

How to Prevent and Manage Procedural Complications During TEER?

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Potential conflicts of interest

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I have the following potential conflicts of interest to declare:

Clinical Proctor : Boston Scientific, Abbott Medical

Honoraria or consultation fees : Boston Scientific, Abbott Medical

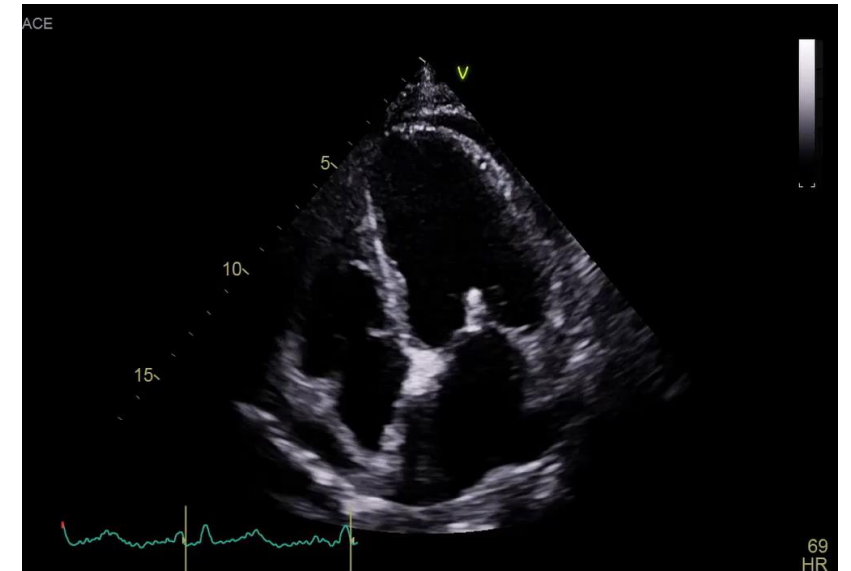
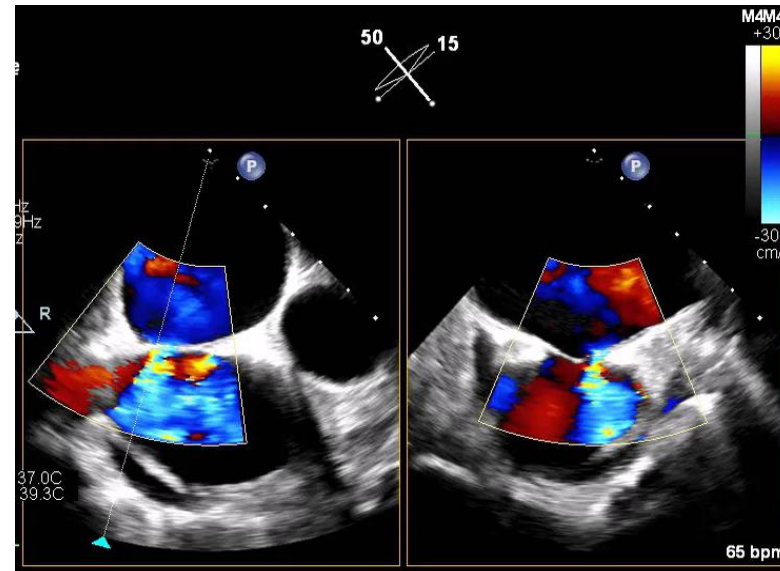
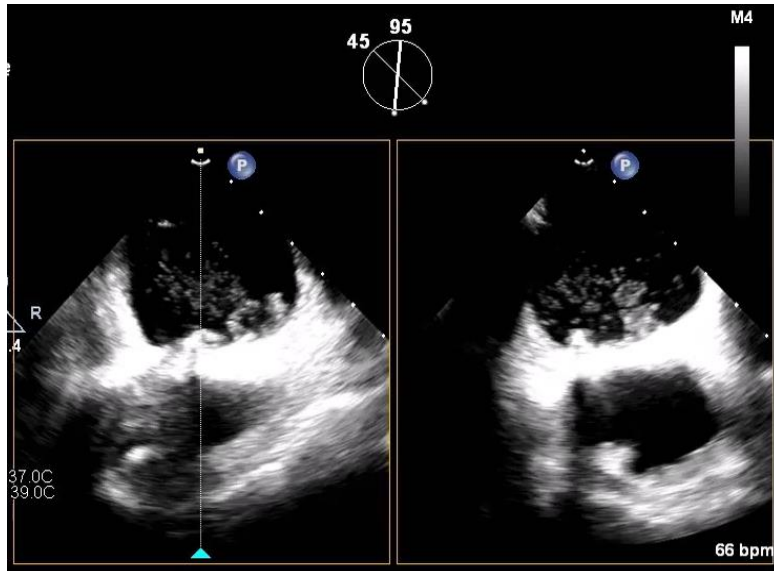
Complications during TEER

- Transseptal Puncture
 - Cardiac tamponade
- SGC Insertion
 - Iliac vein injury
 - Thrombus and air embolization
 - Pulmonary vein injury
- Leaflet grasping
 - Single leaflet device attachment
 - Leaflet tear
- SGC Removal
 - Right-left shunt
 - Acute right ventricular failure

Transseptal Puncture ⇒ Cardiac Tamponade

- Don't move the needle if image can not be obtained
- Don't puncture the atrial wall
- Should puncture within fossa ovalis

We can do MitraClip if the height from tenting to annulus is more than 30mm !

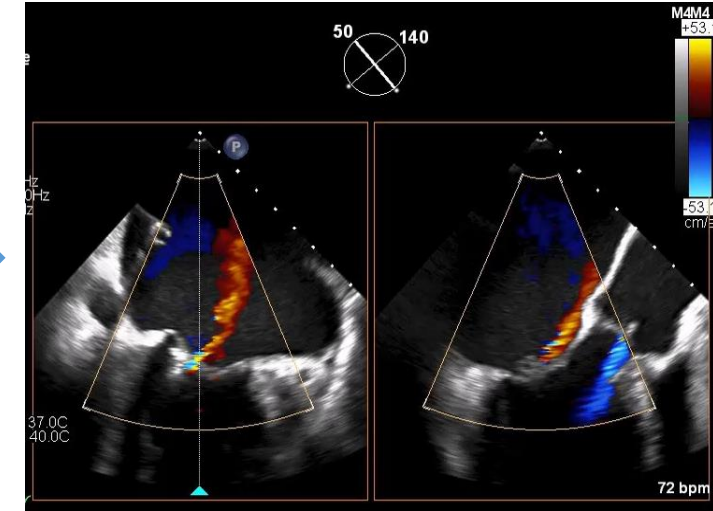
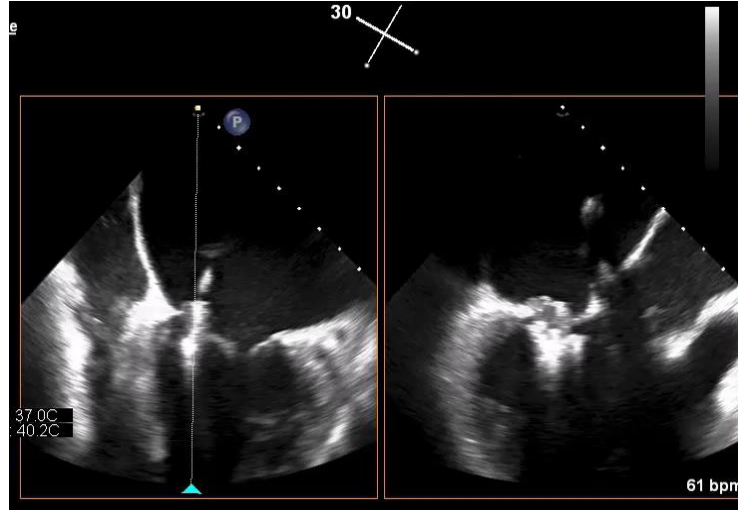
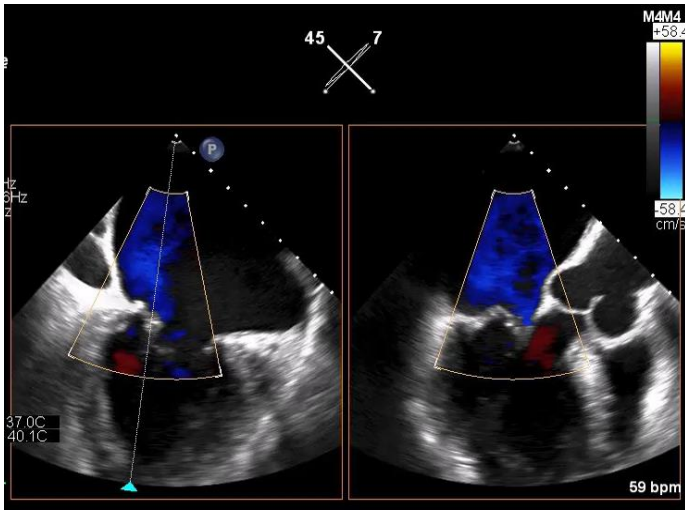


Puncture most posterior part of atrial septum
After SGC removal pericardial effusion appeared

Don't puncture outside of fossa !

Leaflet Grasping

- Single leaflet device attachment



NTW implantation for P3 flail.
Leaflet insertion is not reliable
at the timing of gripper down.
But MR reduced.

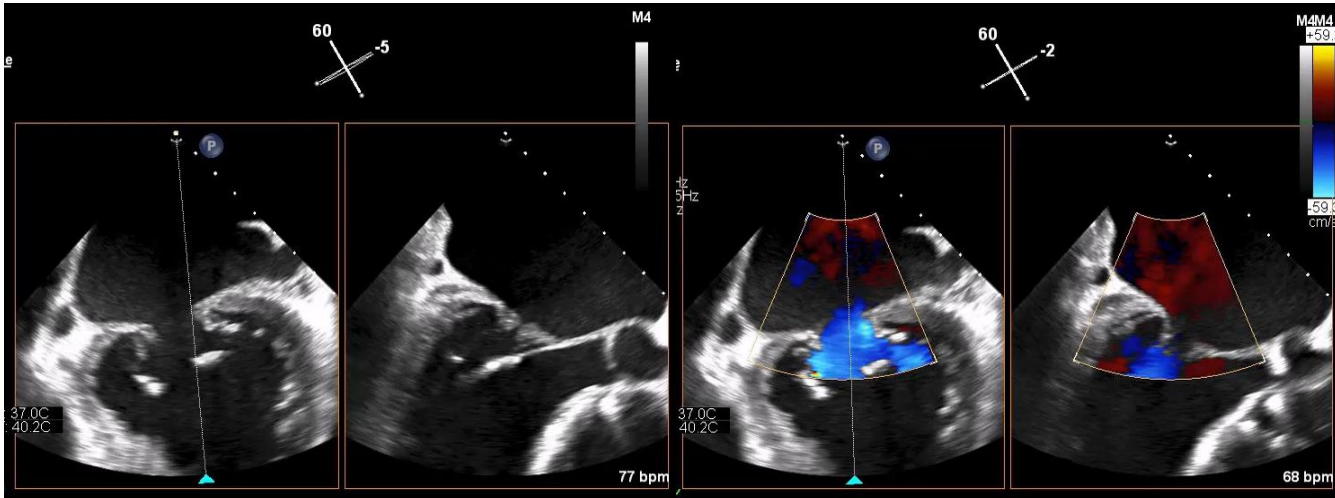
Insufficient leaflet visibility



Next day, posterior leaflet
slipped off from the clip.

Leaflet Grasping

- Leaflet tear

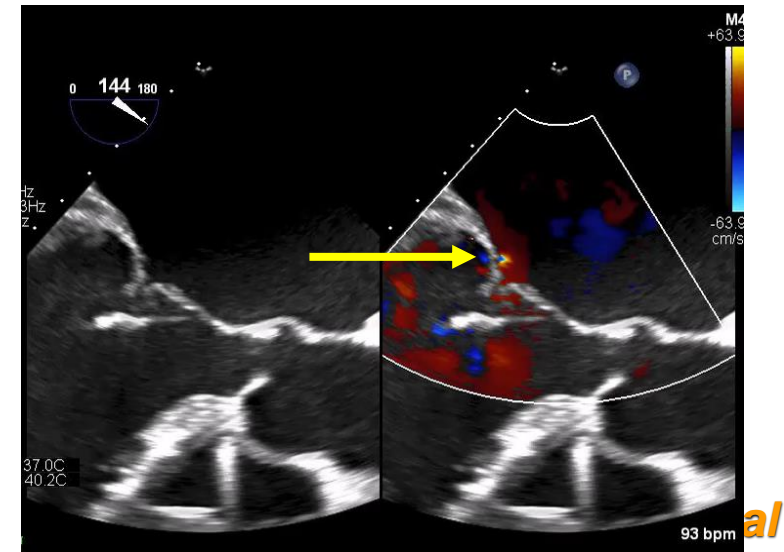
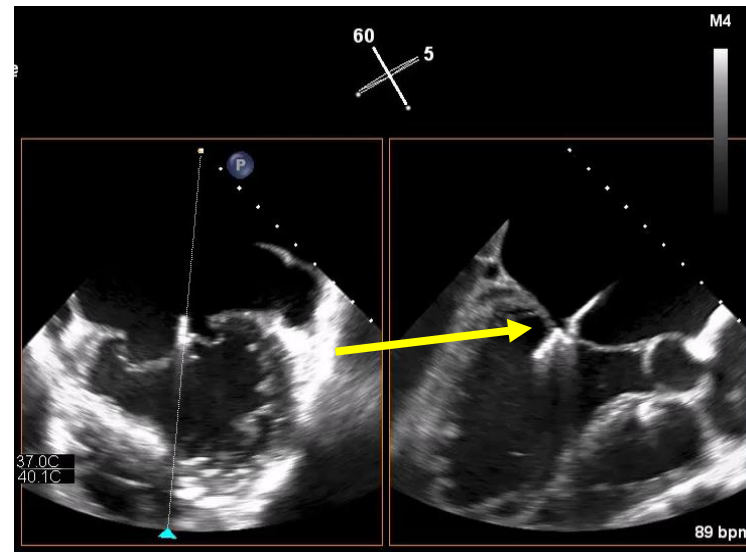
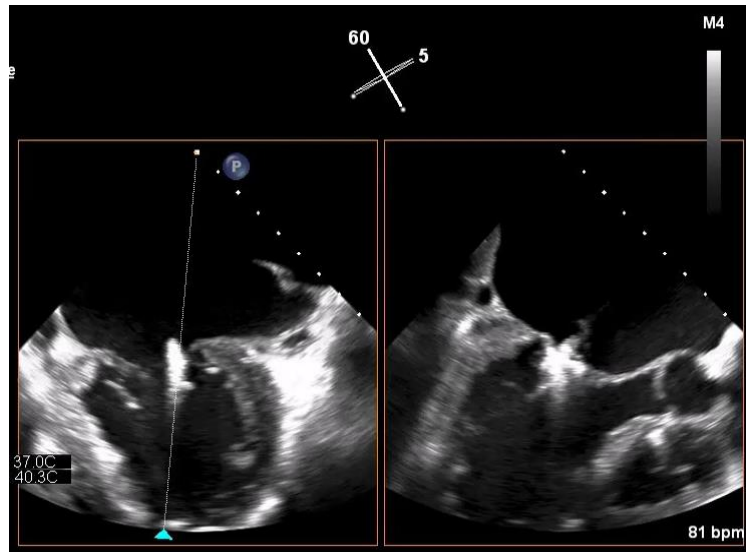


After closing the clip, posterior leaflet was not restricted.

MR jet coming from mid portion of posterior leaflet indicates leaflet perforation.

Huge tension to leaflet

MitraClip for ventricular FMR with PML tethering



Prevention of SLDA and Leaflet Tear

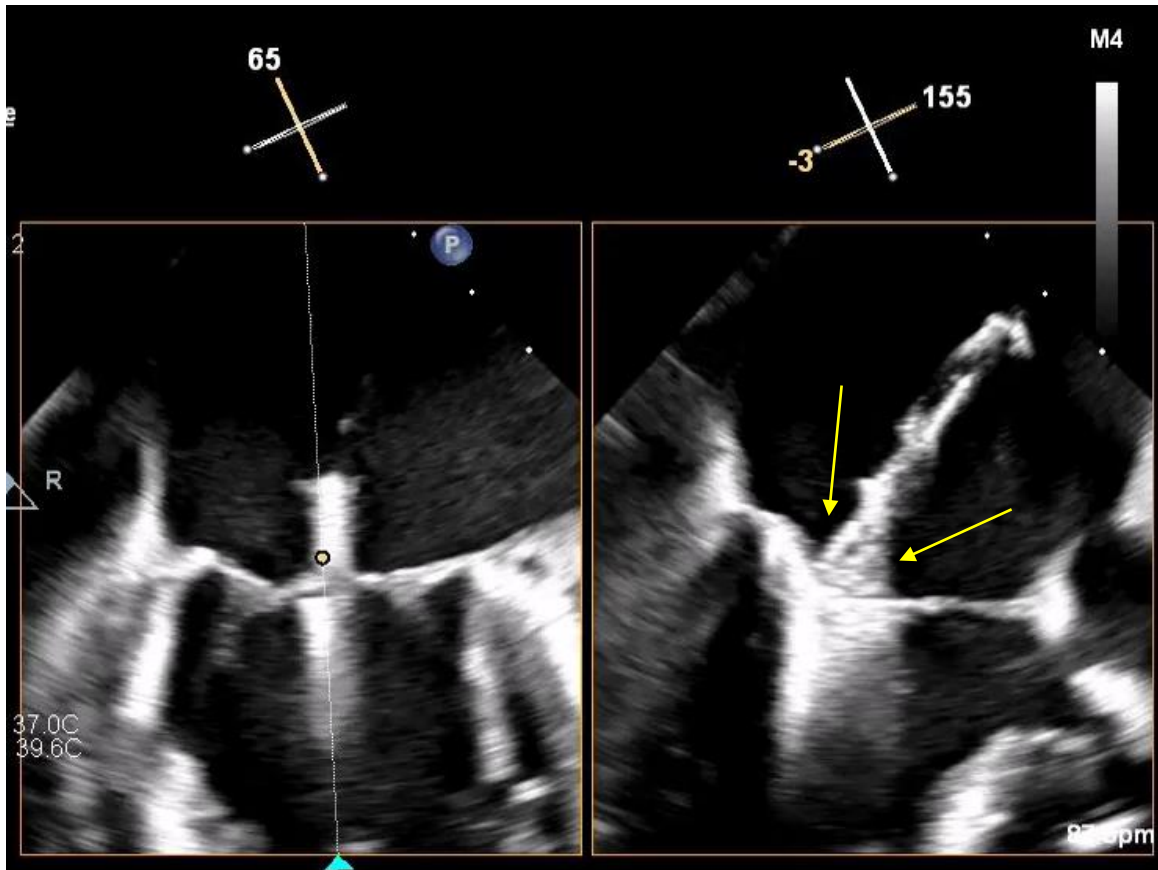
- Secure gripper down
- CGA use for leaflet insertion confirmation

**Improve
leaflet visibility**

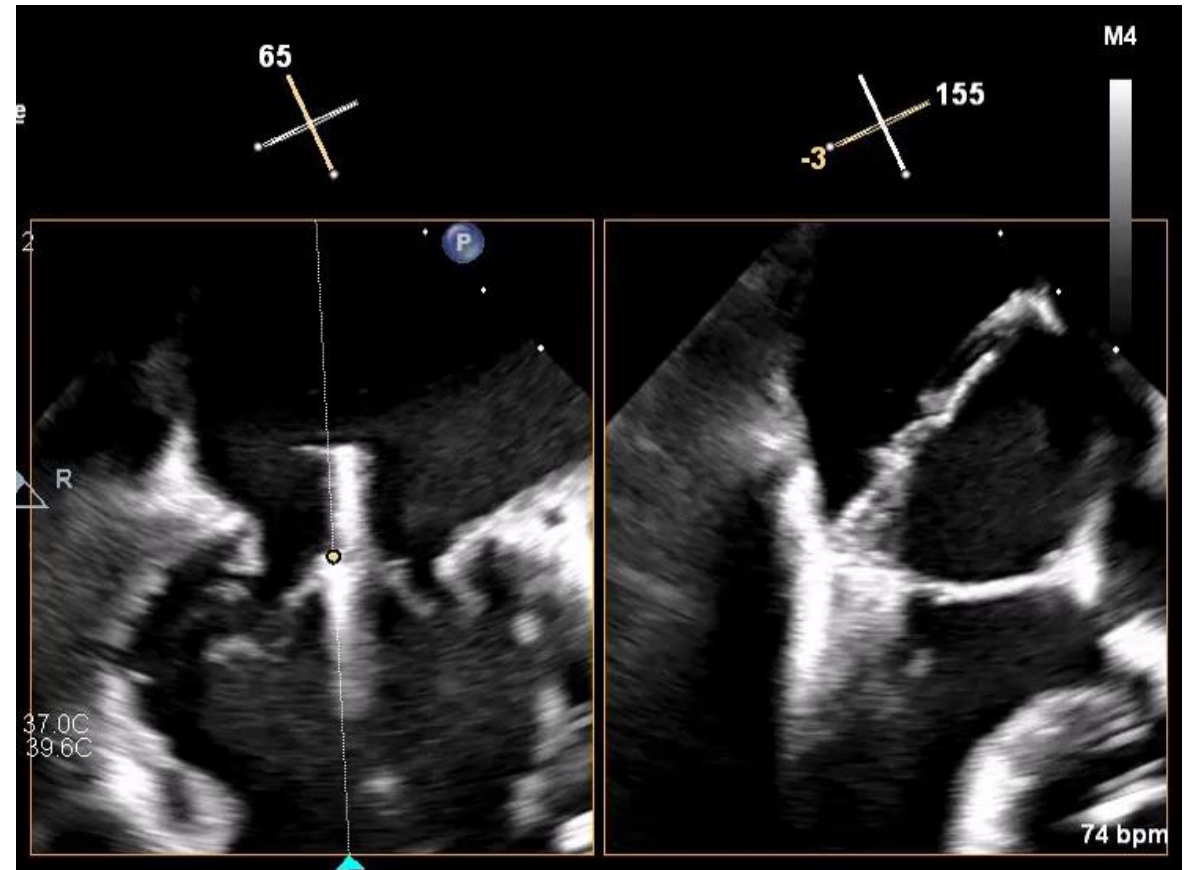
- Grasp only 1 time
- Slowly closing the clip

Reduce tension to the leaflet

Gripper Down



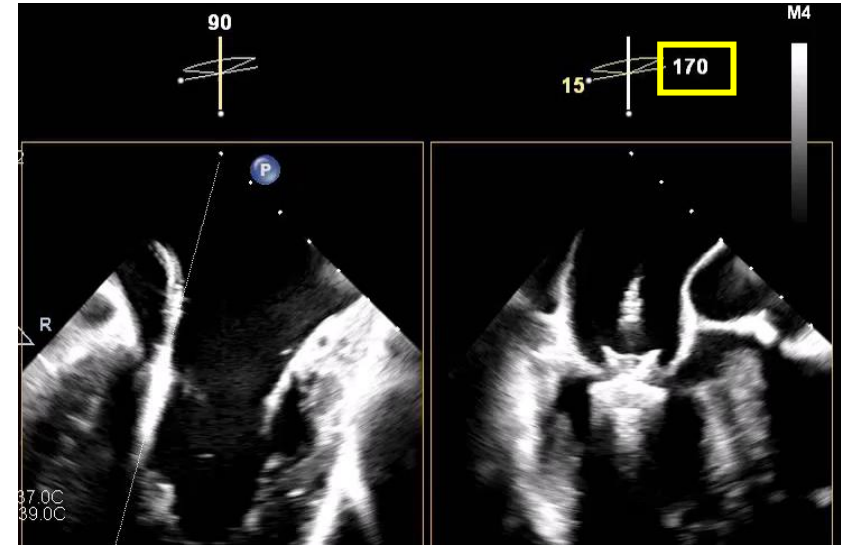
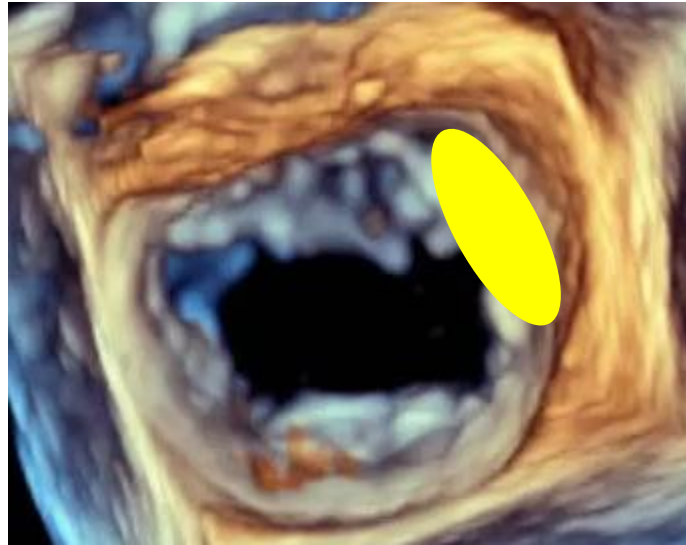
We should stop hand before gripper down to confirm how much leaflet in the clip arm.



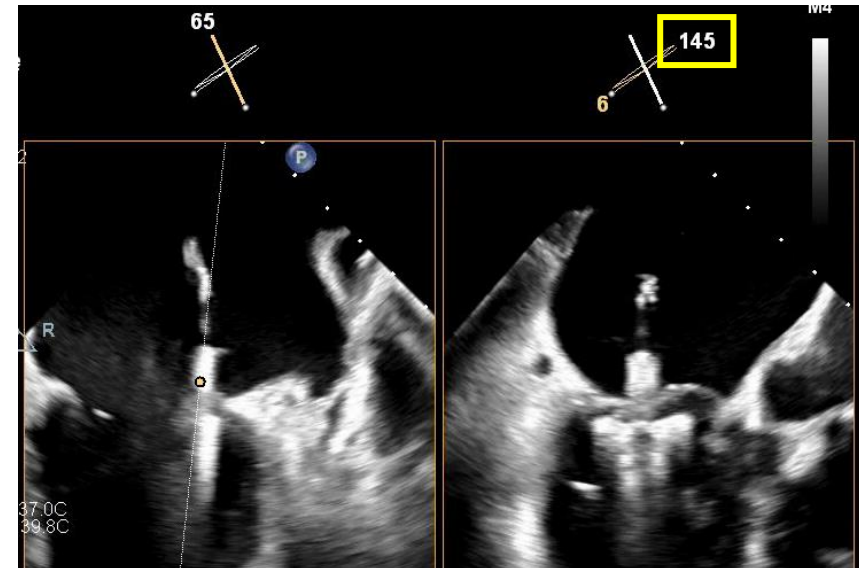
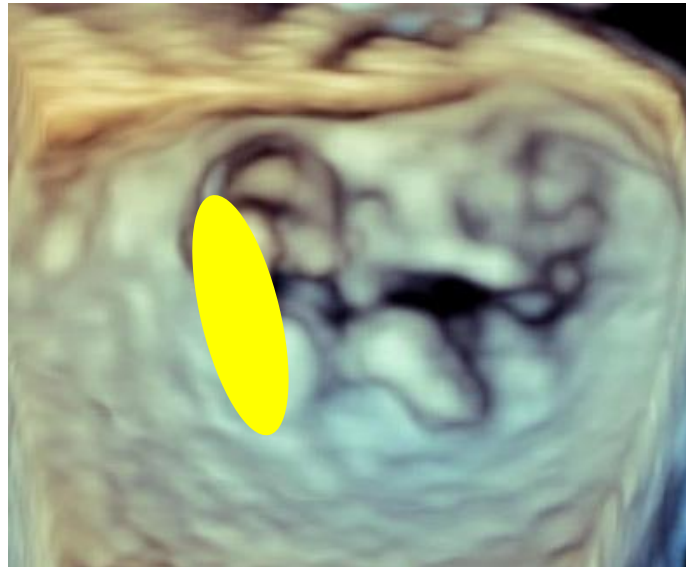
Slowly put the gripper down keeping both leaflet on the clip arm
If possible, we should grasp without CGA.

Grasping in Non-Central MR

A3/P3 Prolapse

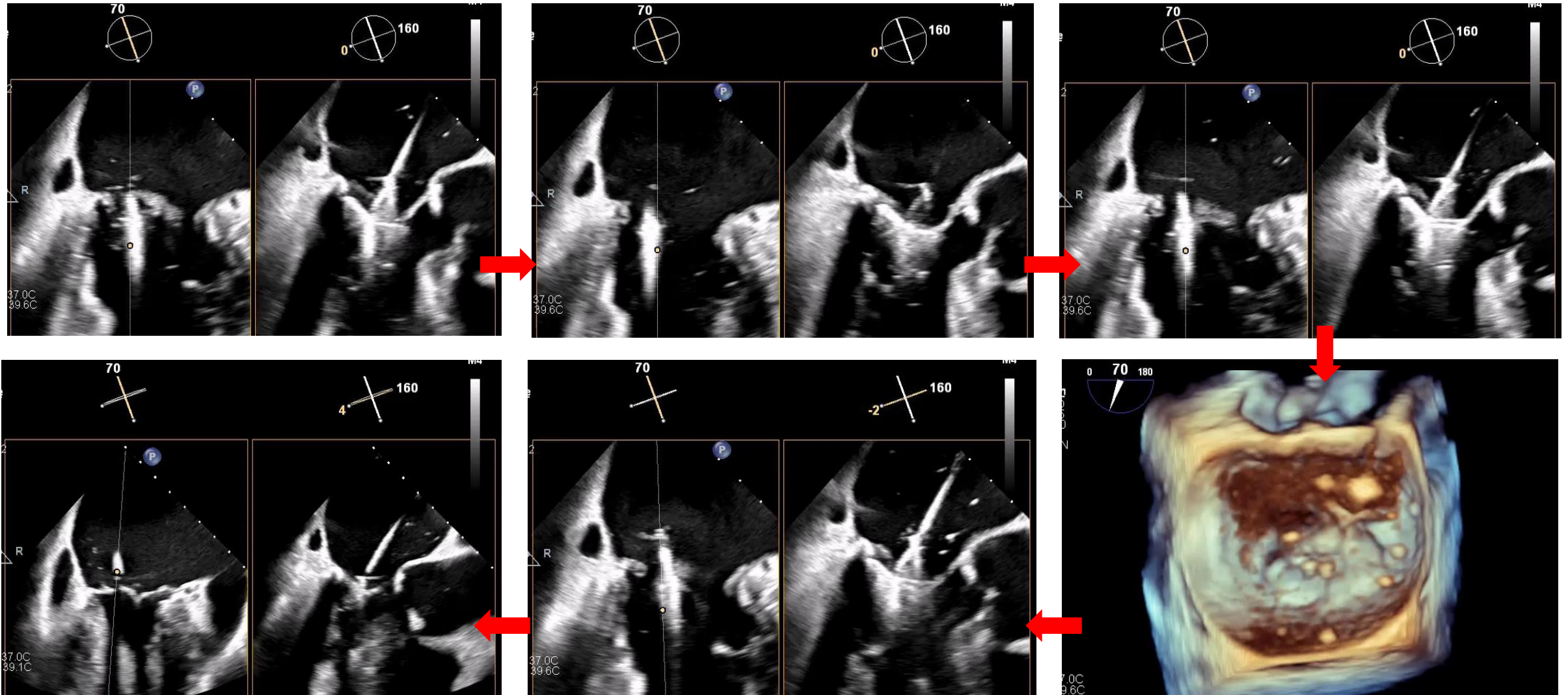


ACOM Prolapse



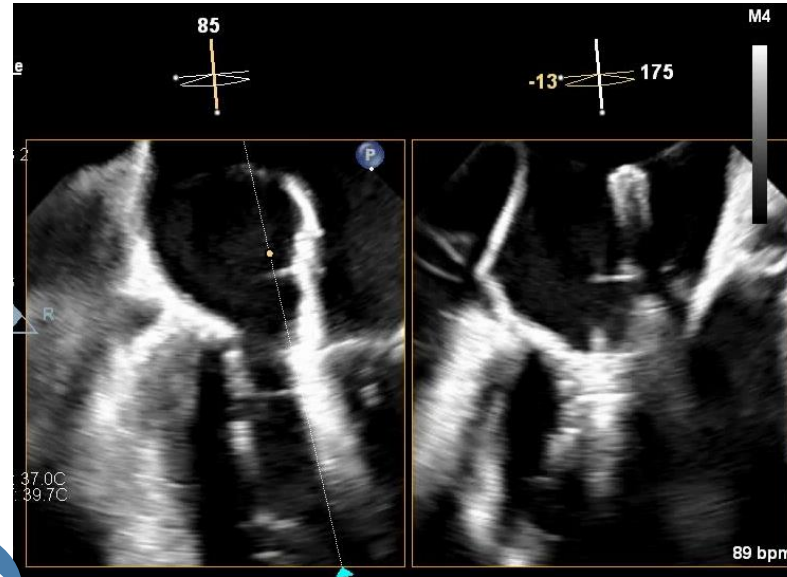
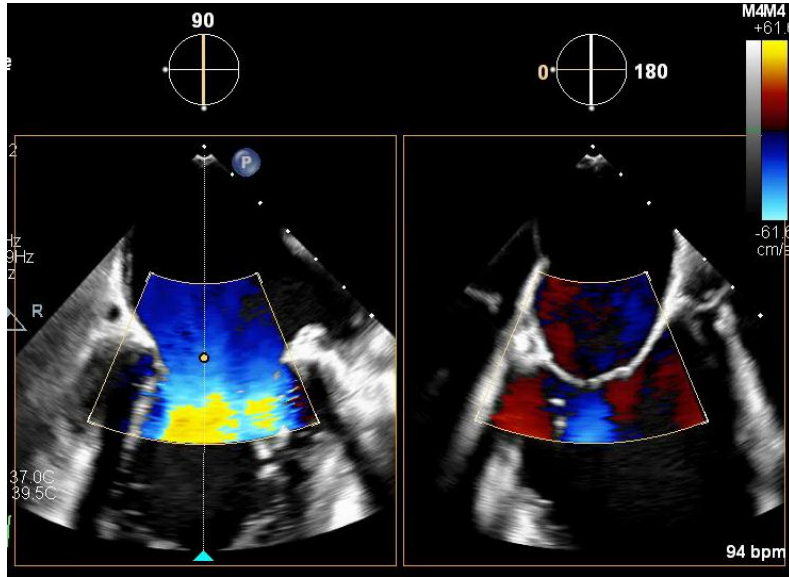
Grasping angle should be adjusted based on the clip orientation

Use of CGA

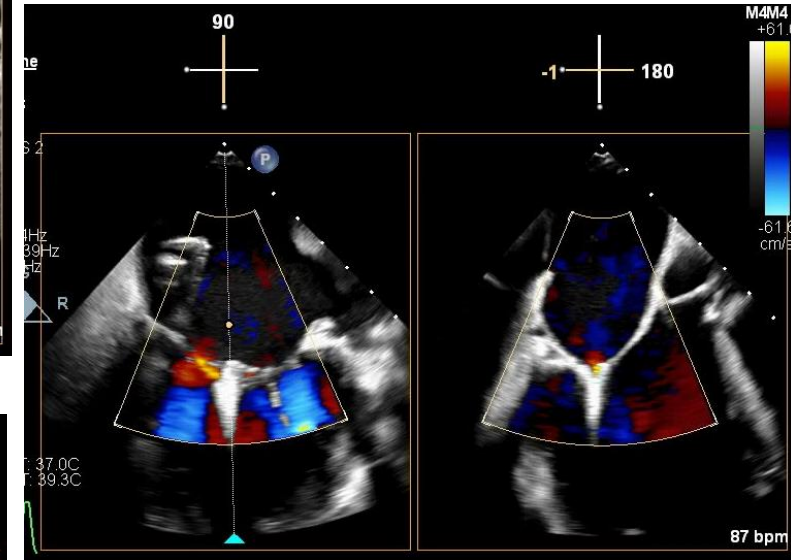
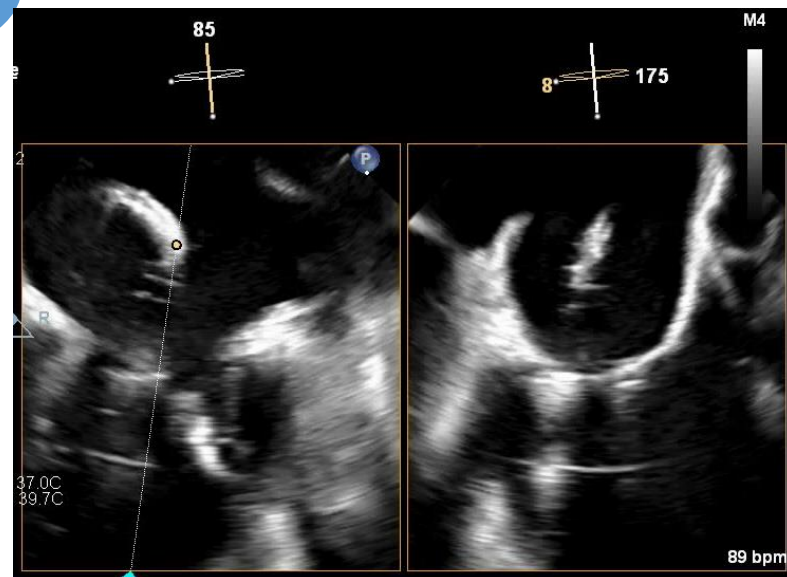
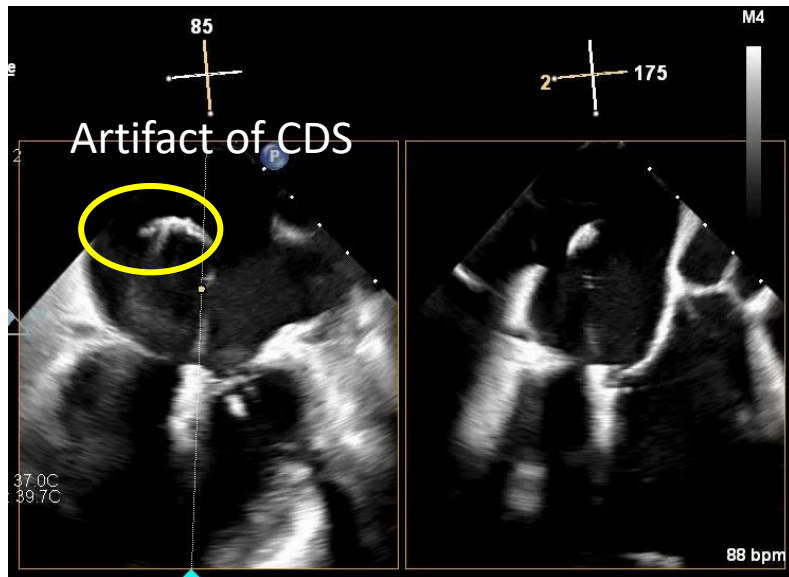


Minimum maneuver after grasping anterior leaflet
Recommend to use for final adjustment of tissue insertion

CGA for Leaflet Insertion Confirmation



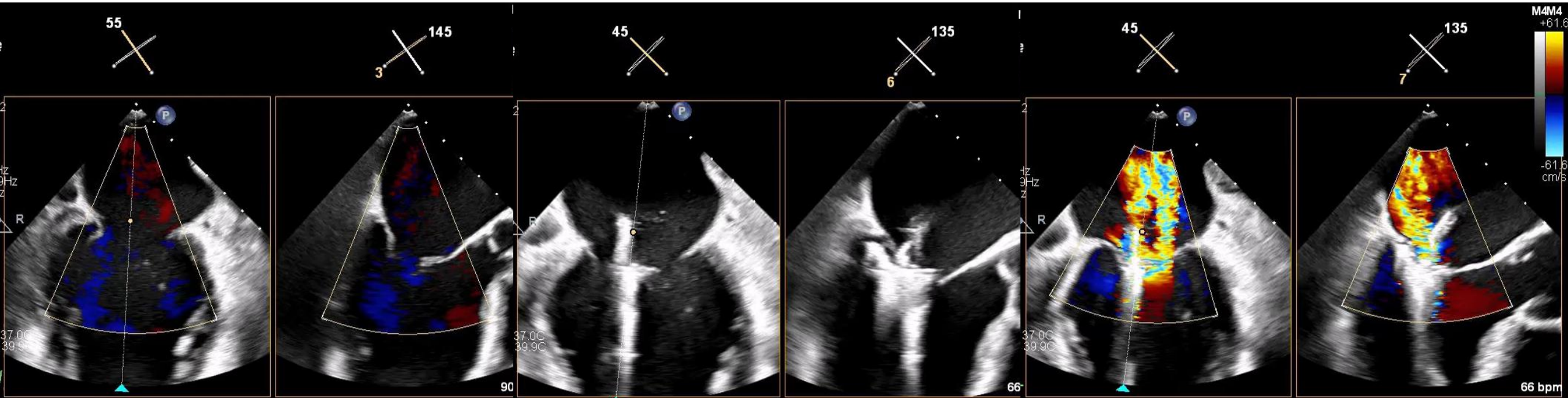
Check the posterior leaflet from medial side



CGA is effective for confirmation

Check the anterior leaflet from lateral side

Clip Close to Minimize the Tension

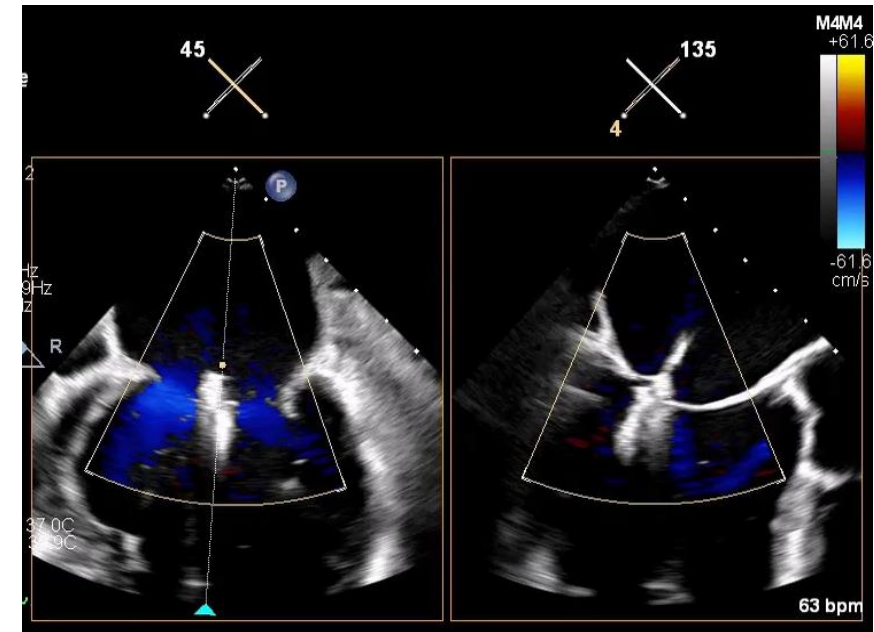
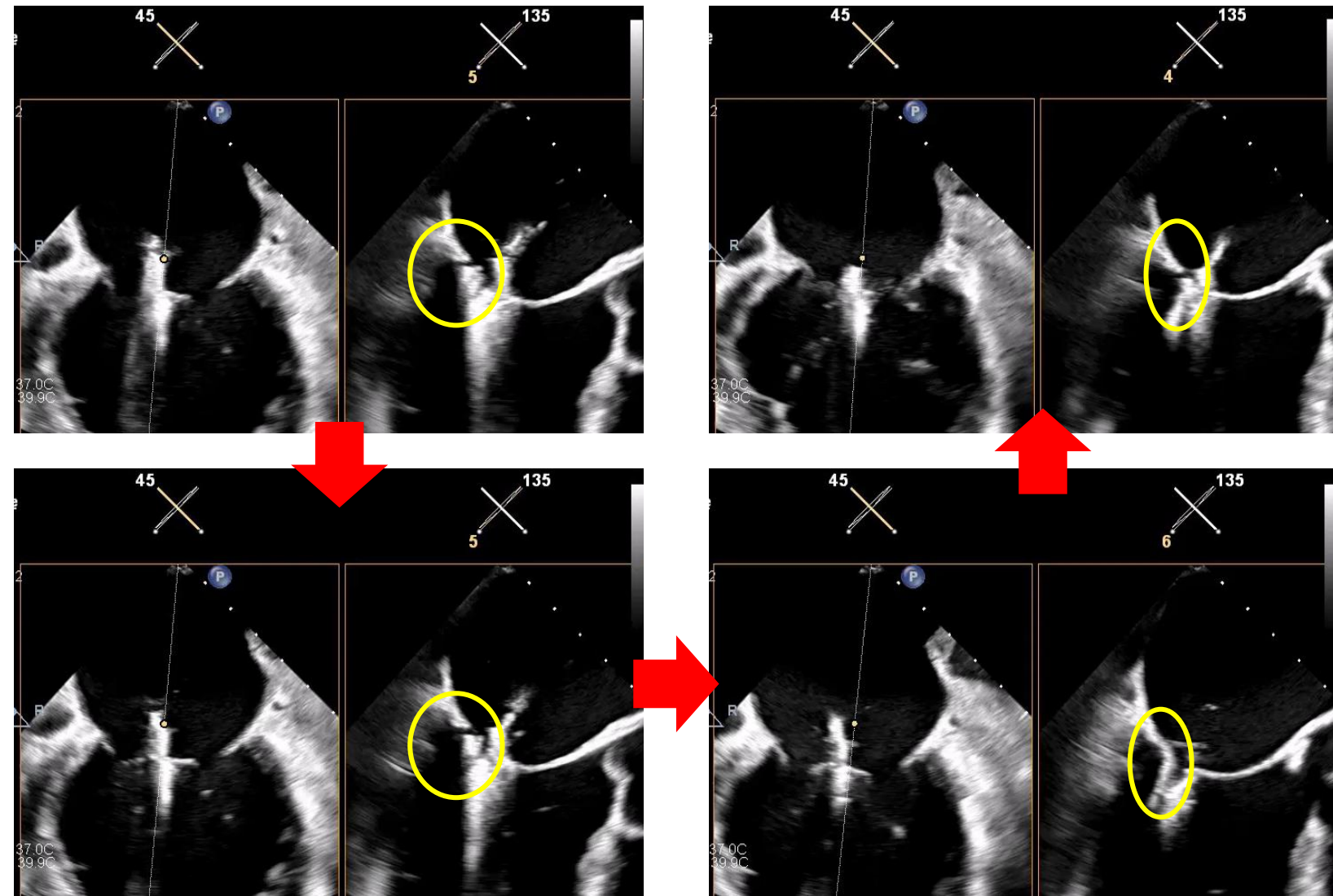


In the step of clip closing, we have to care the tension of clip arm to the leaflet.

In this ischemic MR, we grasp the leaflets using XTW clip.

After half closing, we confirmed the clip position in color doppler.

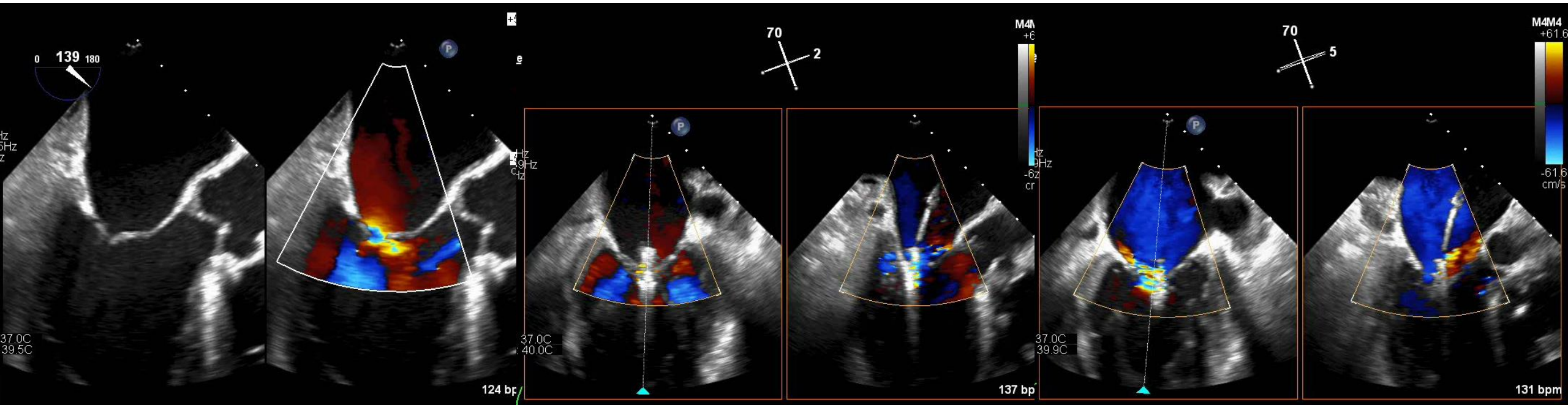
How to Release the Tension



Release the tension by pushing the clip to LV.
After completely closing, MR is assessed by color doppler.

Check the leaflet touched by tip of clip arm (not color)

How should we bail out leaflet tear?

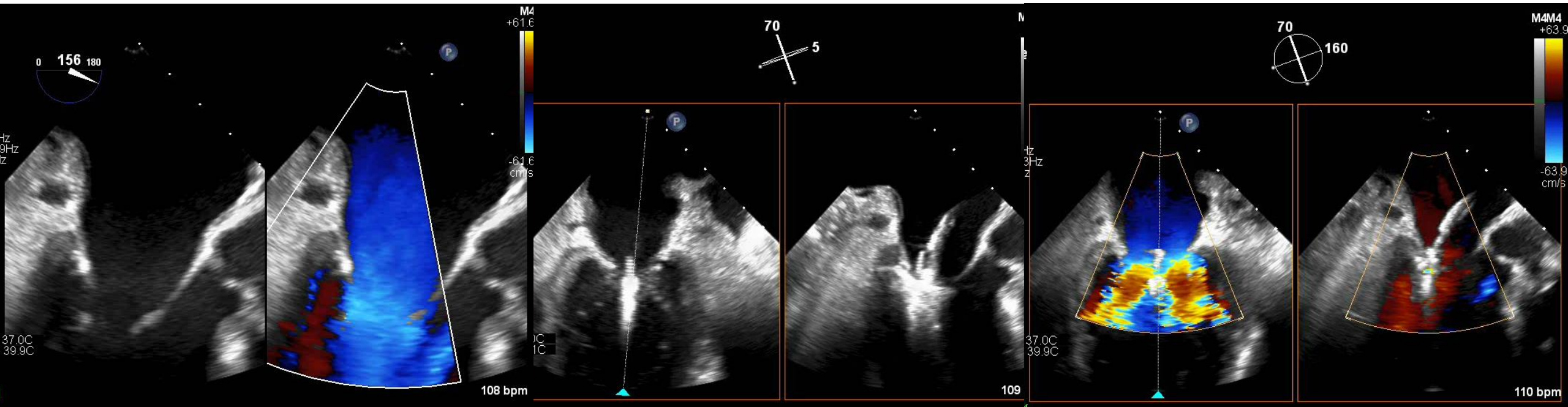


MR once reduced closing the NTW clip.

But, MR worsened after fully closing the clip, indicating leaflet tear.

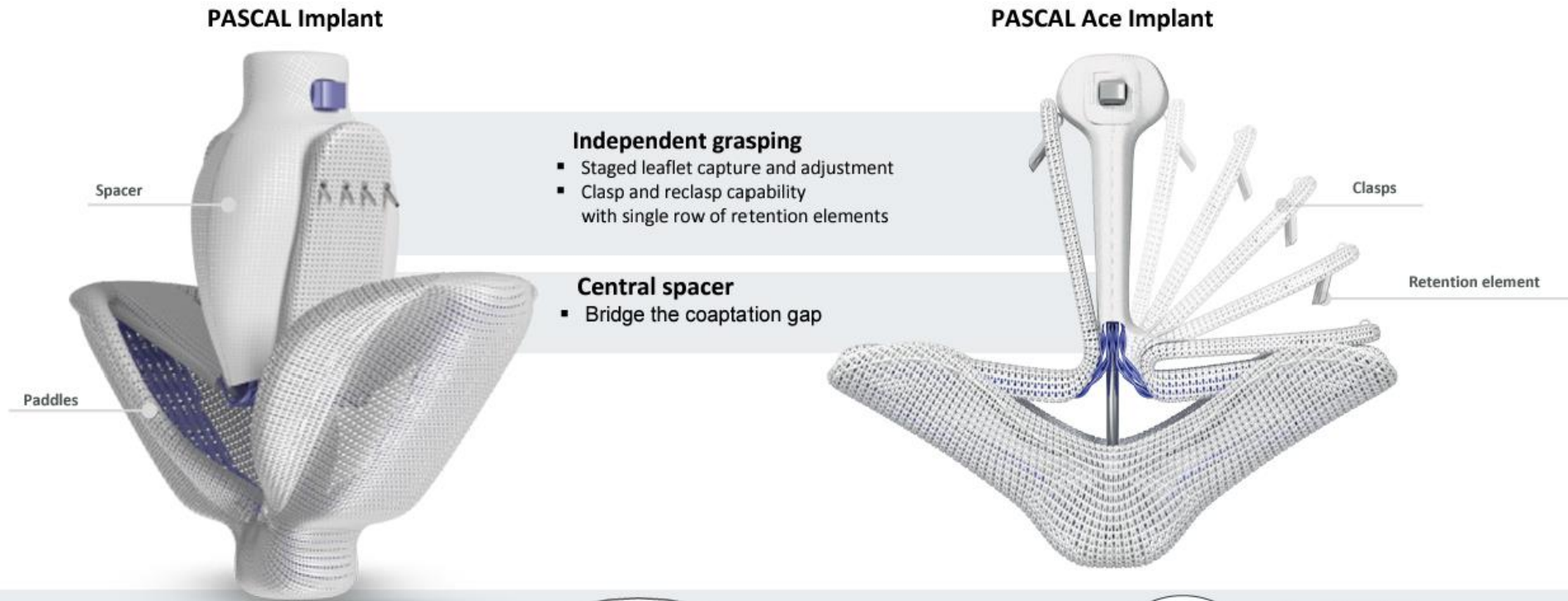
Surgery? Observation?

Bail Out of Leaflet Tear



1. Check the perforated part.
2. Select XTW or XT to fully cover the perforated part.
3. After carefully closing the clip, MR reduced to mild.
* When the distance between the injured part and leaflet tip is >10 mm, the first clip should be placed at the uninjured part to improve the coaptation.

Use of PASCAL Device



Nitinol construction

Passive closure,
acute implant flexing



Elongation

Navigate in dense chordae

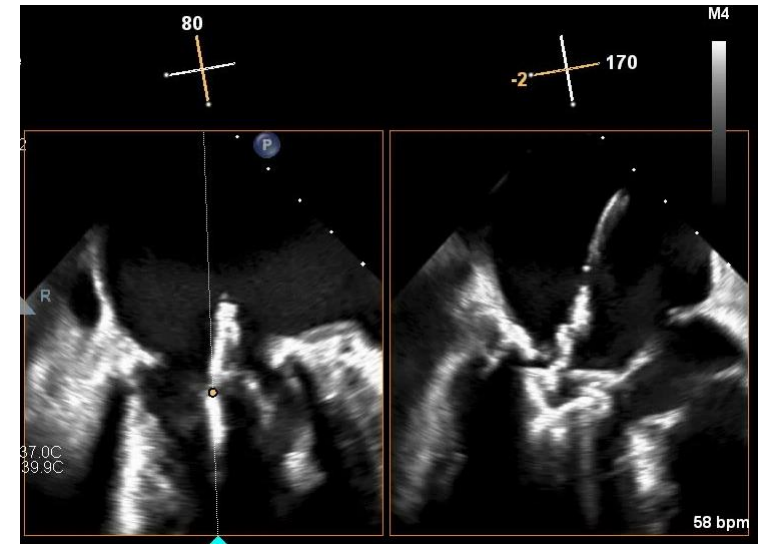
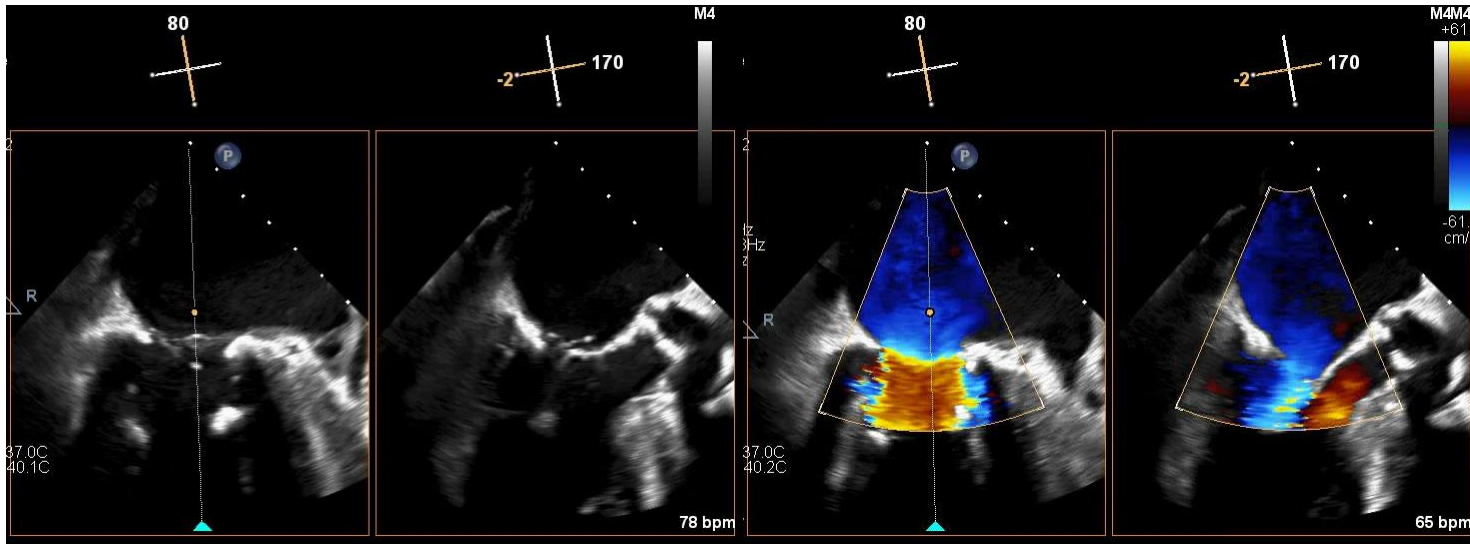


Two Implants

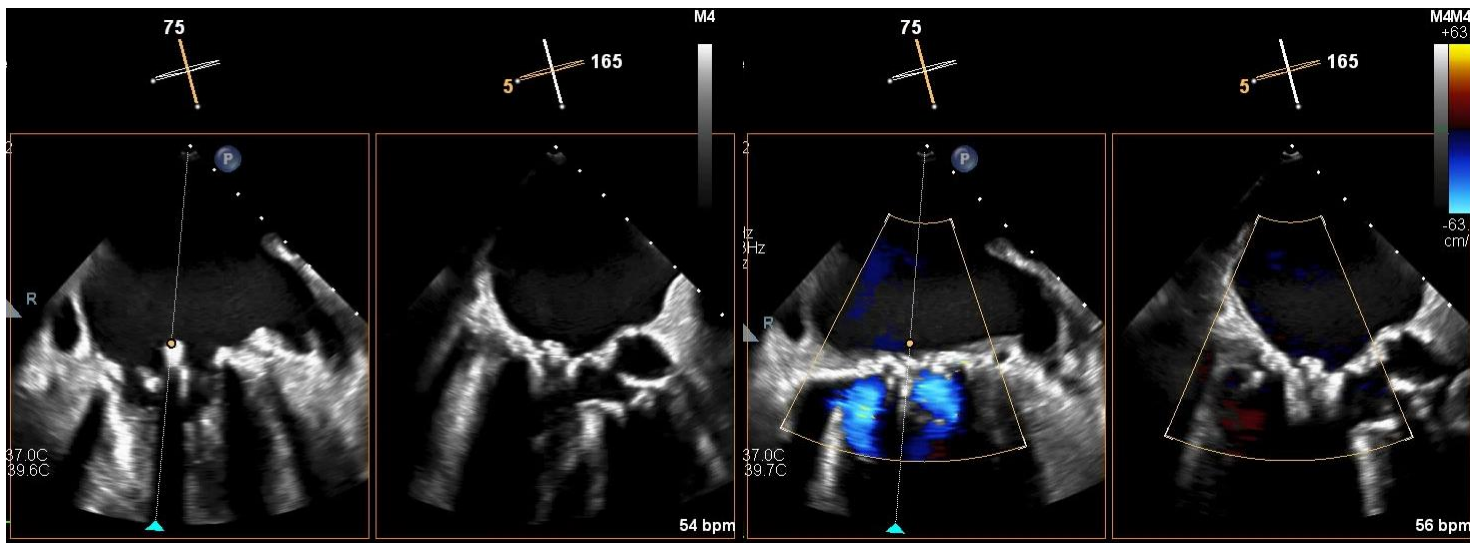
PASCAL with broader contoured paddles and PASCAL Ace with a narrow profile. Both with central spacer designed to provide multiple options for patients

Nitinol construction and central spacer \Rightarrow Reduce the tension on leaflet
Elongation system \Rightarrow Reduce the risk of chordae entanglement

PASCAL for Calcified Mitral Valve



Posterior leaflet with MAC was grasped within posterior paddle.



Nitinol system with spacer limits the tension on the leaflets and reduces risk of stenosis.

Summary

- Transseptal puncture and leaflet grasping are key steps of intraprocedural complications of TEER.
- Leaflet visibility and tension of the leaflets are main factors of leaflet associated complications.
- PASCAL device may contribute to maintain the safety of TEER procedure.