TEER Guidance for New Centers

Patient Selection for MitraClip : DMR and FMR

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Outlines

1. Optimal candidate to TEER : Clinical perspectives
2. Anatomically suitable MV anatomy for TEER

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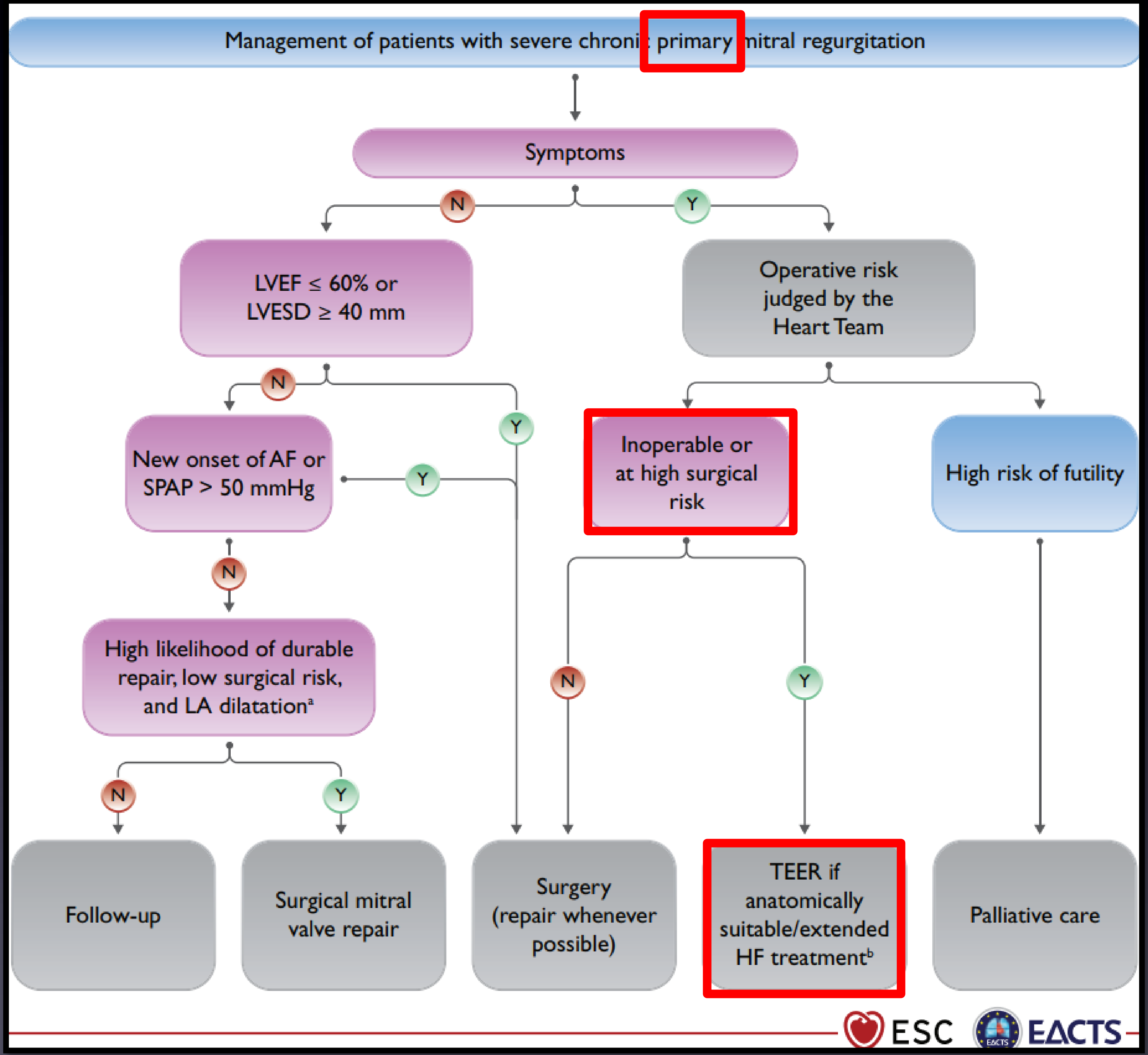
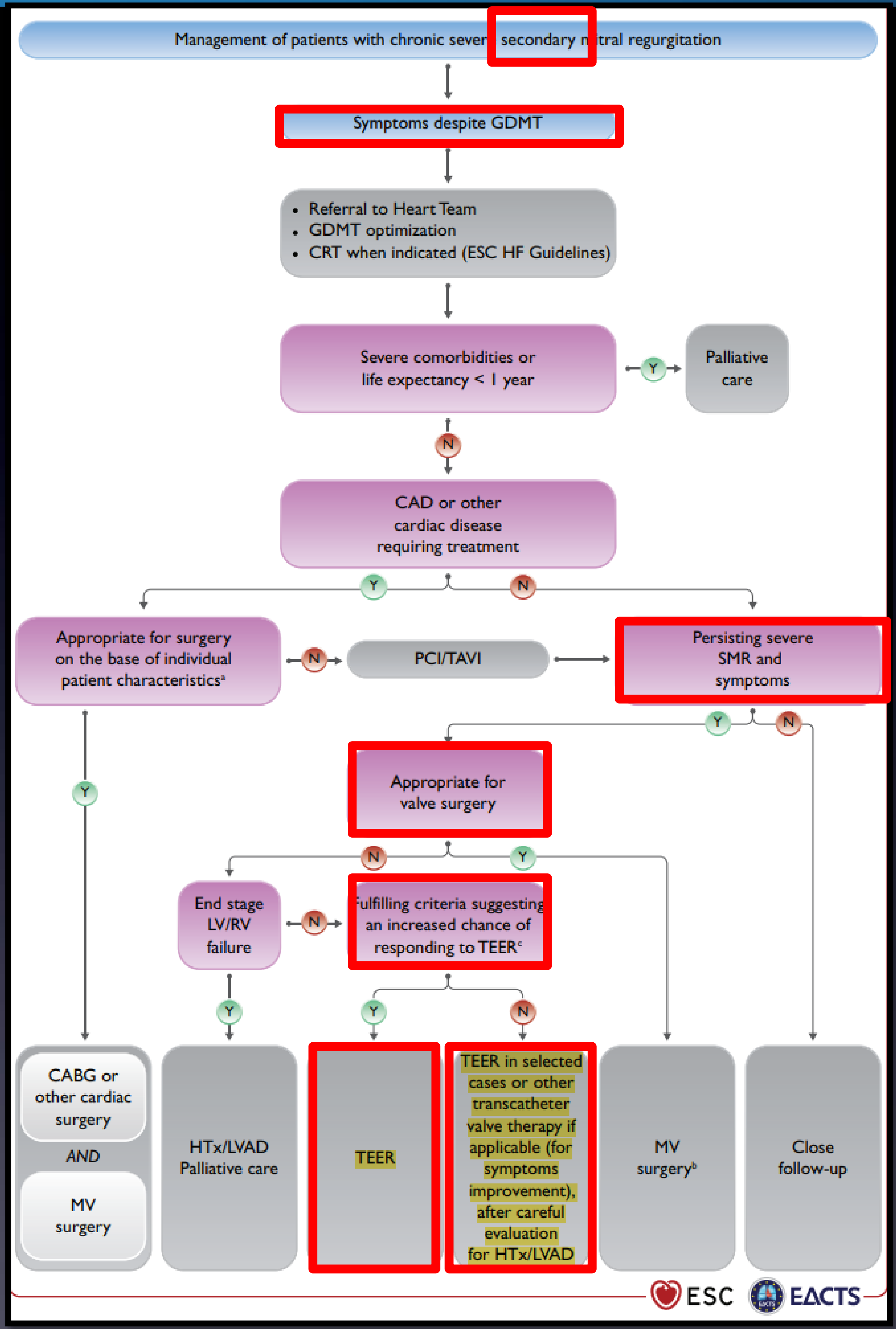
1. Optimal candidate to TEER : Clinical perspectives
2. Anatomically suitable MV anatomy for TEER

Current Guideline

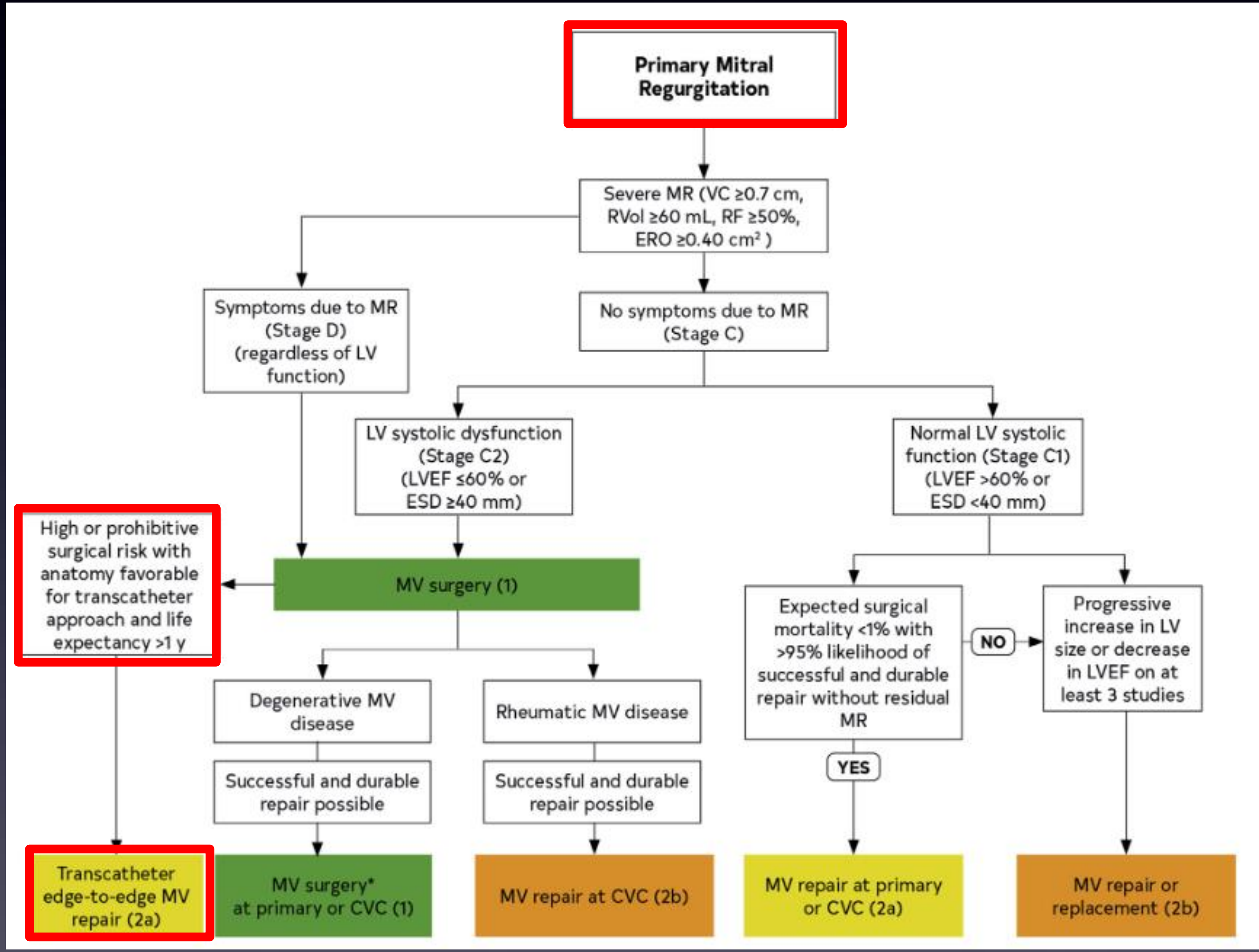
2021 ESC/EACTS Guidelines for the management of valvular heart disease

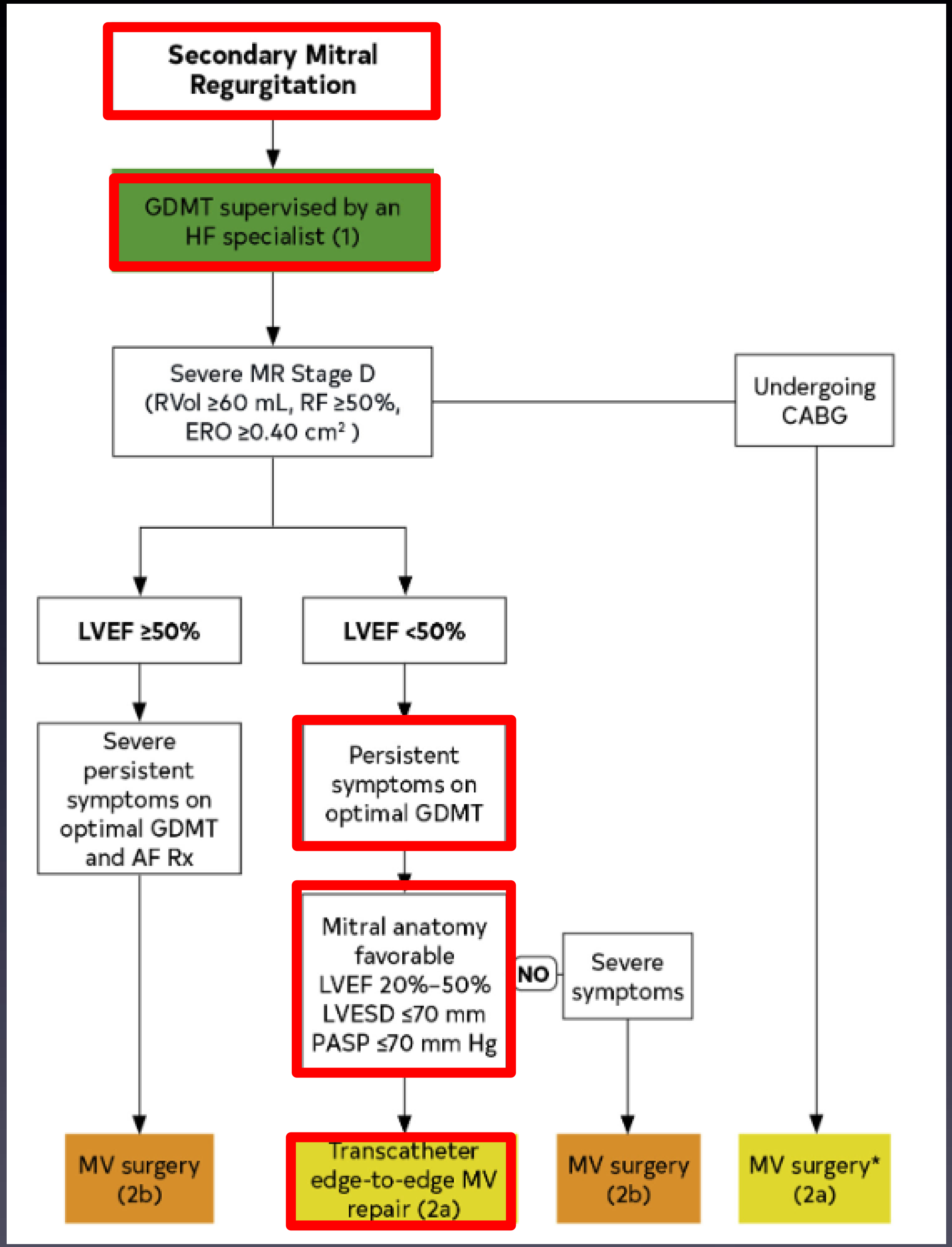




Current Guideline

2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease





TEER Highlights from ACC/AHA VHD Guidelines

- TEER for primary MR
  - 2014 Class 2b → 2020 Class 2A
  - Recommendation of TEER expanded to include **surgical high-risk** pts
  - Condition for optimal GDMT for pts is removed

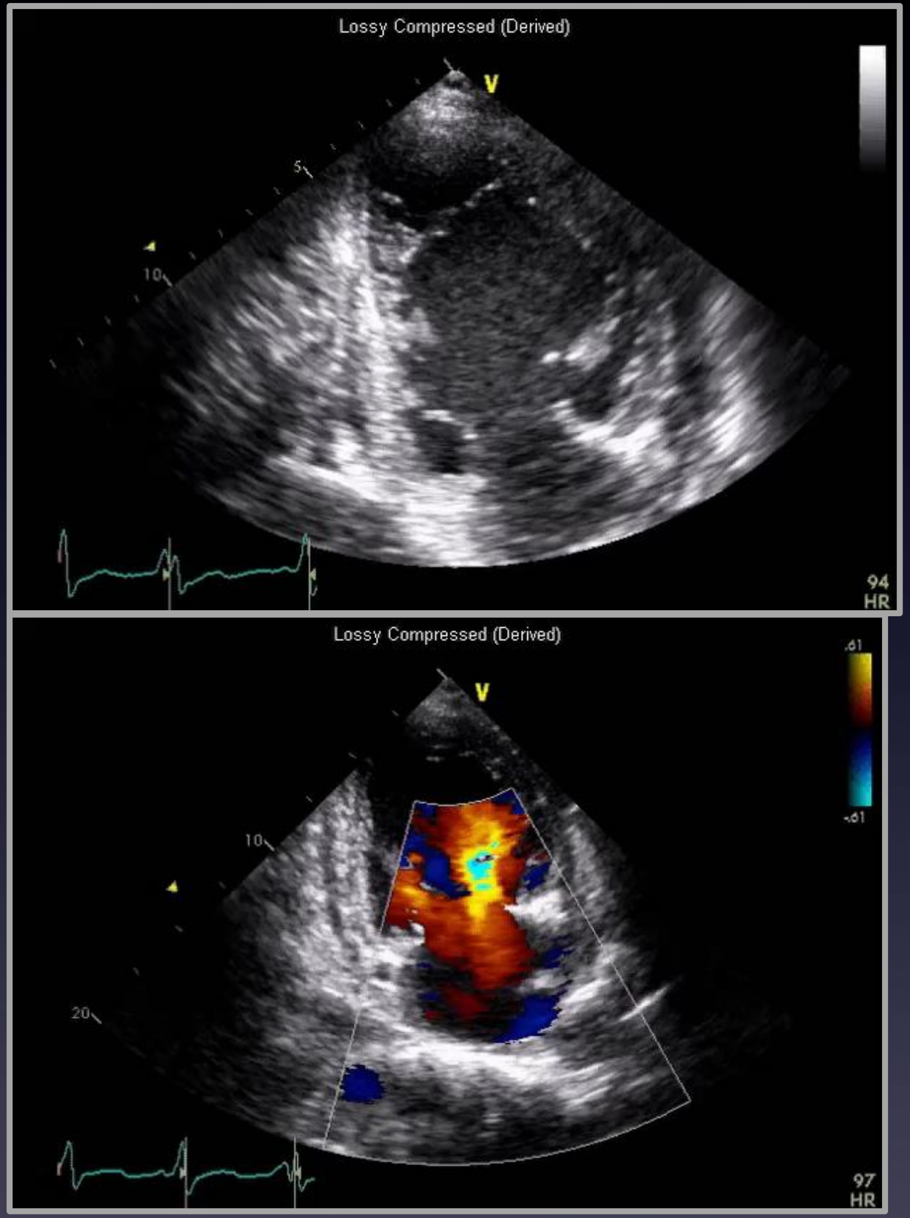
- TEER for secondary MR
  - New 2020 Class 2A
  - Recommended for a COAPT-like subsets for severe 2ndary MR pts
    - **20%<LVEF<50%, LVESD ≤ 70mm, PASP ≤ 70mmHg**
    - **Persistent symptoms while GDMT**
  - Optimal GDMT by a cardiologist expert

COAPT criteria
Indication CoR IIa LoE B for M-TEER in SMR

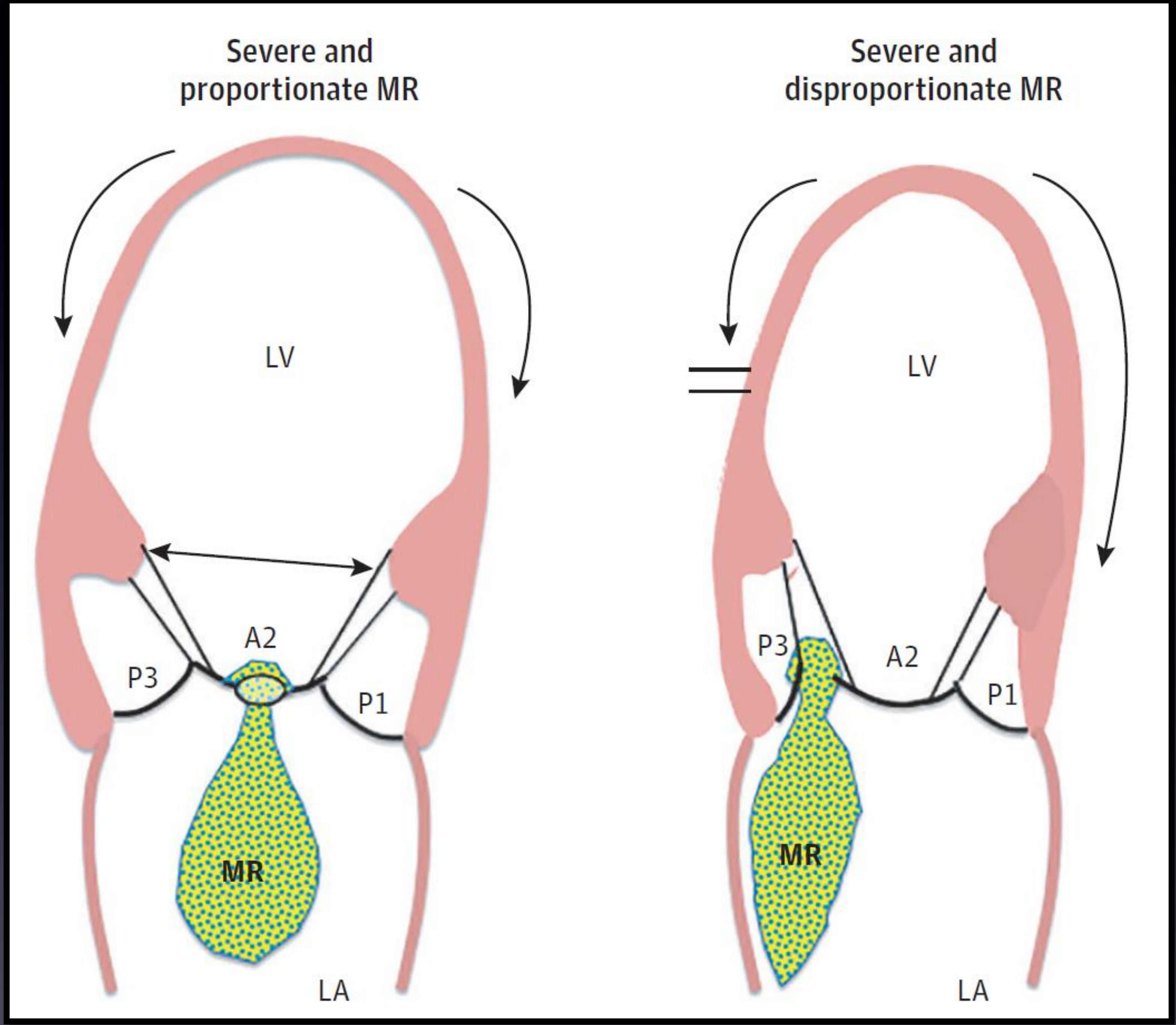
YES	NO
- Severe SMR	- Haemodynamic instability[c]
- Optimised HF treatments according to 2021 ESC guidelines	- Stage D HF[d]
- NYHA Class II, III or ambulatory IV	- Moderate or severe RV dysfunction
- LVEF 20-50%	- Systolic pulmonary pressure >70 mmHg
- LV end-systolic diameter ≤70 mm	- COPD requiring oxygen or steroid
- At least one HF hospitalisation within the previous year or increased NP levels[a]	- Coronary, aortic or tricuspid valve disease requiring surgery
- Anatomy judged suitable for M-TEER[b]	- Hypertrophic, restrictive or infiltrative cardiomyopathy

FMR : Proportionate and Disproportionate MR

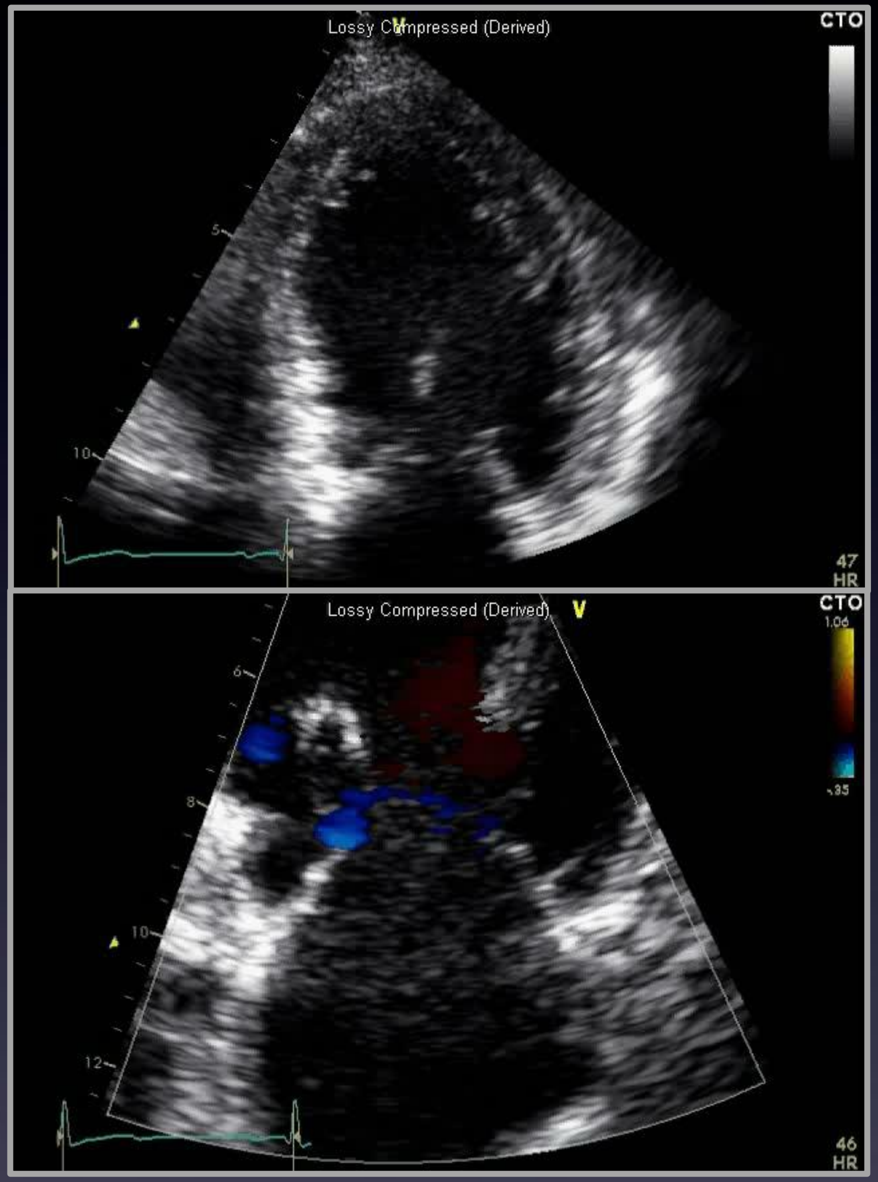
MITRA-FR like subset
Proportionate MR



LV 75.9/63.1 mm
LVEF 29%
ERO 0.57 cm^2
RV 55.8 ml



COAPT like subset
Disproportionate MR



LV 59.8/42 mm
LVEF 49%
ERO 0.33 cm^2
RV 51.2 ml

JAMA Cardiol. doi:10.1001/jamacardio.2019.5971

Determinants of TEER efficacy in FMR

Optimal	Conditionally suitable	Unsuitable
NYHA class II-III	NYHA class IV	NYHA class IV, frequent HHF
Non-ischemic CMP	Ischemic CMP	ICMP with large infarct size (>30%)
Disproportionate MR EROA/LVEDV ratio ≥ 0.14 LVEDV index <96mL/m^2	Proportionate MR	Advanced LV ds (pVO2<10ml/kg/min) EROA/LVEDV ratio ≤ 0.12
Preserved RV function	RV dysfunction with CR	RV dysfunction without CR
No pulmonary hypertension	Reversible pul.HT	Irreversible pul.HT
ECV on cardiac MR <30%	ECV on cardiac MR >30%	NT proBNP>10,000 pg/mL

Adapted from Front. Cardiovasc. Med. 2021;8:585415

Outlines

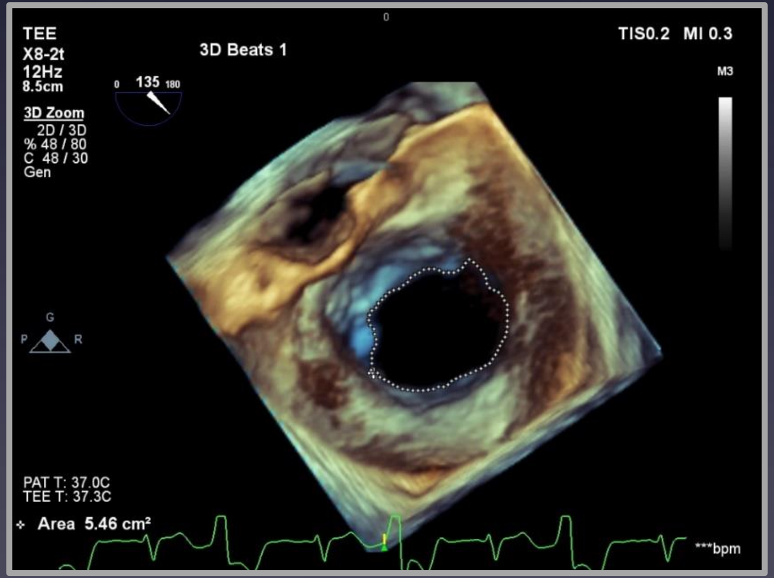
1. Optimal candidate to TEER : Clinical perspectives
2. **Anatomically suitable MV anatomy for TEER**
3. Assessment of TEER during procedure

Suitable MV morphology for TEER

2020 Focused Update of 2017 ACC expert consensus decision pathway

TABLE 7 Feasibility of Transcatheter Edge-to-Edge Clip Repair

	Favorable Features*	Less Favorable or Unfavorable Features*
Location of Leaflet Pathology	Noncommissural pathology (medial, middle, lateral segments)	Commissural segments, leaflet perforations, or clefts
Calcification	No or minimal calcification	■ Severe leaflet calcification or calcification in area of grasping zone ■ Severe annular calcification
Mean MV Gradient	Transmitral gradient <4 mm	Mitral stenosis (rheumatic or calcific; mean mitral gradient >5 mm Hg)
MVA	MVA $\geq$4.0 cm^2	MVA <4.0 cm^2
Grasping Zone Length	>10 mm	<7 mm



MVA 5.46 cm2

P2 length= 1.30 cm

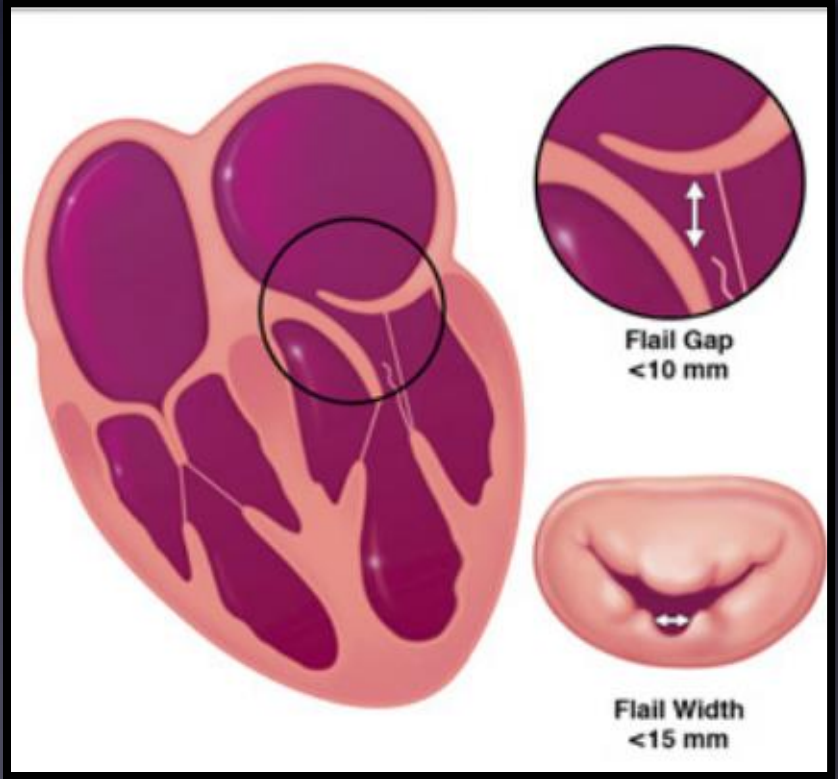
JACC 2020;75:2236-70

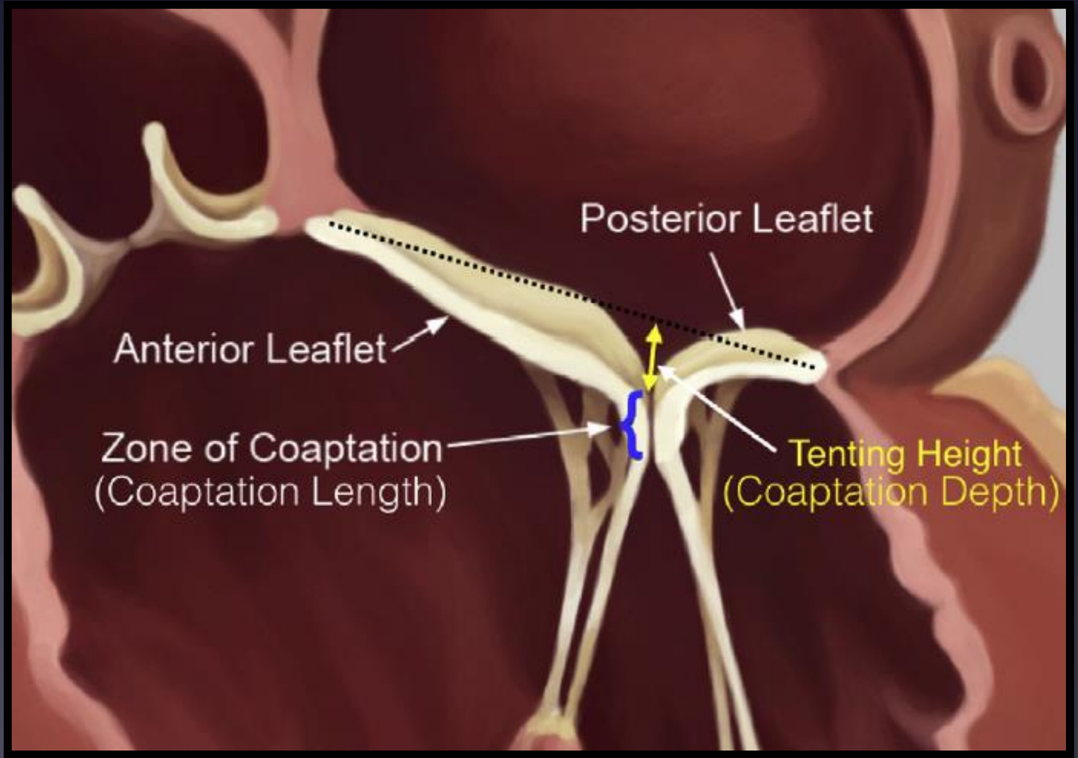
Suitable MV morphology for TEER

2020 Focused Update of 2017 ACC expert consensus decision pathway

TABLE 7 Feasibility of Transcatheter Edge-to-Edge Clip Repair

	Favorable Features*	Less Favorable or Unfavorable Features*
Primary MR	Flail width <15 mm; flail gap <10 mm; single segment pathology Normal leaflet thickness	■ Flail width >15 mm and flail gap >10 mm ■ Multisegment pathology; highly mobile flail leaflet with multiple ruptured chords ■ Severely and diffusely thickened (5 mm in diastole) and redundant leaflets (Barlow's type valve); LVESD >55 mm
Secondary MR	Coaptation depth <11 mm; coaptation length (overlap length) ≥2 mm	LVESD >70 mm





JACC 2020;75:2236-70

Criteria for MV-TEER

Complexity of valve morphology and center experience as criteria for MV-TEER

Repair!

Anatomical suitability for M-TEER

Centre experience

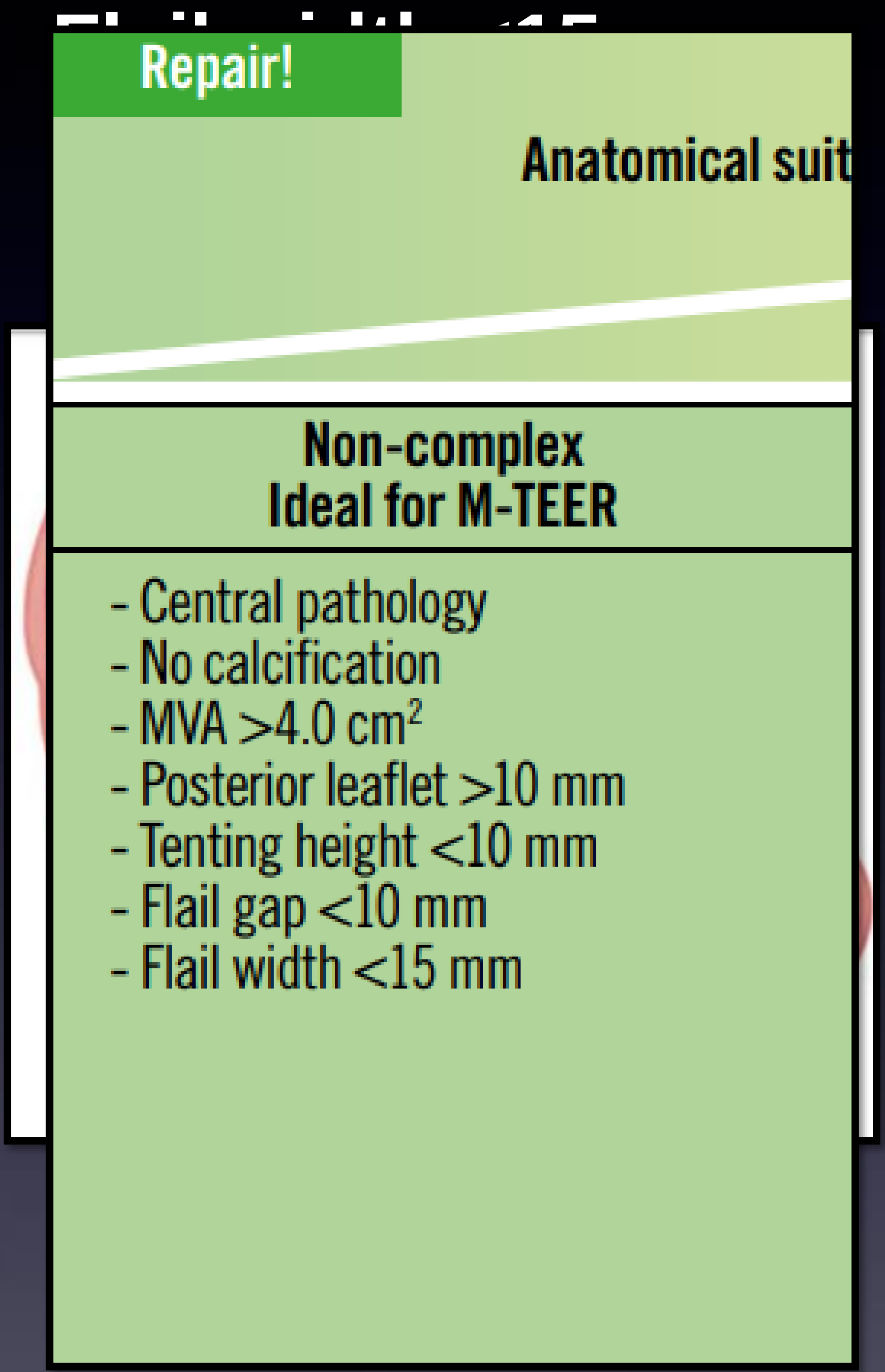
Replacement?

Non-complex Ideal for M-TEER	Complex Suitable for M-TEER	Very complex Challenging for M-TEER	Criteria favouring replacement M-TEER hard or impossible
- Central pathology - No calcification - MVA >4.0 cm^2 - Posterior leaflet >10 mm - Tenting height <10 mm - Flail gap <10 mm - Flail width <15 mm	- Isolated commissural lesion (A1/P1 or A3/P3) - Annular calcification without leaflet involvement - MVA 3.5-4.0 cm^2 - Posterior leaflet length 7-10 mm - Tenting height >10 mm - Asymmetric tethering[26] - Coaptation reserve <3 mm[24] - Leaflet-to-anulus index <1.2[25] - Flail width >15 mm - Flail gap >10 mm - Two jets from leaflet indentations	- Commissural lesion with multiple jets - Annular calcification with leaflet involvement - Fibrotic leaflets - Wide jet involving the whole coaptation - MVA 3.0-3.5 cm^2 - Posterior leaflet length 5-7 mm - Barlow's disease - Cleft - Failed surgical annuloplasty	- Concentric MAC with stenosis - MVA <3.0 cm^2 - Relevant mitral valve stenosis (mean gradient >5 mmHg) - Posterior leaflet <5 mm - Calcification in the grasping zone - Deep regurgitant cleft - Leaflet perforation - Multiple/wide jets - Rheumatic mitral stenosis

EuroIntervention 2023;18:957-976

Favorable MV morphology for TEER : DMR

Primary MR

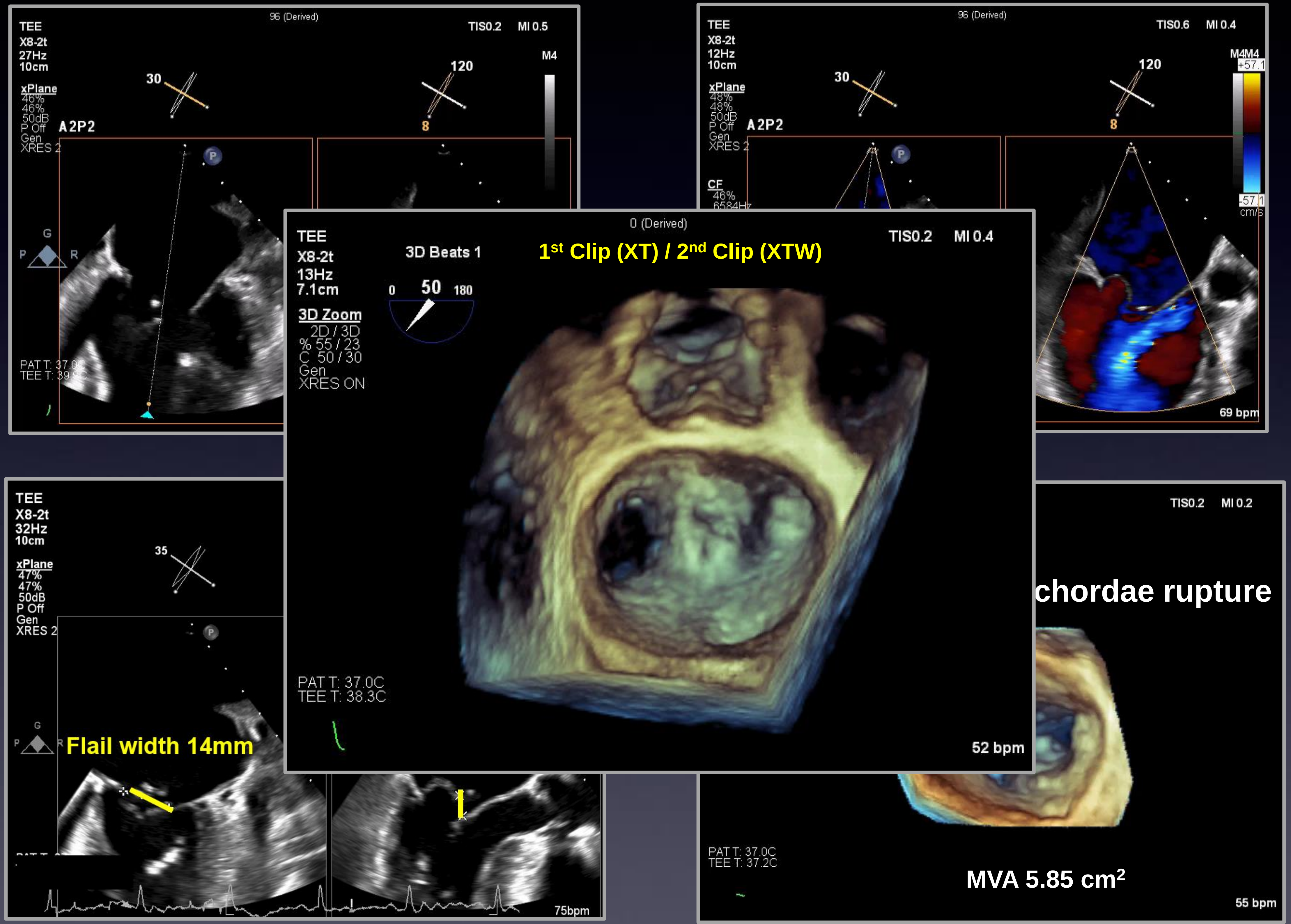

Repair!

Anatomical suit

Non-complex
Ideal for M-TEER

- Central pathology
- No calcification
- MVA >4.0 cm^2
- Posterior leaflet >10 mm
- Tenting height <10 mm
- Flail gap <10 mm
- Flail width <15 mm

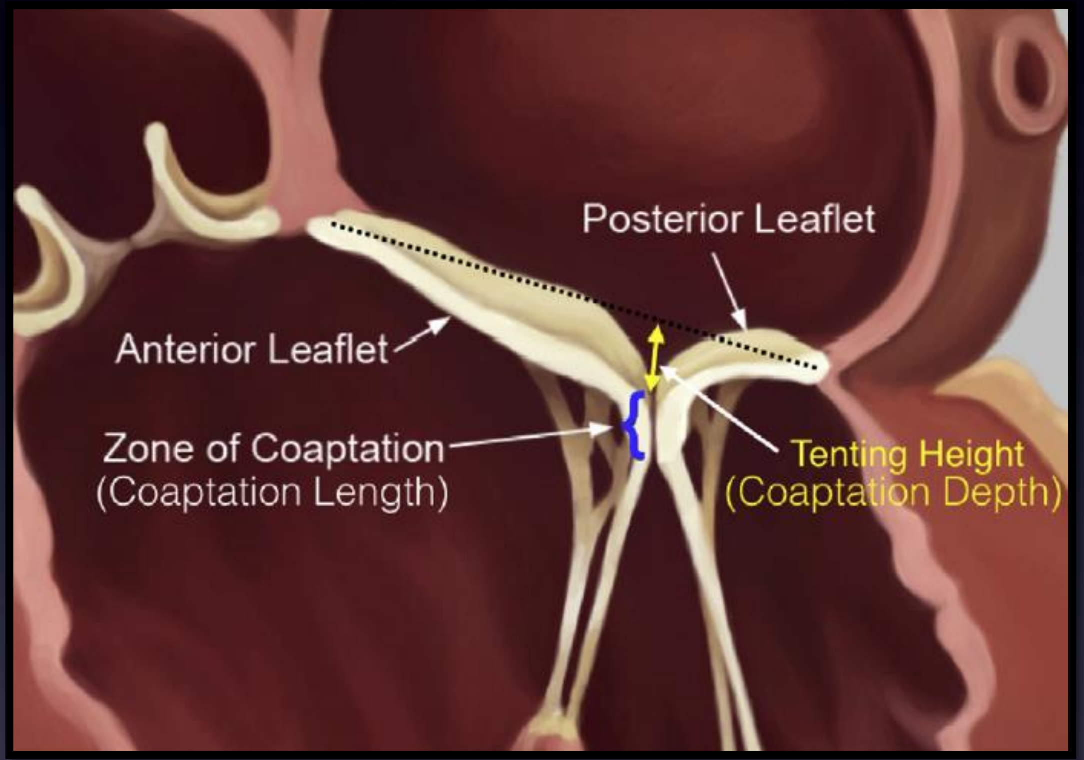
85/F Primary MR



Favorable MV morphology for TEER : FMR

Secondary MR

Coaptation depth <11mm
Coaptation length ≥ 2mm



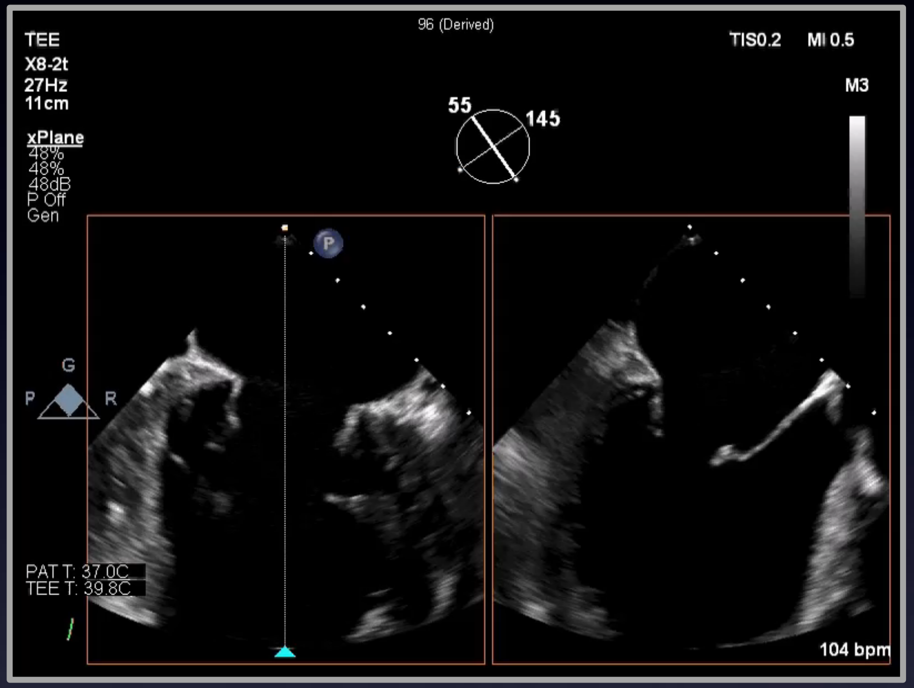
Coaptation depth : distance from the point of coaptation to the annular plane

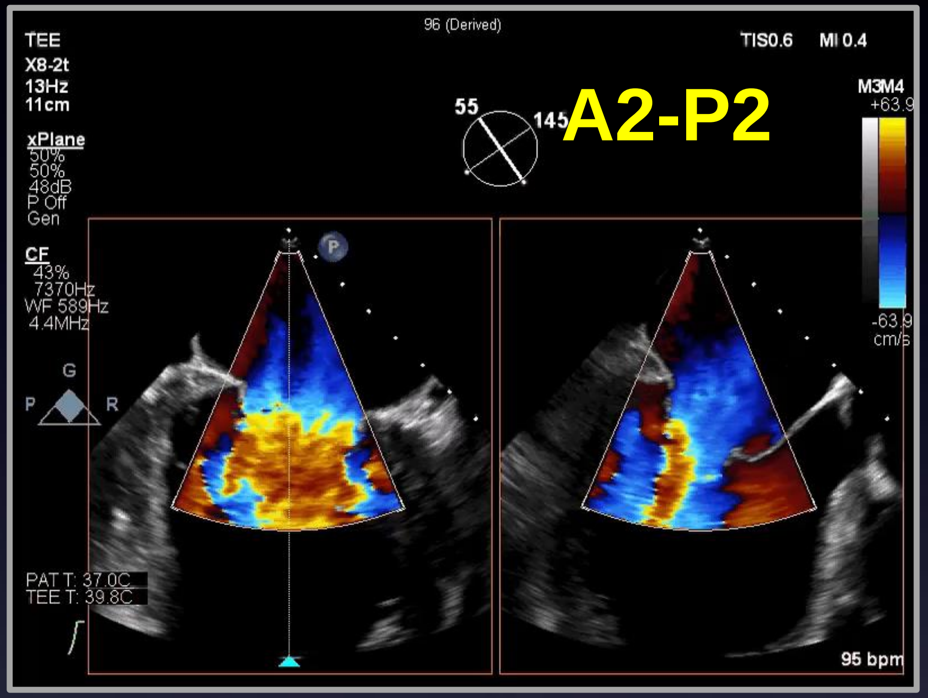
Coaptation length : length of residual leaflet below the point of coaptation

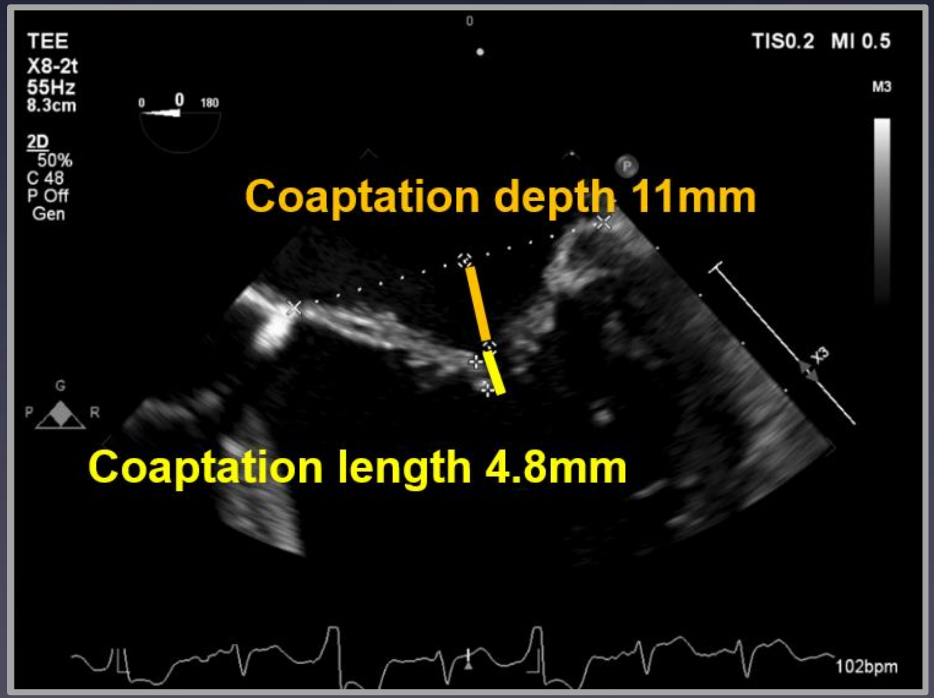
JASE 2018;31:434-53

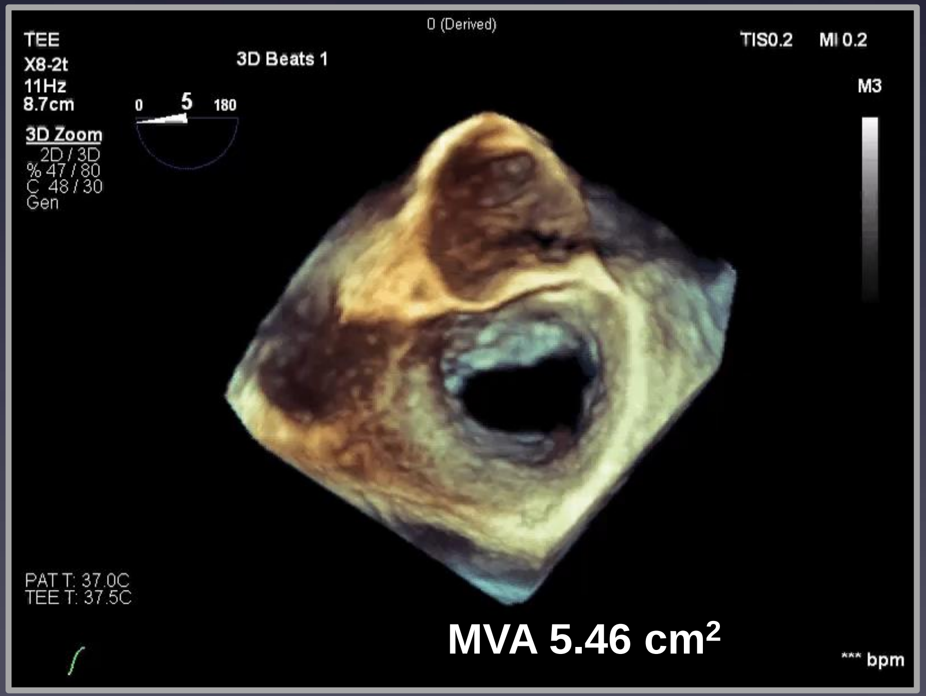
76/F HFrEF with severe Secondary MR

LV 75.9/63.1 mm, LVEF 29%







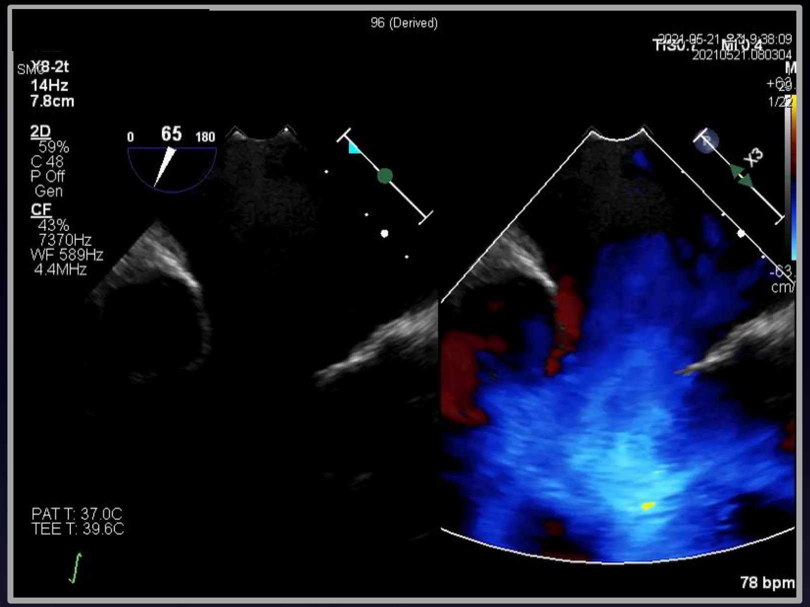


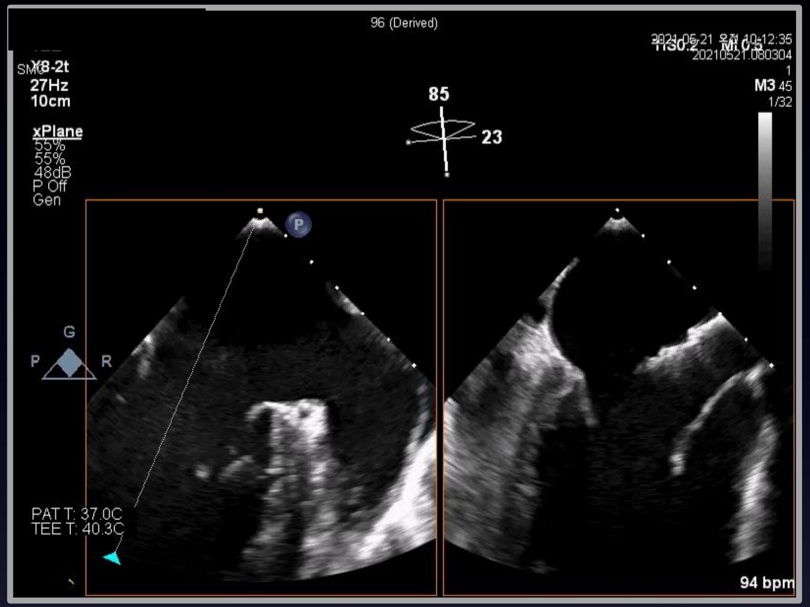
Favorable MV morphology for TEER : FMR

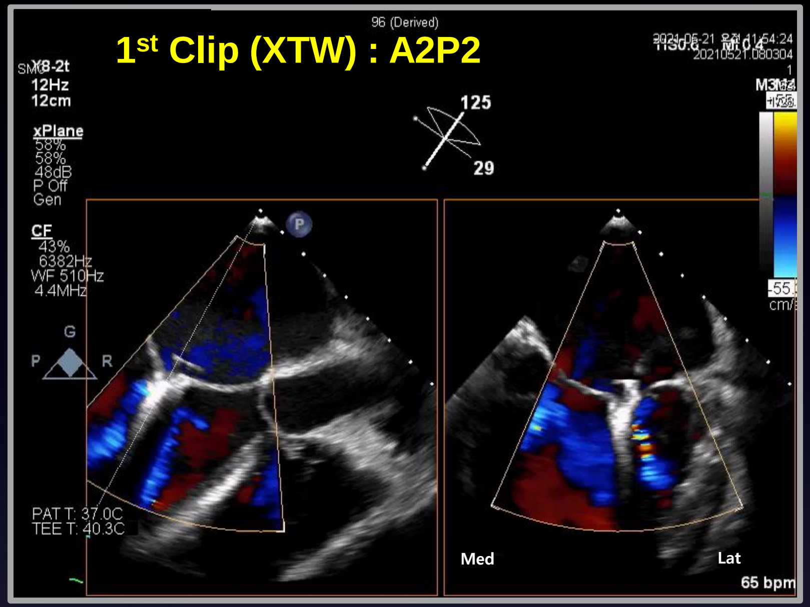
76/F HFrEF with severe Secondary MR

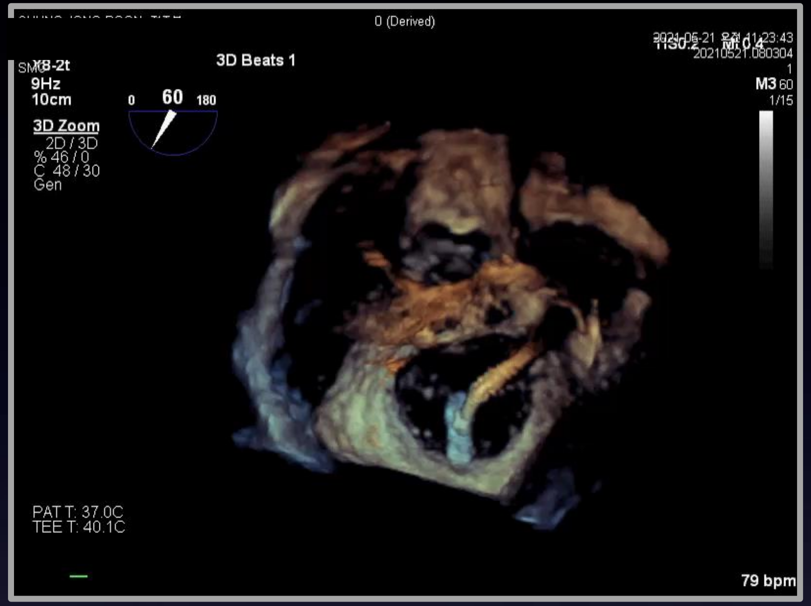
LV 75.9/63.1 mm, LVEF 29%

1st MitraClip(XTW) implantation

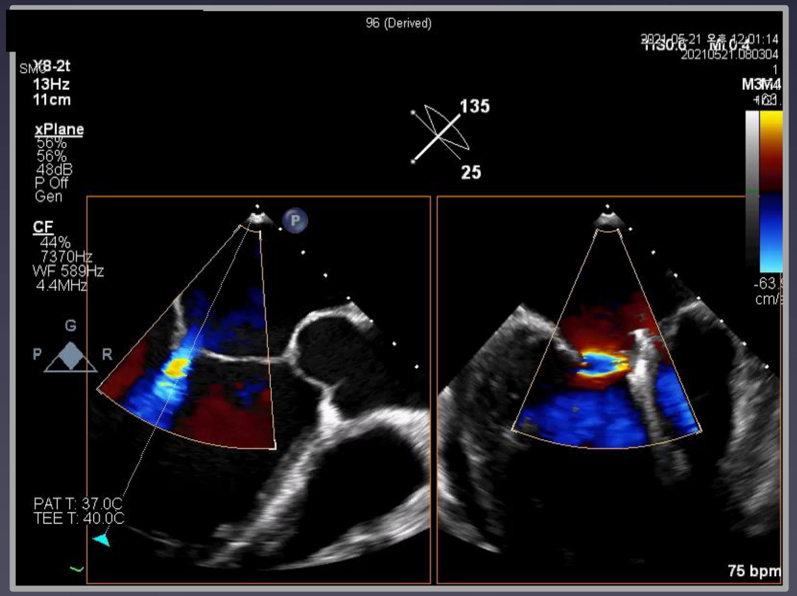


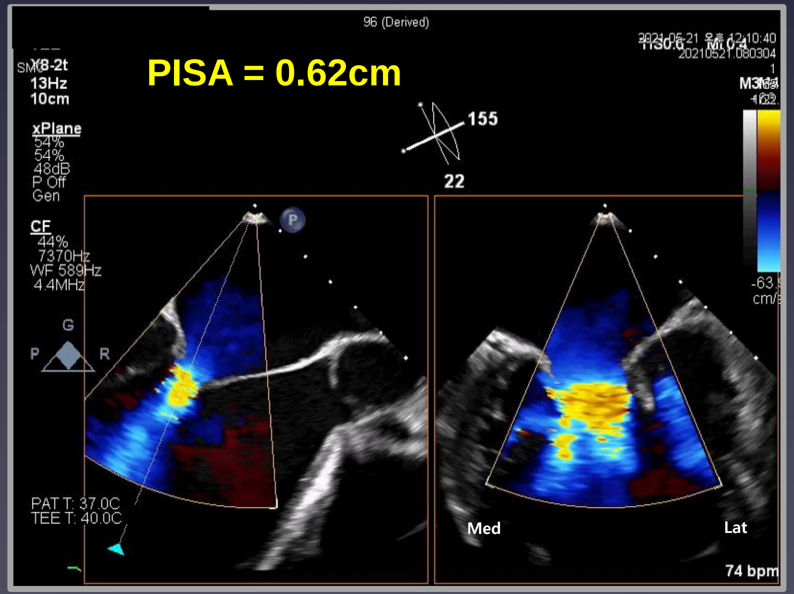


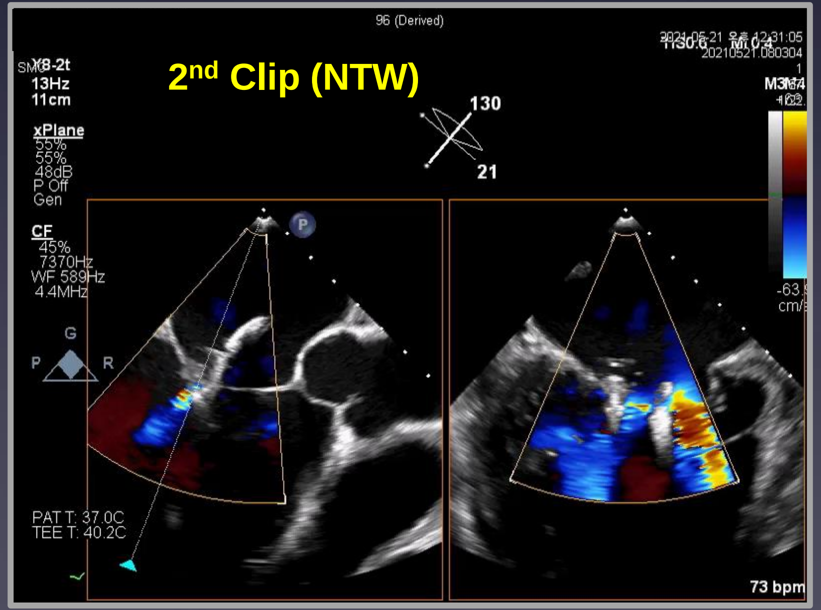


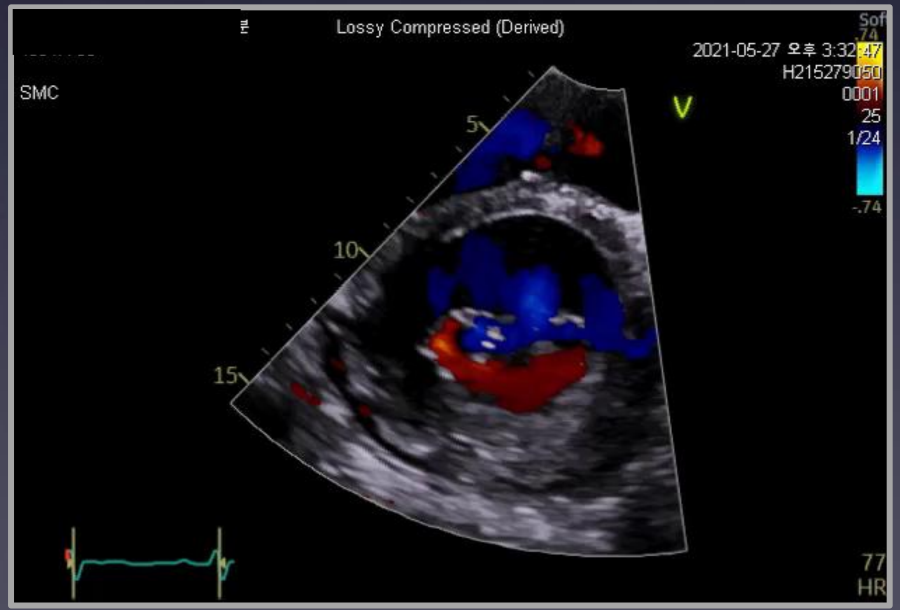


2nd MitraClip(NTW) implantation



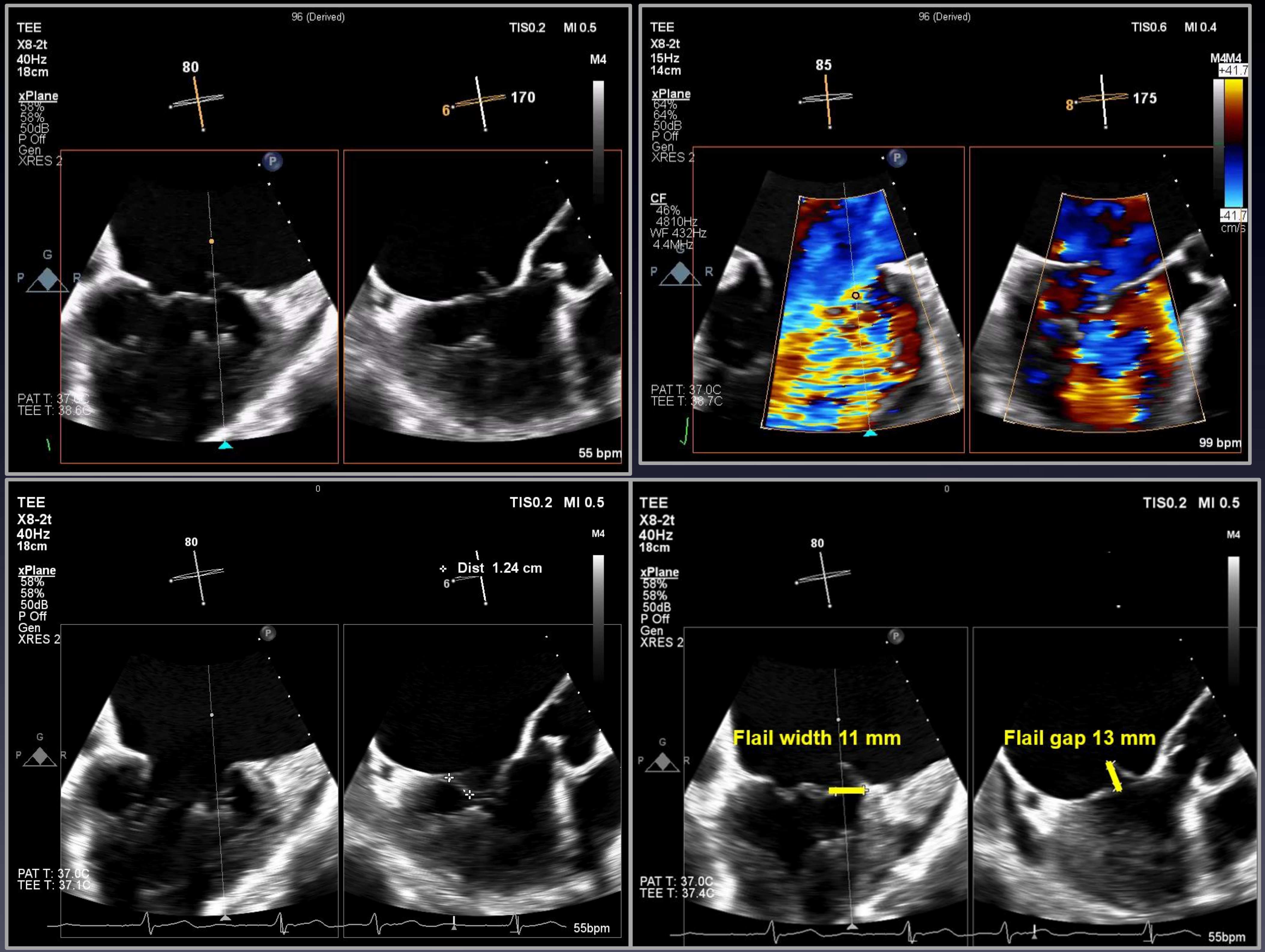






Unfavorable MV morphology for TEER : DMR

81/M Primary MR, AF



Primary MR

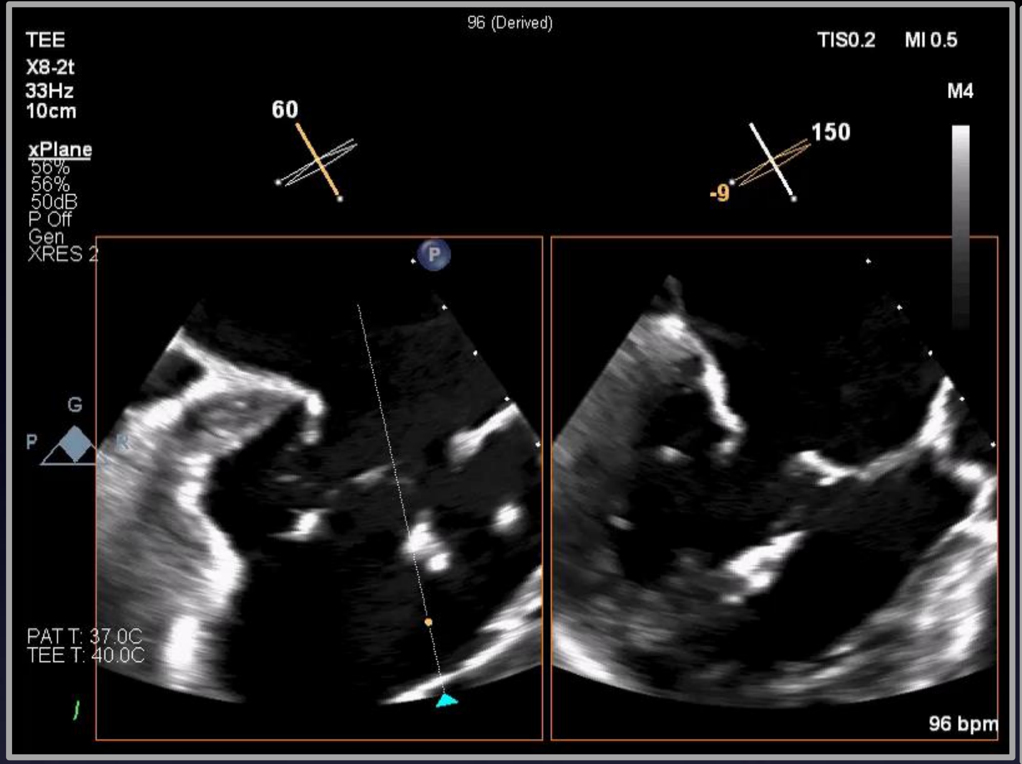
Flail width <15mm
Flail gap < 10mm

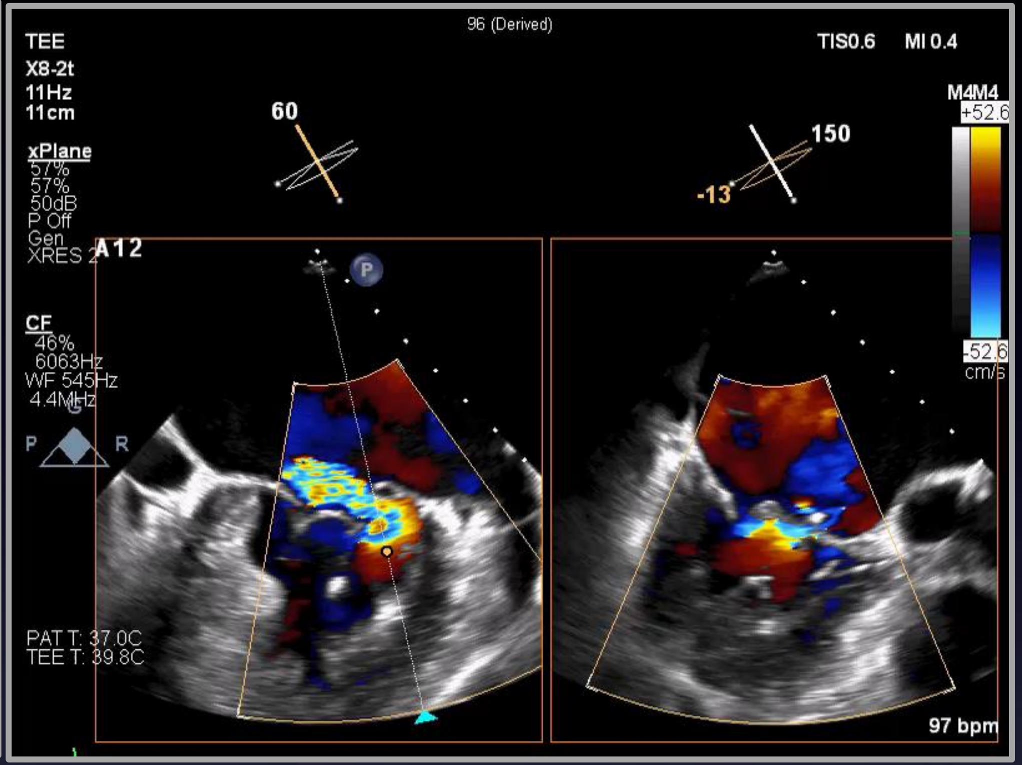
A 1 & A2 prolapse with chordae rupture

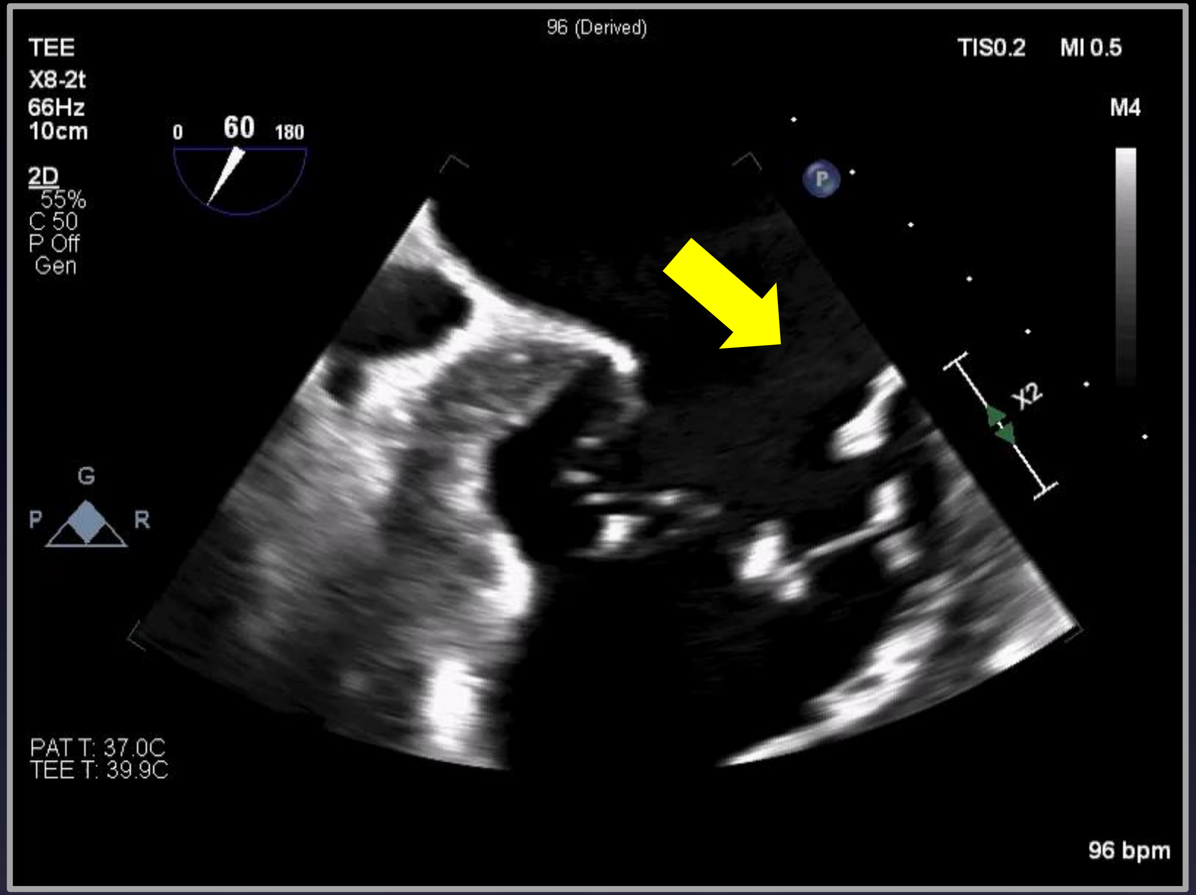
=> MVR & Maze OP

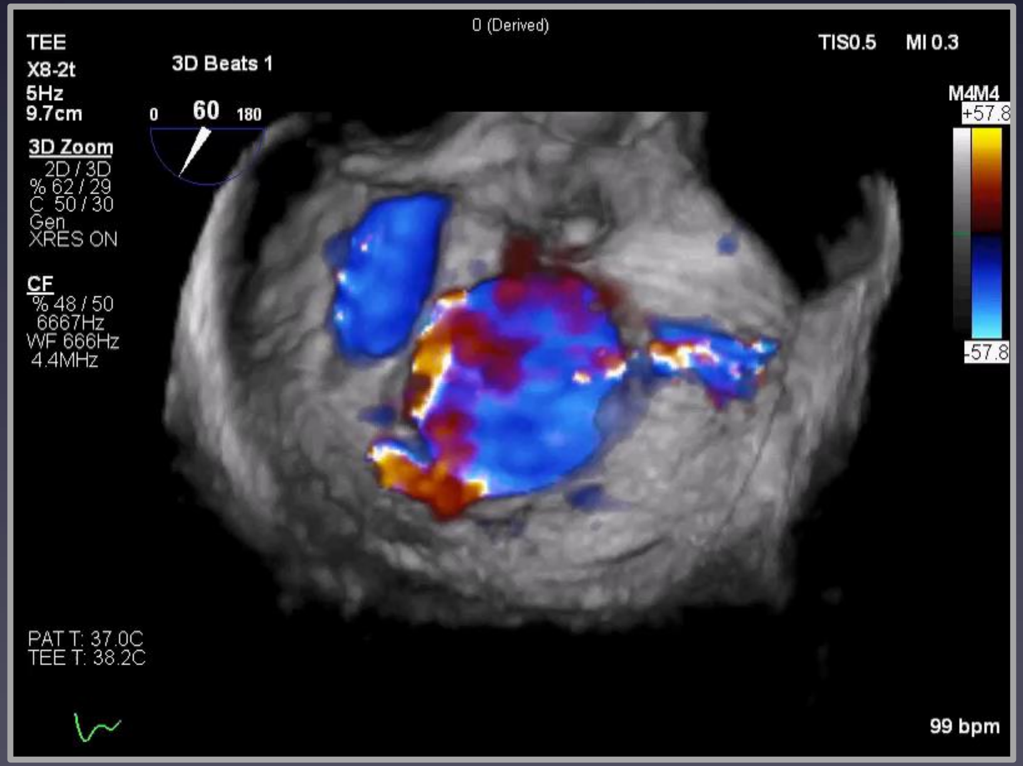
Less Favorable MV morphology for TEER : DMR

73/F Primary MR, ESRD on HD







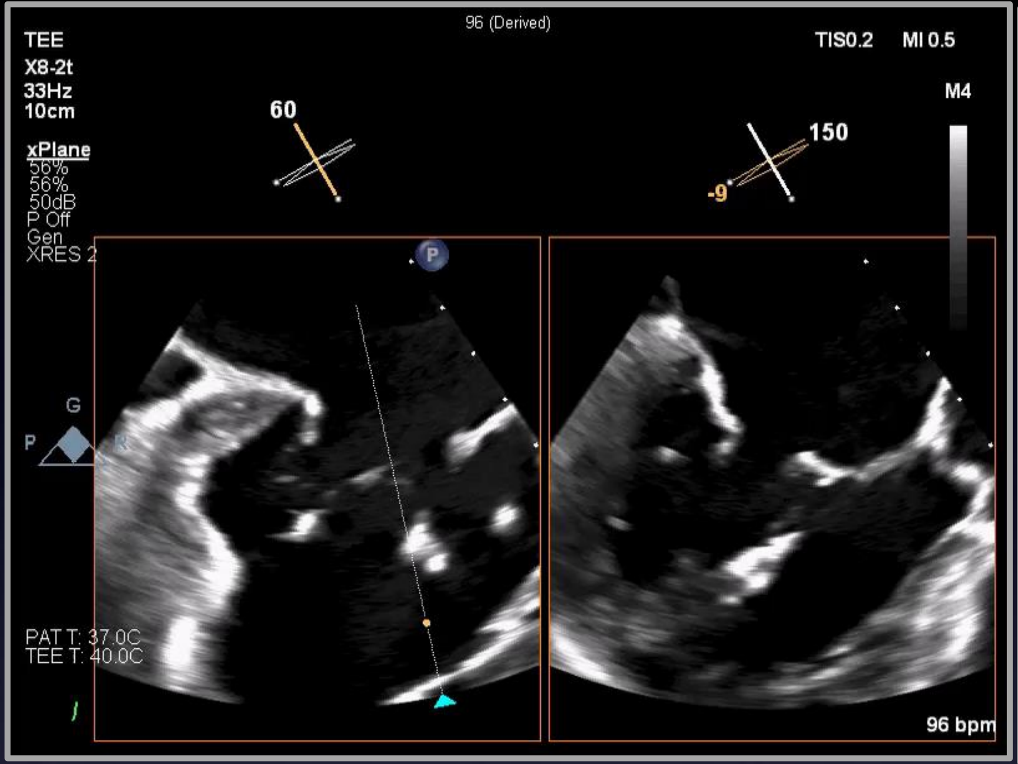


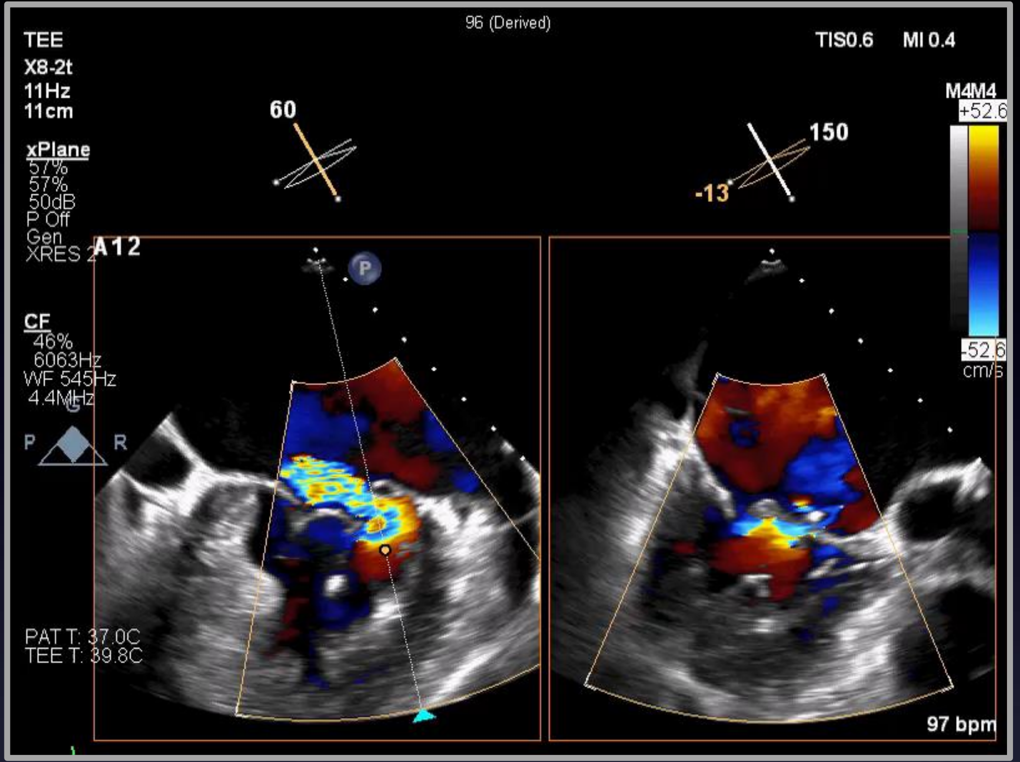
P1 prolapse with chordae rupture
Leaflet thickening and chordae calcification

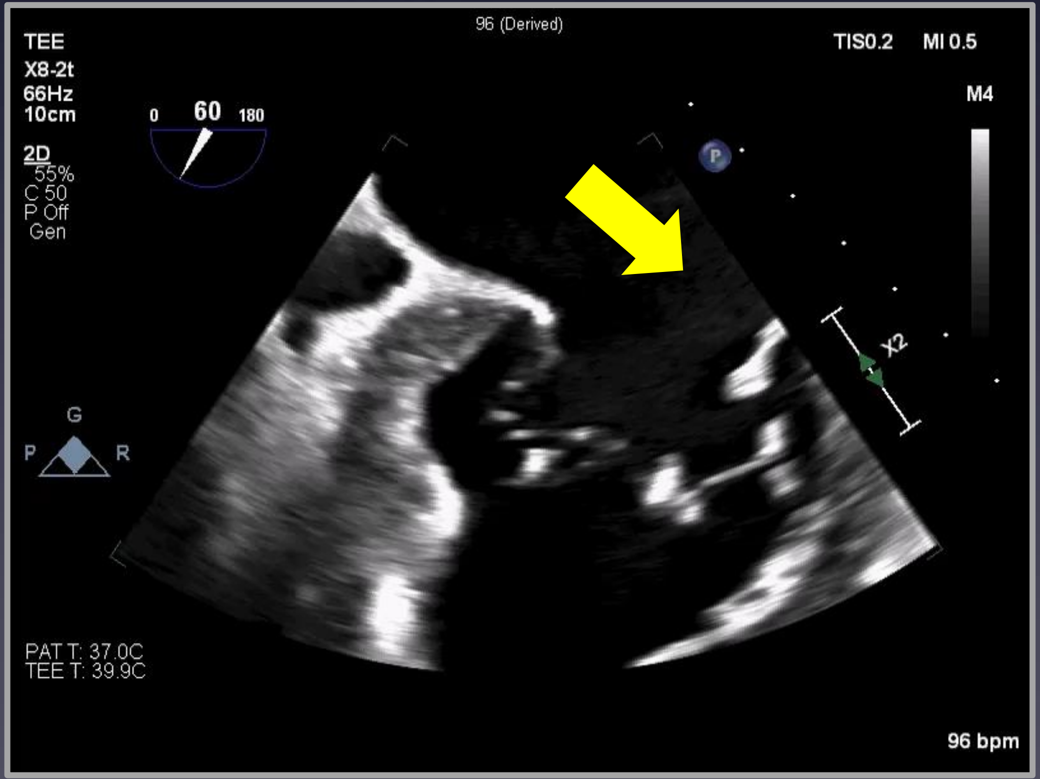
Less Favorable or Unfavorable Features*
Commissural segments, leaflet perforations, or clefts
■ Severe leaflet calcification or calcification in area of grasping zone ■ Severe annular calcification

Less Favorable MV morphology for TEER : DMR

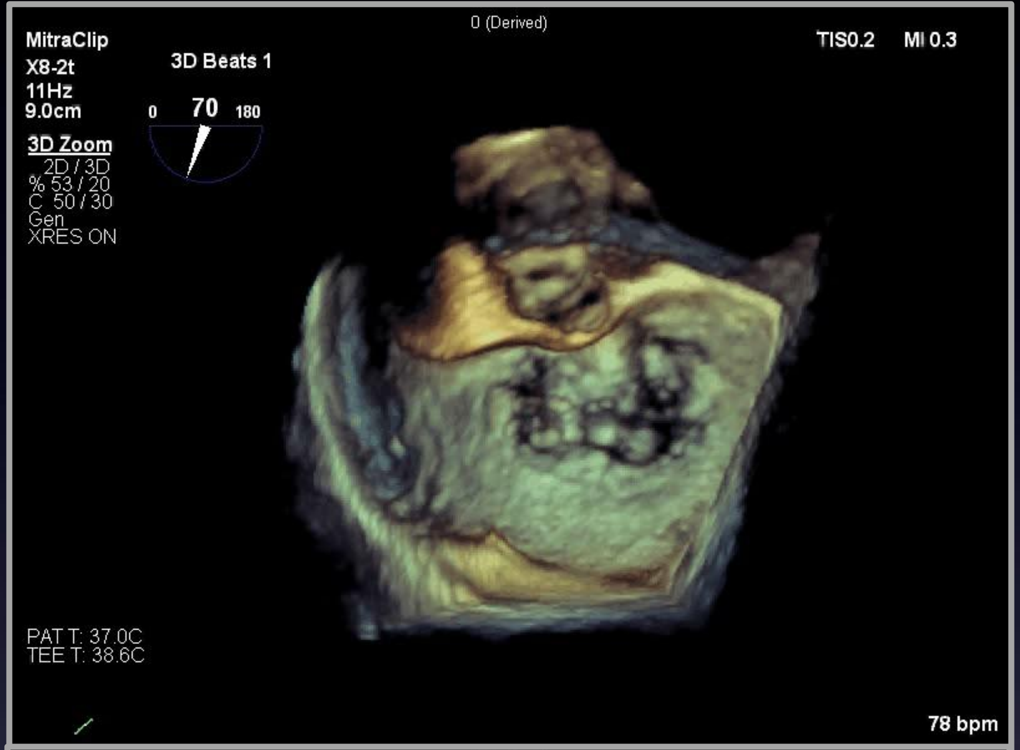
73/F Primary MR, ESRD on HD





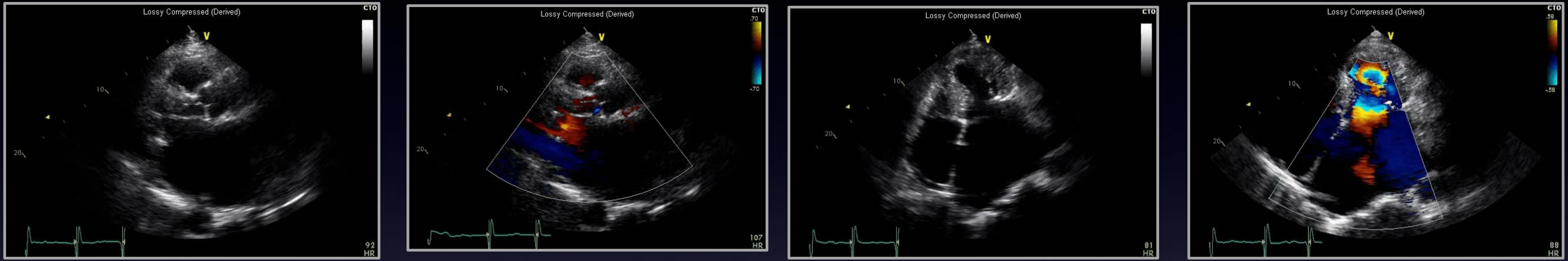


1[st] Clip (XT)   2[nd] Clip (XT)



Less Favorable MV morphology for TEER

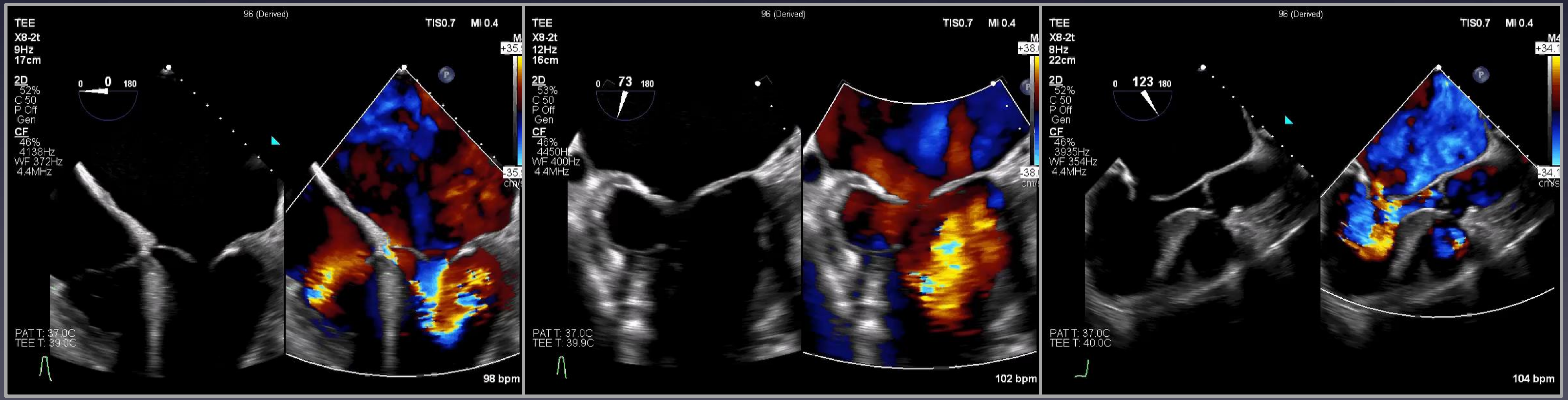
74/M Atrial MR, HCMP(1997 Dx), AF (1997 Dx)
Rt. MCA Inf (2009 Dx)



LV 57.3/36.3 mm

EF 62%

LAVI=269.2 ml/m^2



Less Favorable MV morphology for TEER

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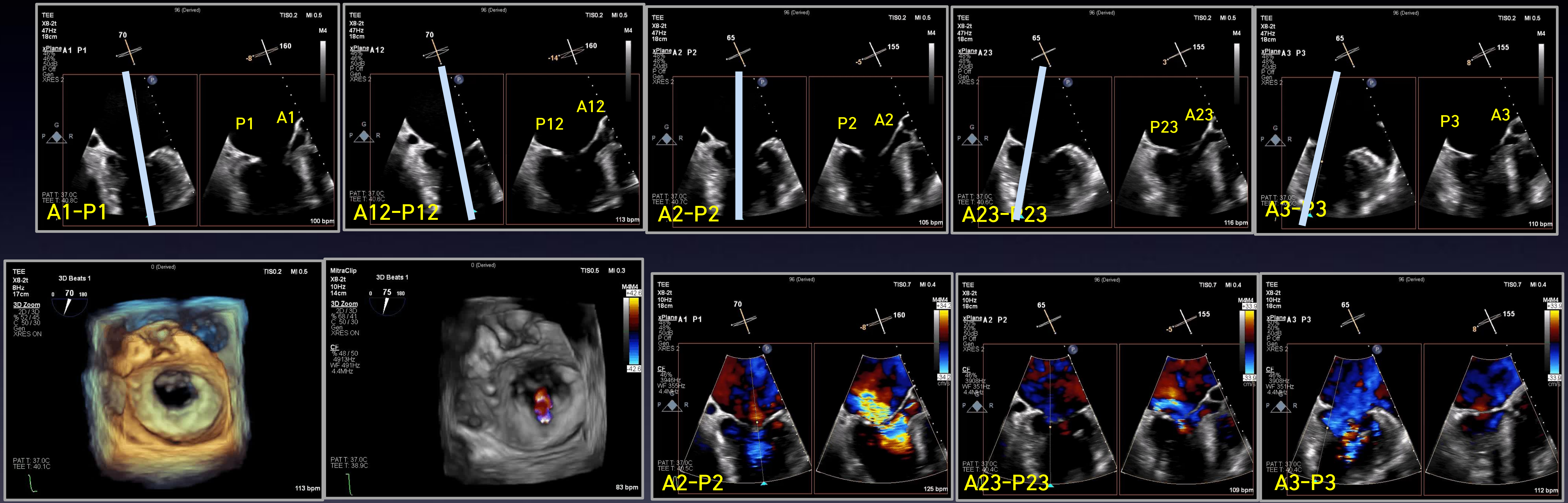


Less Favorable MV morphology for TEER

74/M Atrial MR, HCMP(1997 Dx), AF (1997 Dx)
Rt. MCA Inf (2009 Dx)

Case : LJS
Transthoracic Echocardiography

- Date : 2023-01-14

Post. MV annulus calcification & slightly prolapsed AMVL with severe eccentric MR

MR PISA r= 0.92cm, MV ERO= 40.5mm^2,

MR RV= 50.38ml, MR RV by vol= 45ml,

Pulmonic vein systolic reversal flow : (-)

LV size : LVIDd = 57.3mm, LVIDs = 36.3mm

LVEDV= 161.93ml, LVESV= 60.02ml)

- LVEF : 62.9%, LA : 85.5mm, LAVI : 262.9ml/m^2
- RV systolic pressure : 45.7mmHg
- Aortic regurgitation : minimal
- Mitral regurgitation : moderate to severe
- Tricuspid regurgitation : mild

Case : LJS
Transesophageal Echocardiography

- Date : 2023-01-16

1) Severe MR with PMVL tethering (P2 portion)

-- Posterior annulus calfication, calcification on chorda

-- PISA radius= 1.06cm, MV meanPG= 2.8mmHg

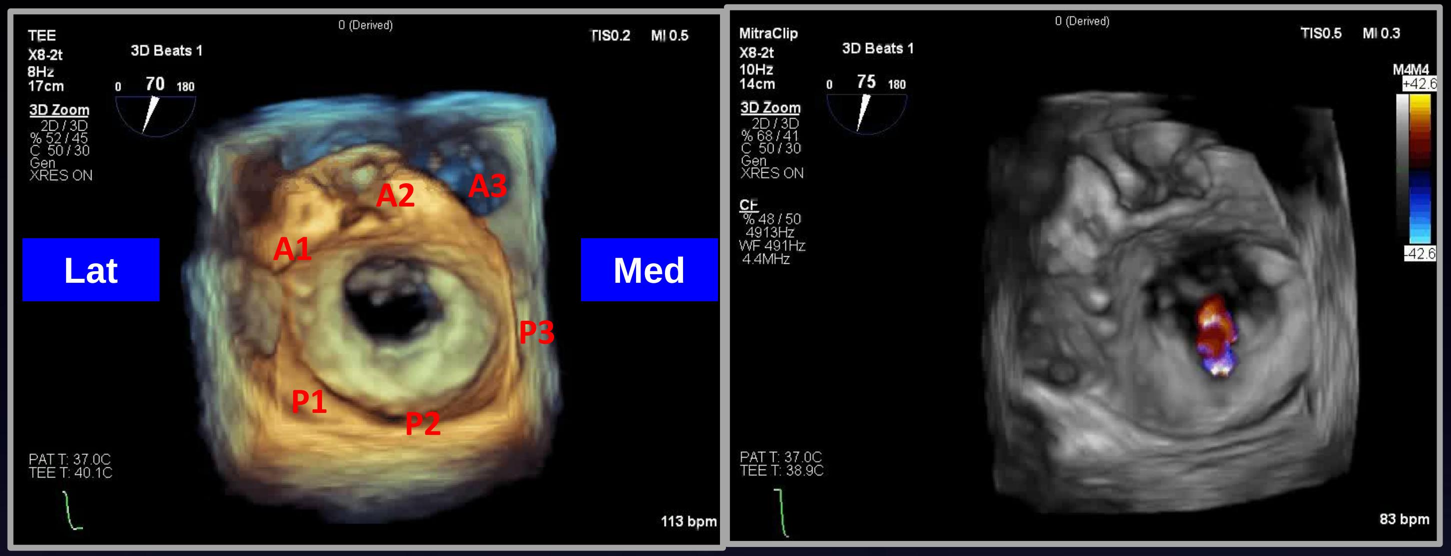
-- Systolic reversal flow into LAA (+), left pulmonary vein (+)

12. MitraClip information

- PMVL tethering (P2 portion)
- Non-coaptation gap: max 0.4cm
- PMVL length : 1.1~ 1.23cm
- Septal puncture height : >4.5cm
- MV area : 5.48cm^2, 7.03cm^2 , meanPG : 2.8mmHg
- Limitation : Huge LA, PFO

Less Favorable MV morphology for TEER

74/M Atrial MR, HCMP(1997 Dx), AF (1997 Dx)

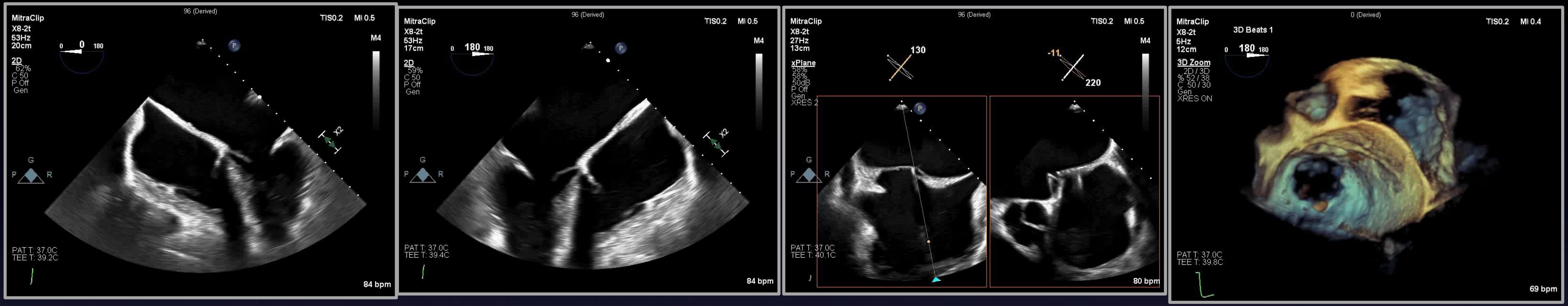


Atrial fMR
Huge enlarged LA (LAVI 262.9 ml/m^2)
Multiple jets at A2/P2 (1.5, 2.5)
NonCoaptiation gap 3~4mm

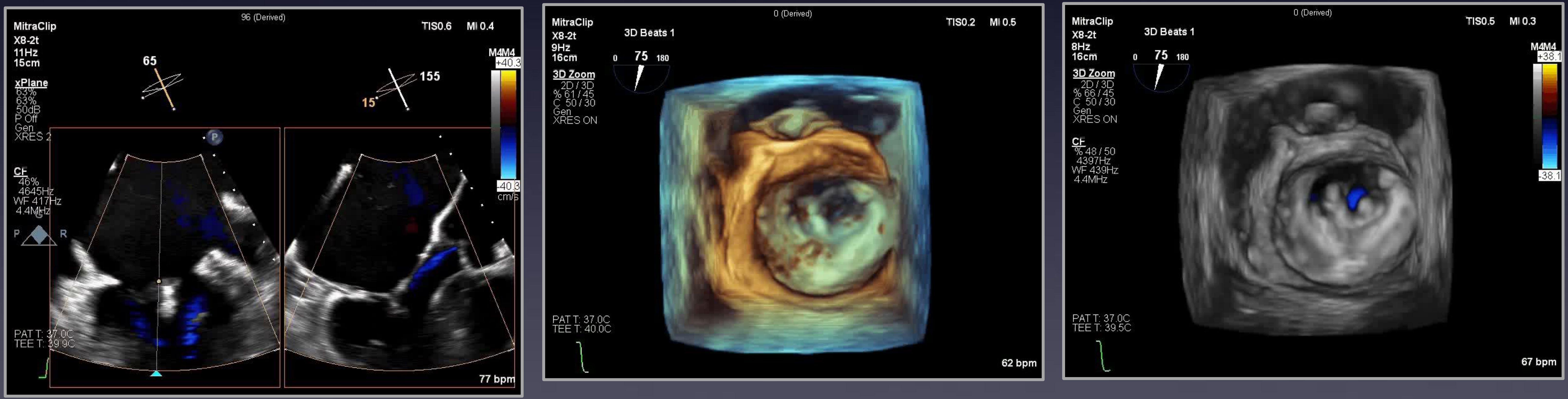
plan :
1st Clip with XTW at 1.5 area
2nd Clip with XTW at 2.5 area
Septal puncture; Inferior-posterior as much as possible

Less Favorable MV morphology for TEER

74/M Atrial MR, HCMP(1997 Dx), AF (1997 Dx)



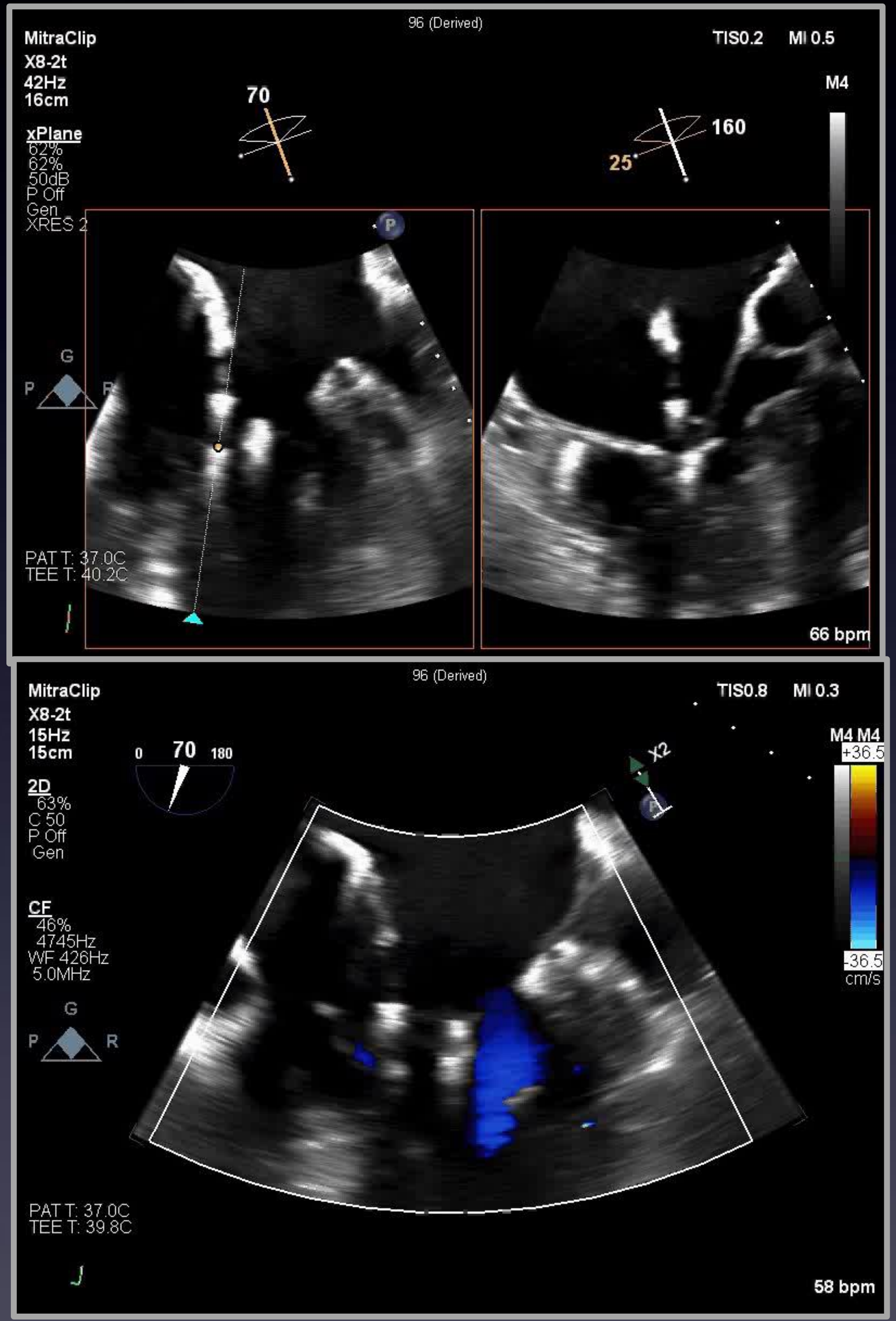
1st Clip (XTW) at 1.5 area

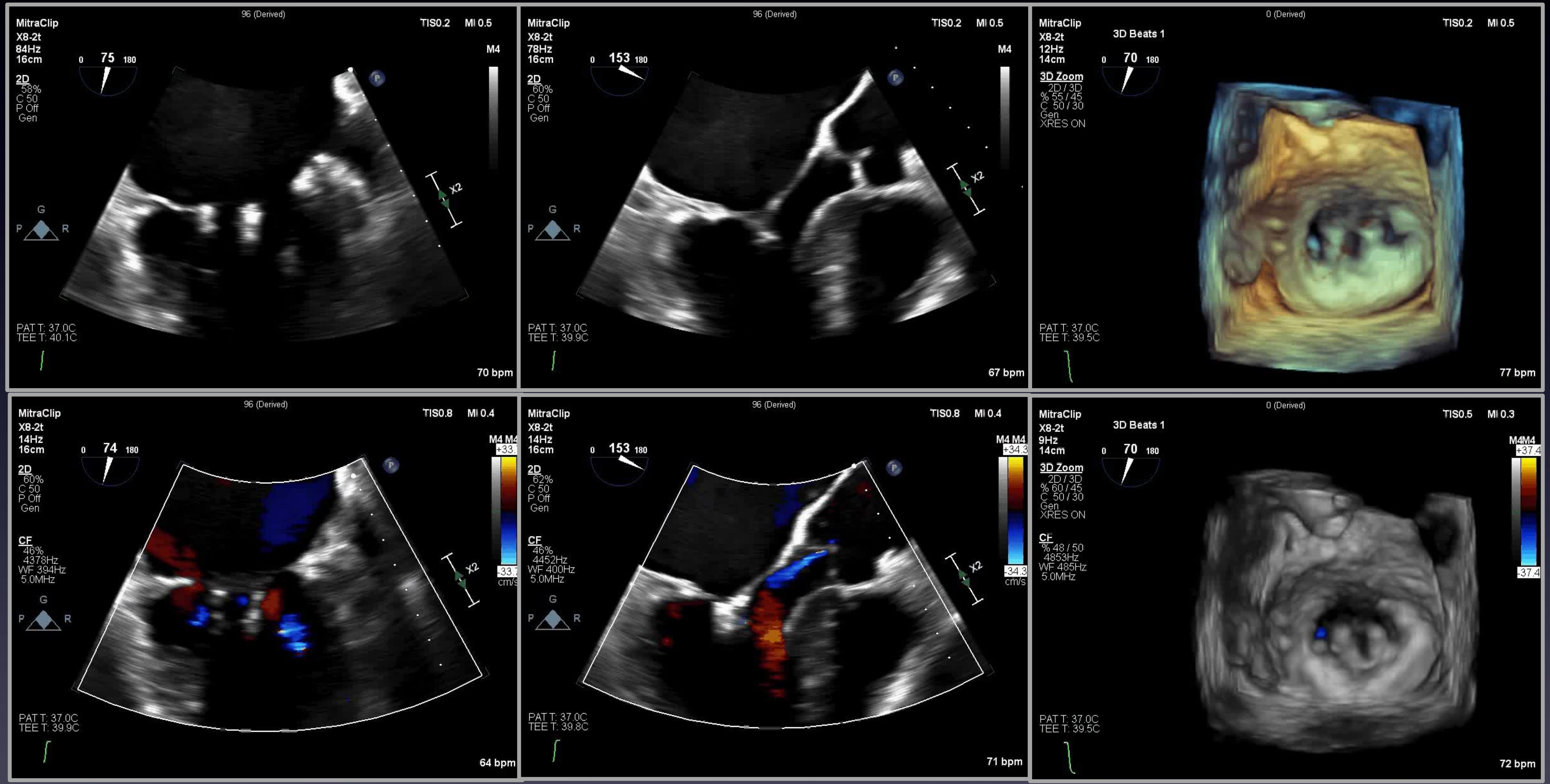


Less Favorable MV morphology for TEER

74/M Atrial MR, HCMP(1997 Dx), AF (1997 Dx)

2nd Clip (XTW) at 2.5 area





1st Clip (XTW) at 1.5 area   2nd Clip (XTW) at 2.5 area

Special Thanks to SMC SHD TEER team

Imaging team


Sung-Ji Park


Eun Kyoung Kim

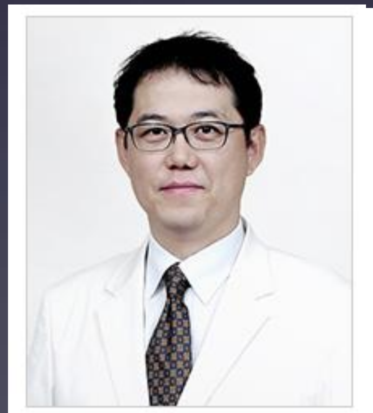

Jihoon Kim

Intervention team


Joo Yong Hahn


Ki Hong Choi

VHD surgery team


Kiick Sung


Dong-Seop Jeong


Suryeun Chung

VHD Anesthesiology team

Take Home Message

- Selection of the optimal candidate for MitraClip is the best way to succeed in the procedure.