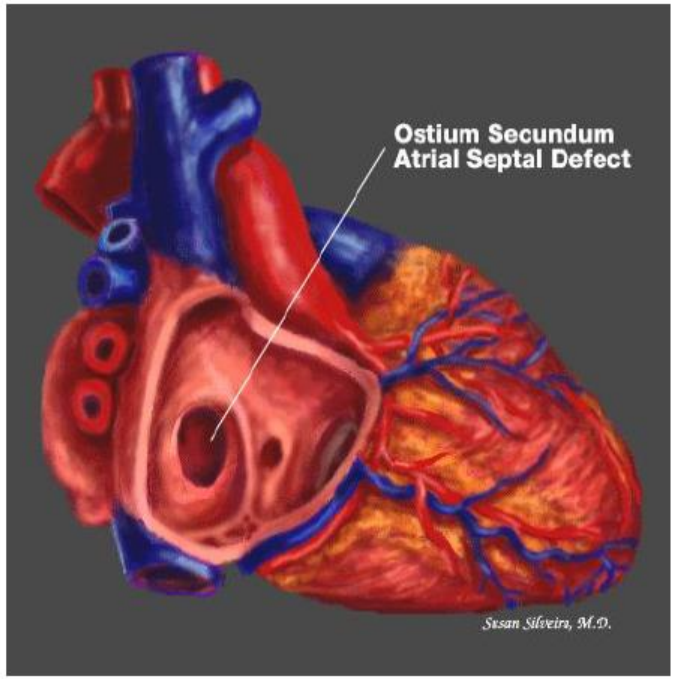
ASD מולד או יאטרוגני – לסגור או לא לסגור

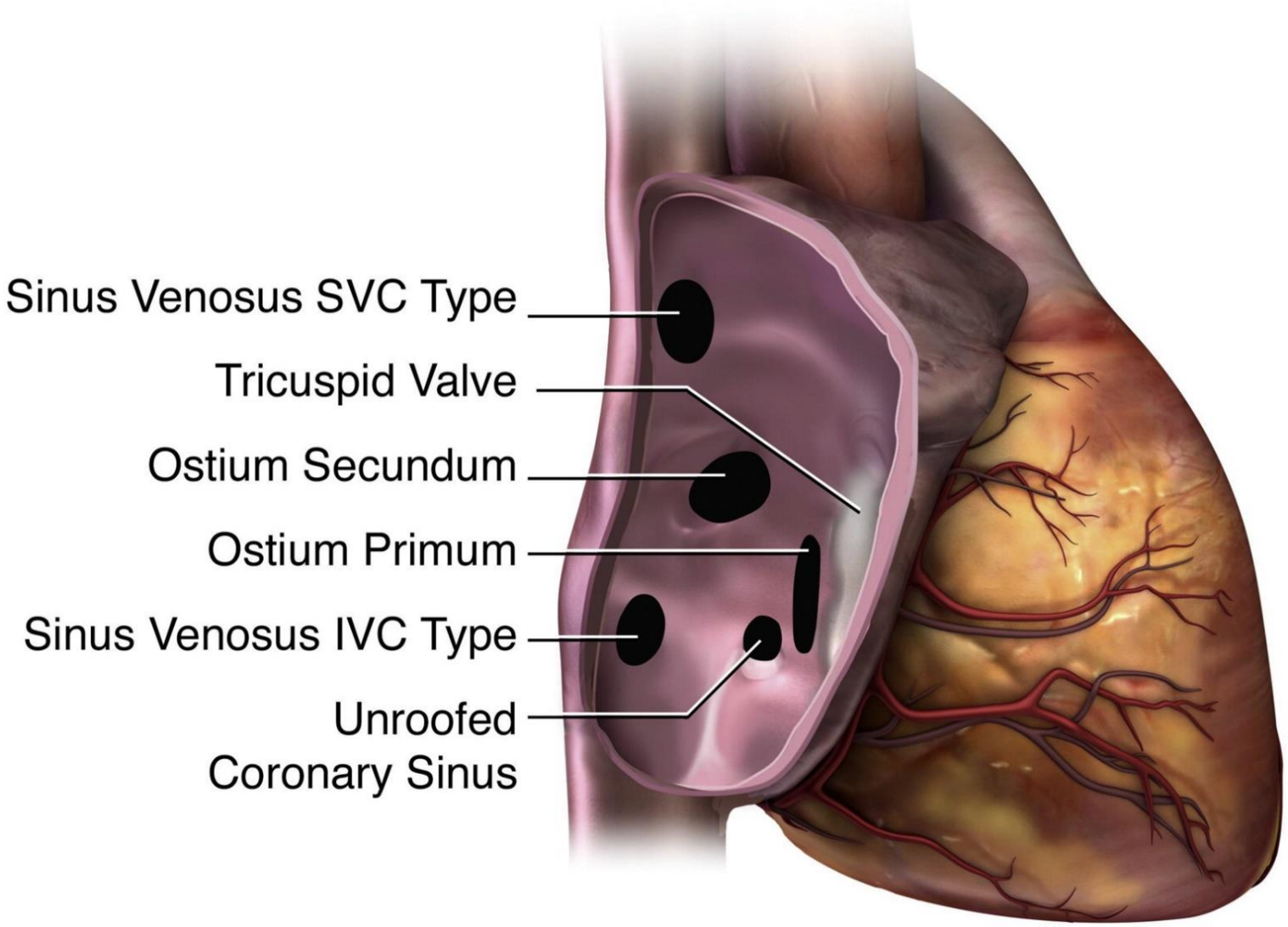
ד"ר אפרת מזור דריי
מנהלת שירות מומי לב במבוגרים
יו"ר החוג למומי לב מולדים במבוגרים
המרכז הרפואי שיבא, תל השומר

שיבא תל השומר | מרכז לב, חזה וכלי דם ע"ש אולנה ולב לבייב

Atrial Septal Defect (ASD)

- The most prevalent congenital heart disease lesion in the adult population with CHD.
- Secundum ASD accounts for > 90% of observed cases.
- More prevalent among females than males.
- Approximately 1/3 of an ostium secundum ASD close spontaneously between 1 and 2 years of age.
- The mechanisms are not well established.

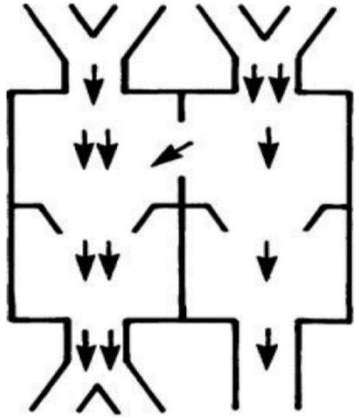




Journal of the American Society of Echocardiography 2015 28, 910-958DOI: (10.1016/j.echo.2015.05.015)

Physiologic consequence of ASD

- In the ostium secundum ASD, the right ventricle is thinner and more compliant than the left ventricle -> blood flow is from LA through the ASD across the TV into the relatively compliant RV -> into the low-resistance pulmonary vascular bed.
- Accordingly, the RV is volume overloaded and the LV is volume underloaded.
- RV function is usually maintained through the fourth decade.



Clinical presentation and natural history

- PAP can be normal, but on average increases with age. Severe pulmonary vascular disease is nevertheless rare (< 5%) and its development presumably requires additional factors, including genetic predisposition (similarities to idiopathic PAH).
- With increasing age and with increasing PAP, tachyarrhythmias become more common (atrial flutter, atrial fibrillation).
- Systemic embolism may be caused by paradoxical embolism (rare) or atrial fibrillation.

Physiologic consequence of ASD

- Reduced LV compliance (ischemic heart disease, HTN, cardiomyopathy, aortic and mitral valve disease) may increase L to R shunt.
- Reduced RV compliance (pulmonic stenosis, PAH, other RV disease or tricuspid valve disease) may decrease L to R shunt or eventually cause shunt reversal, resulting in cyanosis.

Clinical presentation and natural history

- Patients frequently remain asymptomatic until adulthood; however, the majority develop symptoms beyond the fourth decade including reduced functional capacity, exertional shortness of breath, and palpitations (supraventricular tachyarrhythmias), and less frequently pulmonary infections and right heart failure.

Management

- Consensus guidelines have recommended surgical or percutaneous ASD closure in adults with right heart enlargement, with or without symptoms.

Management

Oster M, et al.
2018 ACHD Systematic Review (Part 2): Medical Versus Interventional Therapy for Secundum ASD

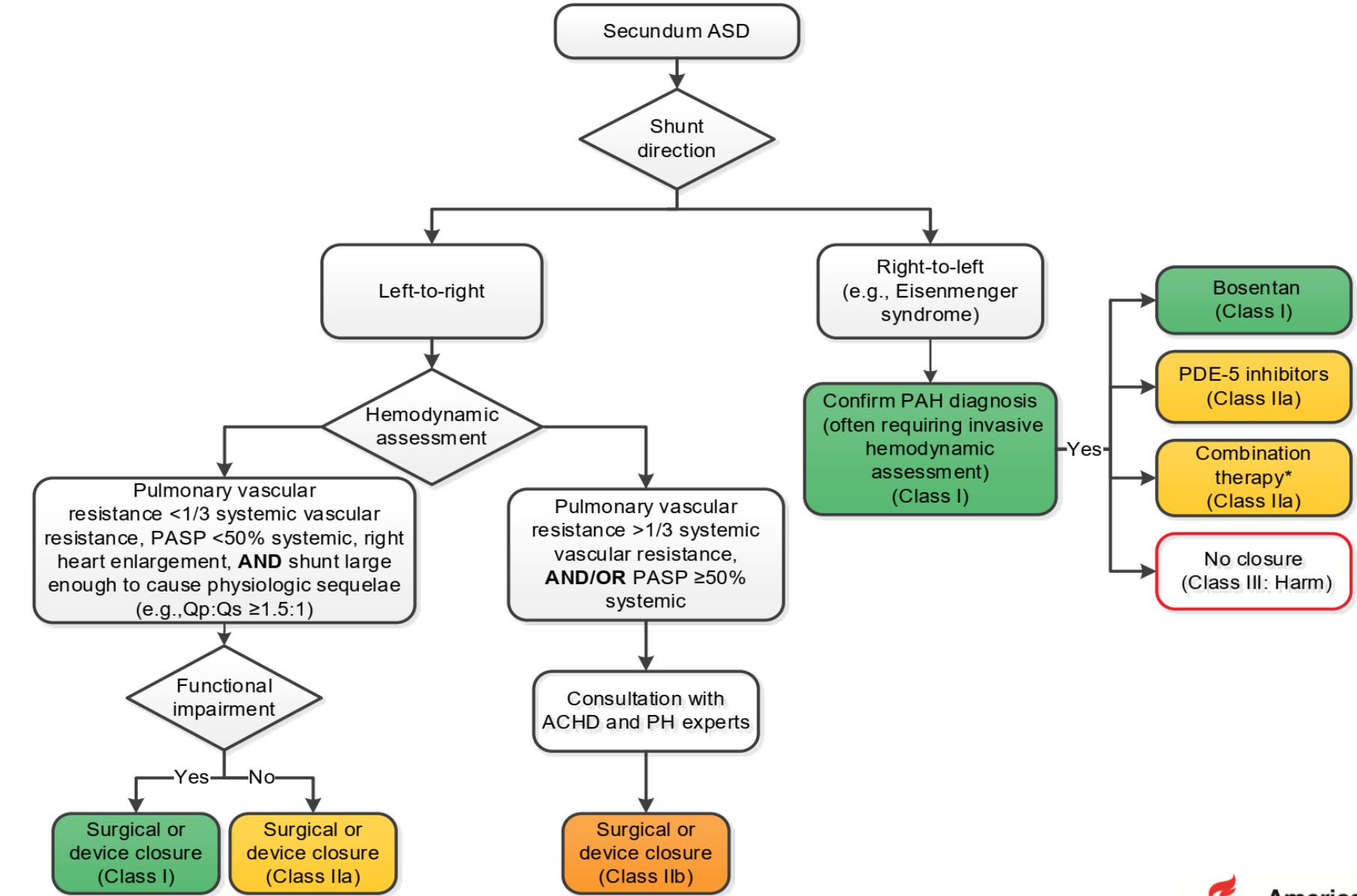
Interventional Therapy Versus Medical Therapy for Secundum Atrial Septal Defect: A Systematic Review (Part 2) for the 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

Management

- In conclusion, pooled data analysis on the impact of secundum ASD closure in adults was notably limited because of the lack of randomized controlled trials in patients with only secundum ASD.
- The few cohort studies in this population demonstrated improvement in functional status and right ventricular size and function as shown by echocardiogram.
- However, our findings suggest that at the time of this publication, insufficient data are available to determine the impact of ASD repair on mortality rate in adults.

Secundum ASD



AMERICAN COLLEGE of CARDIOLOGY

American Heart Association®

life is why™

ESC
European Society of Cardiology

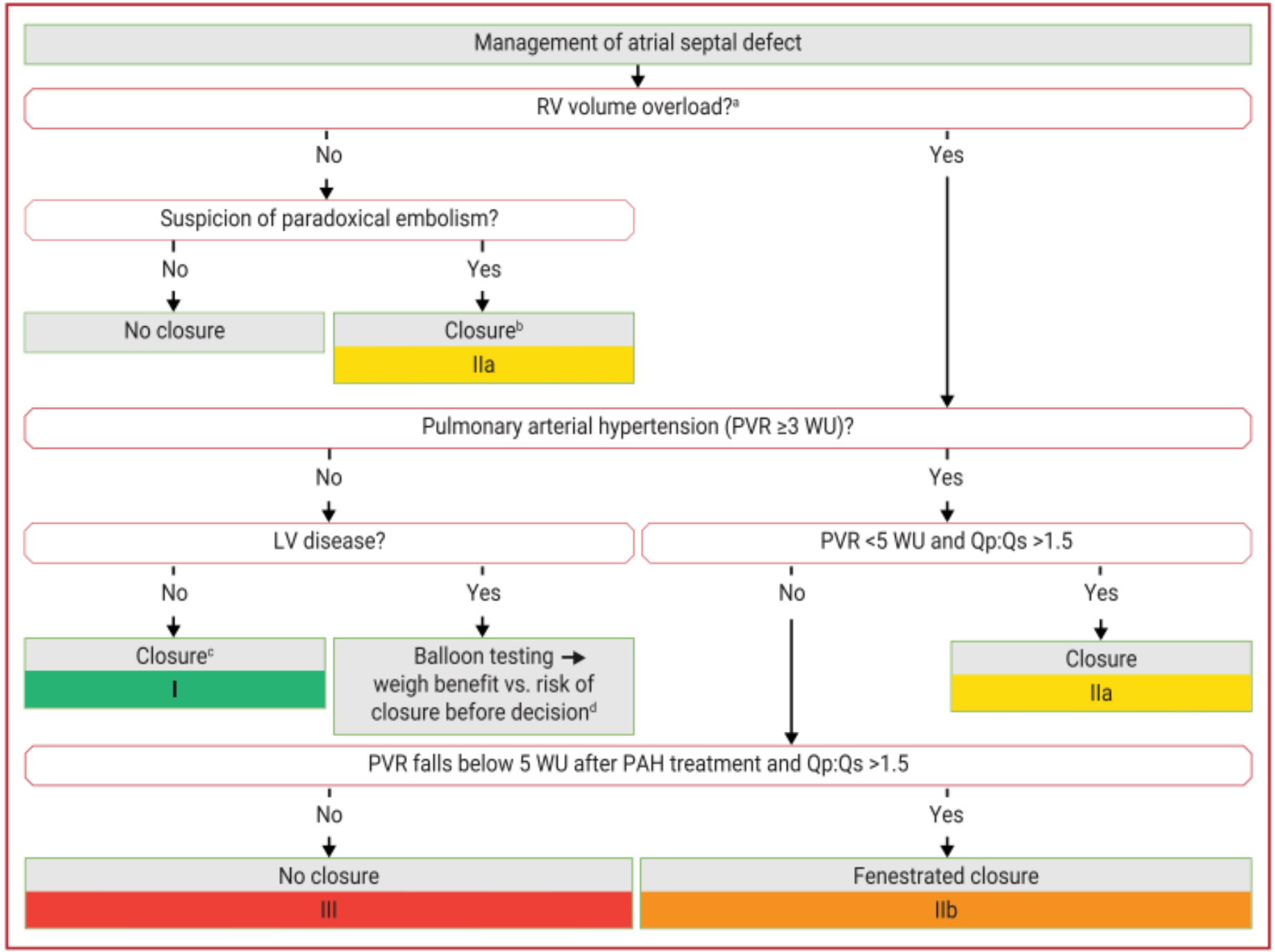
European Heart Journal (2020) **00**, 1–83
doi:10.1093/eurheartj/ehaa554

ESC GUIDELINES

2020 ESC Guidelines for the management of adult congenital heart disease

The Task Force for the management of adult congenital heart disease of the European Society of Cardiology (ESC)

Endorsed by: Association for European Paediatric and Congenital Cardiology (AEPC), International Society for Adult Congenital Heart Disease (ISACHD)


Management of atrial septal defect
RV volume overload?[a]
No
Yes
Suspicion of paradoxical embolism?
No
Yes
No closure
Closure[b]
IIa
Pulmonary arterial hypertension (PVR ≥3 WU)?
No
Yes
LV disease?
PVR <5 WU and Qp:Qs >1.5
No
Yes
No
Yes
Closure[c]
I
Balloon testing → weigh benefit vs. risk of closure before decision[d]
Closure
IIa
PVR falls below 5 WU after PAH treatment and Qp:Qs >1.5
No
Yes
No closure
III
Fenestrated closure
IIb

Surgical treatment

- Surgical repair has low mortality (<1% in patients without significant co-morbidity) and good long-term outcome (normal life expectancy and low long-term morbidity) when performed early (childhood, adolescence) and in the absence of pulmonary hypertension.
- In patients with atrial flutter/AF, cryo- or radiofrequency ablation should be considered at the time of surgery.

Device Closure

- Device closure has become first choice for secundum defect closure when feasible from morphology (includes stretched diameter ,38 mm and sufficient rim of 5 mm except towards the aorta).
- Studies comparing surgery and catheter intervention have reported similar success rates and mortality, but morbidity was lower and hospital stay shorter with catheter intervention.

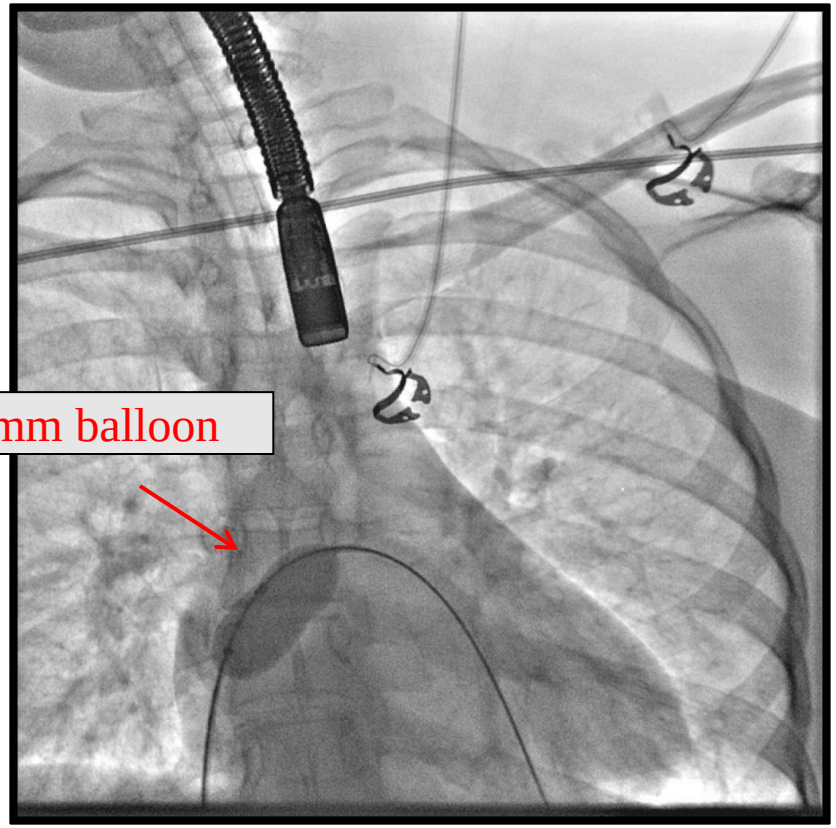
Device Closure

- Outcome is best with repair at age ,25 years.
- ASD closure after the age of 40 years appears not to affect the frequency of arrhythmia development during follow-up. The prevalence of atrial arrhythmias is up to 40-60%.
- However, patients benefit from closure at any age with regard to morbidity (exercise capacity, shortness of breath, right heart failure), particularly when it can be done by catheter intervention.
- Device closure may restrict access to the LA for later EP intervention.
- Antiplatelet therapy is required for at least 6 months (aspirin 75 mg o.d. minimum).

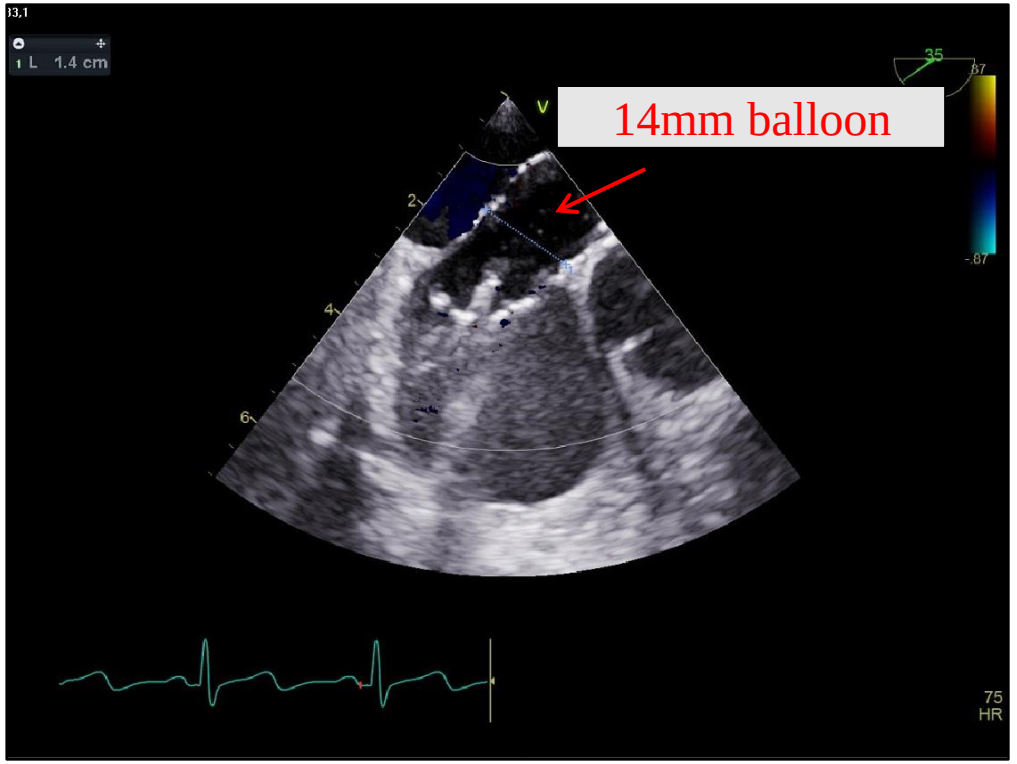
Treatment

ASD occluder implantation

Sizing - Fluoroscopy

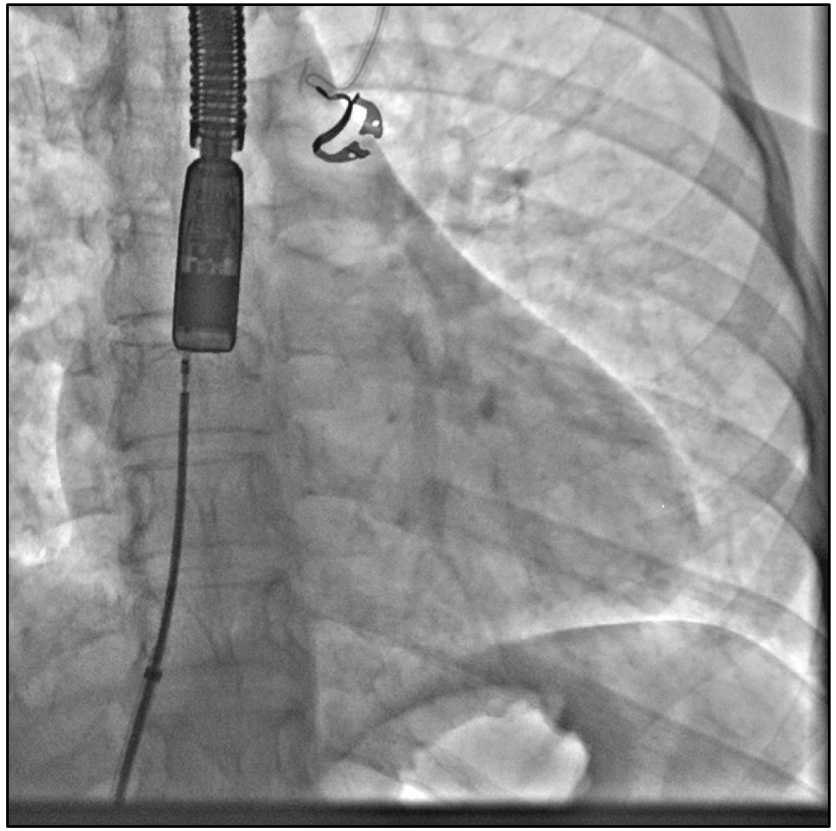


Sizing - TEE

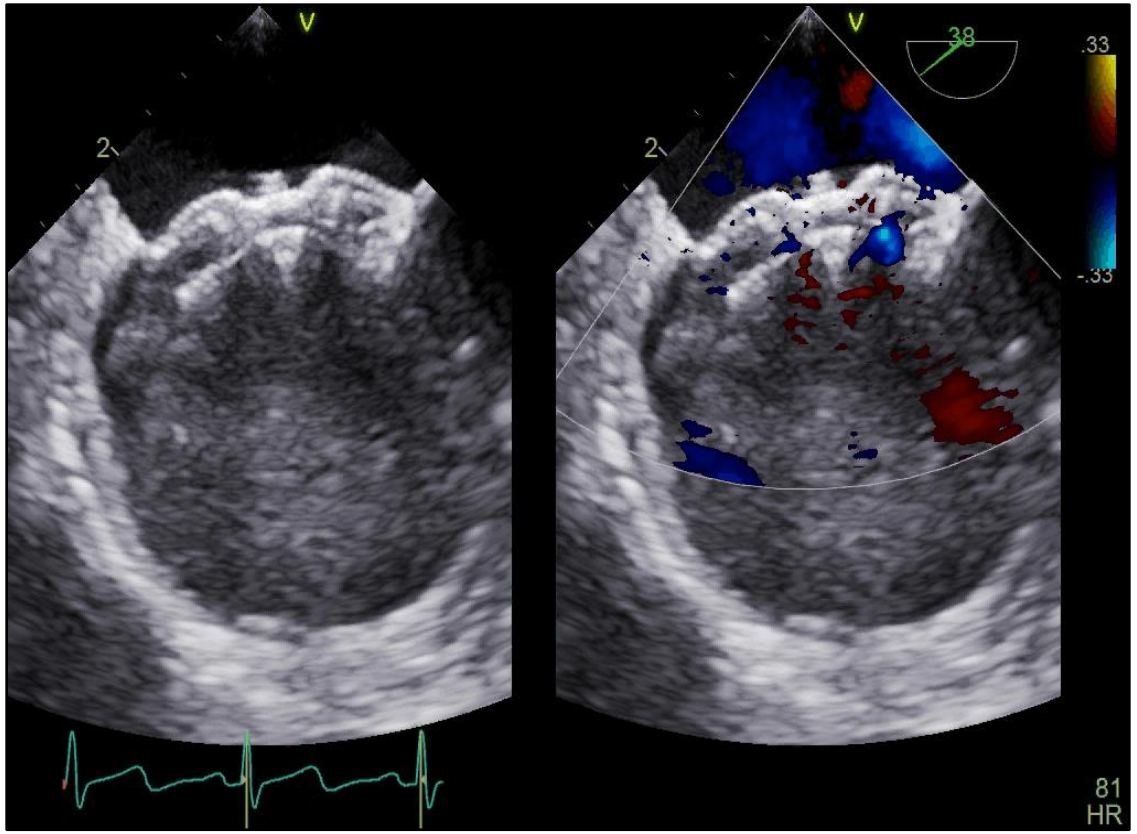


Treatment

Implantation - Fluoroscopy

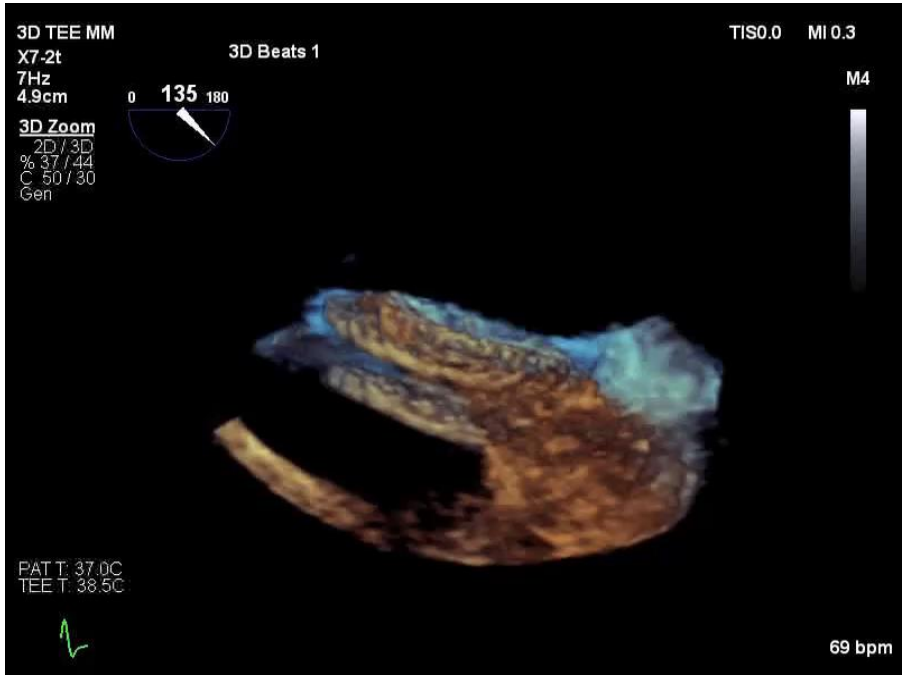


Implantation - TEE

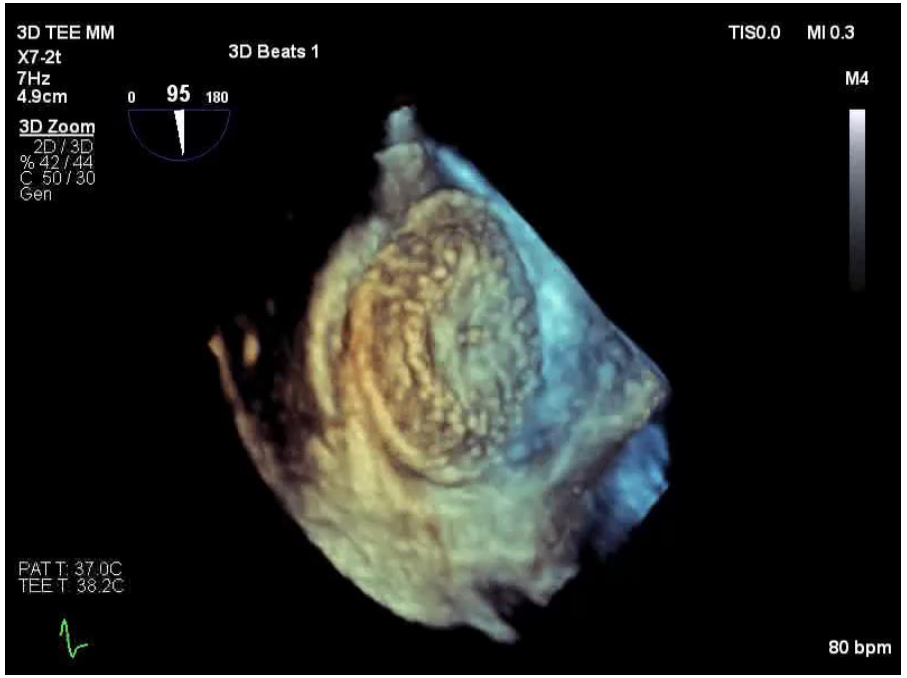


3D TEE

Implantation - TEE

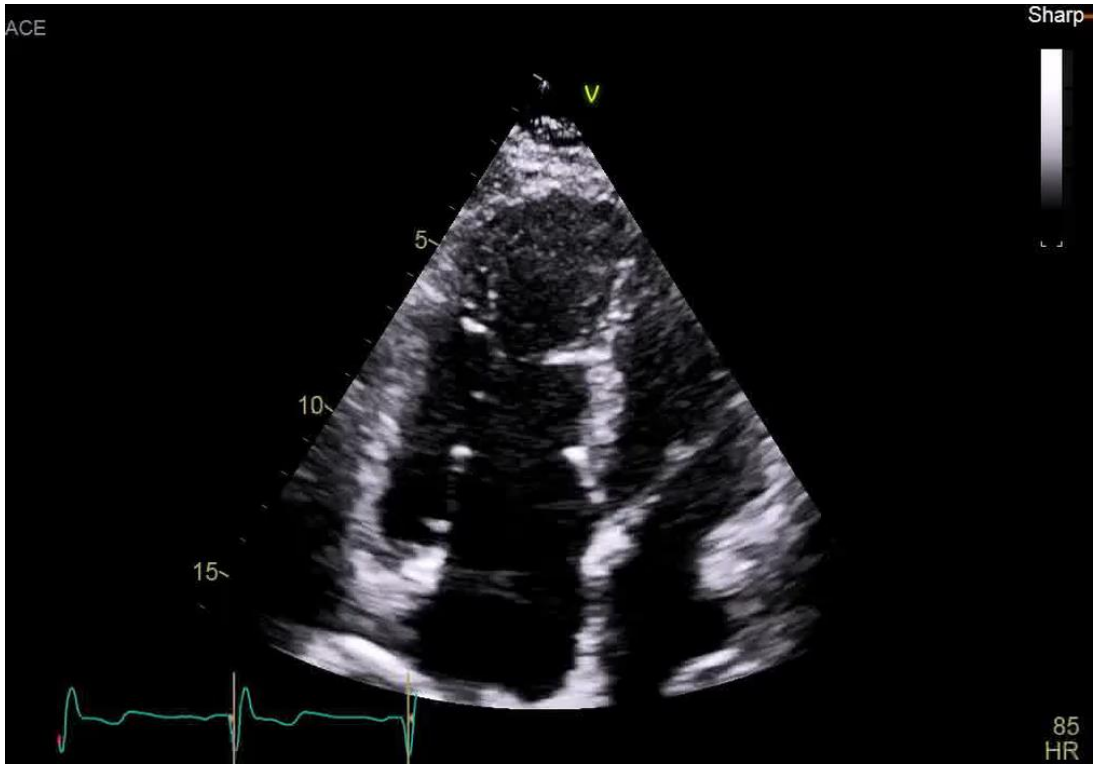


Implantation - TEE

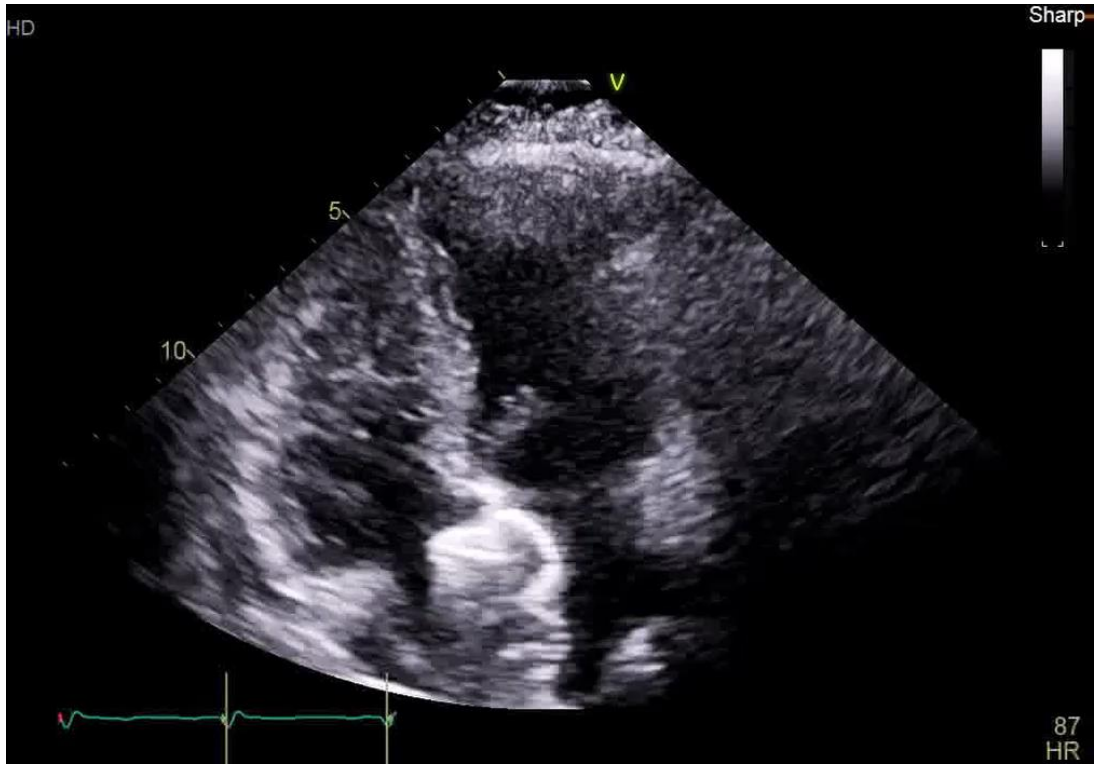


1 month post implantation

לפני סגירה



אחרי הסגירה



Iatrogenic ASD (iASD)

- Percutaneous procedures involving transseptal punctures are common and include pulmonary vein isolation, left atrial appendage closure, percutaneous balloon mitral valvuloplasty, and transcatheter MV repair.
- Their hemodynamic consequences are minimal and routine closure of the iASDs is not performed.

Iatrogenic ASD (iASD)

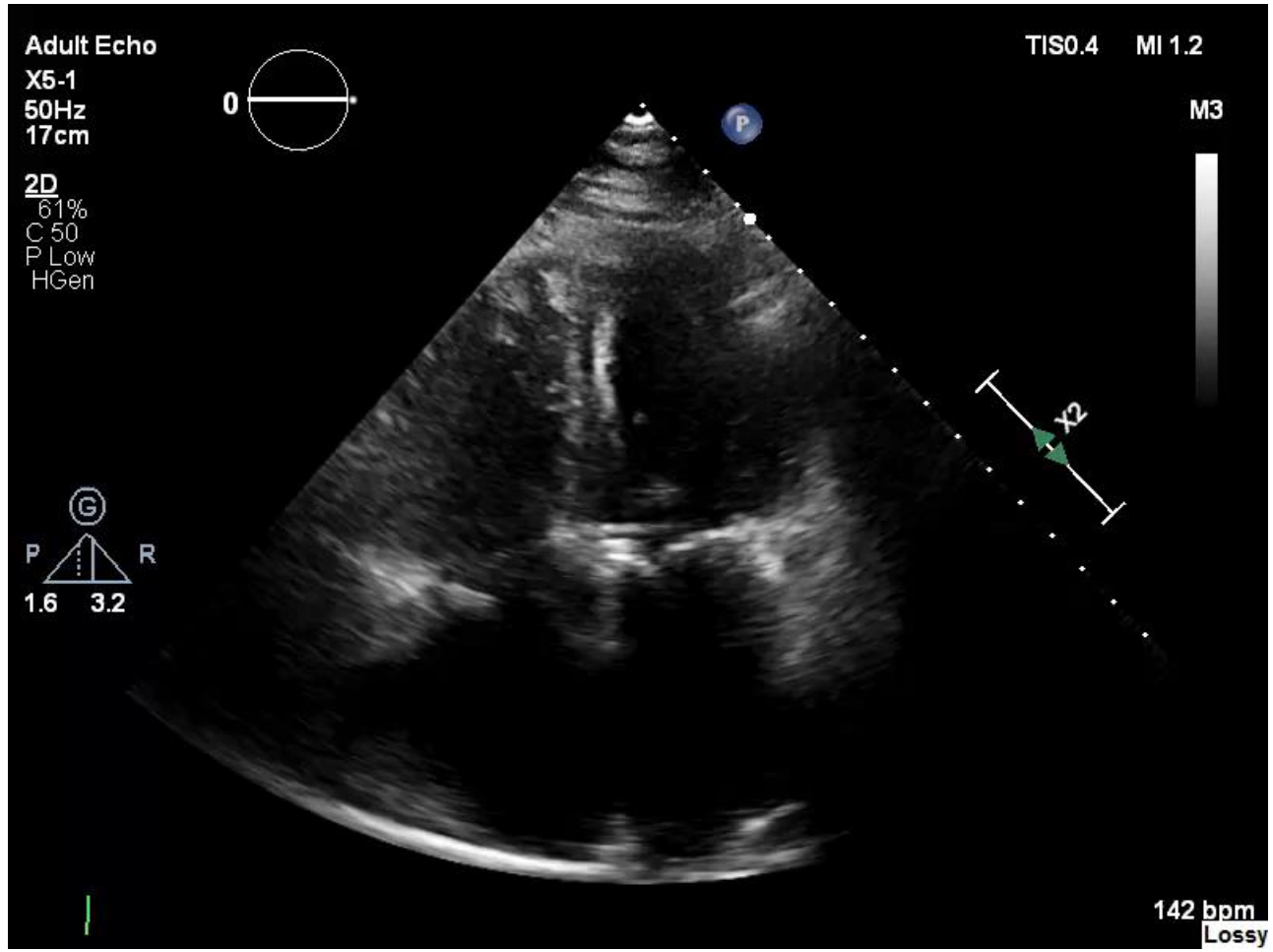
- Concerns lay in long-term shunting that may lead to right ventricular failure, pulmonary hypertension, and arrhythmias.
- The clinical relevance of persistent iASDs has been increasingly recognized yet definitive management and guidelines have yet to be established.

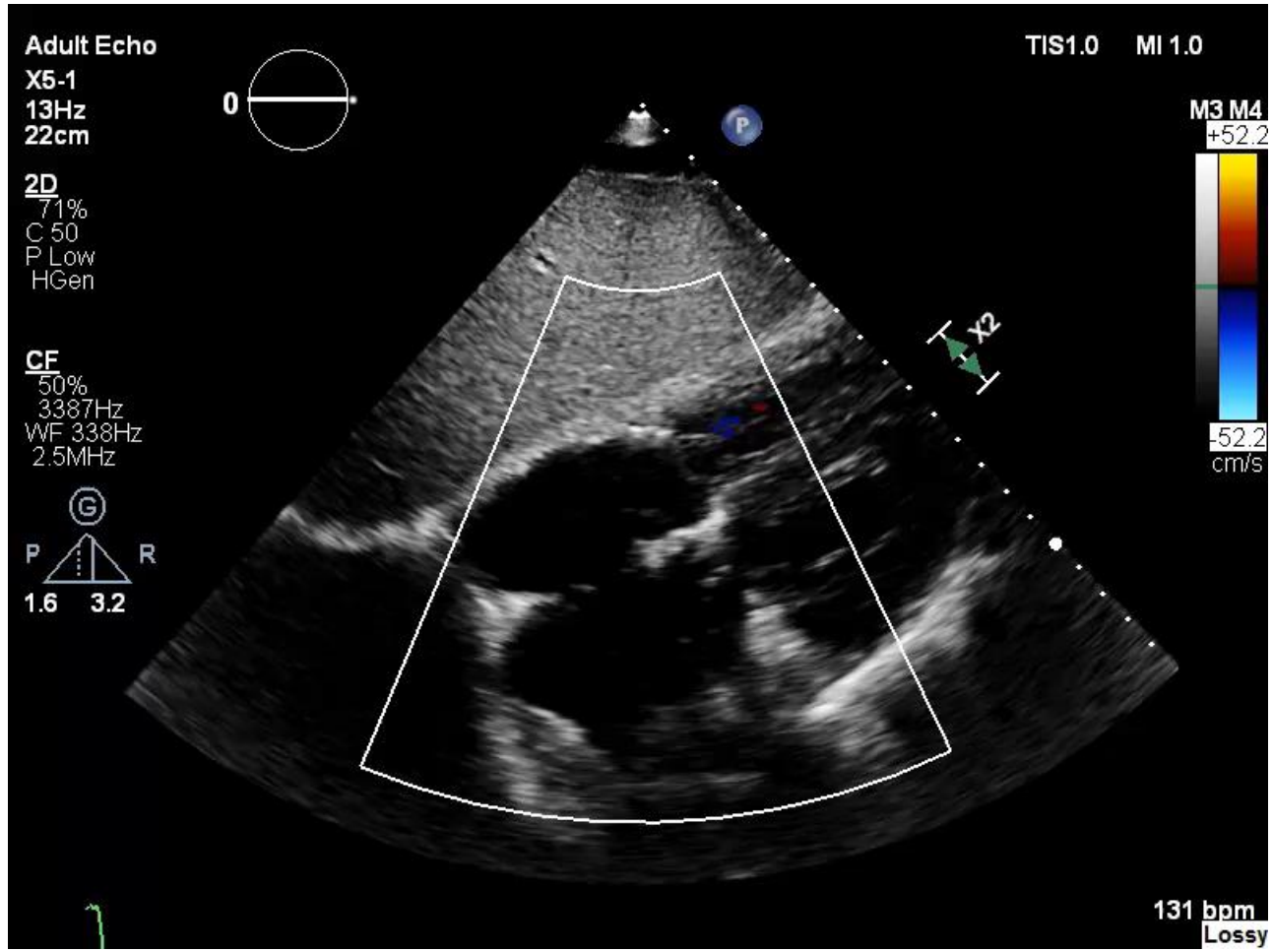
Case

- בת 79, סוכרתית והיפרטנסיבית.
- לפני 4 שנים נזקקה להסרה ניתוחית של פיברואלסטומה על העלה השמאלי של המסתם האאורטלי. סביב הניתוח היו אירועי פרפור עליות מהיר שטופלו באמיודורון לחודש ובנוגדי קרישה.
- במהלך השנים ארועים חוזרים של פרפור תסמיני מהיר, כאשר תרופות אנטי-אריתמיות שונות כולל פרופפנון, פלקניד, דרונדורון ואמיודורון לא נסבלו עקב חולשה.
- עקב דמם משמעותי מהמעי הגס עברה לפני שנה וחצי השתלת סוגר לאוזנית עליה שמאל.

Case

- אקו לב ו TEE חודש אחרי הפעולה מדגים תפקוד סיסטולי כולל של חדר שמאל תקין. חדר ימין בגודל ותפקוד תקינים. הודגם התקן באוזנית ללא עדות לטרומבוס על פניו וללא דליפות סביבו. הודגם ASD יאטרוגני מינימאלי עם דלף משמאל לימין.
- אקו לב ביקורת שנה אחרי מדגים חדר שמאל עם תפקוד שמור. חדר ימין תקין. ללא הפרעה מסתמית משמעותית. ללא עדות ליתר לחץ דם ריאתי. הודגם בחלק מהמנחים ASD יאטרוגני קטן.


Adult Echo
X5-1
50Hz
17cm
2D
61%
C 50
P Low
HGen
0
TIS0.4
MI 1.2
M3
X2
P
R
1.6
3.2
142 bpm
Lossy


Adult Echo
X5-1
13Hz
22cm
2D
71%
C 50
P Low
HGen
CF
50%
3387Hz
WF 338Hz
2.5MHz
P
R
1.6
3.2
0
TIS1.0
MI 1.0
M3 M4
+52.2
-52.2
cm/s
X2
131 bpm
Lossy

Case

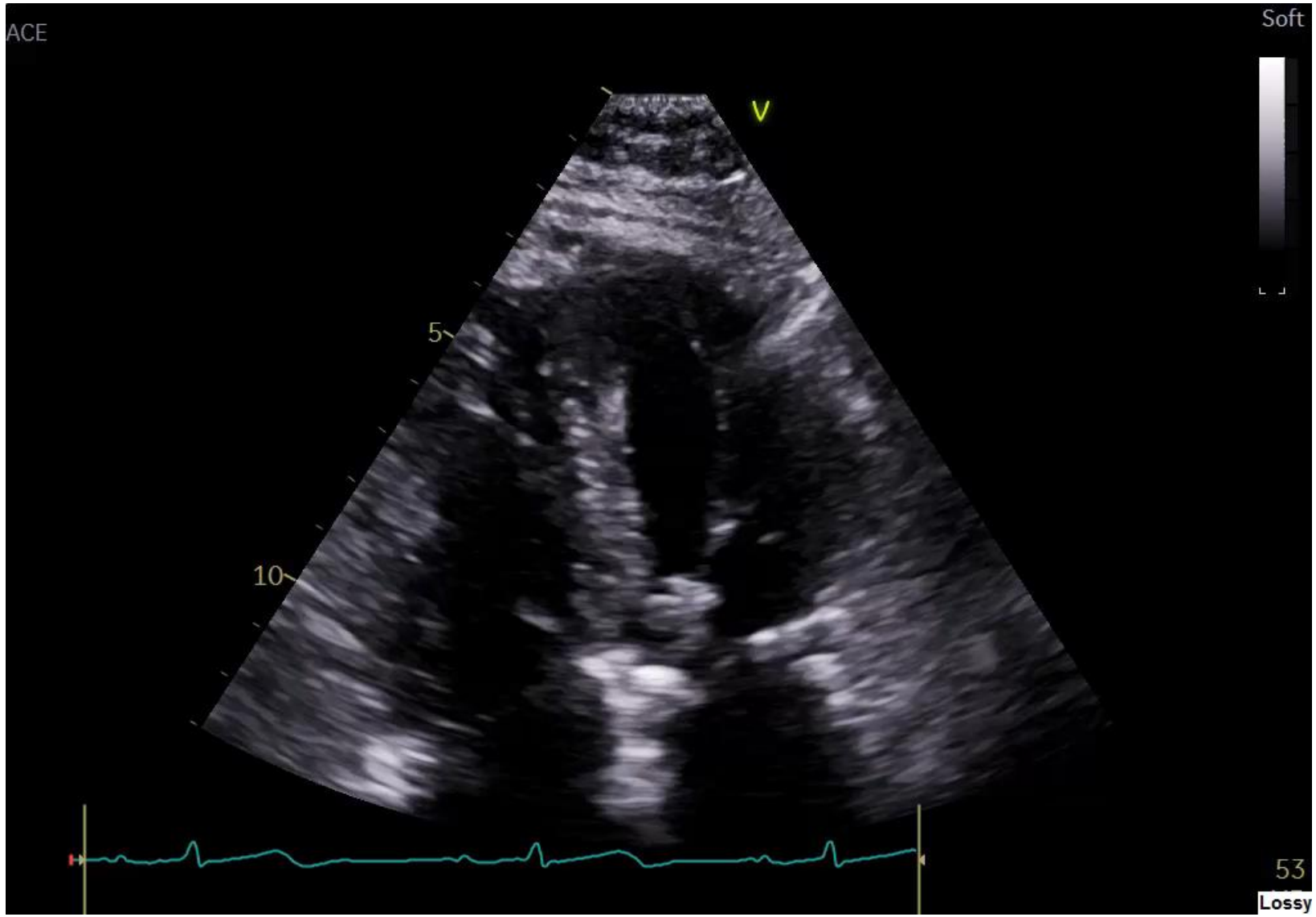
- אקו TTE שנה וחצי אחרי הפעולה מדגים חדר שמאל עם תפקוד שמור. הפרעה דיאסטולית דרגה 2. חדר ימין מורחב עם ירידה קלה בתפקודו. לחץ דם ריאתי מוגבר במידה בינוני (SPAP של 54 ממ"כ). הודגם דלף יאטרוגני בין העליות.
- המטופלת מפתחת קוצר נשימה במאמצים ותלונות על חולשה.

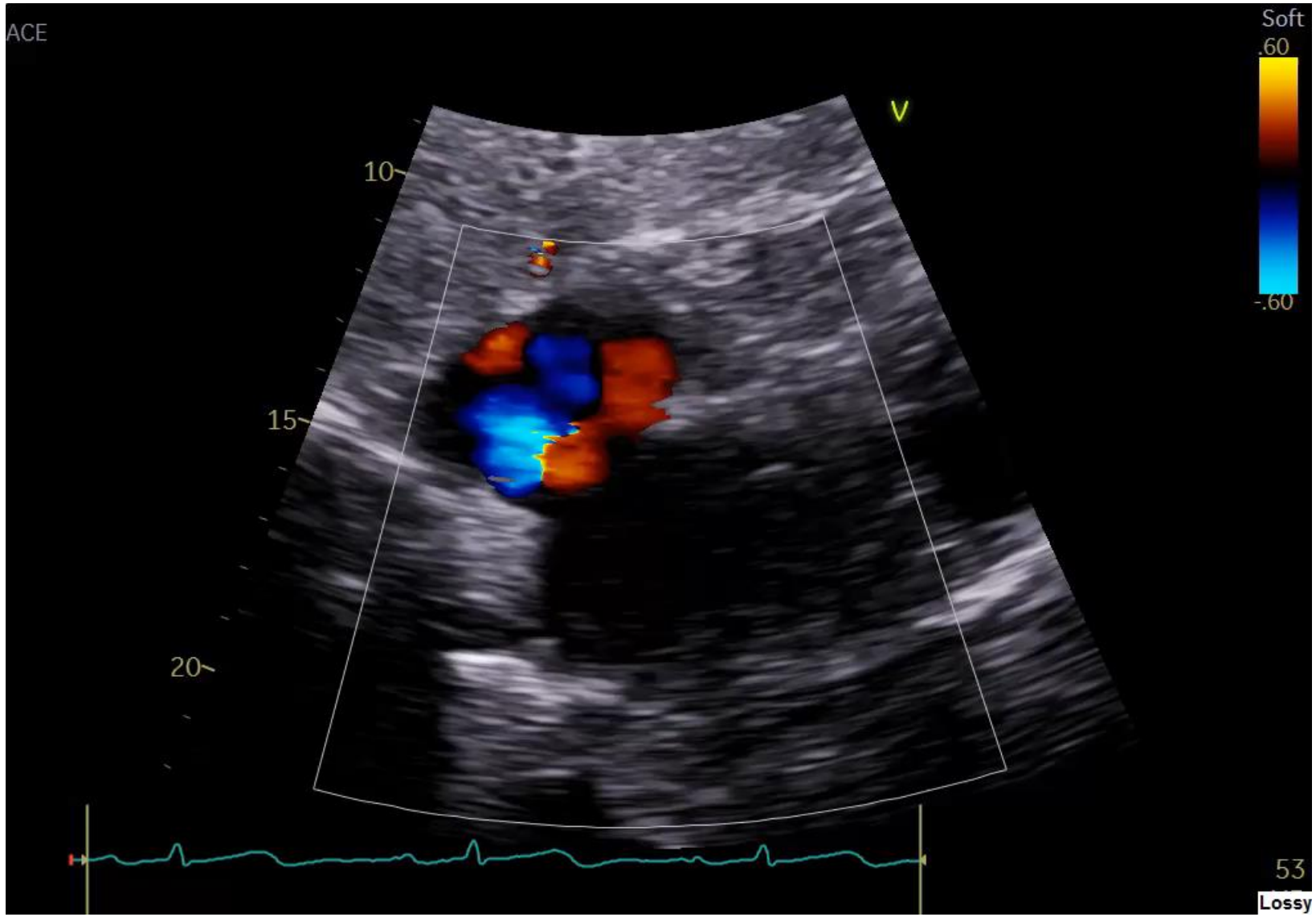
Case

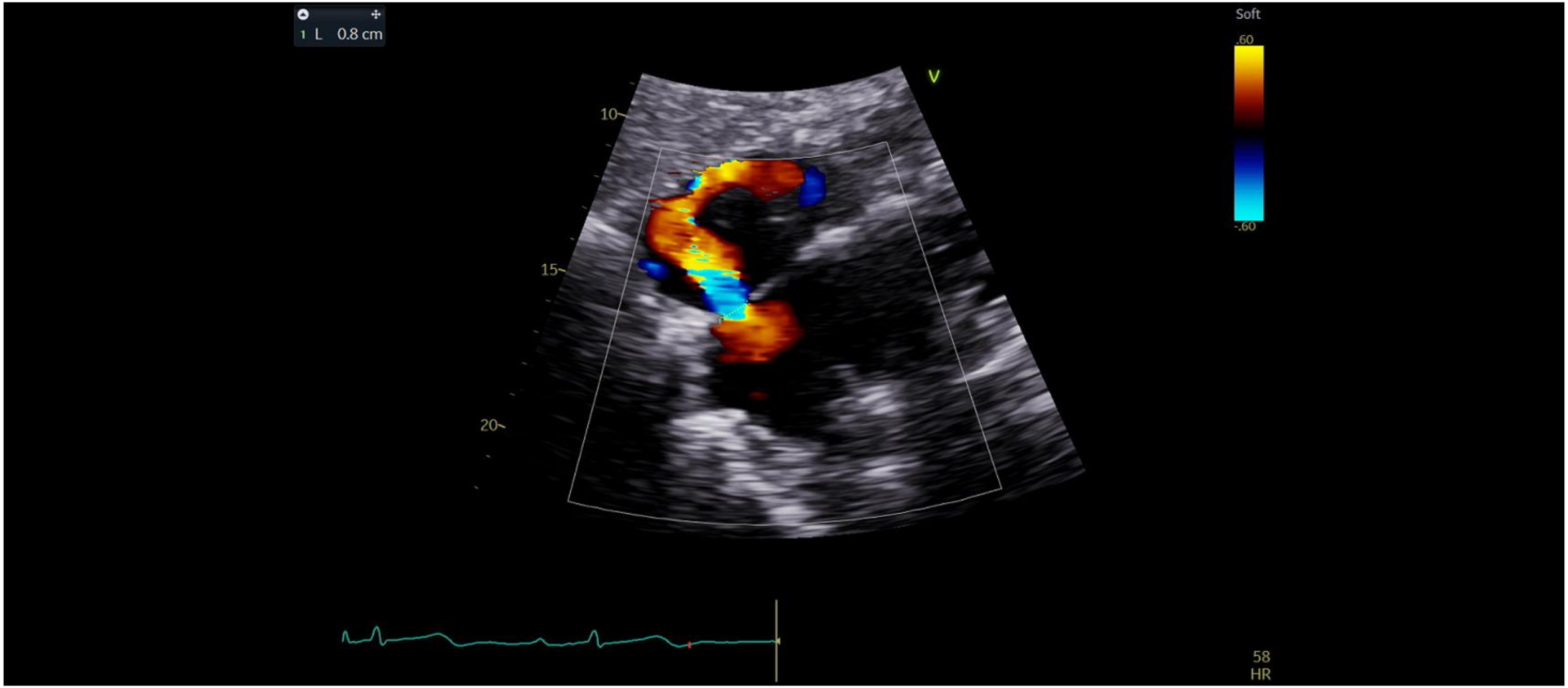
- עקב המשך אירועים סימפטומטים של פרפור עליות מהיר ואי סבילות לטיפול תרופתי עוברת בידוד של ורידי הריאה עם בלון קריו.
- פיתחה בהמשך רפרוף עליות לא טיפוסי. מיפוי של הרפרוף הראה כי האסטמוס הינו בין צלקות לקיר הקידמי ליד ה LAAO. בוצע קו צריבה מ MA עד ל RSPV בין הצלקות עם האטה משמעותית עד להפסקת הרפרוף וחזרה לסינוס. לאחר מגן בוצע בידוד של הקיר האחורי ו RPV.

Case

- אקו לב אחרי הפעולה מדגים חדר שמאל שמור. חדר ימין מורחב עם תפקוד תקין. יל"ד ריאתי מוגבר (SPAP של 49 ממ"כ). הודגם דלף יאטרוגני 8 מ"מ עם שנט משמאל לימין.


ACE
Soft
V
5
10
53
Lossy


ACE
Soft
.60
-.60
V
10
15
20
53
Lossy


1 L 0.8 cm
Soft
.60
-.60
V
10
15
20
58
HR

MRI

- חדר שמאל בגודל ותפקוד תקין (LVEF של 65%). עליה שמאל מורחבת (שטח 23 סמ"ר). חדר ימין מורחב (RVEDV של 175 מ"ל) עם תפקוד תקין (RVEF 56%). עליה ימין מורחבת (שטחה 33 סמ"ר). הודגם ASD עם חישוב QP/QS של 1.7.

Case

- המטופלת ממשיכה להיות סימפטומטית.
- האם יש אינדיקציה לסגור את ה ASD?

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DOI: 10.1002/ccd.29149

WILEY

INTERVENTIONAL ROUNDS

Iatrogenic atrial septal defect following the MitraClip procedure: A state-of-the-art review

Anis John Kadado MD | Ashequl Islam MD

Prevalence

- From the available data, it is apparent that the prevalence of iASDs decreases with time.
- At 30 days, up to 82% of patients were noted to have residual iASDs using TEE, decreasing to 50% at 6 months.
- At 12 months follow-up, all available studies used TTE imaging which showed residual iASD in 10–27% of patients.

Clinical consequences

- Multiple case reports describing the consequences of iASDs related to various percutaneous transseptal procedures are available, some of which include:
- Hypoxemia secondary to right-to-left shunting.
- Heart failure.
- Systemic embolization.

Immediate consequences of iASD

- Clinical deterioration due to acute hypoxemia secondary to large right-to-left shunting should be addressed by immediate closure of the iASD.

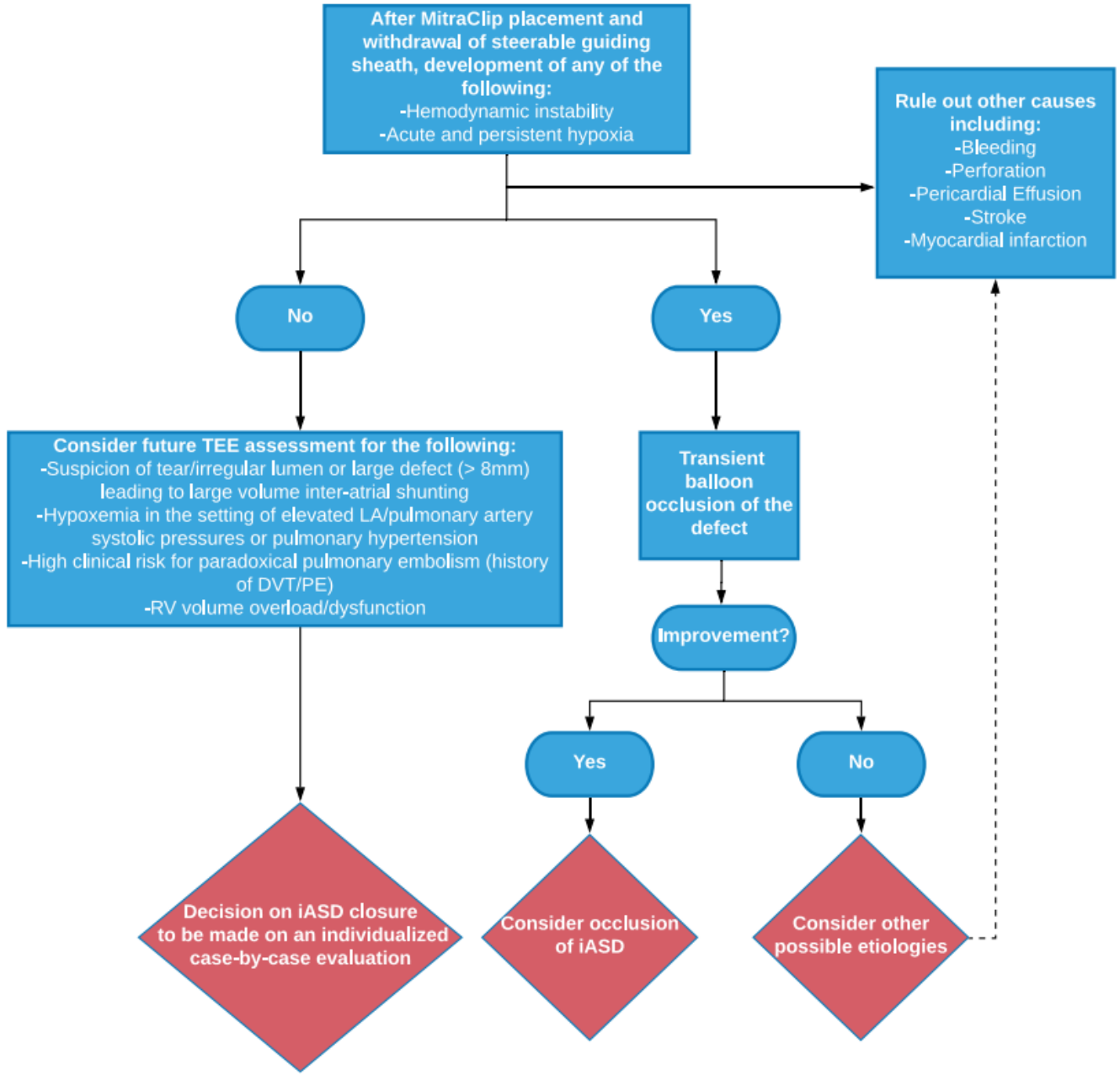


FIGURE 1 Algorithm for the management of iASDs post MitraClip placement based on clinical and hemodynamic status postprocedure. iASD, iatrogenic atrial septal defect

Long term iASDs

- Limited to retrospective analyses, long-term clinical outcomes related to persistent iASDs remain unclear.
- Factors associated with persistent iASDs following procedures:
- 22 Fr size catheter use
- Longer duration of procedure
- Extensive movement of sheaths
- High LA pressure
- Left ventricular hypertrophy

Management of long term iASDs

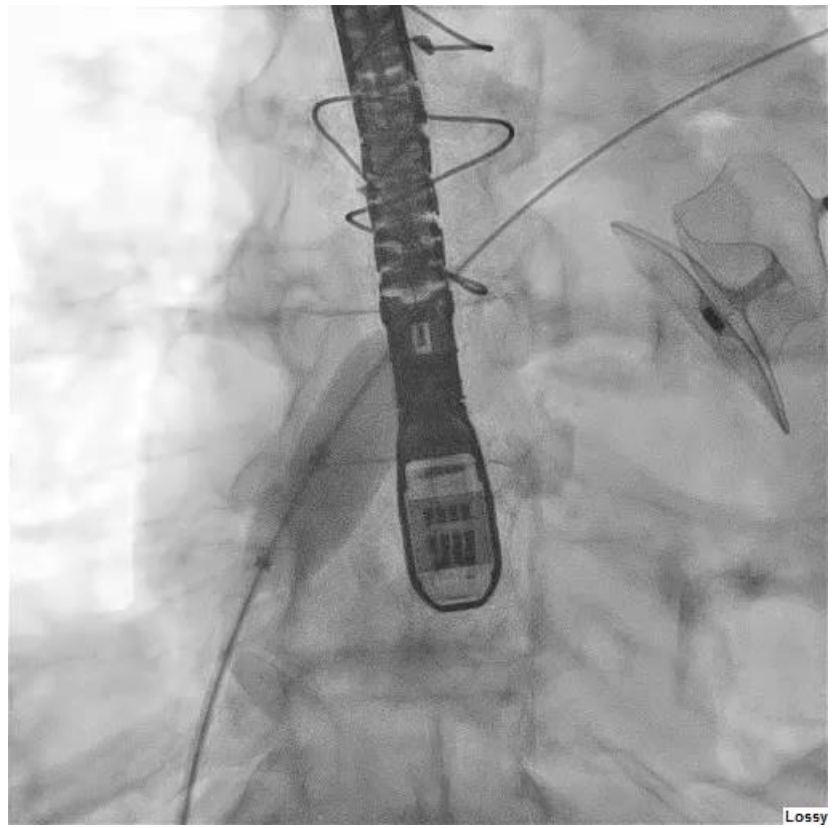
- TEE may be considered for assessment of iASDs in selected patient populations:
- Patients at high risk for paradoxical embolism.
- Patients who develop symptoms of RV dysfunction due to possible large iASD leading to high atrial shunt volume.
- New-onset heart failure symptoms.

Management of long term iASDs

- As per the published data, it appears that defects with a diameter of 7–8 mm are more or less likely to close spontaneously.
- Right ventricular dysfunction appears to be an indication for ultimate closure of iASDs, especially if secondary to significant left-to-right shunting.

Case

- הוחלט על סגירה מילעורית של ה ASD.
- בוצעה סגירה של ה ASD עם התקן בגודל של 20 מ"מ במהלך תקין.
- לאחר הסגירה שיפור בגודל חדר ימין ובסימפטומים.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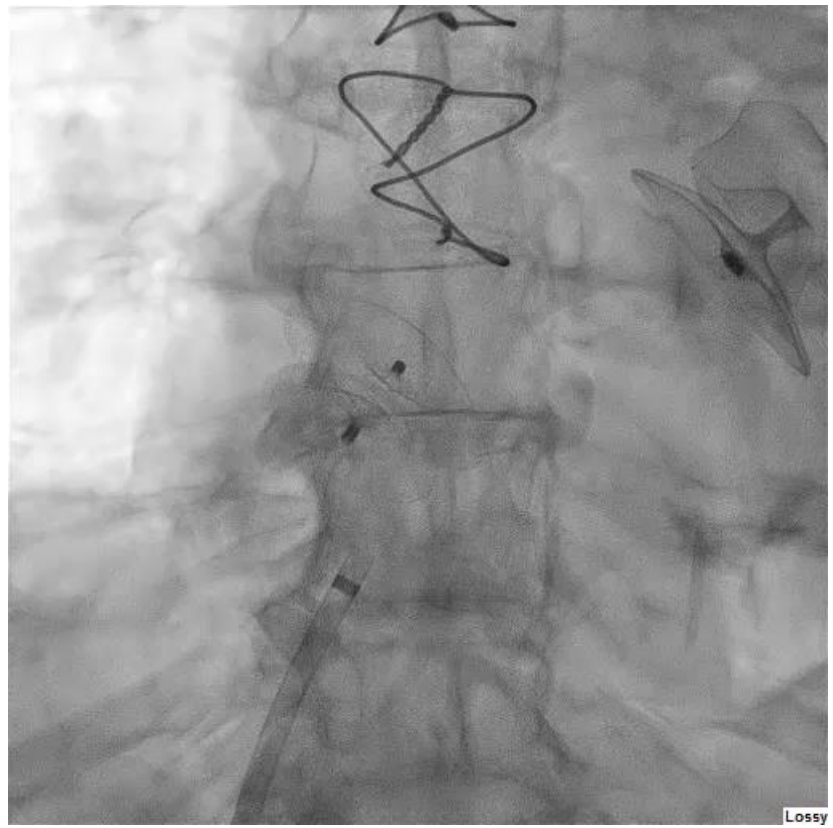
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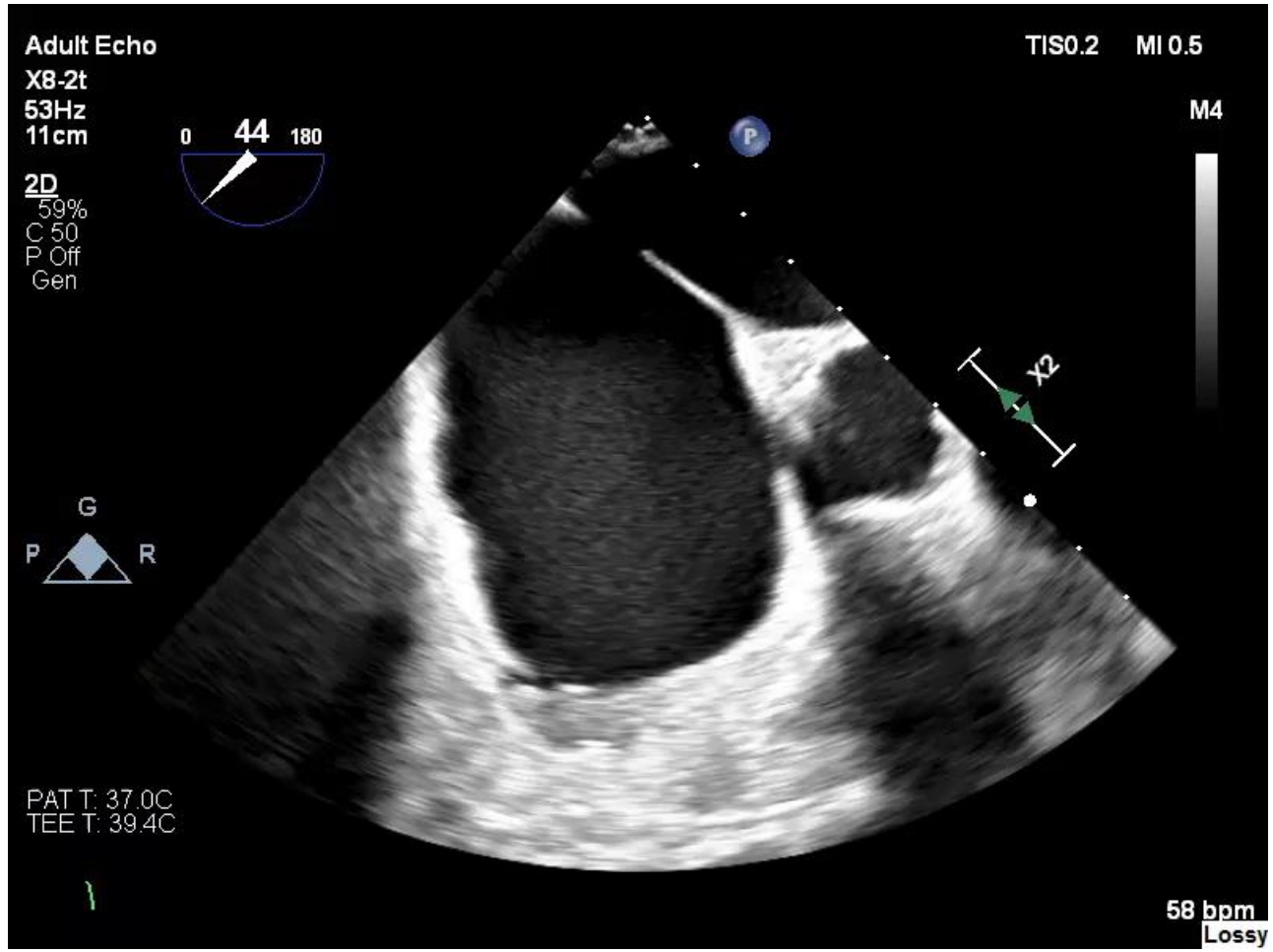
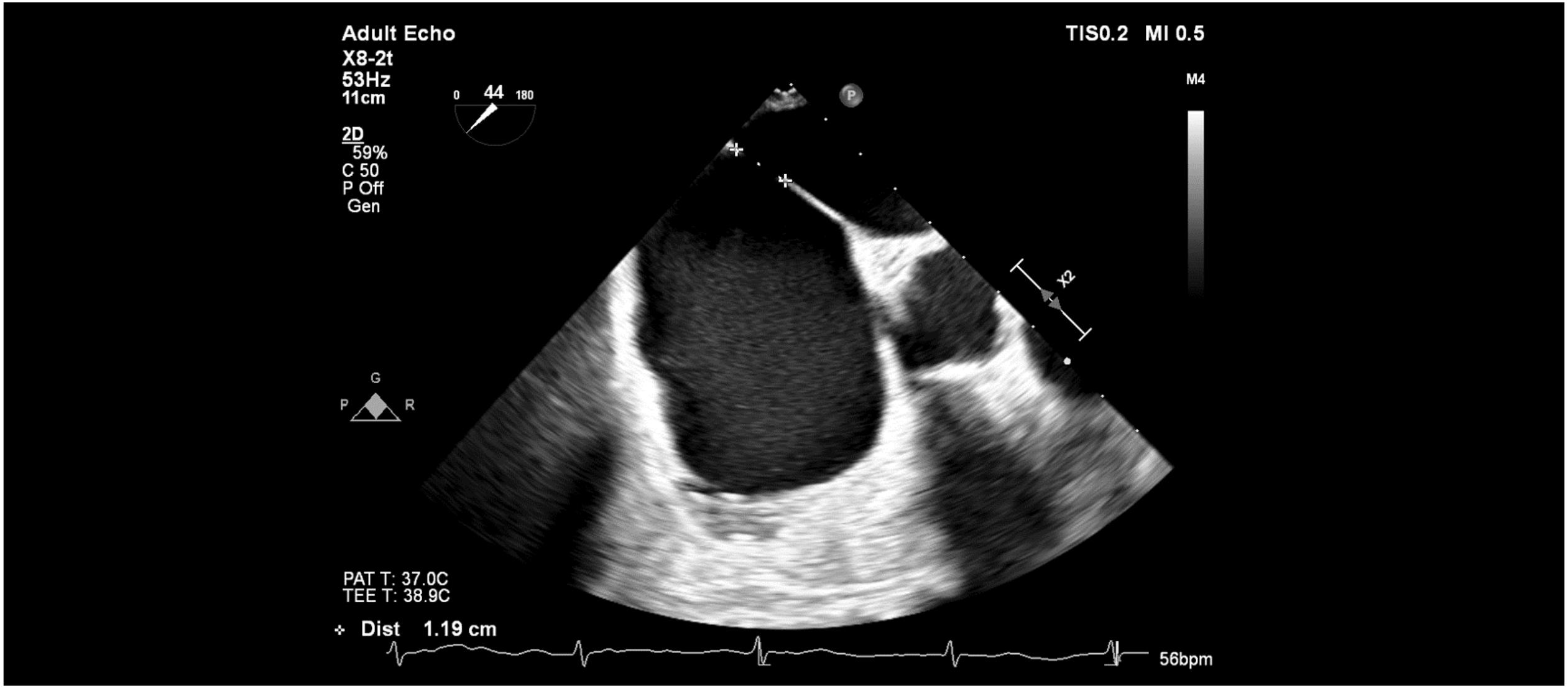
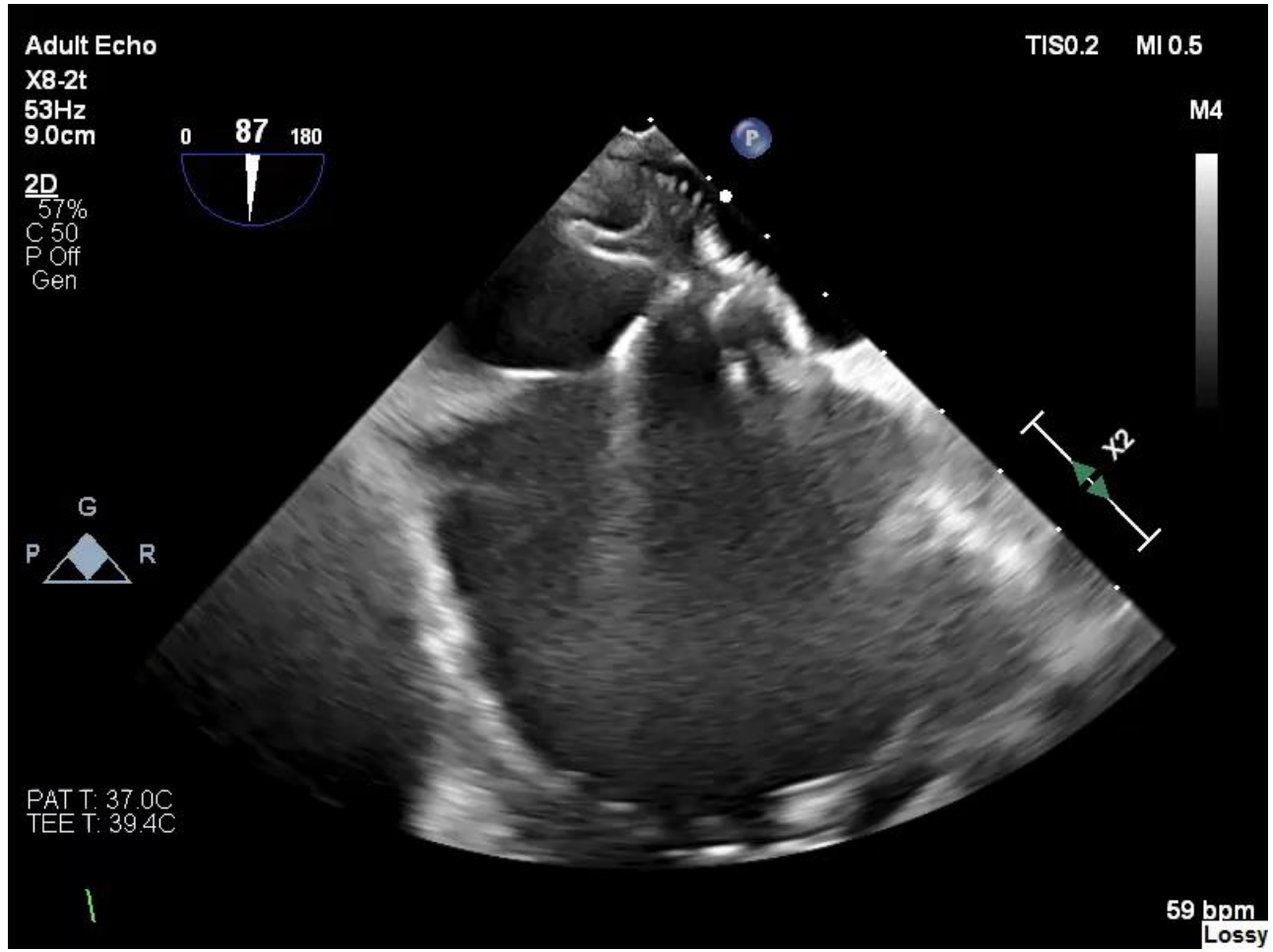
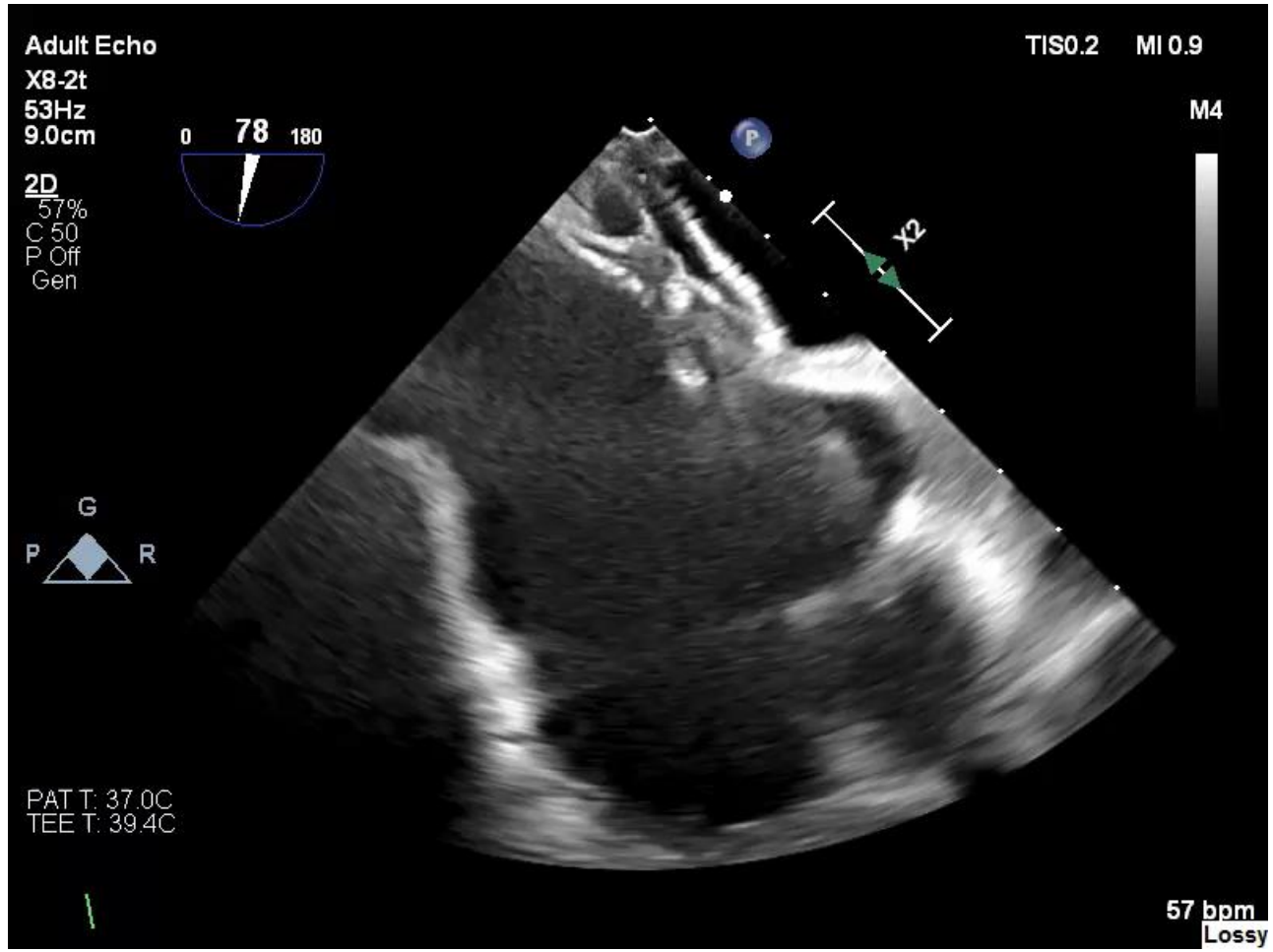
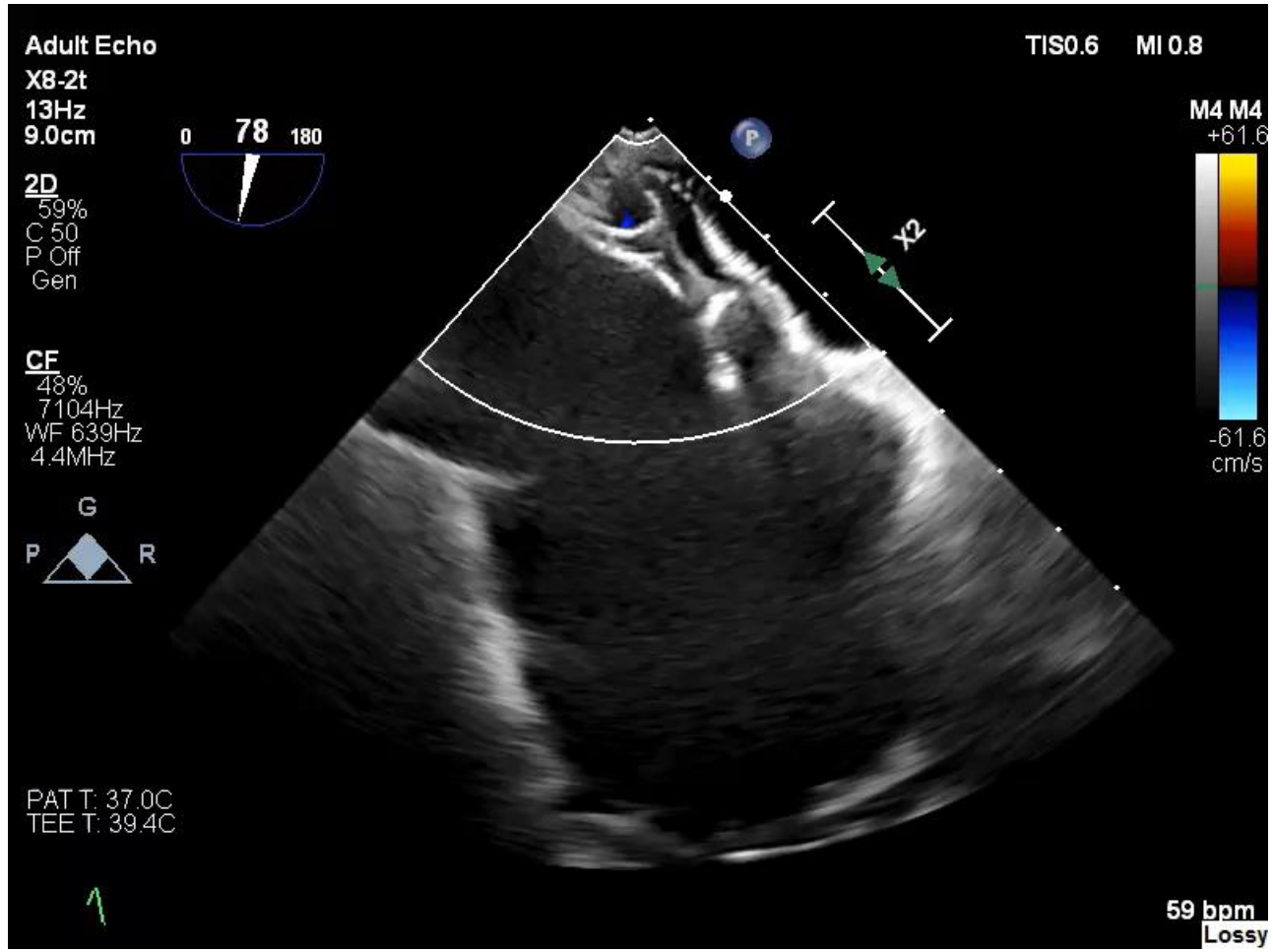

Adult Echo
X8-2t
53Hz
11cm
2D
59%
C 50
P Off
Gen
0
44
180
TIS0.2
MI 0.5
M4
X2
G
P
R
PAT T: 37.0C
TEE T: 39.4C
58 bpm
Lossy


Adult Echo
X8-2t
53Hz
11cm
2D
59%
C 50
P Off
Gen
0
44
180
TIS0.2 MI 0.5
M4
P
x2
G
P
R
PAT T: 37.0C
TEE T: 38.9C
Dist 1.19 cm
56bpm


Adult Echo
X8-2t
53Hz
9.0cm
0
87
180
2D
57%
C 50
P Off
Gen
TIS0.2
MI 0.5
M4
X2
G
P
R
PAT T: 37.0C
TEE T: 39.4C
59 bpm
Lossy


Adult Echo
X8-2t
53Hz
9.0cm
0
78
180
2D
57%
C 50
P Off
Gen
TIS0.2
MI 0.9
M4
X2
G
P
R
PAT T: 37.0C
TEE T: 39.4C
57 bpm
Lossy


Adult Echo
X8-2t
13Hz
9.0cm
0
78
180
2D
59%
C 50
P Off
Gen
CF
48%
7104Hz
WF 639Hz
4.4MHz
G
P
R
TIS0.6
MI 0.8
M4 M4
+61.6
-61.6
cm/s
X2
PAT T: 37.0C
TEE T: 39.4C
59 bpm
Lossy


THANK YOU