

Nightmare

AORTIC STENOSIS AND MITRAL REGURGITATION

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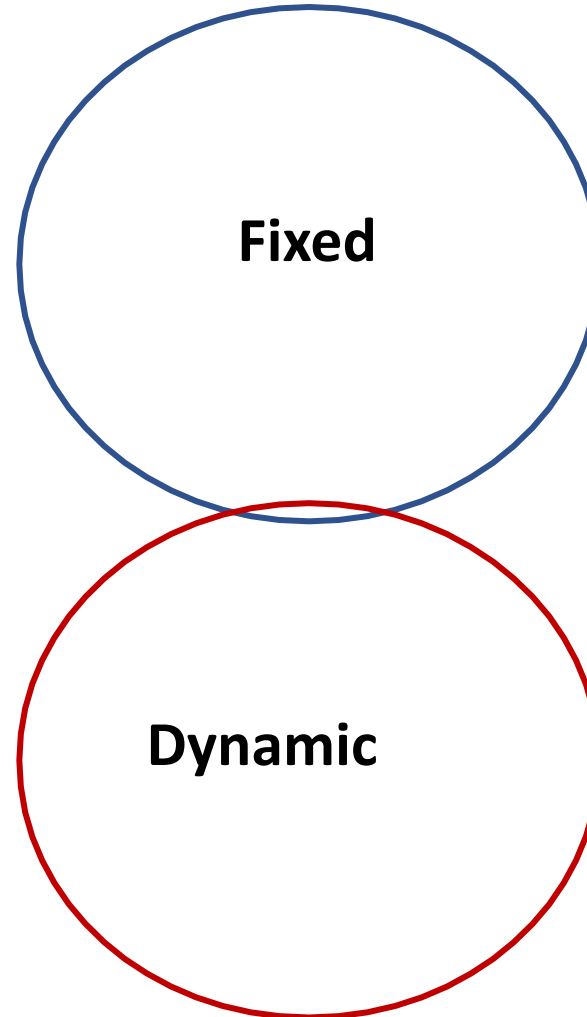
AORTIC STENOSIS AND MITRAL REGURGITATION

Understanding the Co-Existence

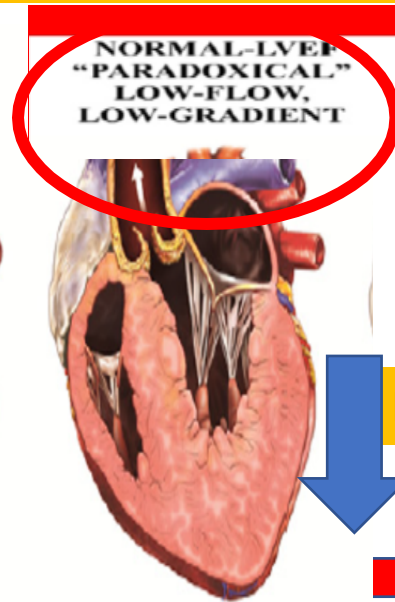
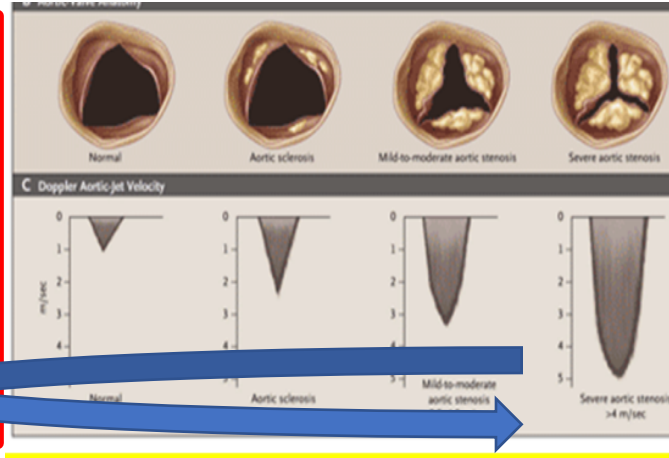
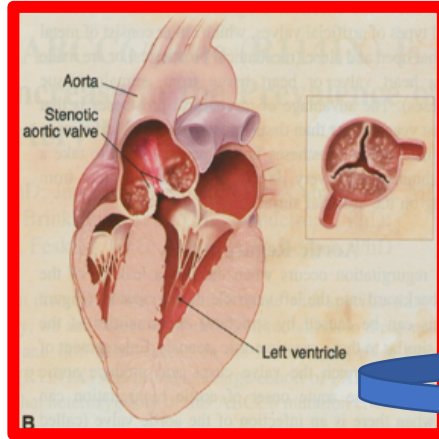
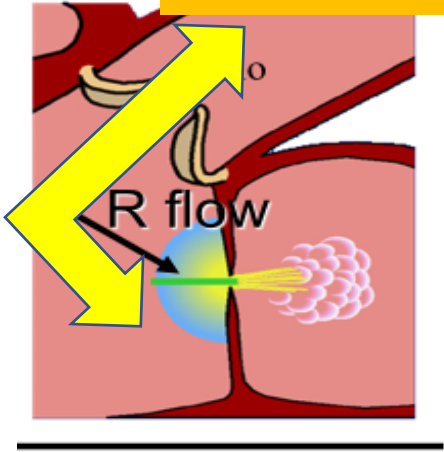
- Concomitant mitral regurgitation (MR) is commonly observed in patients with aortic stenosis (AS), subtending varying mechanisms and hemodynamic severity
- Complex AS and MR pathophysiologic interplay may occur
- Diagnostic workflow and management strategy may be challenging

UNDERLYING MECHANISMS OF MITRAL REGURGITATION CONCOMITANT TO AORTIC STENOSIS

- **Primary organic mitral valve diseases**
 - - fibrocalcified valve apparatus
 - - massive annular calcification
 - - prolapse/flail leaflet
 - - post-endocarditis lesions
 - - post-radiation lesions
- **Secondary mitral dysfunction**
 - - annular dilation
 - - atrial remodeling (atrial fibrillation)
 - - left ventricular dysfunction (ischemic, AS-induced)
 - - left ventricular dyssynchrony (Left Bundle Branch Block)
- **Abnormal systolic anterior motion (SAM)**



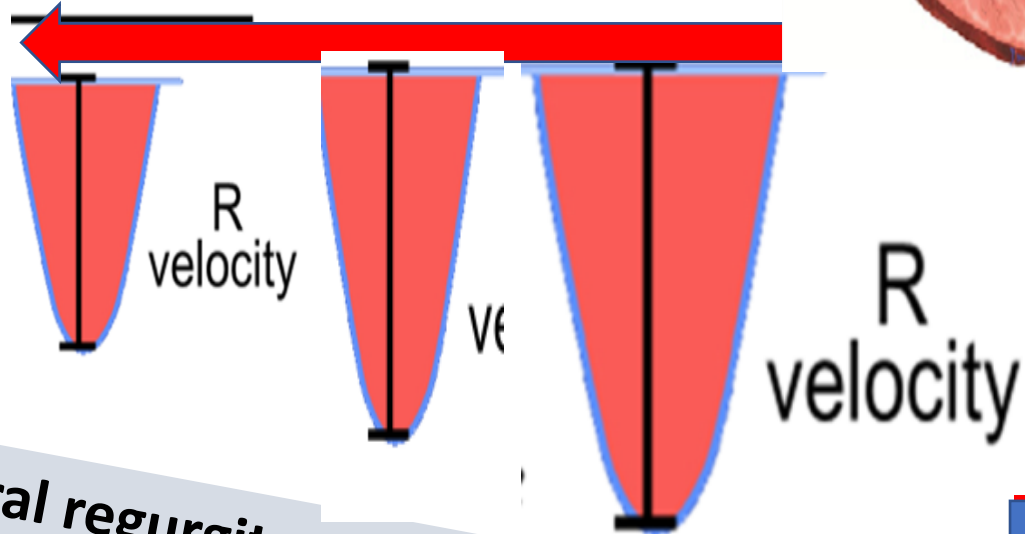
AORTIC STENOSIS PROGRESSION AND CONCOMITANT MITRAL REGURGITATION



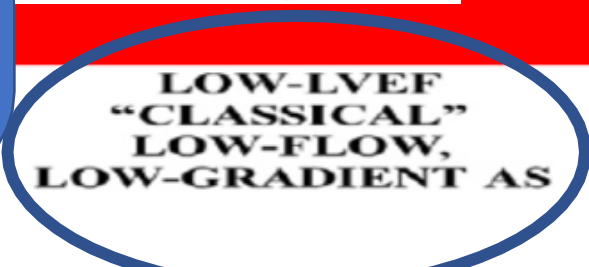
Aortic stenosis masking

Forward aortic flow

Diagram showing the Effective Regurgitant Orifice (ERO) as a black area within the mitral valve. Below it, the formula is given: $6,28 \times R^2 \times \text{Vel Aliasing}$ MR velocity. The text 'Effective Regurgitant Orifice' is written below the diagram.



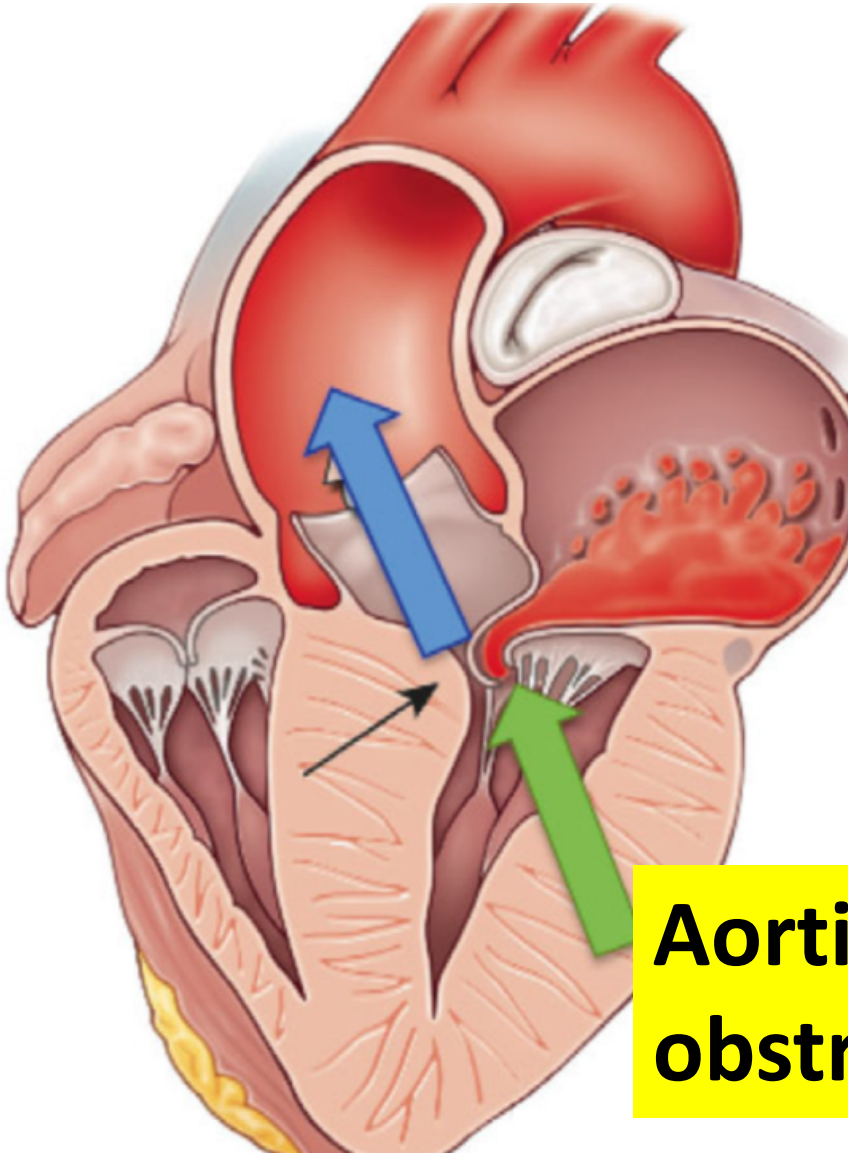
Mitral regurgitant jet velocity ---->



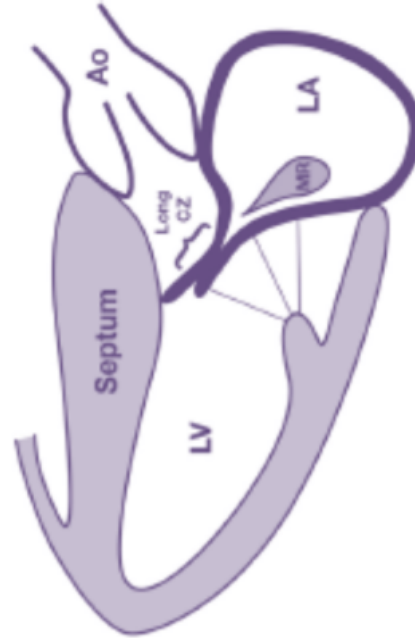
RECIPROCAL AS/MR HEMODYNAMIC INTERACTION: DIAGNOSTIC ISSUES

- **Concomitant mitral regurgitation (MR) is an important determinant of a low aortic forward flow leading to opposite impact in assessment of AS :**
 - *underestimation or masking AS using transvalvular gradient*
 - *mimicking AS using functional or anatomical valve area (in the setting of LV dysfunction)*
- **Aortic stenosis because of increasing endo-ventricular systolic pressure leads to**
- *overestimation of MR severity due to increase velocity extension of the regurgitant jet into left atrium*
- *underestimation of MR severity using ERO formula*
- *real increase of MR in the setting of progressive LV dysfunction*

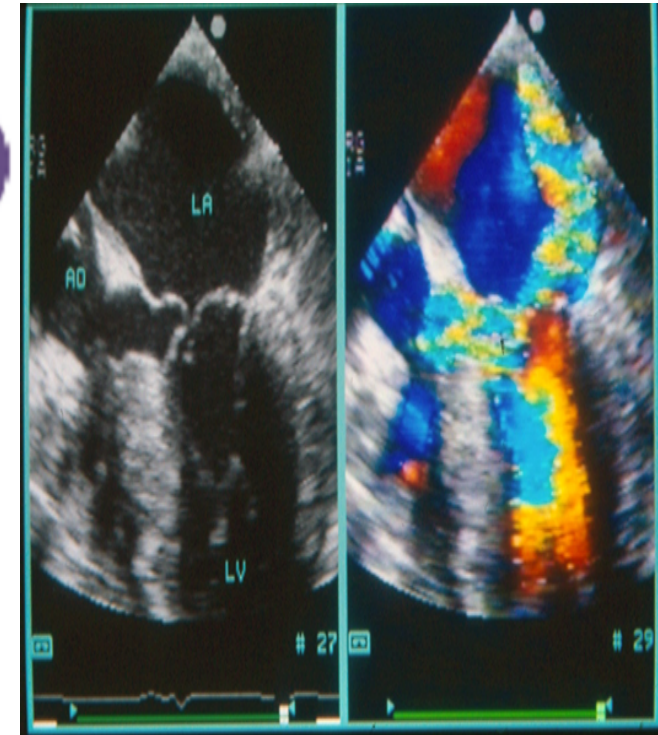
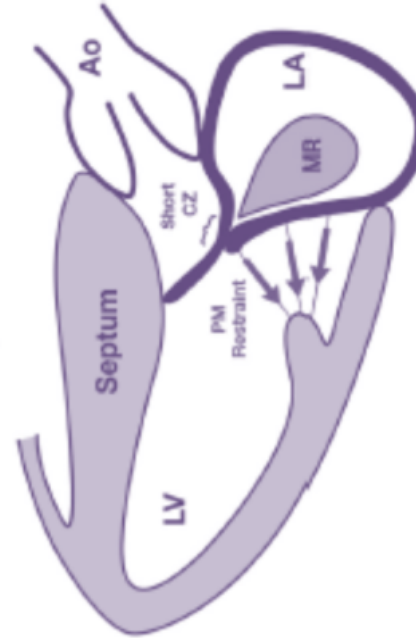
Systolic Anterior Motion (SAM)-related Mitral Regurgitation: a subverted paradigm of AS/MR co-existence



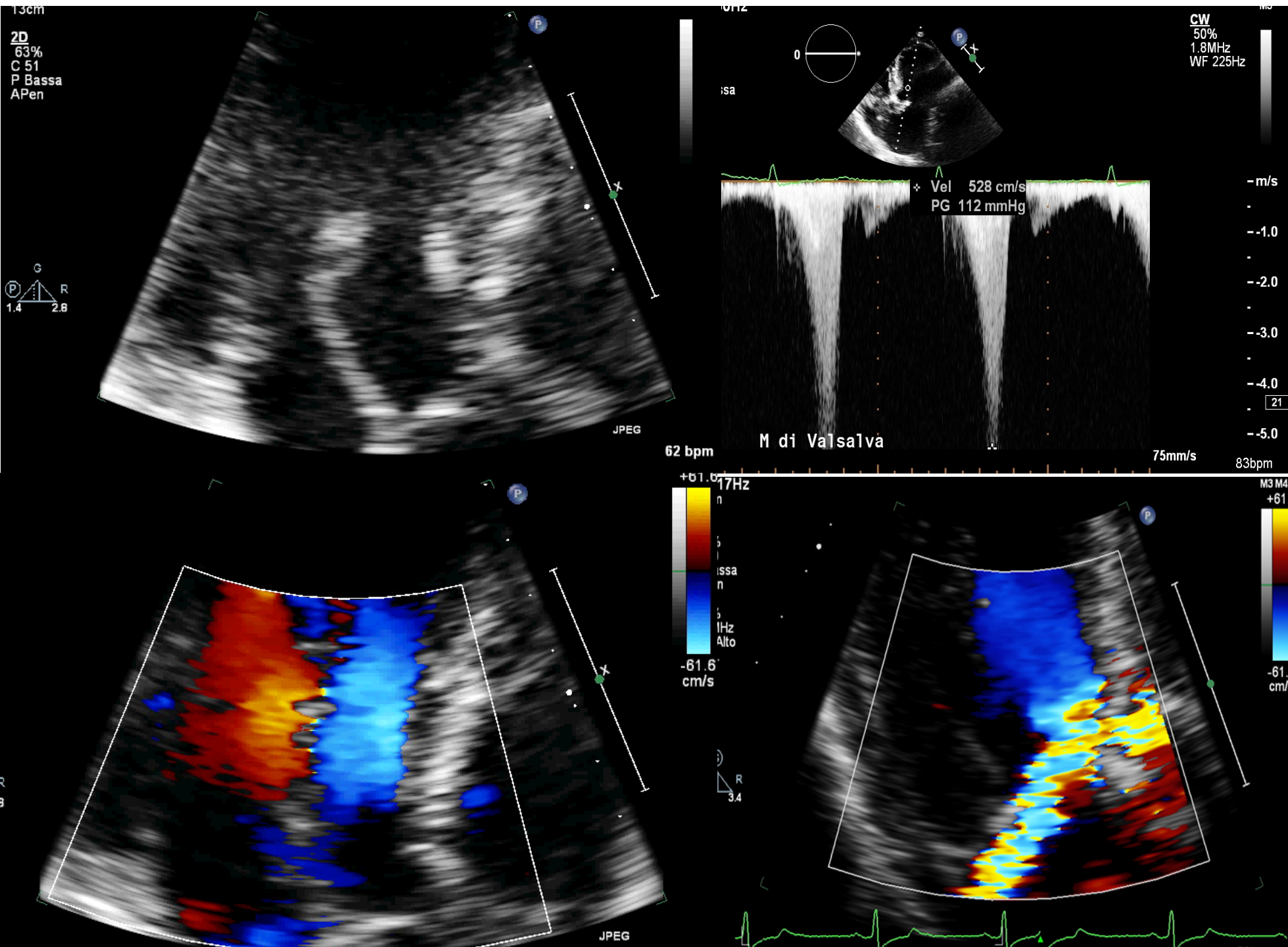
A. Long untethered posterior leaflet



B. Short tethered posterior leaflet



**Aortic Stenosis can mask SAM-related LV
obstruction and Mitral Regurgitation**



Clinical Case

80-year old woman suffering from hypertrophic cardiomyopathy with SAM-related obstruction and MR, responsive to medical therapy.

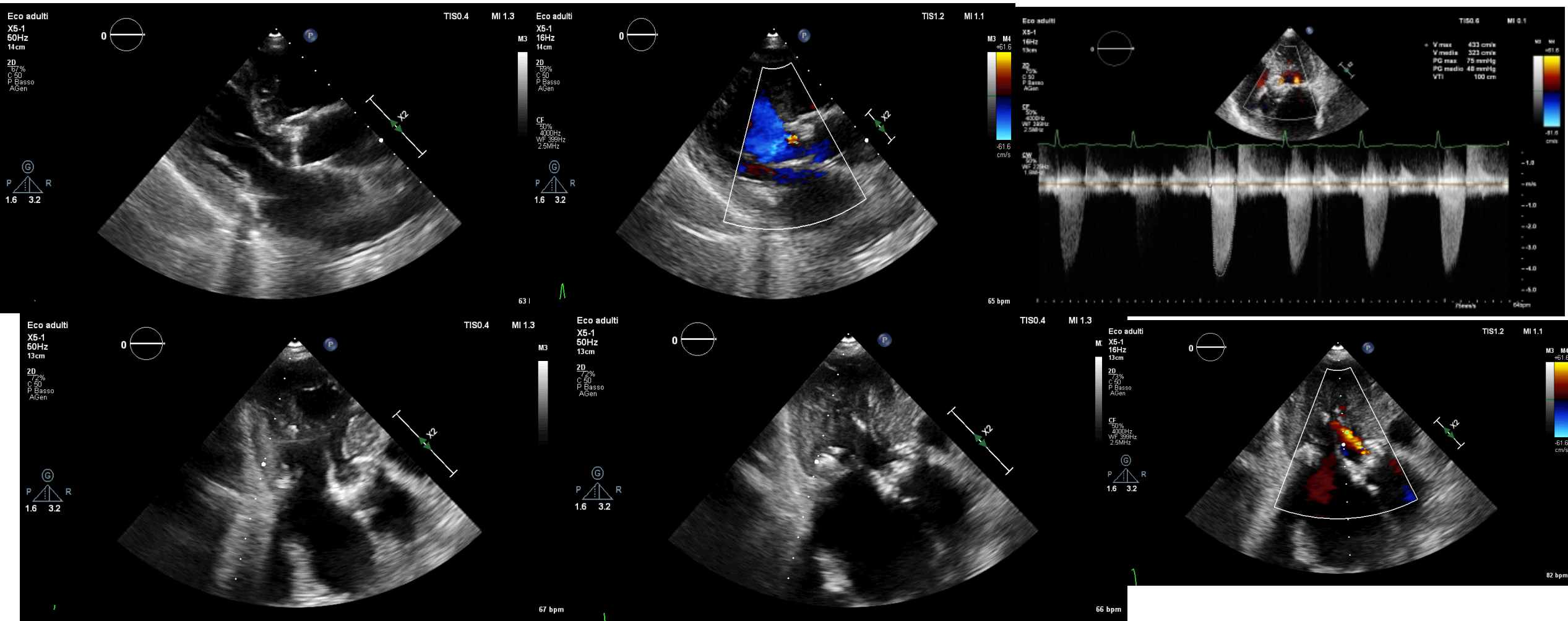
Moderate Interventricular Septal hypertrophy (16 mm)

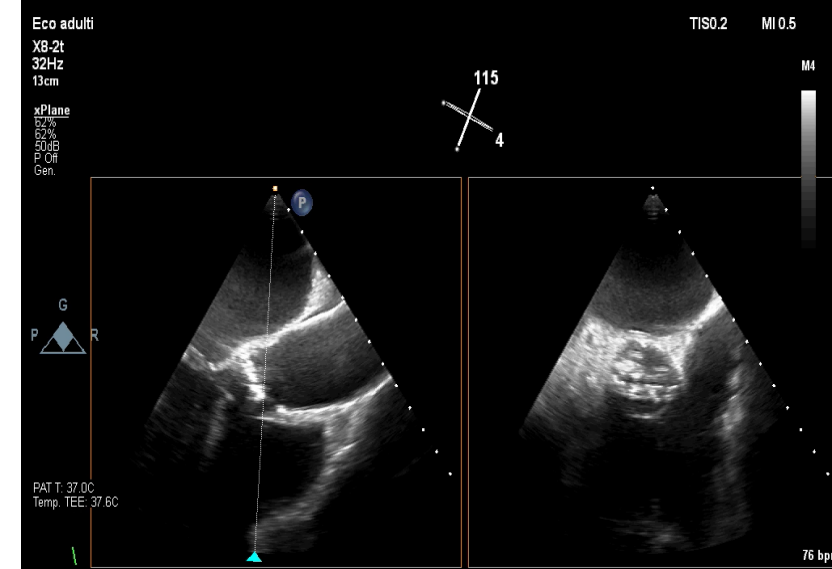
After 5-year of well-being the patient began to experience exertional dyspnea unresponsive to medical therapy

- Clinical examination revealed an ejectional systolic murmur at aortic area decreasing during Valsava Maneuver suggesting aortic valve stenosis rather than dynamic intraventricular obstruction

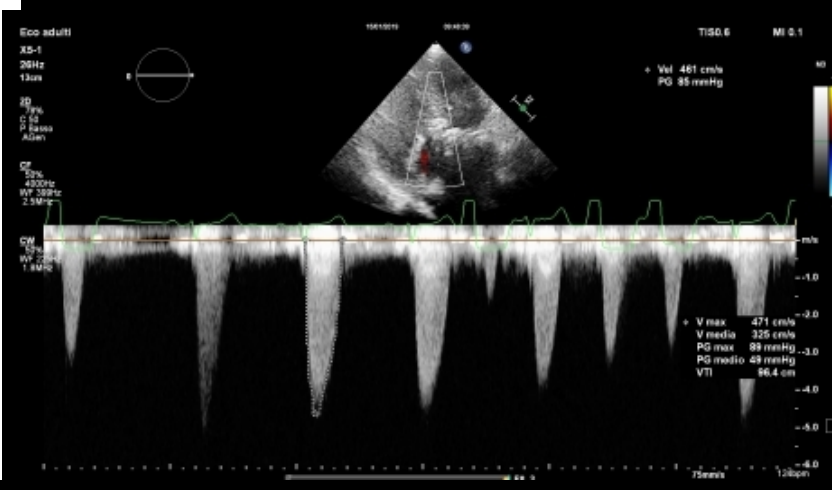
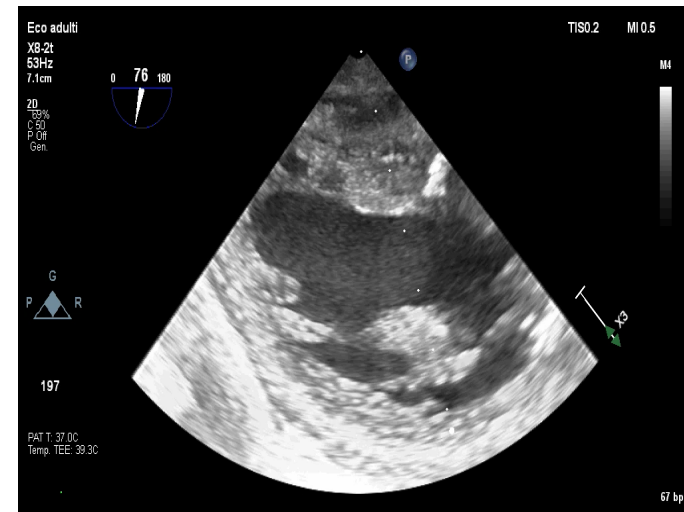
Five-year follow-up echocardiography

- Severe Aortic valve stenosis progression with disappearance of SAM-related LV obstructon and Mitral Regurgitation at rest (mild post-extrasystolic SAM)

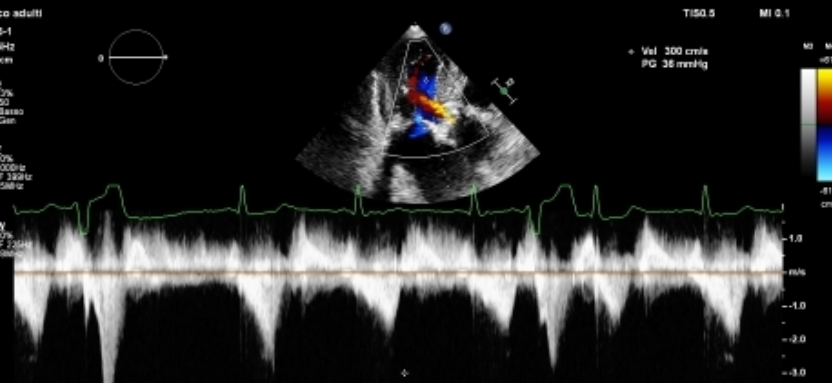
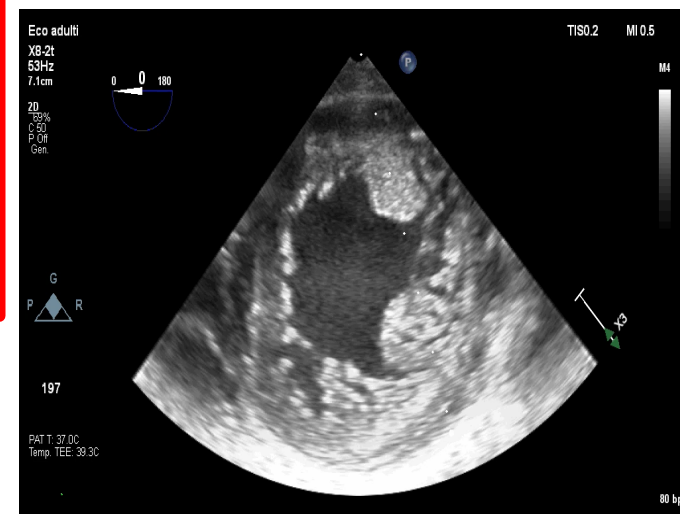




Anatomical Aortic Valve Area 0,7 cm²



Transvalvular Aortic Gradient
 Mean gradient 50 mmHg
 Peak Gradient 75 mmHg



Intraventricular gradient
 Rest 36 mmHg
 post extrasystolic beat 70 mmHg

AORTIC VALVE REPLACEMENT

Risk of unmasking SAM-related LV obstruction and Mitral Regurgitation

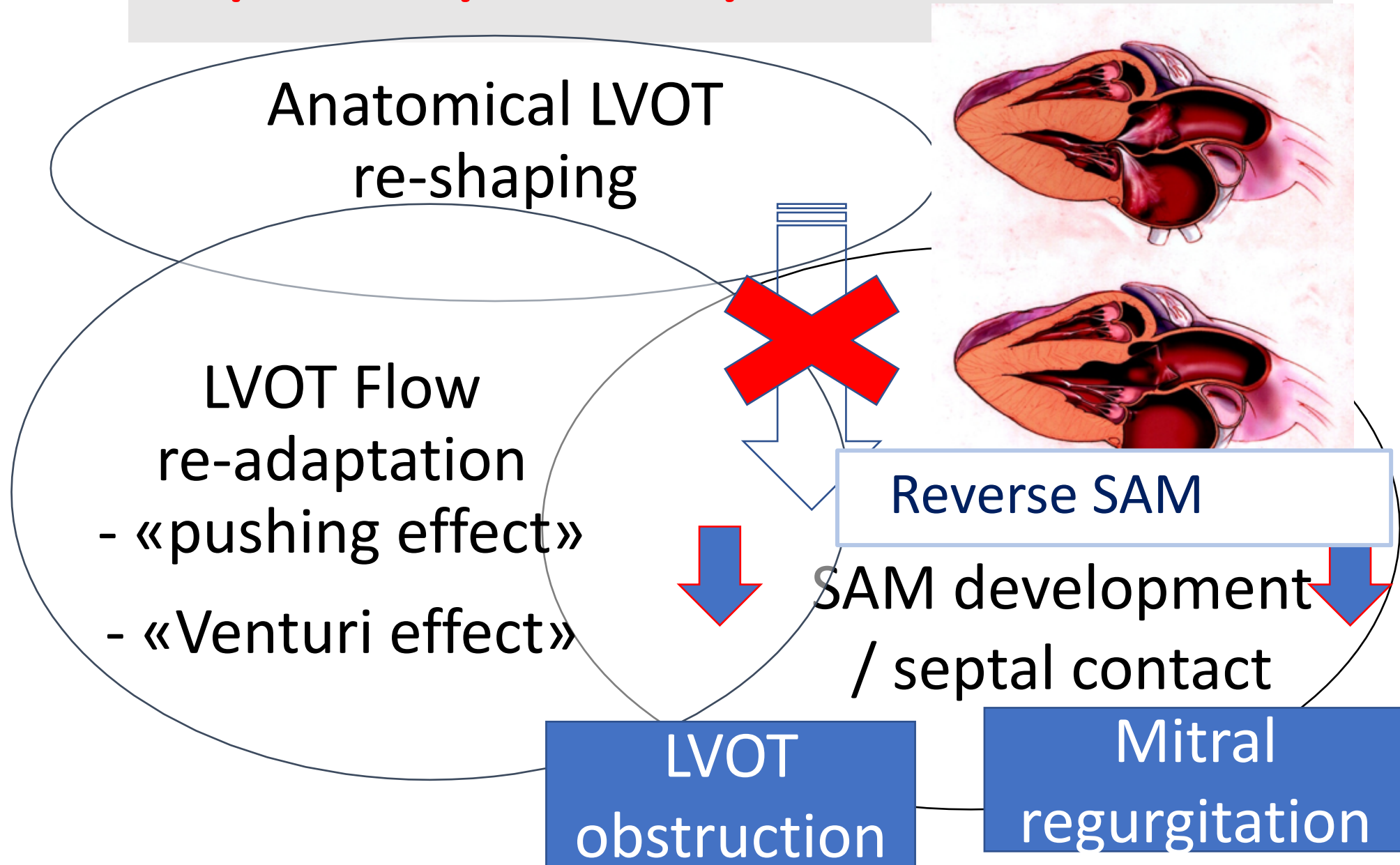
Therapeutic Options

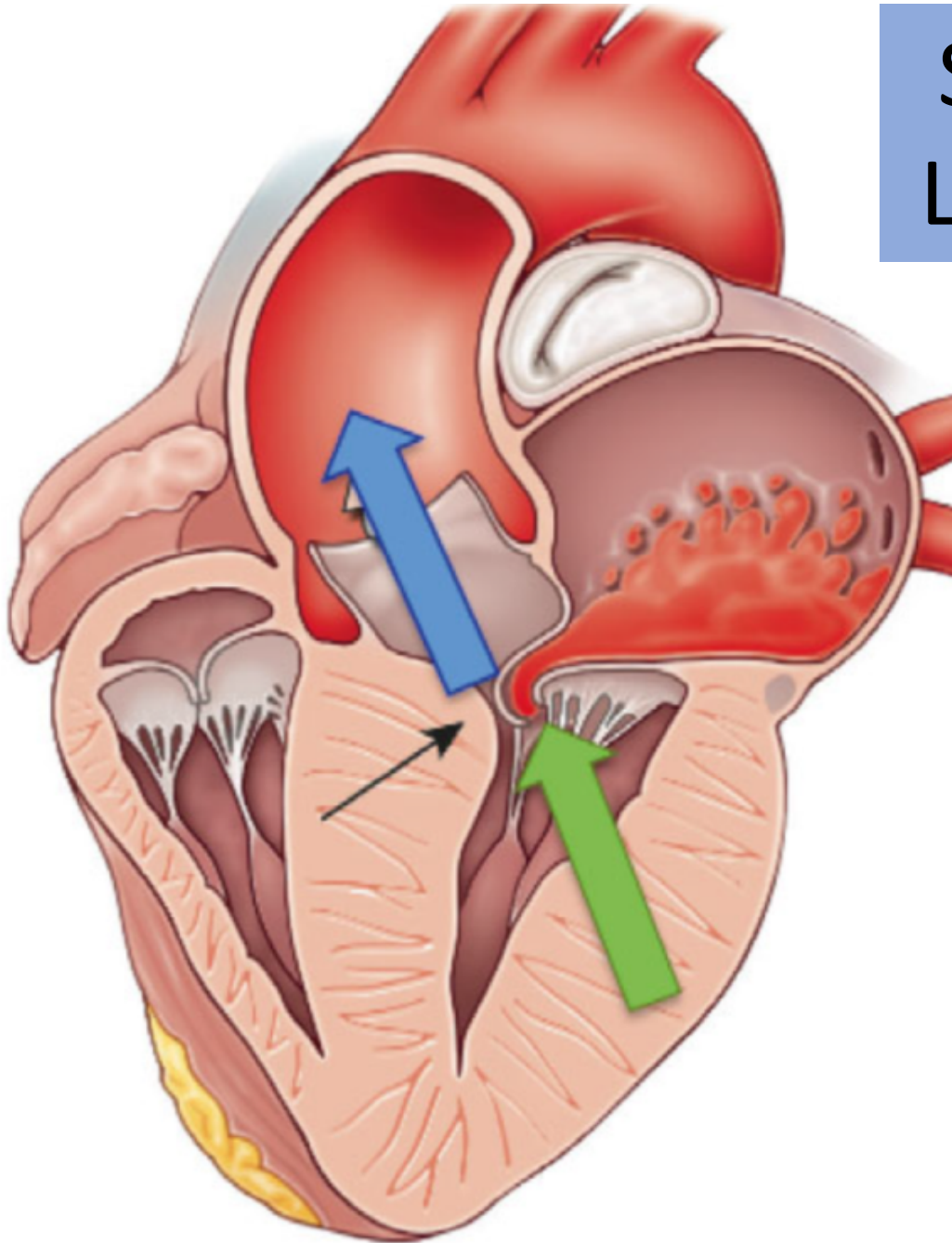
**Transcatheter Aortic Valve
Replacement (TAVR)**
+
Rescue Alcoholic Septal Ablation?
+
Rescue Mitral Valve Edge-to-Edge?



Surgical Aortic replacement
+
Mild septal myectomy ?
+
**Rescue Mitral valve repair
(chordae cutting, Edge-to-Edge)
or replacement ?**

Septal myectomy: rationale





SAM-related LV obstruction

Target zone

Septal-SAM contact

Septal-PM contact

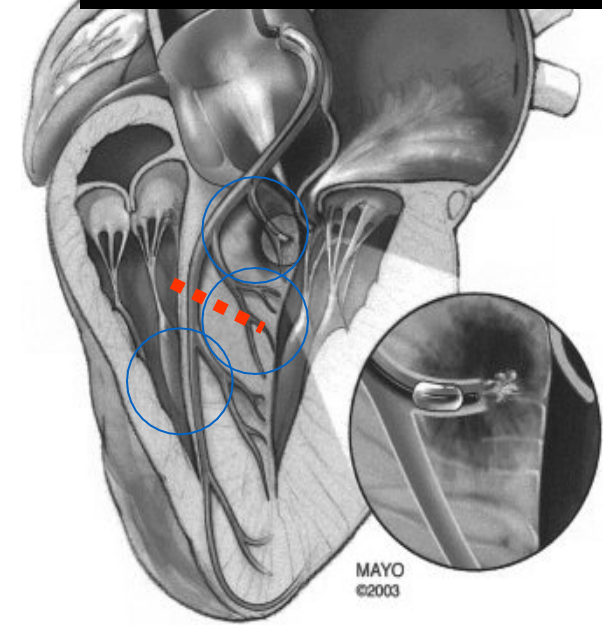
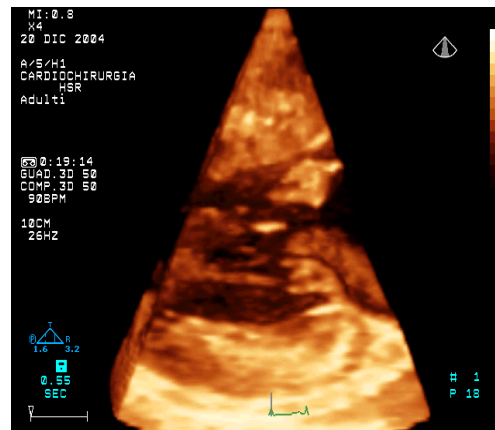
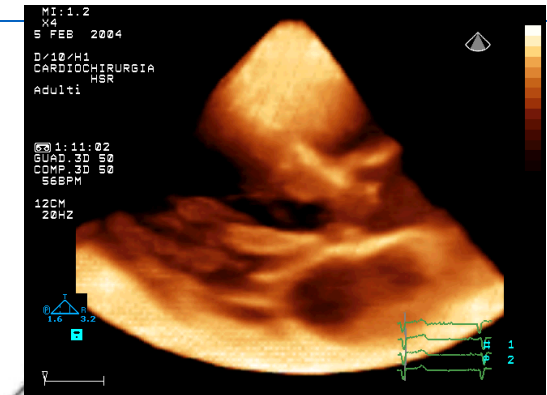
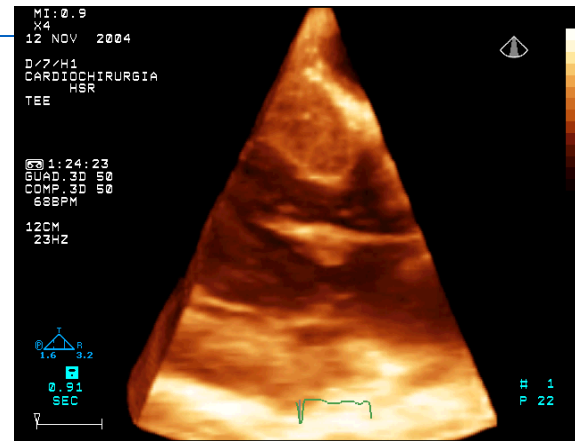
Septal thickness

(>18 mm)

SAM-related MR

THE SELECTION OF SEPTAL CORONARY BRANCH SUPPLYING THE TARGET ZONE: *anatomical considerations*

- *Variability in the origin, size and distribution of septal coronary branches*
- *Varying LV obstruction mechanism(s)*
- *Varying site and size of septum into the target zone*



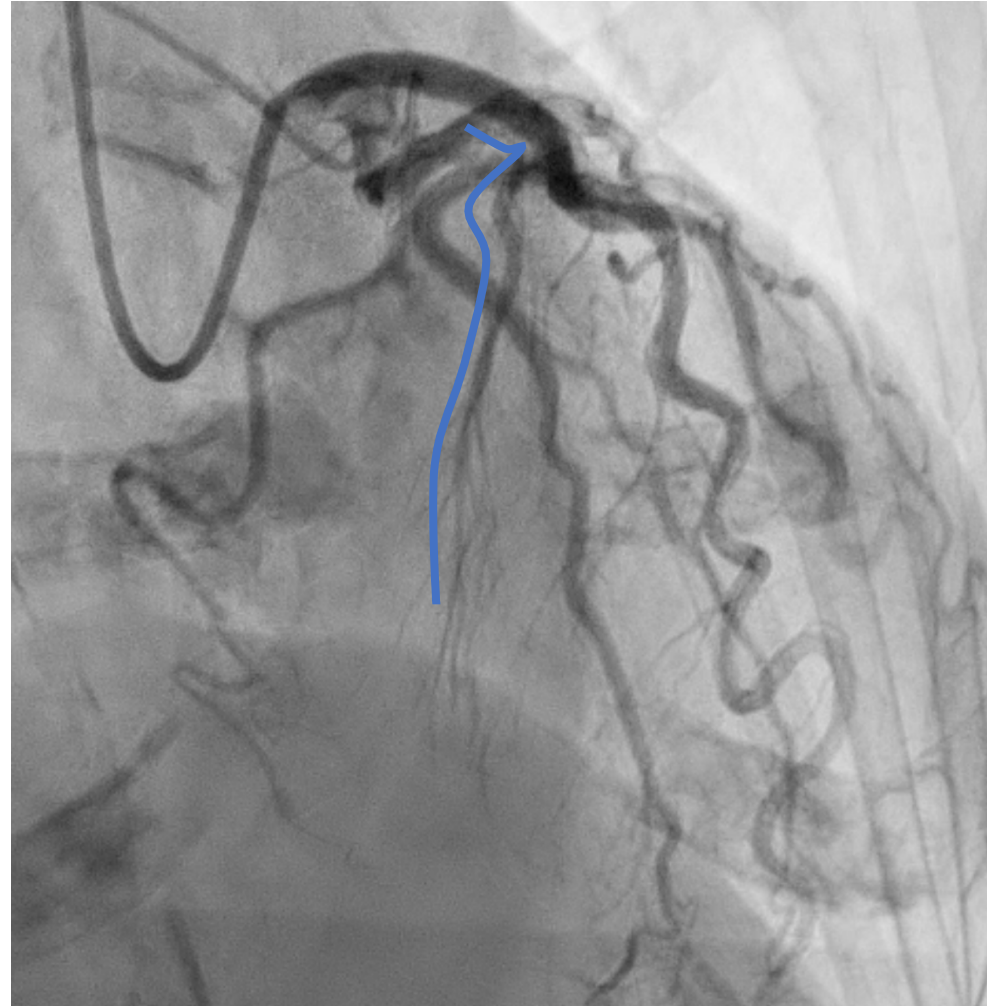
Cath Lab - I

Septal anatomy evaluation



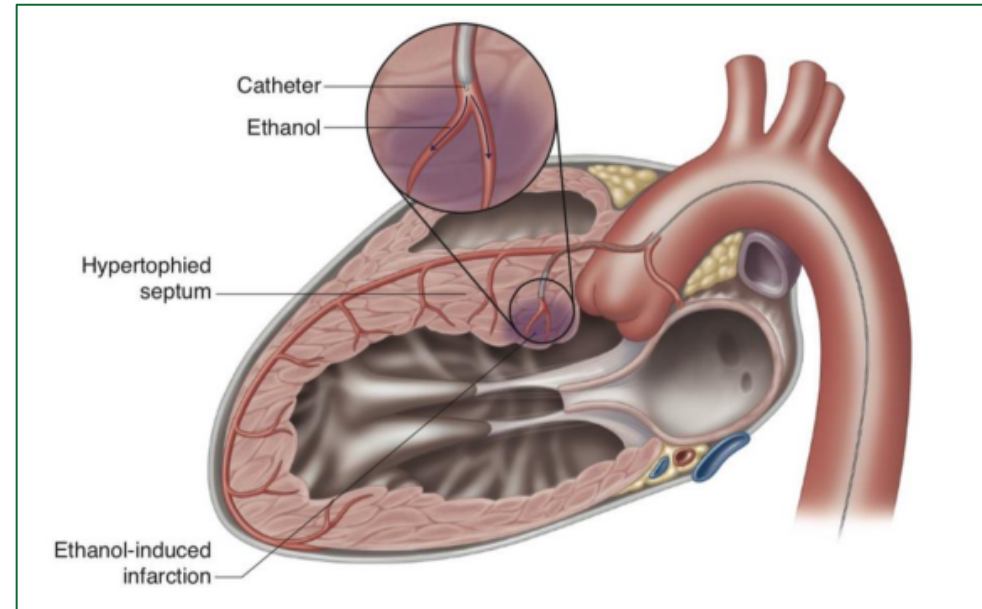
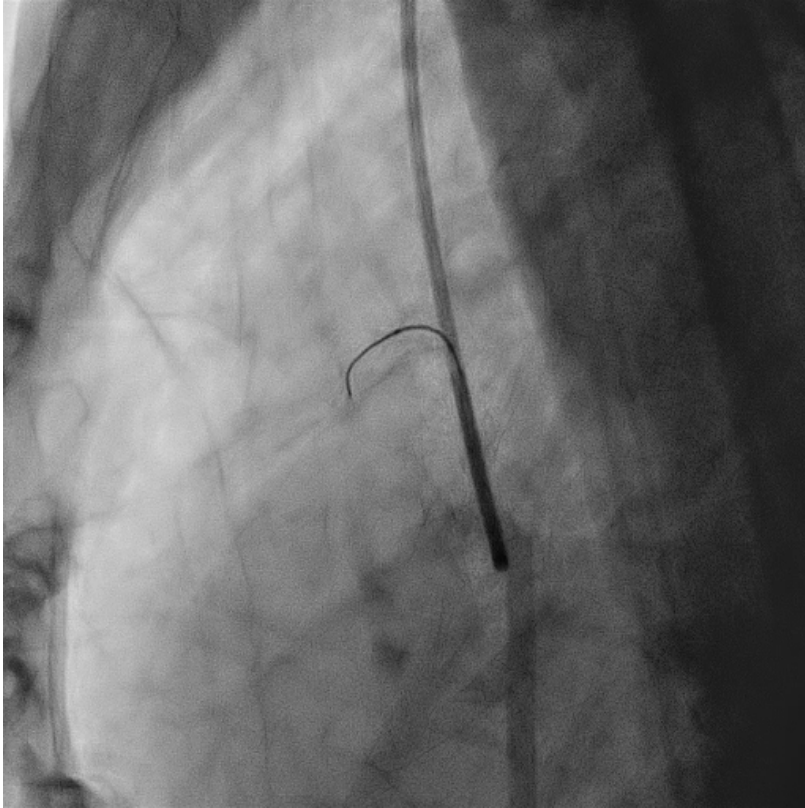
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Septal anatomy evaluation



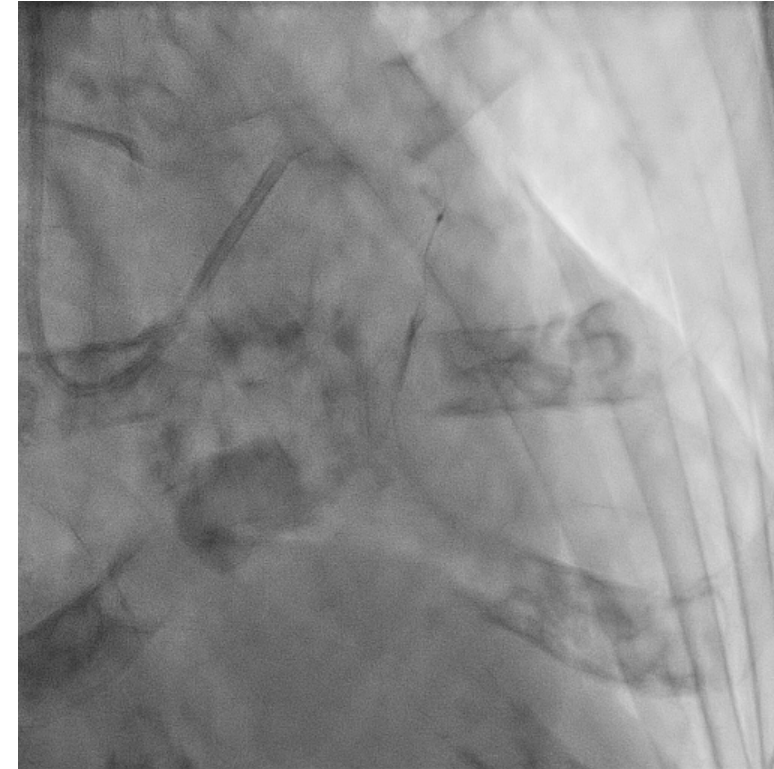
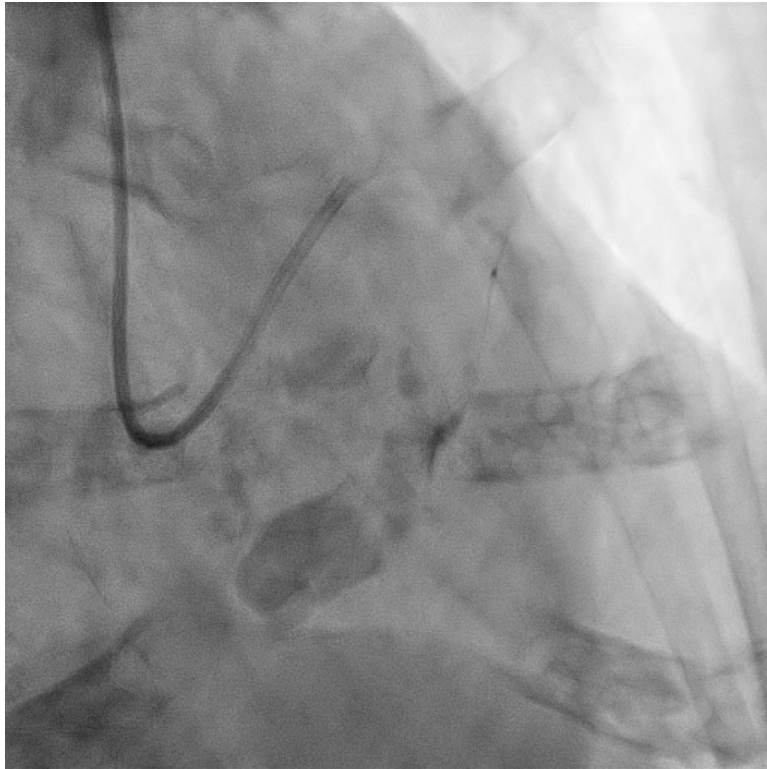
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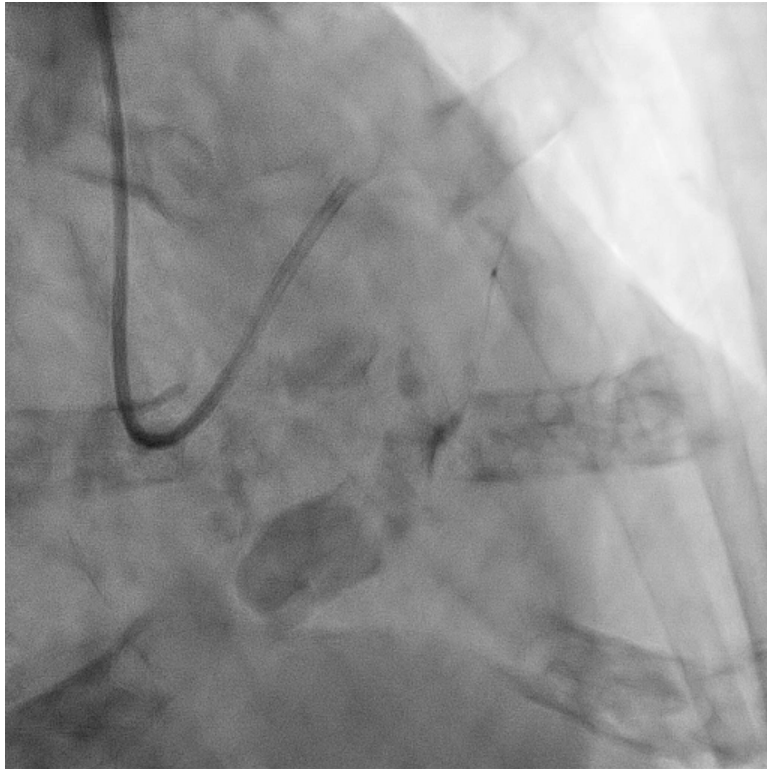
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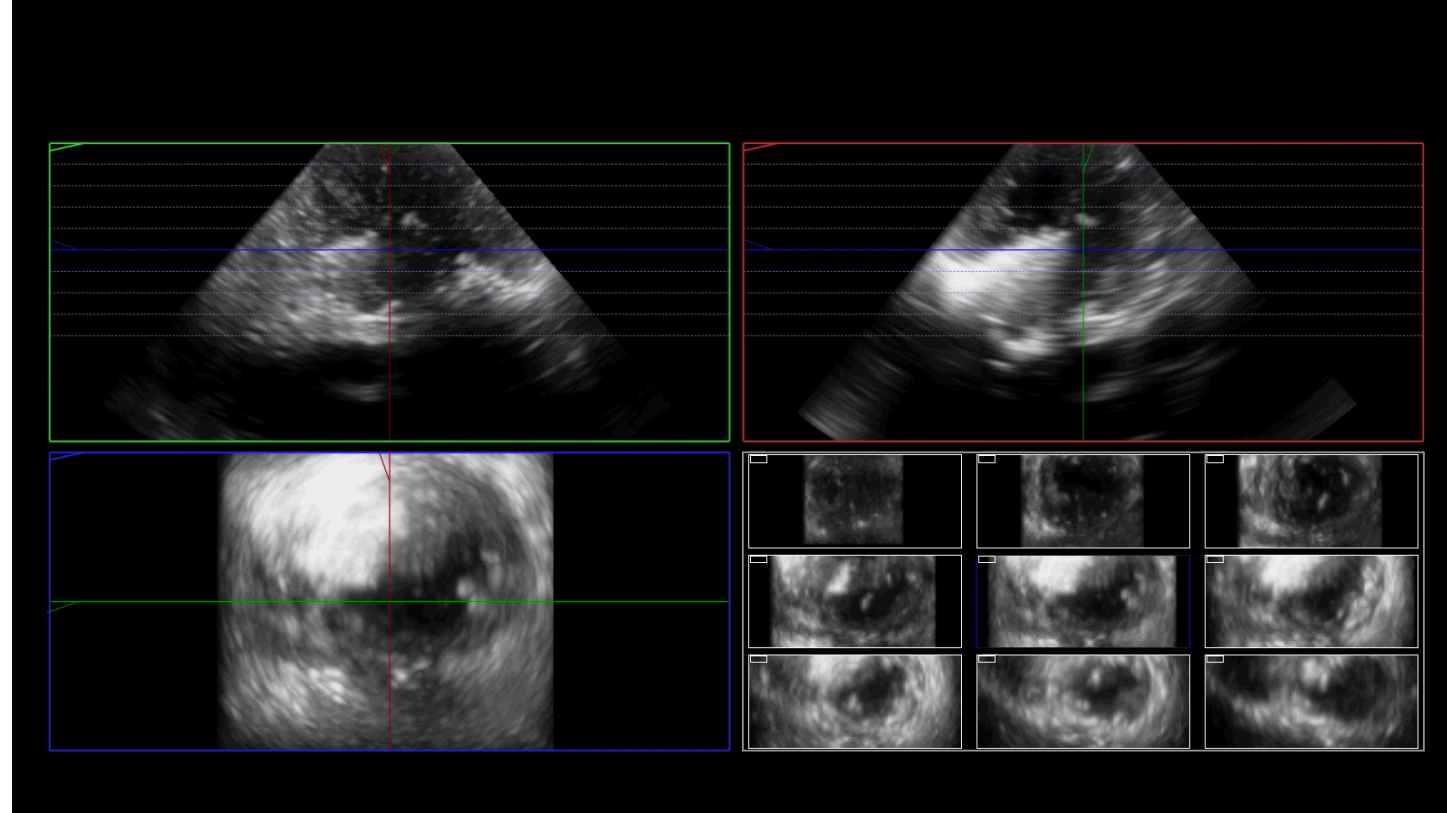
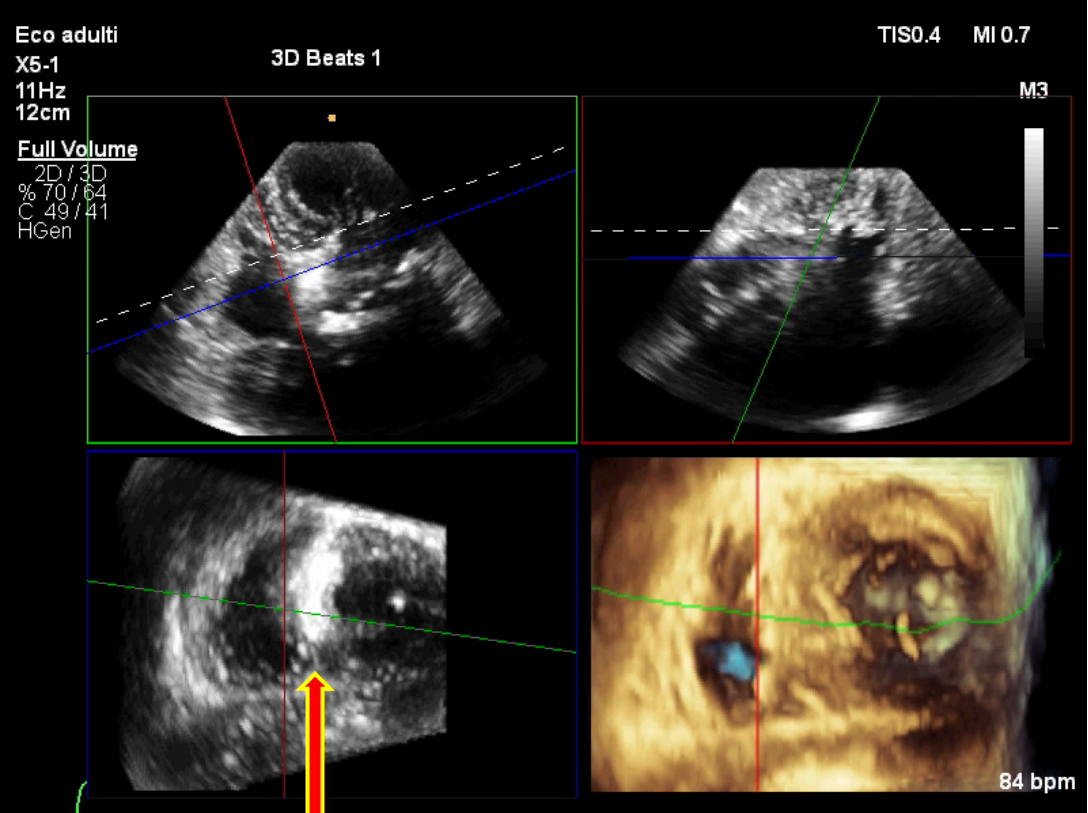


Cath Lab - I

Septal anatomy evaluation

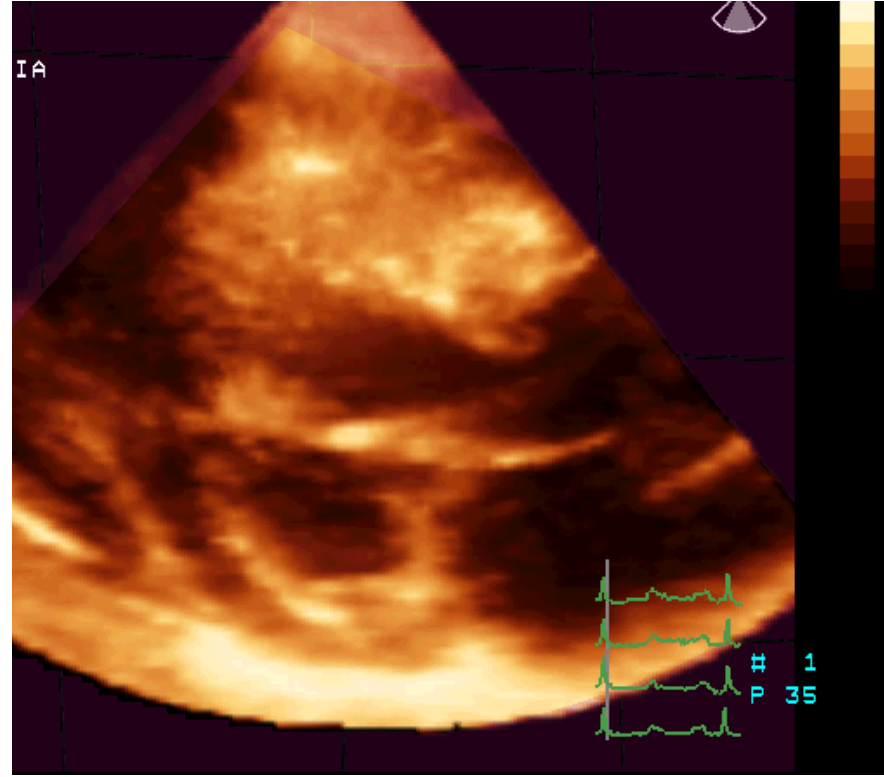
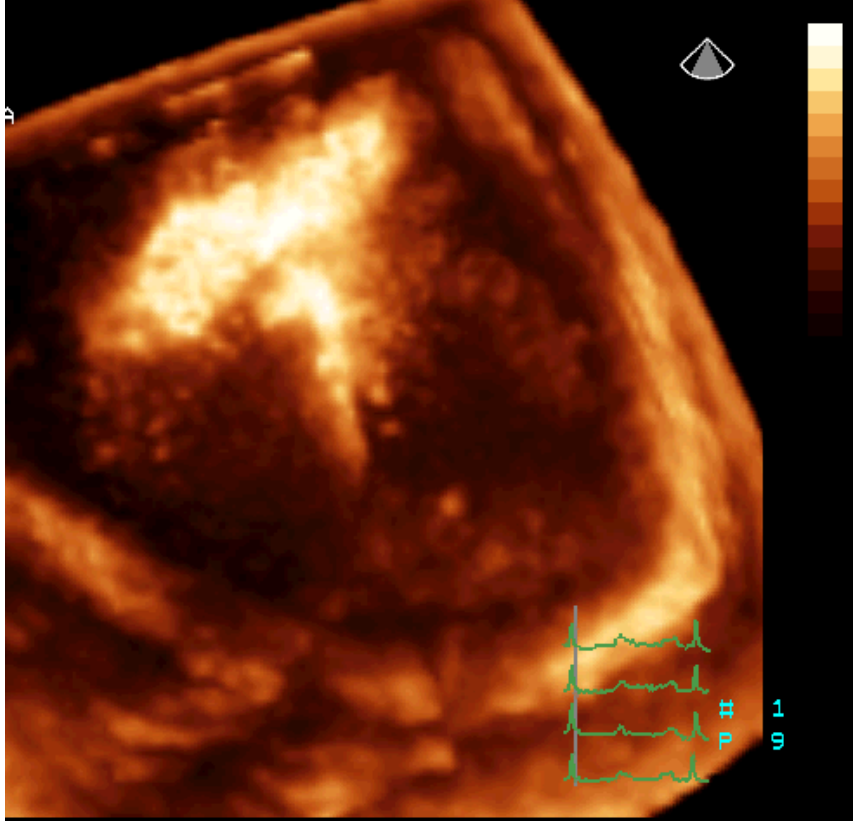


Selective Intracoronary Echo Contrast Injection

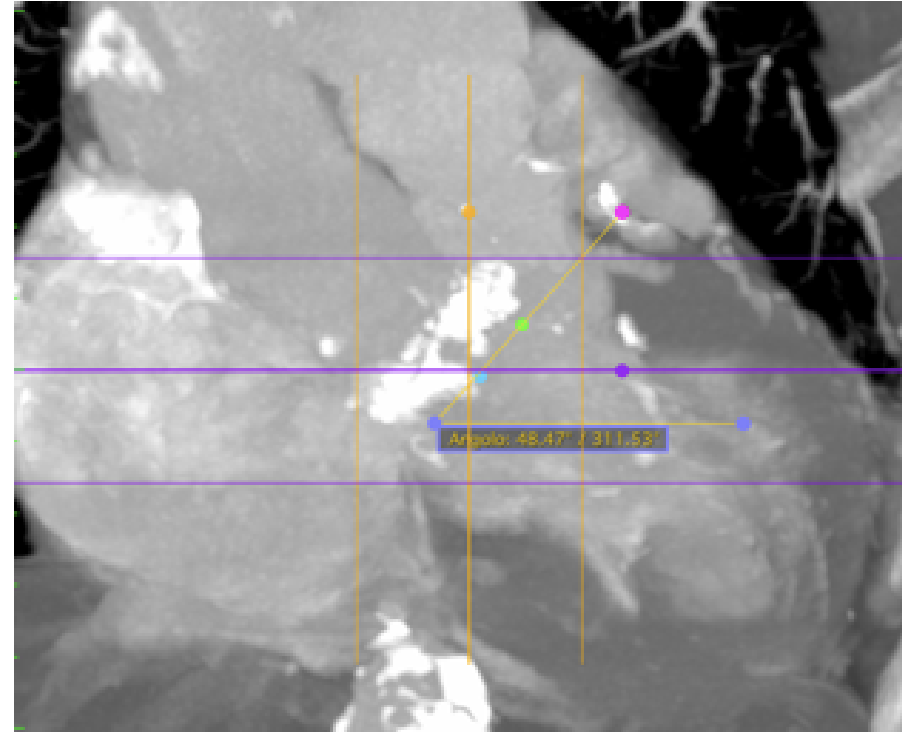
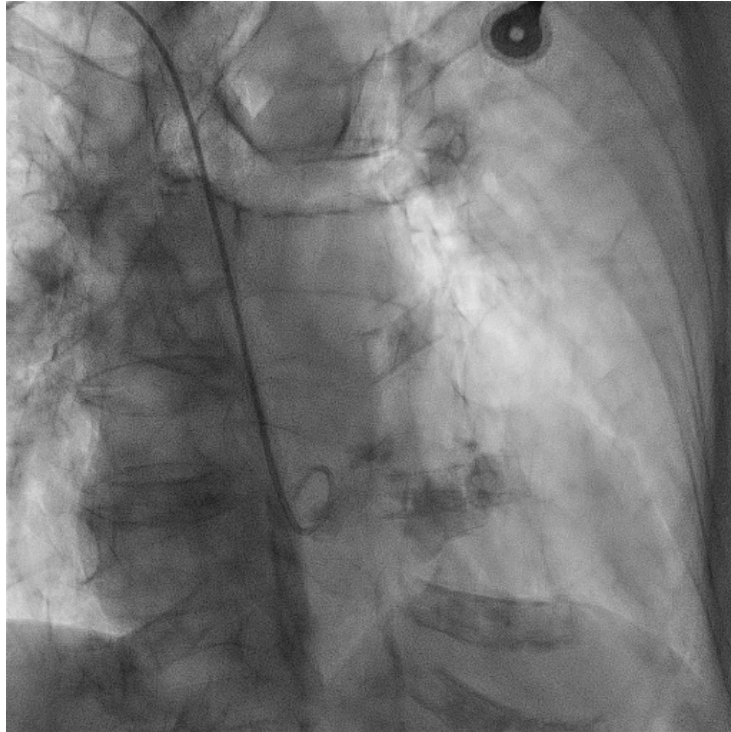


EXTENSION OF ECHO-CONTRAST EFFECT IN TARGET ZONE WITH ADDITIONAL INVOLVEMENT OF RIGHT SEPTAL SITE AND RIGHT VENTRICULAR FREE WALL

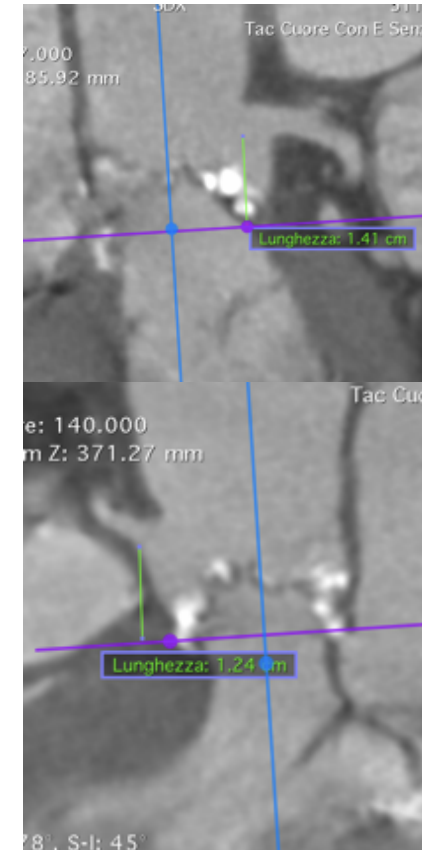
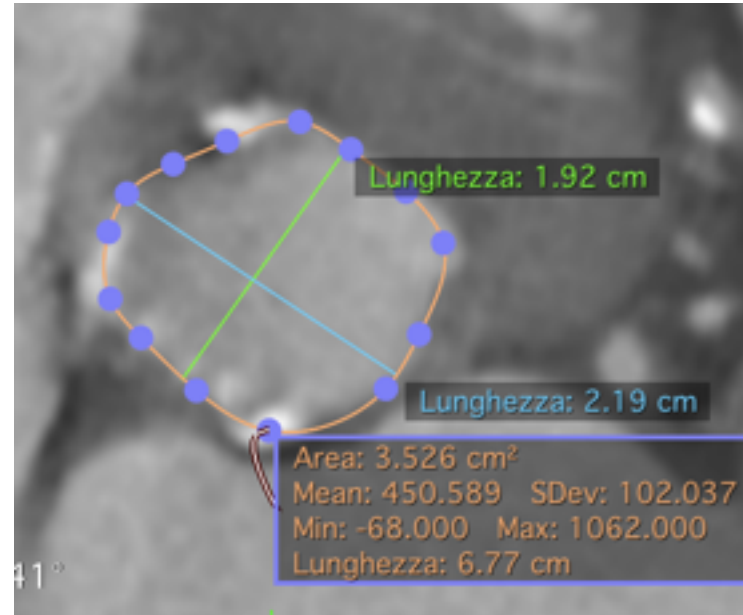
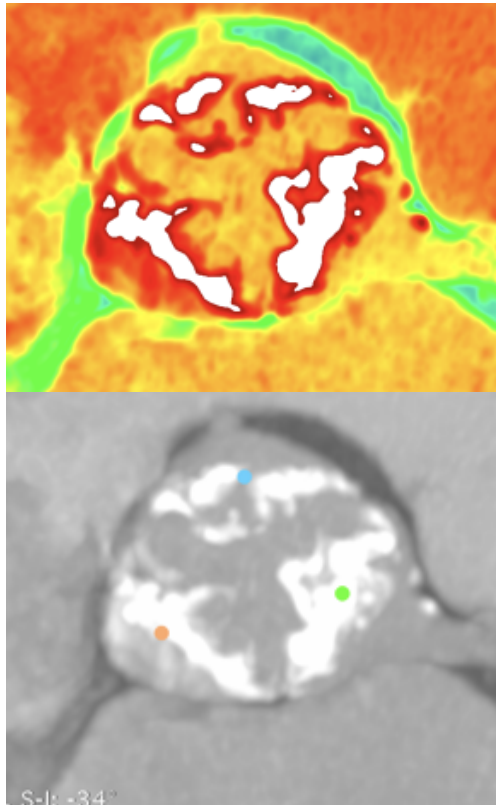
ASA at risk of life-threatening right ventricular ethanololic infarction



TAVI Planning

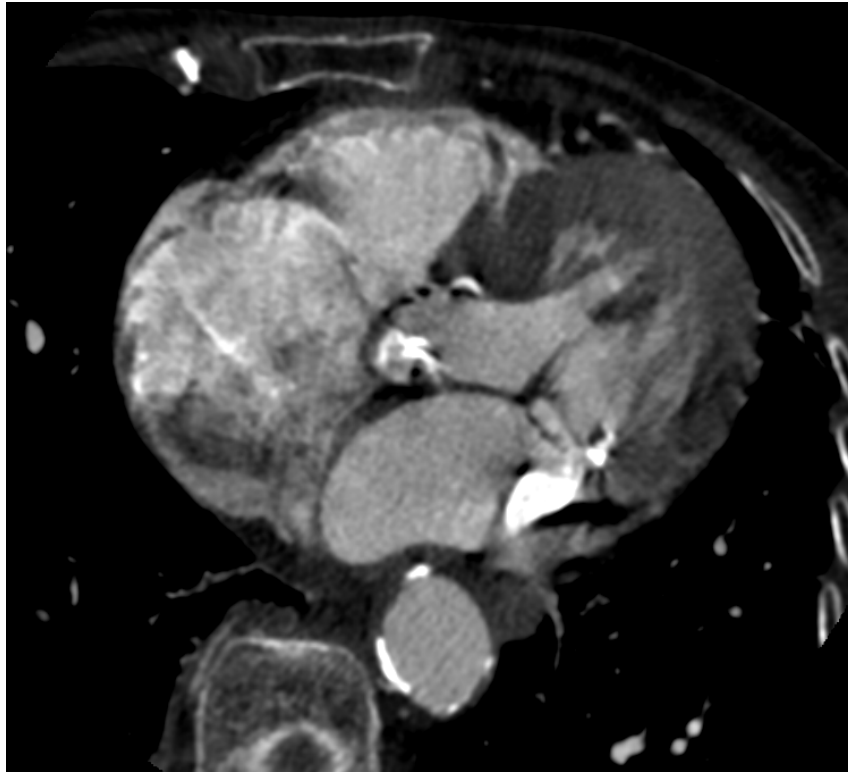


TAVI Planning

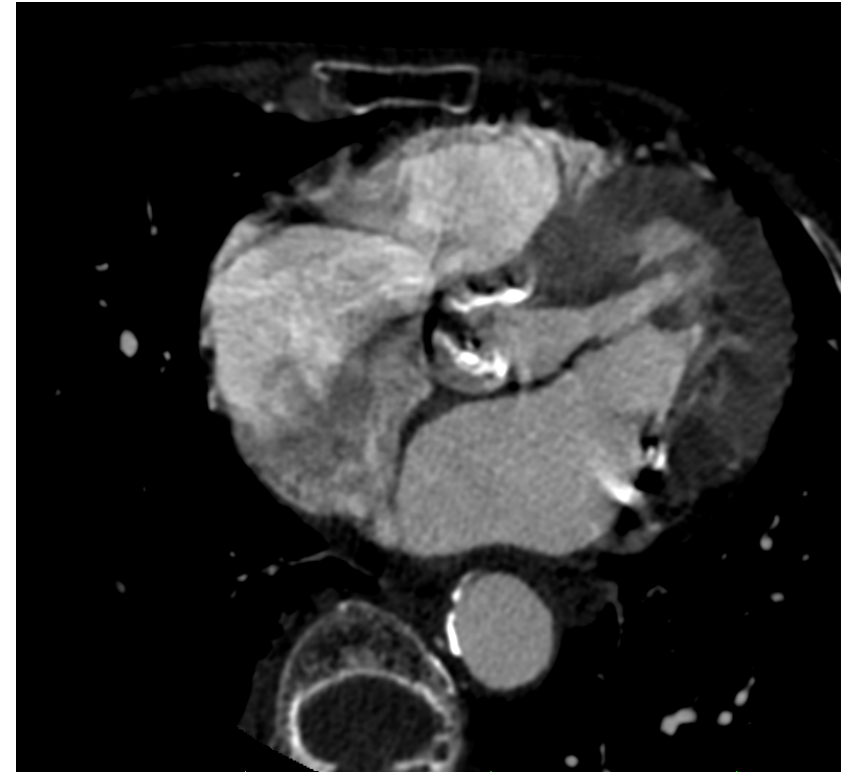


VBR: 19x21 mm
Perimeter: 67.7 mm
PDD: 21.5 mm
Area: 352 mm²
ADD: 21.1 mm

TAVI Planning



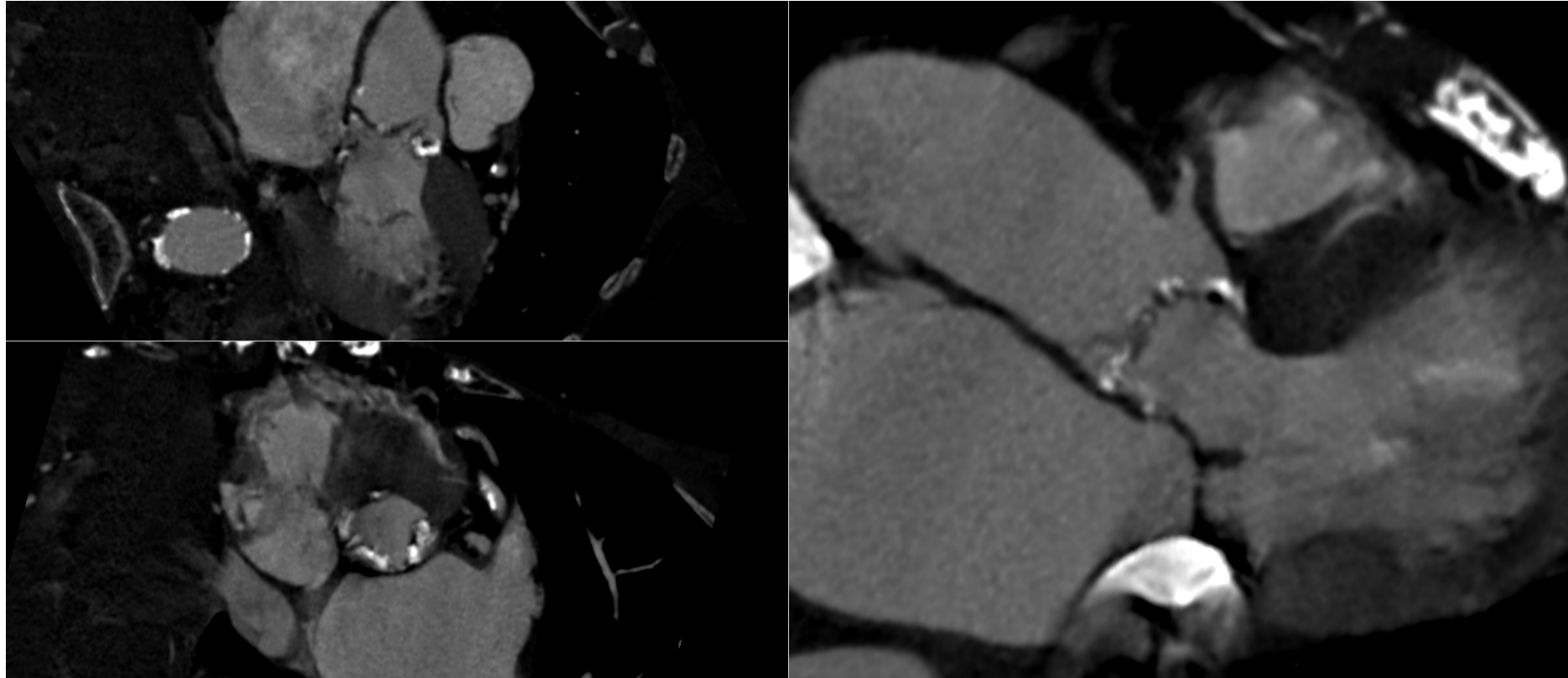
S



D

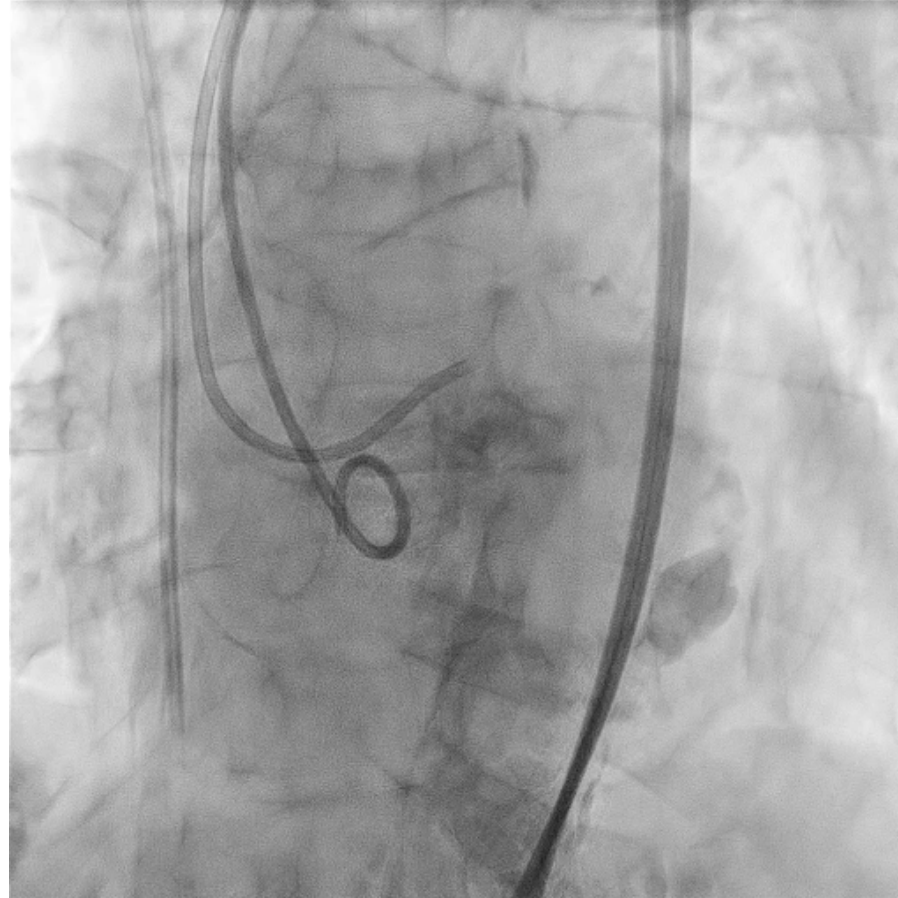
TAVI Planning

AV - LV - Septum

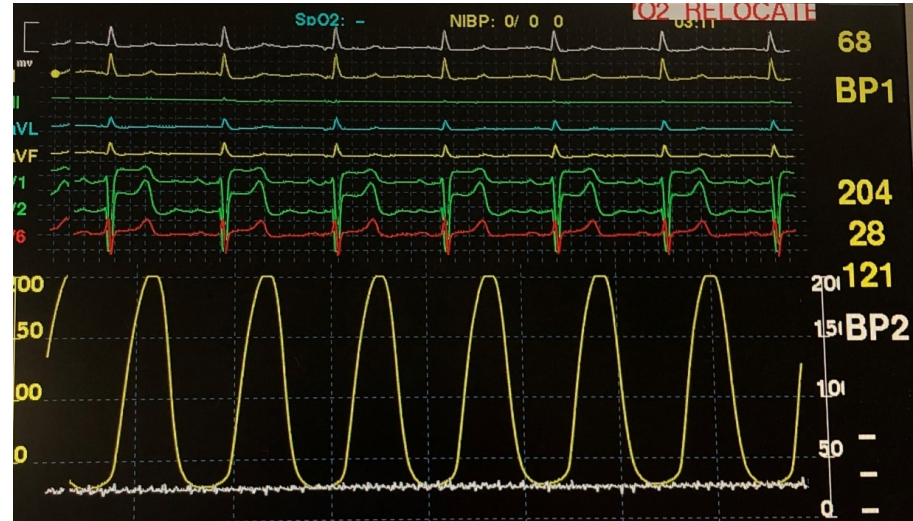
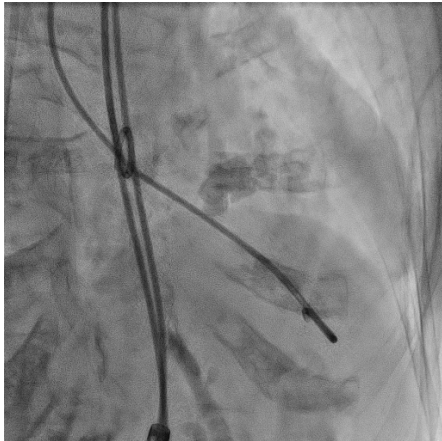


TAVI Procedure

Implant projection



TAVI Procedure

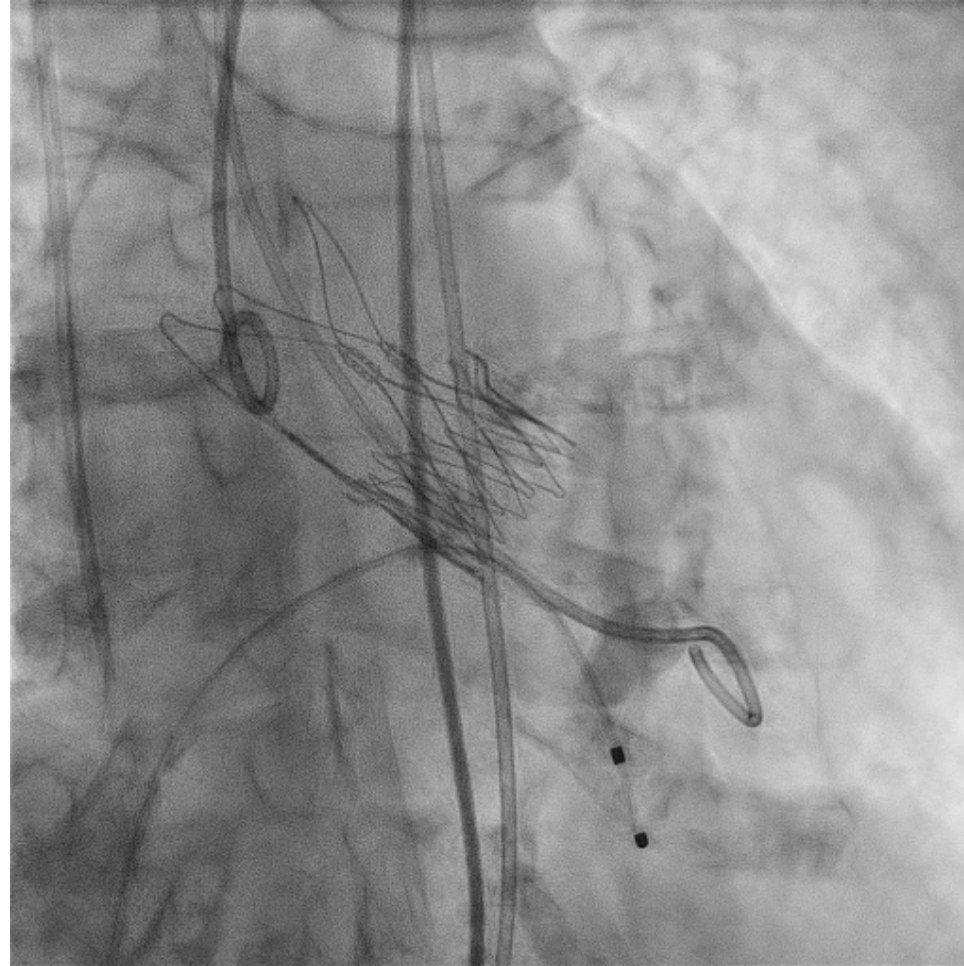


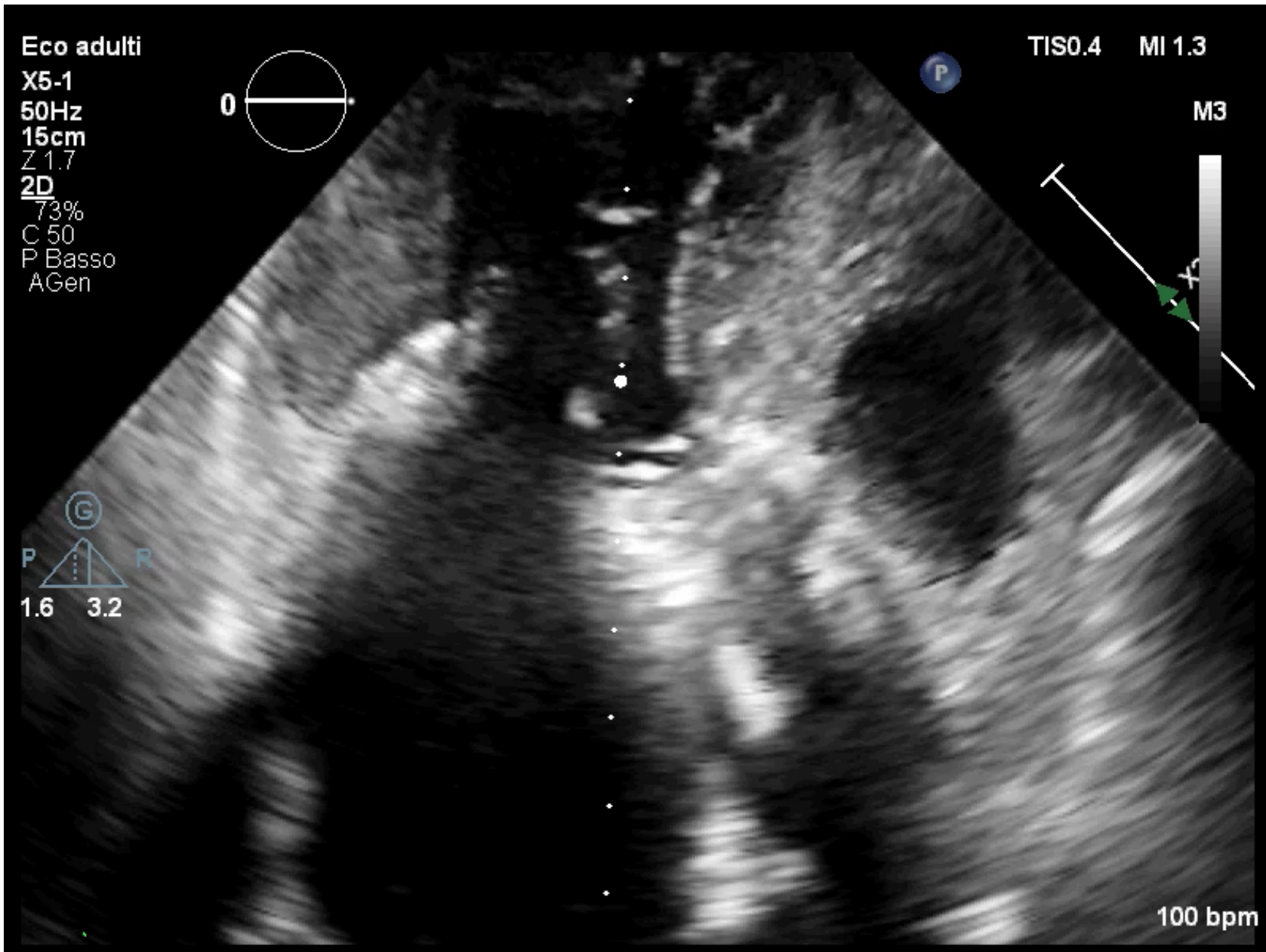
P2P 59 mmHg

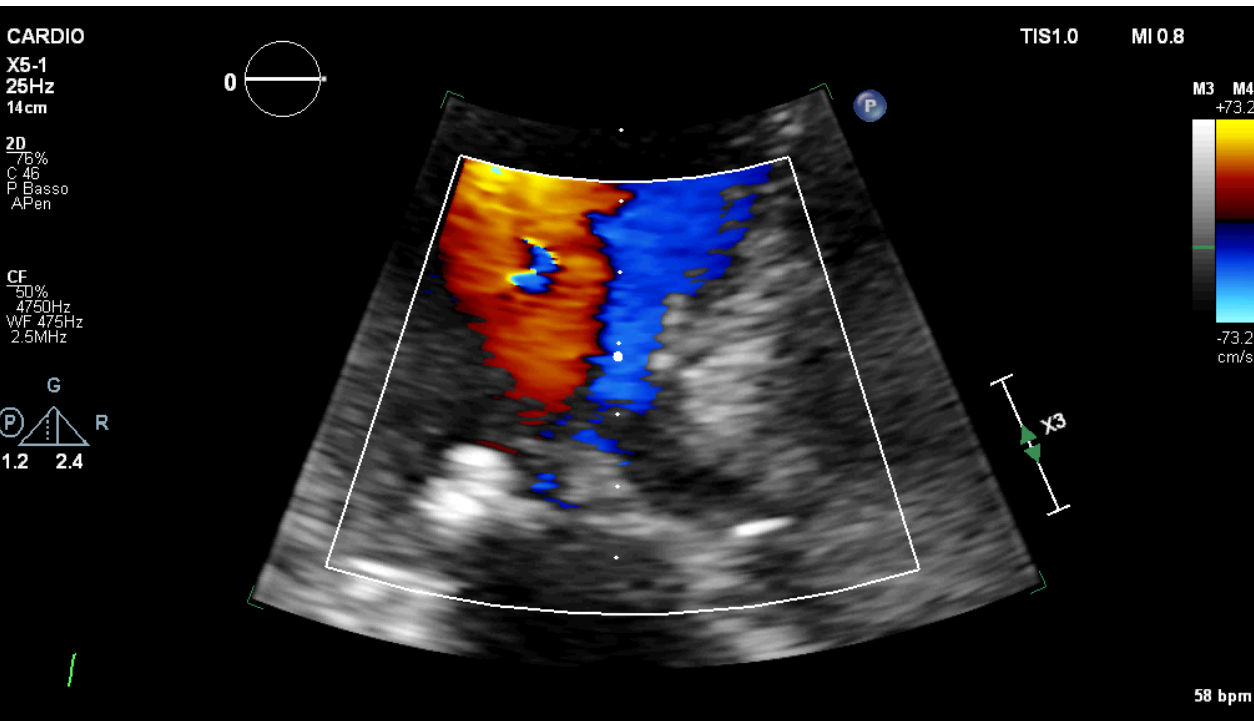
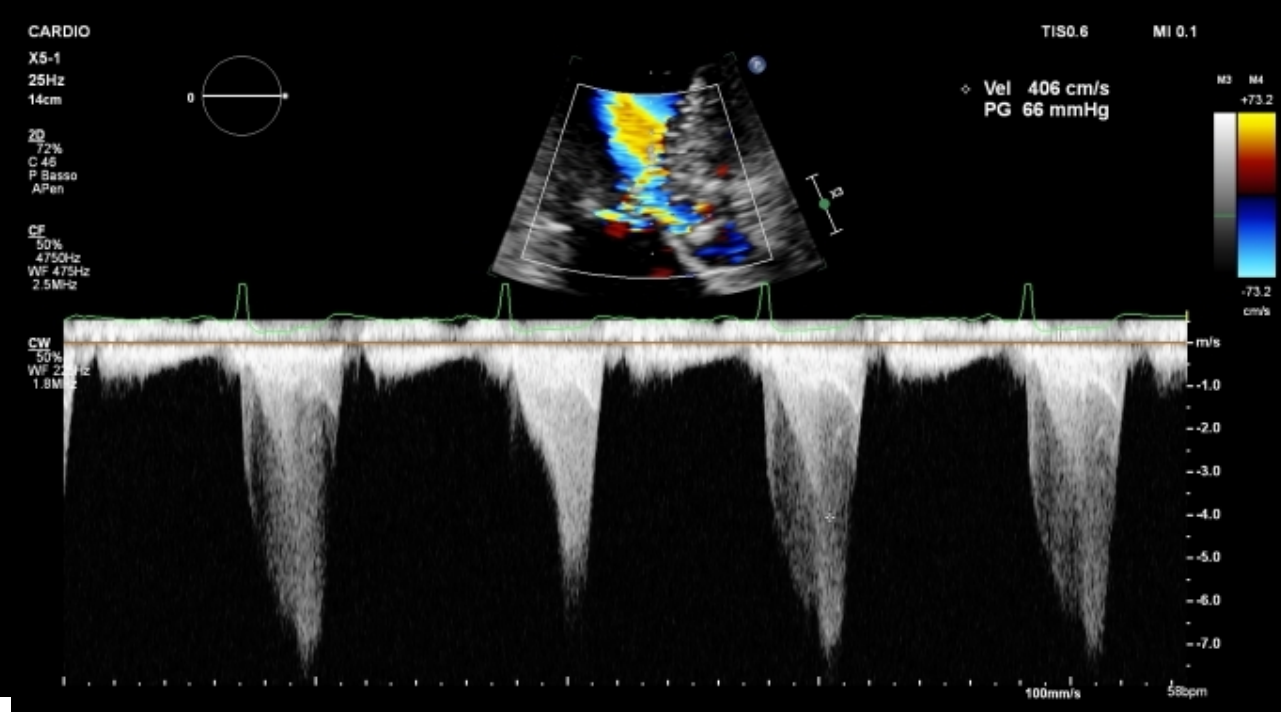
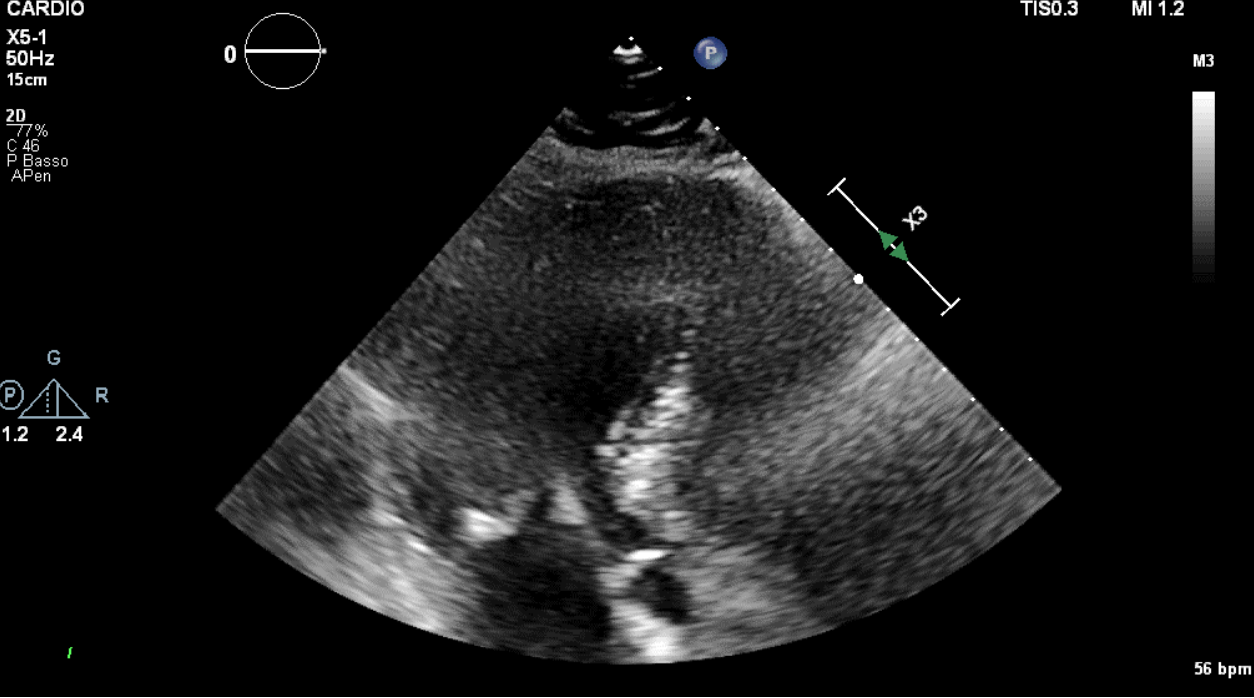


TAVI Procedure

Final result







Post-TAVI unmasking SAM related obstruction and severe mitral regurgitation

Unresponsive to Beta-Blocking infusion

Unstable clinical condition

Rescue MitraClip

Eco adulti

X7-2t

53Hz

11cm

Z 1.4

2D

57%

C 50

P Off

Pen.



G
P R

PAT T: 37.0C
TEE T: 38.1C

Eco adulti

X7-2t

17Hz

11cm

Z 1.4

2D

59%

C 50

P Off

Pen.



G
P R

PAT T: 37.0C
TEE T: 38.3C

TISO.6 MI 0.3

M4 M

+59

-59

cm

x3

58 bpm

58 bpm

58 bpm

58 bpm

58 bpm

58 bpm

58 bpm

58 bpm

58 bpm

58 bpm

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58 bpm

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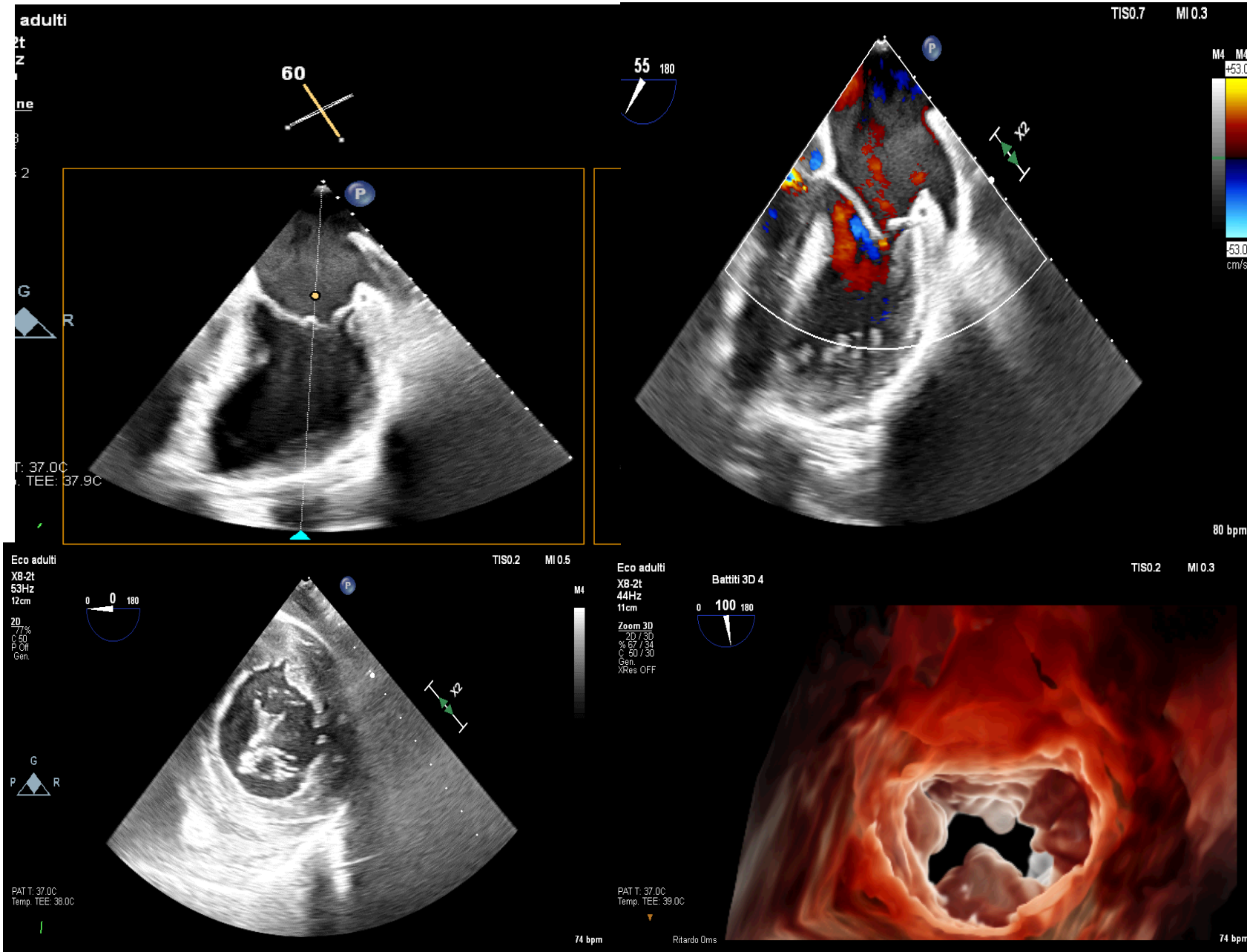
58 bpm

58 bpm

58 bpm

58 bpm

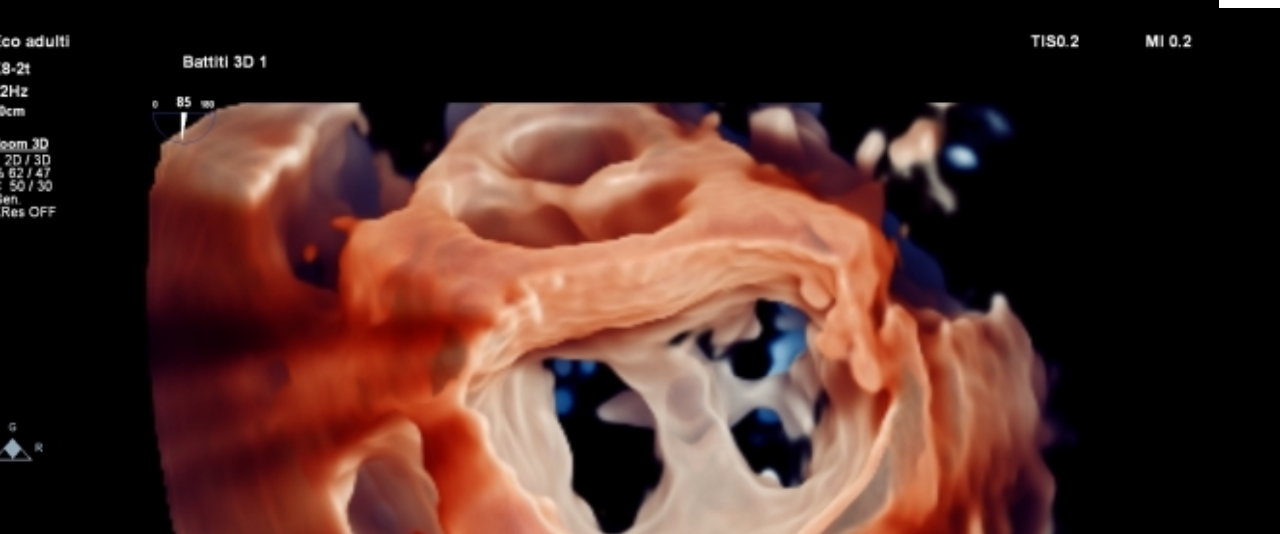
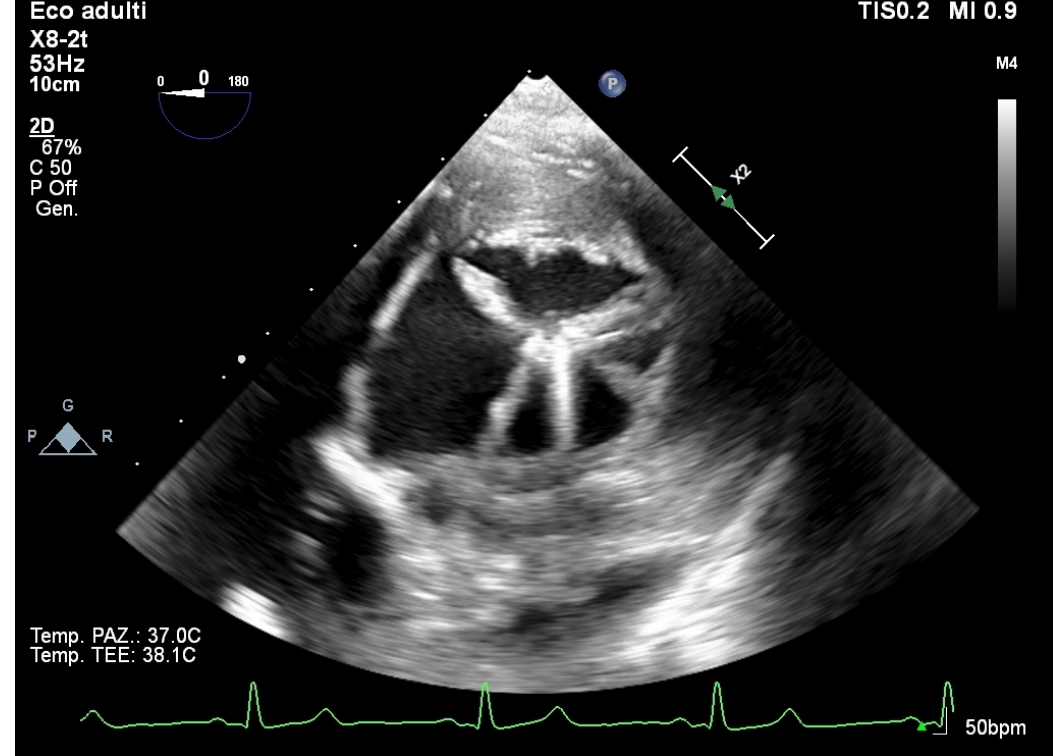
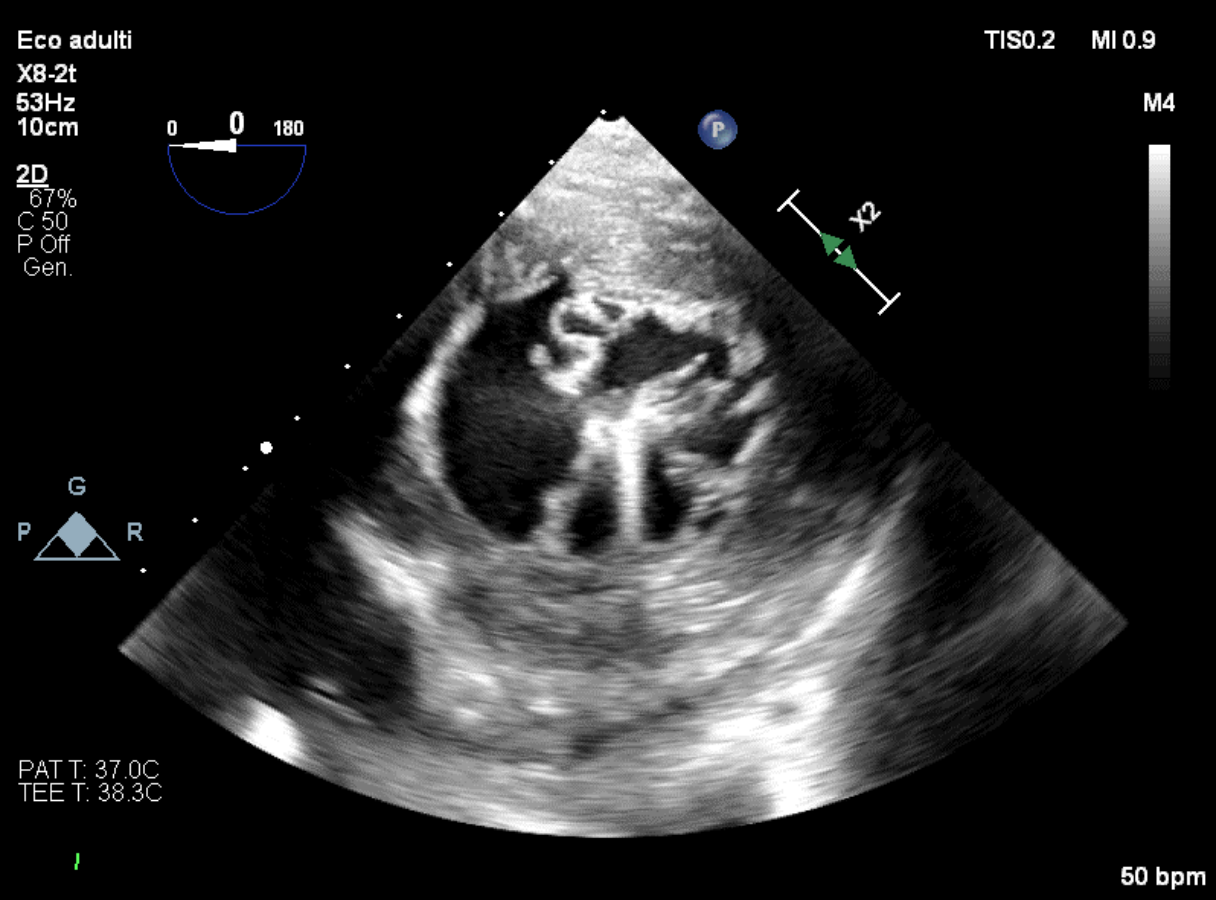
58 bpm

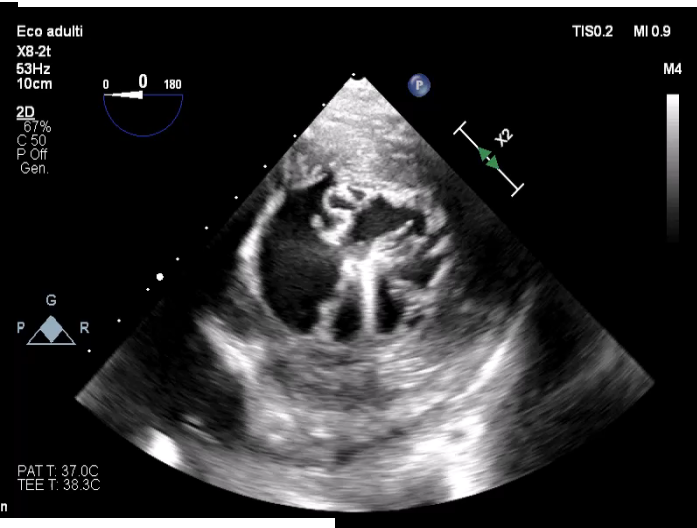
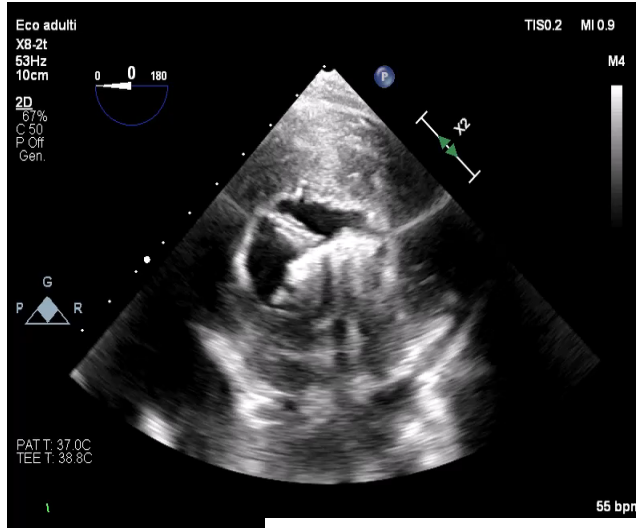
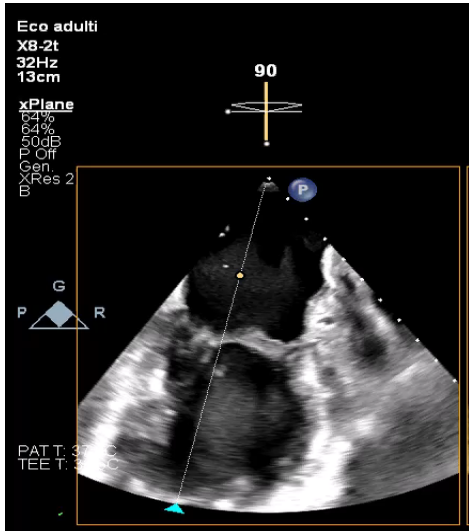


SAM-related LV obstruction and Mitral Regurgitation (Four-leaflet Valve)

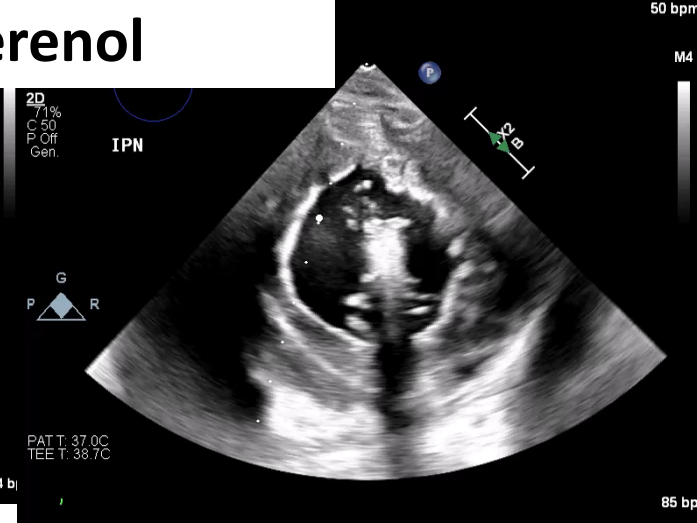
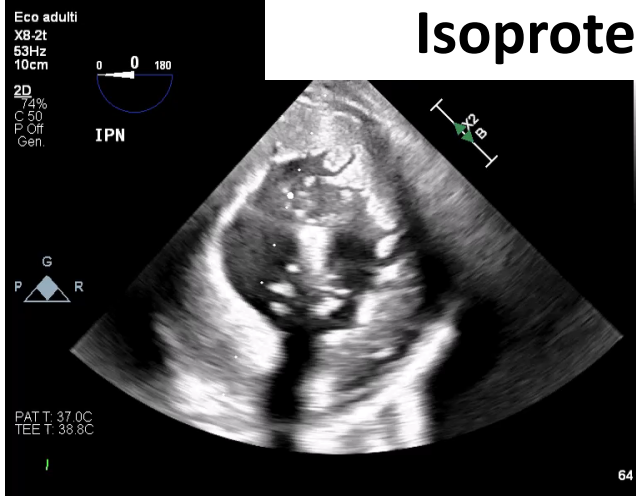
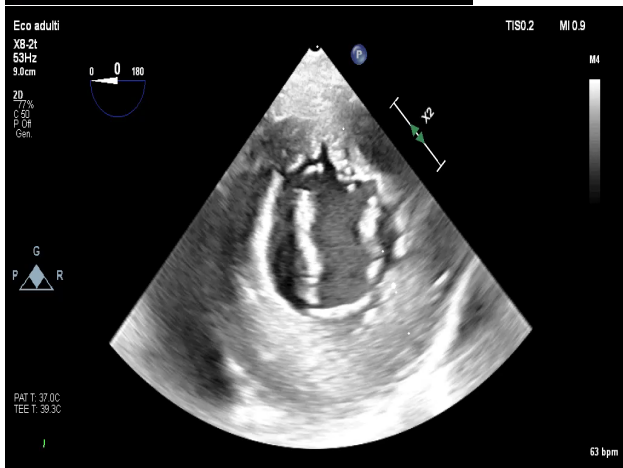


Functional anatomy suitable for mitral clip repair





Isoproterenol





**The nightmare
is
over!**