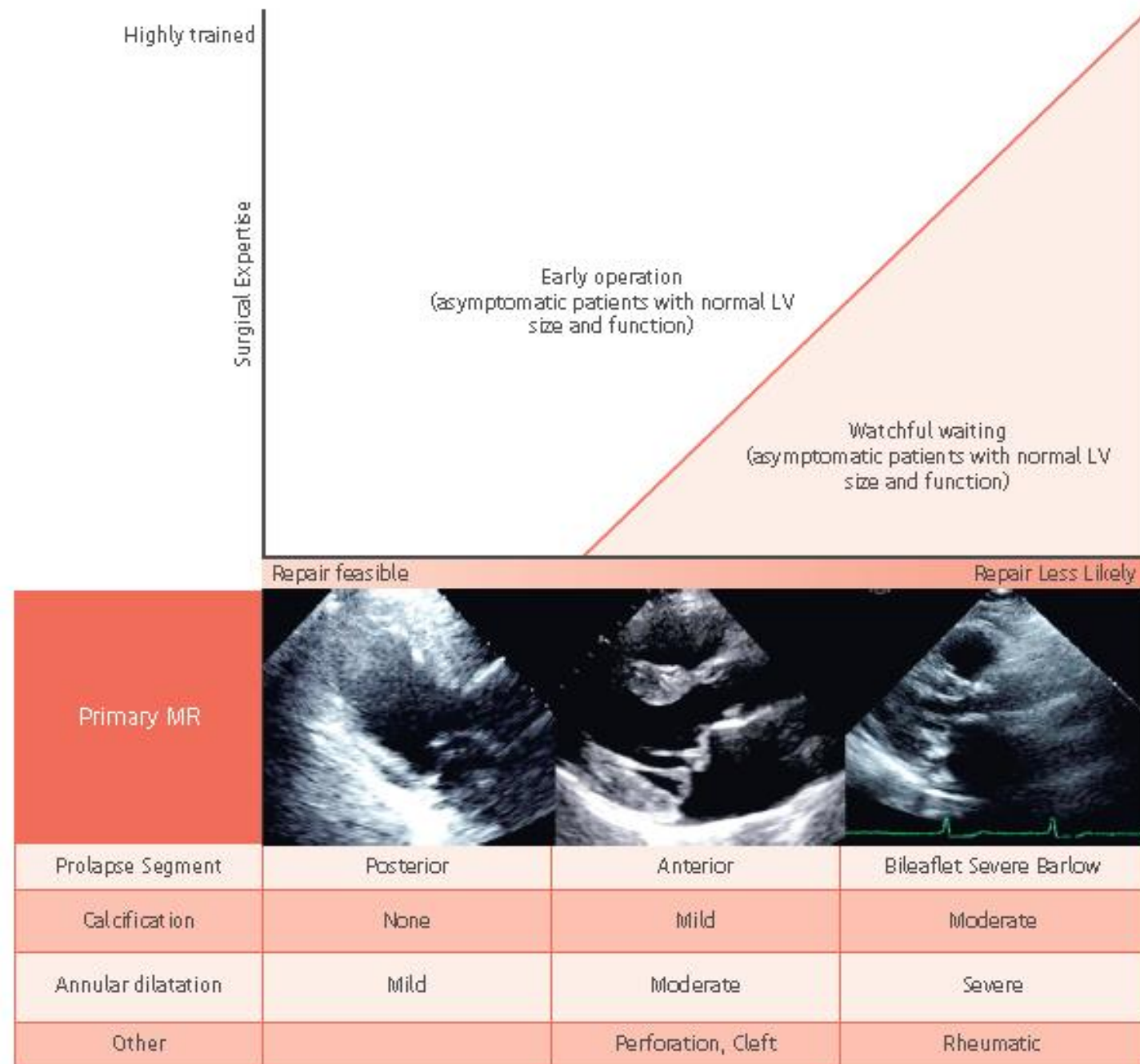
# Primer MY - Cerrahi



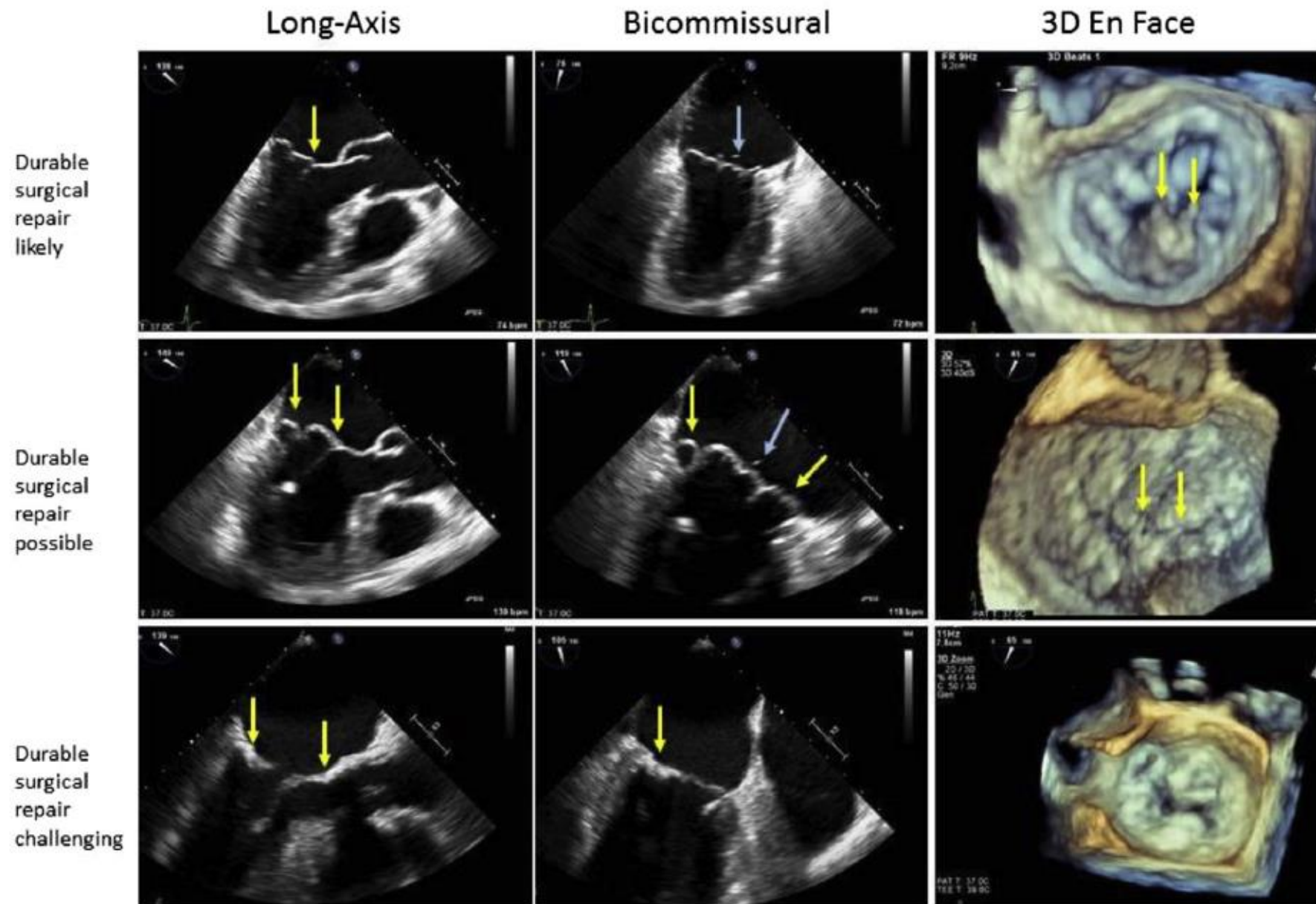
Enriquez-Sarano M, Akins CW, Vahanian A. Mitral regurgitation. Lancet. 2009 Apr 18;373(9672):1382-94.




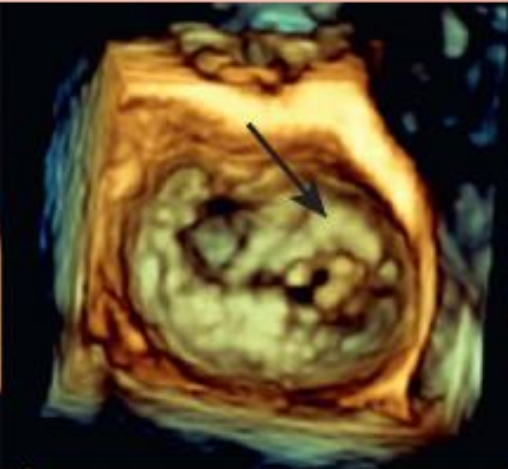
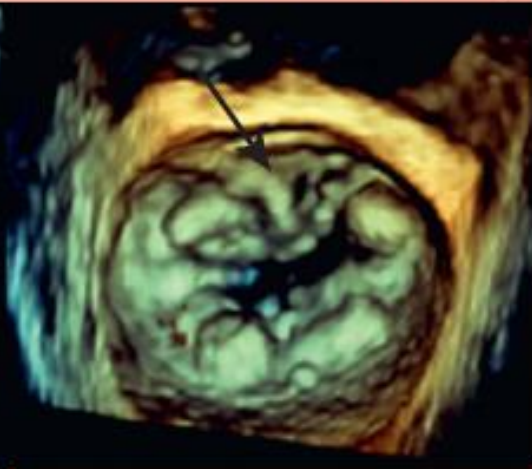




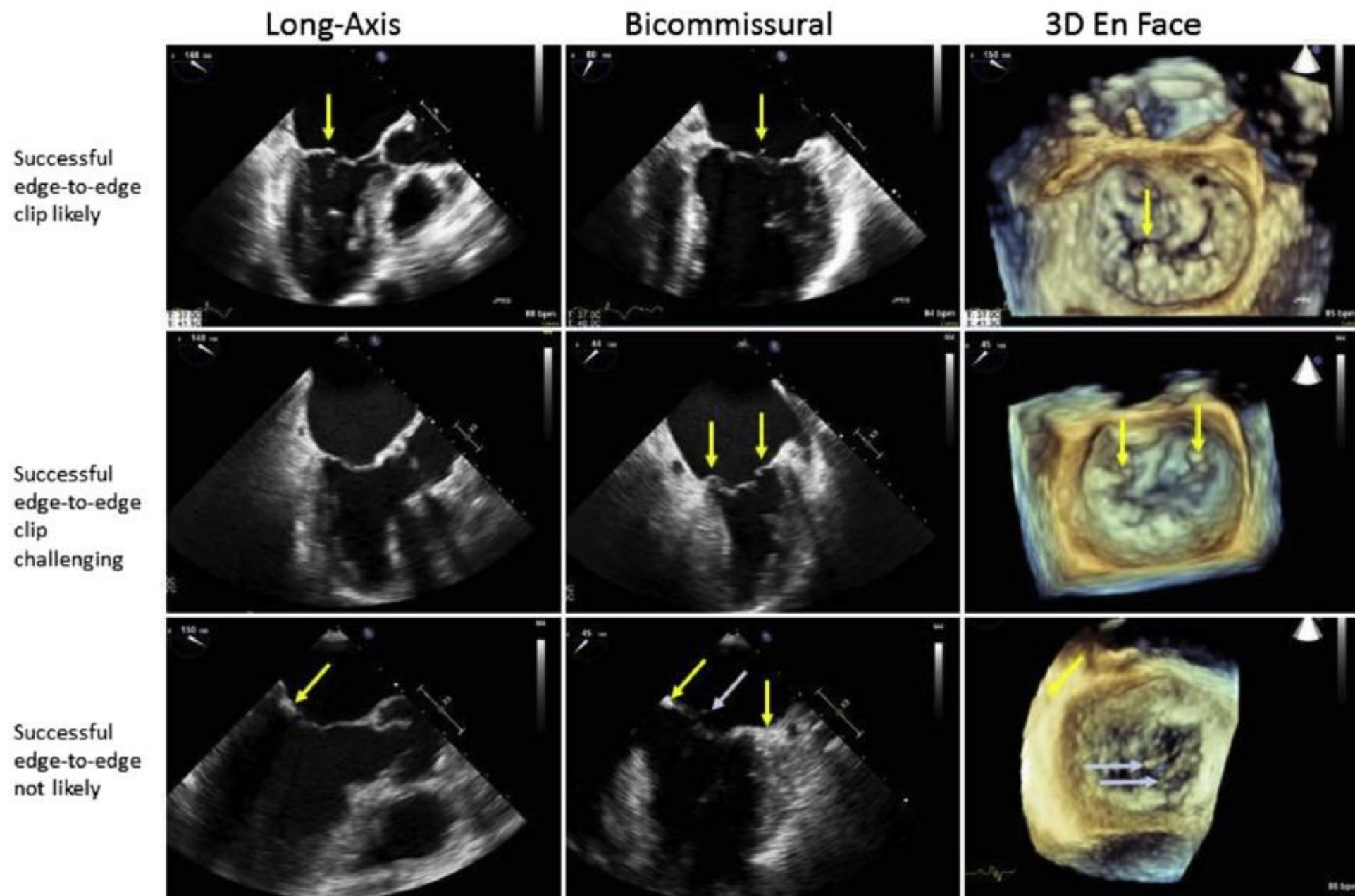
**FIGURE 10** Examples of MV Morphology Observed on TEE That Are Amenable to Surgical Repair in Patients With Primary MR





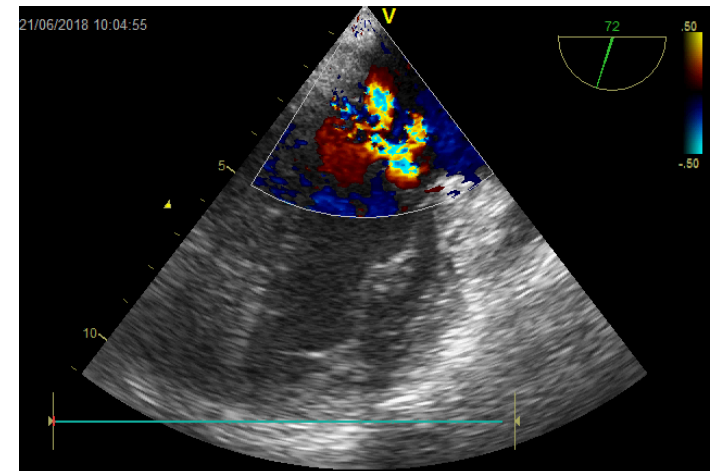
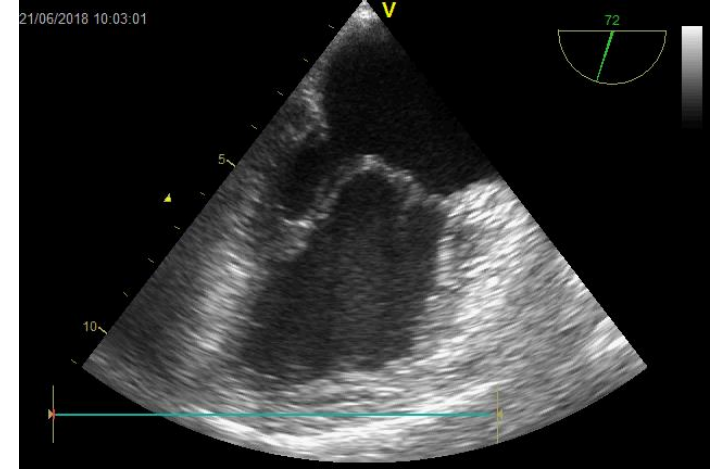
	Feasible		Unlikely
Transcatheter Mitral Valve Repair			
Segment	2	1 or 3	Severe Barlow
Calcification	None	Annular- sparing grasping zone	Grasping zone involved
MVA and MV Gradient	$>4 \text{ cm}^2$ and $<4 \text{ mm Hg}$	$3.5\text{-}4 \text{ cm}^2$	$<3.5 \text{ cm}^2$ and $>5 \text{ mm Hg}$
Flail width	$<15 \text{ mm}$	$>15 \text{ mm}$	
Flail gap	$<10 \text{ mm}$	$>10 \text{ mm}$	

**FIGURE 13** Mitral Anatomy in Transcatheter Edge-to-Edge MV Clip



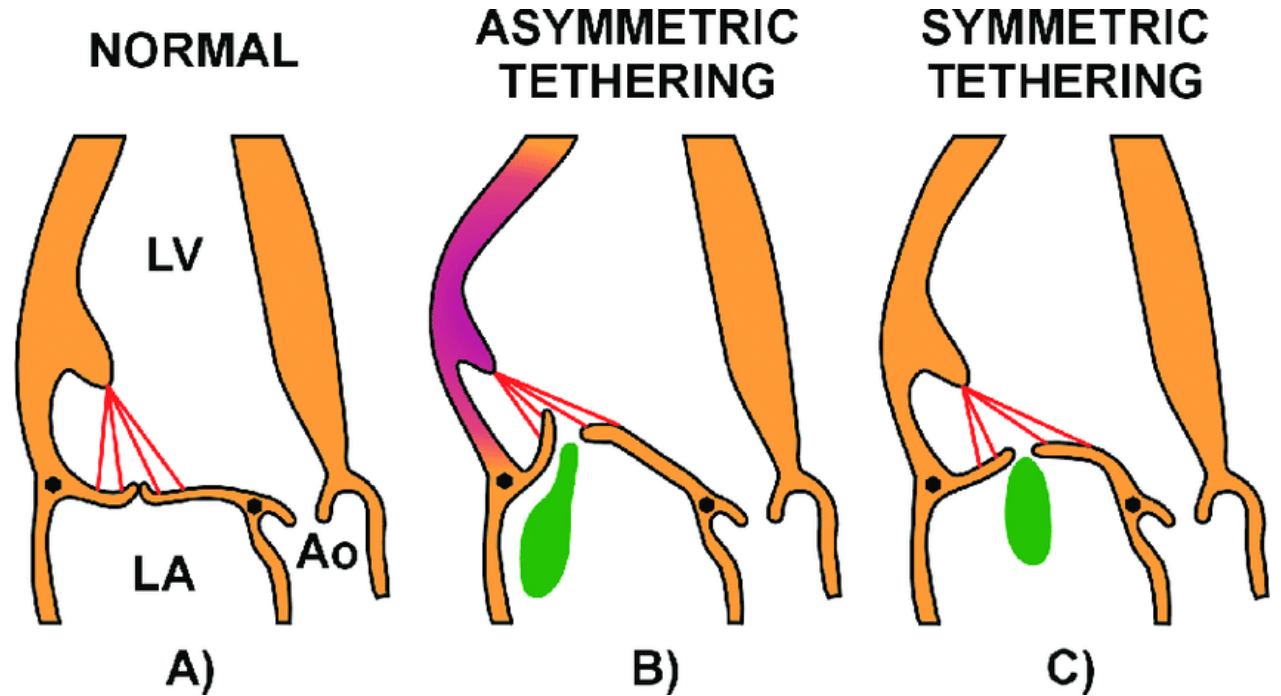
# Sekonder (fonksiyonel) MY

- Atrium ve ventrikülün hastalığı
- Noniskemik/iskemik remodeling



# Sekonder (fonksiyonel) MY

- Atrium ve ventrikülün hastalığı
- Noniskemik/iskemik remodeling
- Ventriküler genişleme
- Papiller kas lateralizasyonu
- Anüler dilatasyon/kontraksiyon kaybı

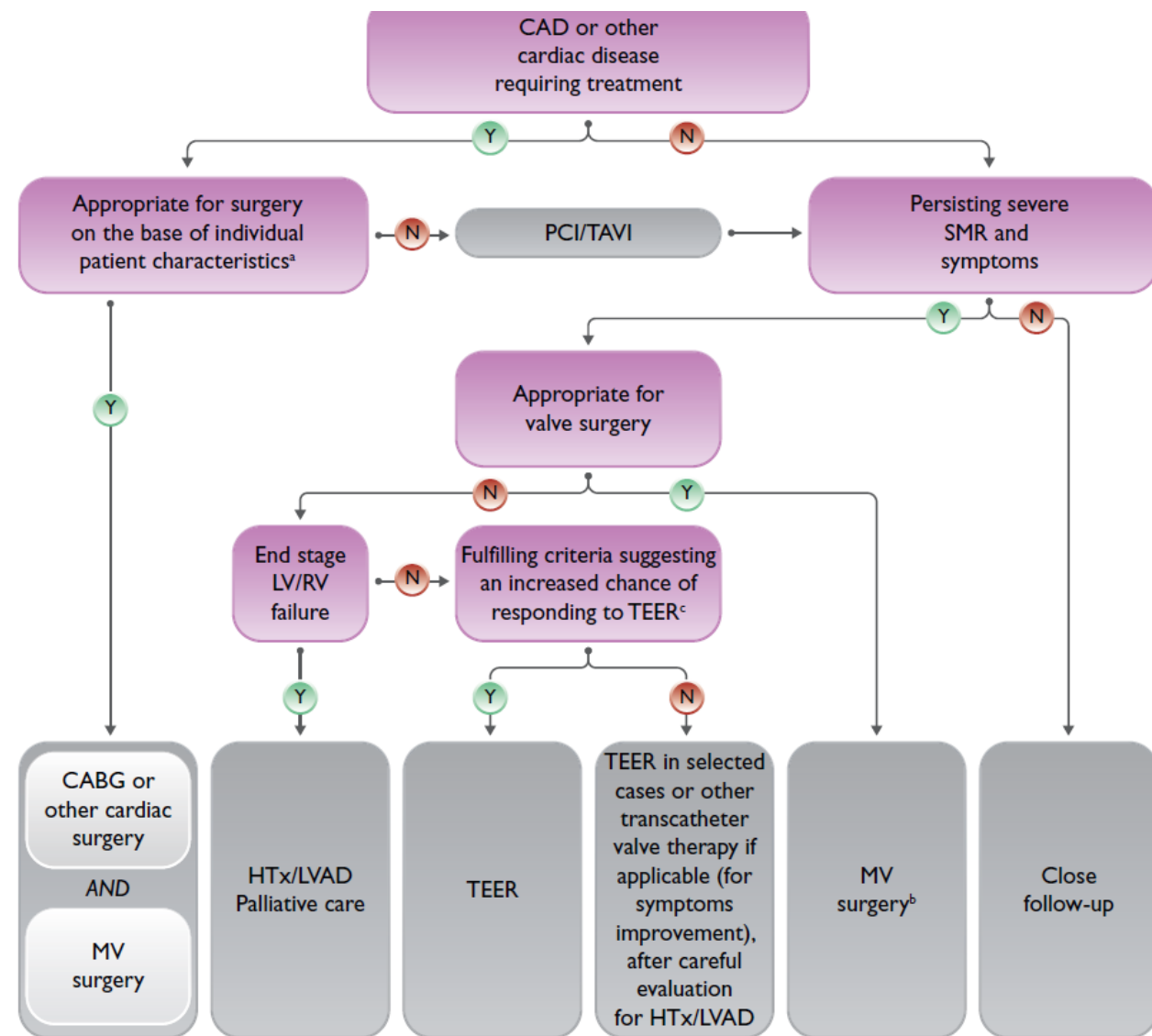
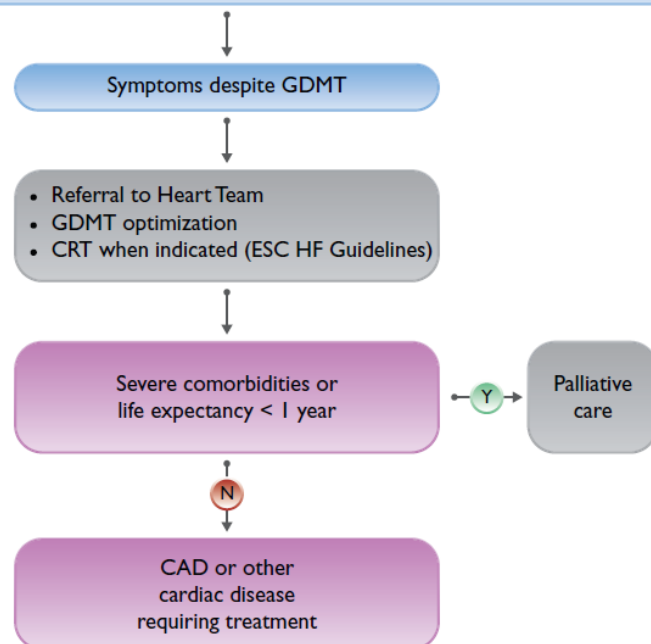




## 2021 ESC/EACTS Guidelines for the management of valvular heart disease

Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

### Management of patients with chronic severe secondary mitral regurgitation



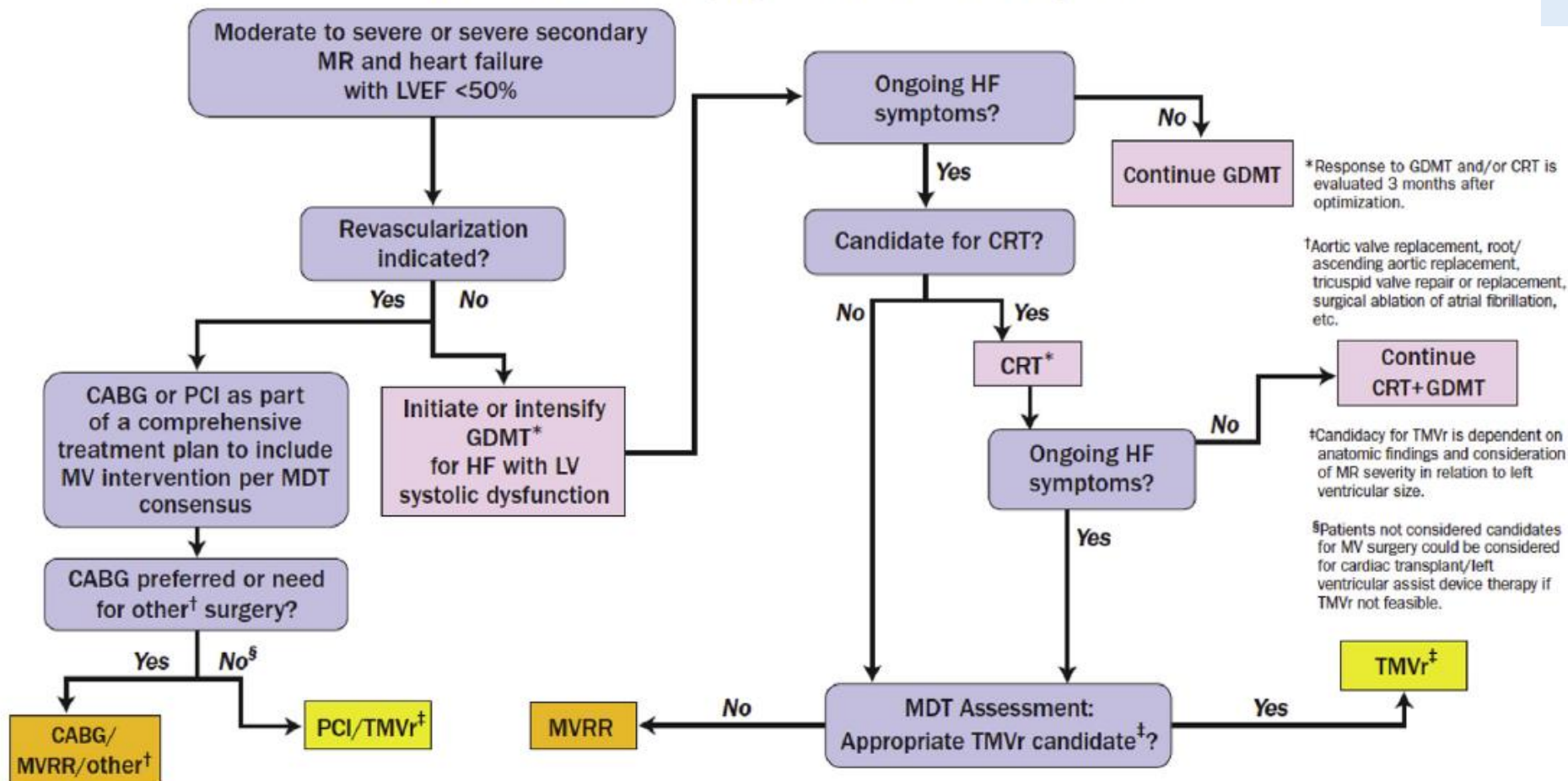
EXPERT CONSENSUS DECISION PATHWAY

2020 Focused Update of the 2017 ACC  
Expert Consensus Decision Pathway  
on the Management of  
Mitral Regurgitation

A Report of the American College of Cardiology Solution Set Oversight Committee

B

Intervention for Symptomatic Secondary MR



**TABLE 1** Summary of Changes in the 2020 Focused Update

2020 Focused Update Section	2017 ECDP	2020 Focused Update
6. <a href="#">Section 5.4.6</a> . Prognosis in MR	Limited role for transcatheter edge-to-edge repair	Includes statement about survival benefit with edge-to-edge repair in selected patients with secondary MR
7. <a href="#">Figure 9A</a> . Intervention for Primary MR <a href="#">Figure 9B</a> . Intervention for Symptomatic Secondary MR	Treatment restricted to surgery	<ul style="list-style-type: none"><li>■ New <a href="#">Figures 9A</a> (Primary MR) and <a href="#">9B</a> (Secondary MR)</li><li>■ Expanded options for secondary MR</li><li>■ Inclusion of transcatheter MV therapy</li></ul>
8. <a href="#">Section 6.3</a> . Transcatheter Treatment of MR	Limited to primary MR	Includes secondary MR
9. <a href="#">Figure 12</a> . Algorithm for Determining Eligibility for Transcatheter MV Intervention	Limited to primary MR	Includes secondary MR
10. <a href="#">Table 7</a> . Feasibility of Transcatheter Edge-to-Edge Clip Repair	Limited to primary MR	Includes secondary MR
11. <a href="#">Section 7</a> . Discussion and Intended Use of Pathway and <a href="#">Section 7.1</a> . Key Points	Limited role for transcatheter edge-to-edge repair in primary MR	<ul style="list-style-type: none"><li>■ Expands MDT to include cardiologist with experience managing HF and MR in management of patients with secondary MR</li><li>■ Expands use of edge-to-edge repair for selected patients with secondary MR</li></ul>

# SONUÇ

- Mitral kapak **KOMPLEKS**
- Yetmezlik sebebi **FARKLI KOMPONENTLER**
- Çok iyi bir **PREOP DEĞERLENDİRME**
- Onarım planlamasında **EKİP ÇALIŞMASI**
- Ekokardiyografi sırasında **VİTALLER VE İLAÇLARA** dikkat
- **TRANSKATETER UYGULAMALARDA ANESTEZİ**
- **ANESTEZİST KALP TAKIMININ ÖNEMLİ PARÇASI**

