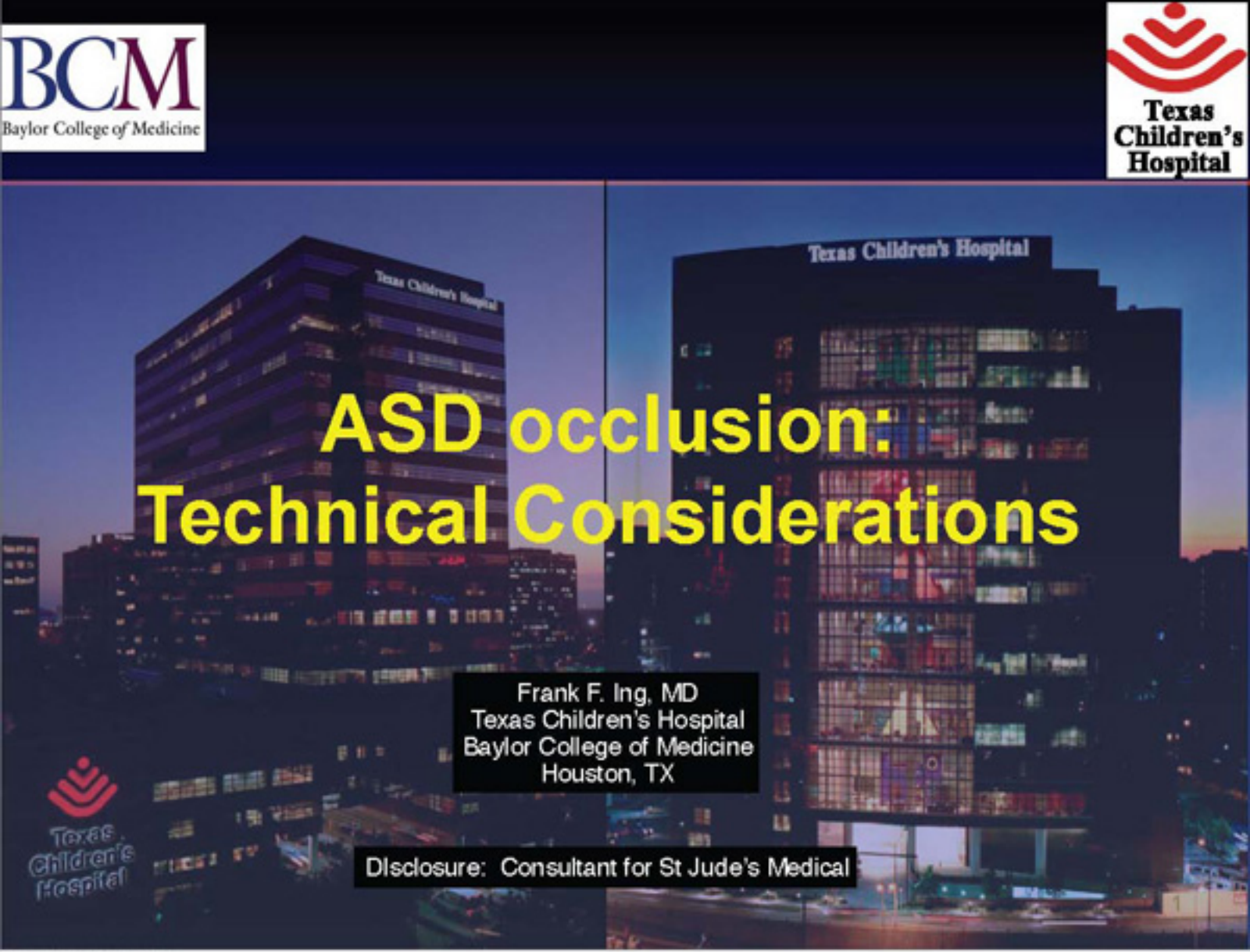

ASD occlusion: Technical Considerations

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Texas Children's Hospital
Baylor College of Medicine
Houston, TX

Disclosure: Consultant for St Jude's Medical

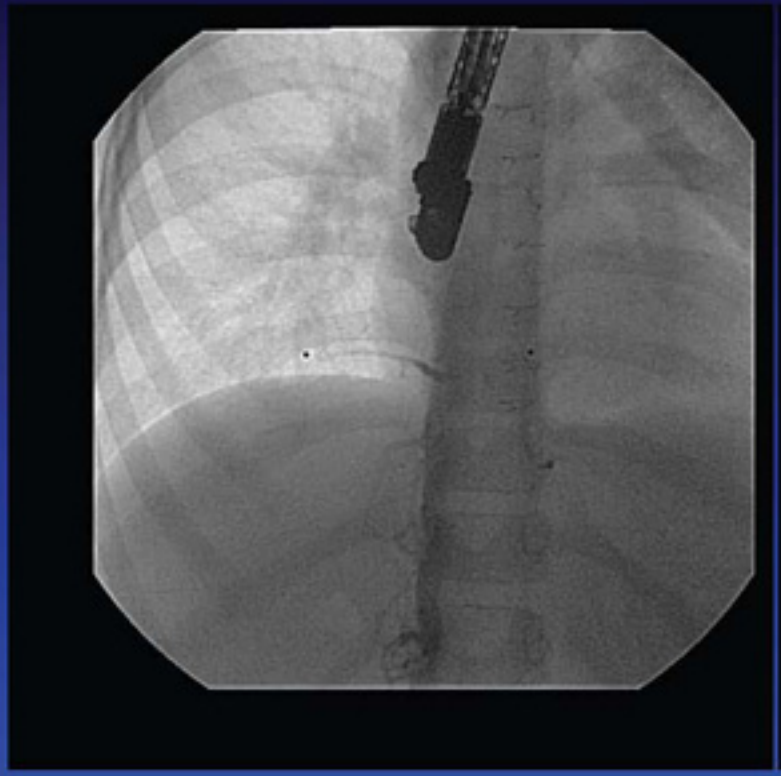
Technical considerations

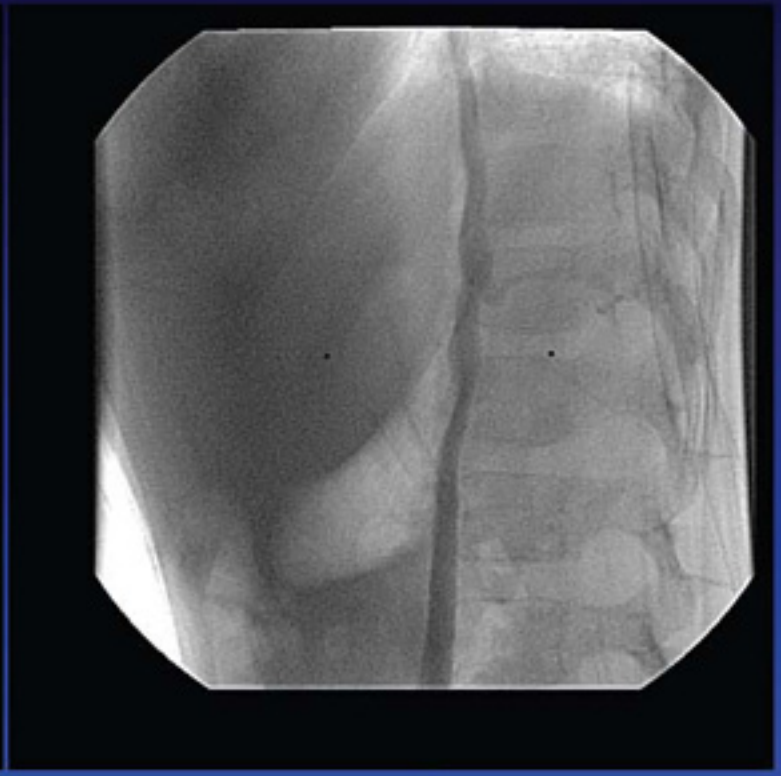
- Pre-occlusion
  - Vascular access
    - Alternate routes
  - Understanding LA anatomy
  - Sizing ASD
- Occlusion
  - Alignment of device to septum
- Post-occlusion
  - Device assessment

Pre-occlusion: Vascular access

- Majority of ASD occlusions via femoral veins
- Occasionally femoral/IVC vein not accessible due to:
  - Bilateral femoral/iliac vein/IVC occlusions
  - Interrupted IVC/ unusual course
  - IVC filter
- Alternative options:
  - Recannulate femoral veins
  - SVC approach-
    - IJ
    - Azygous continuation to SVC
  - Transhepatic approach

TOF s/p repair with residual ASD





Also, with interrupted IVC!

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RIJ approach

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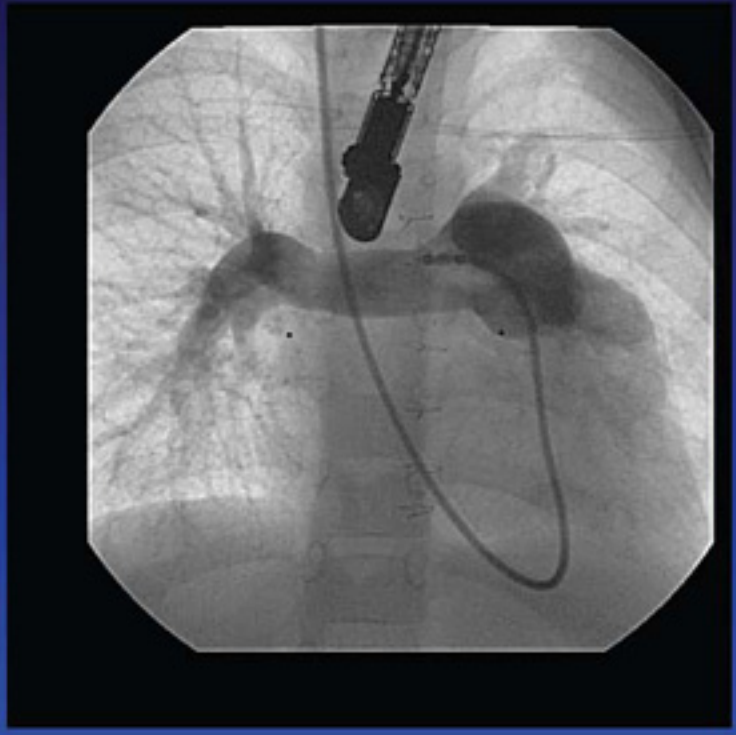
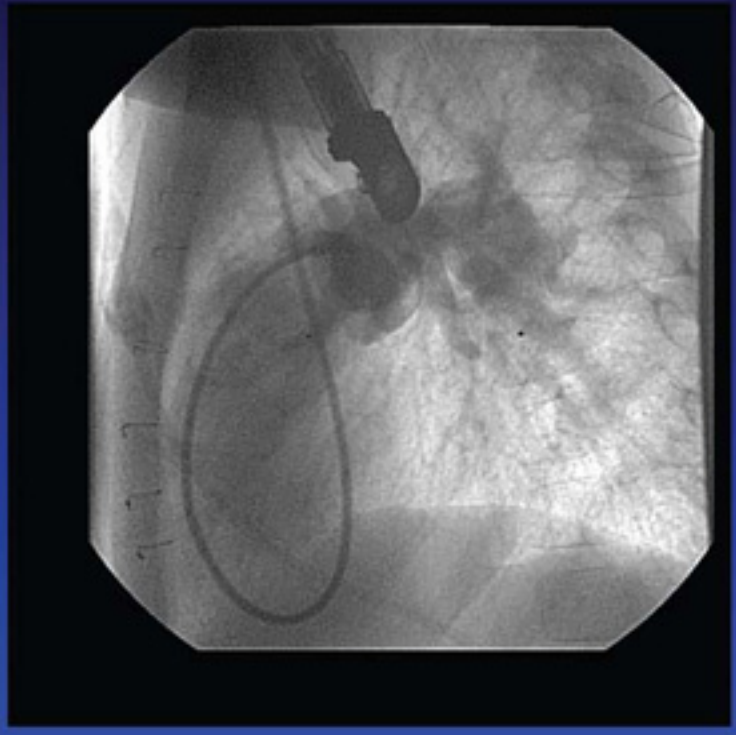
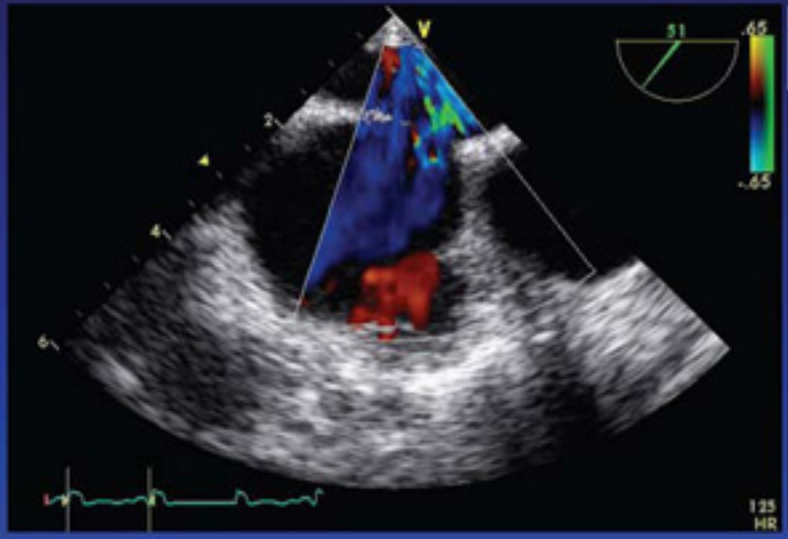
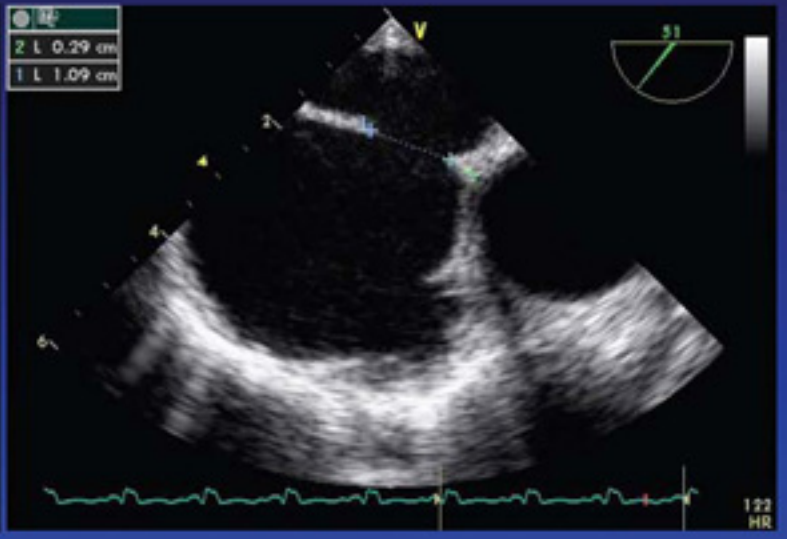




Deficient superior rim

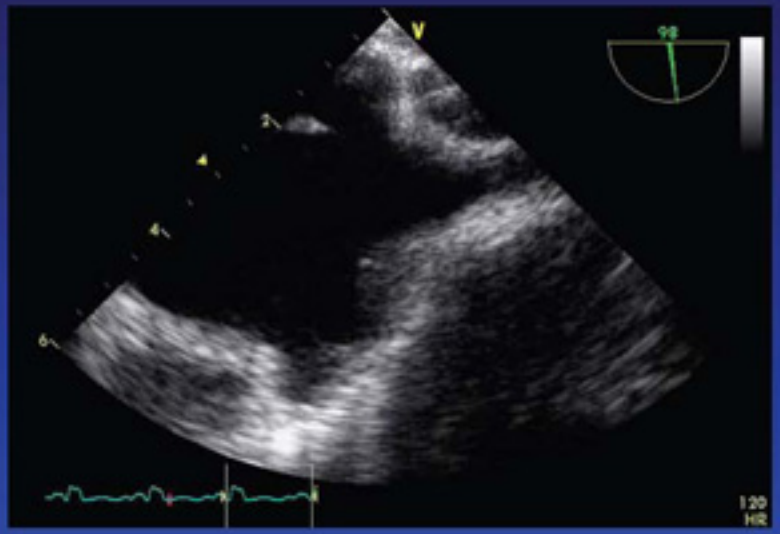
ASD with deficient anterosuperior rim by aorta

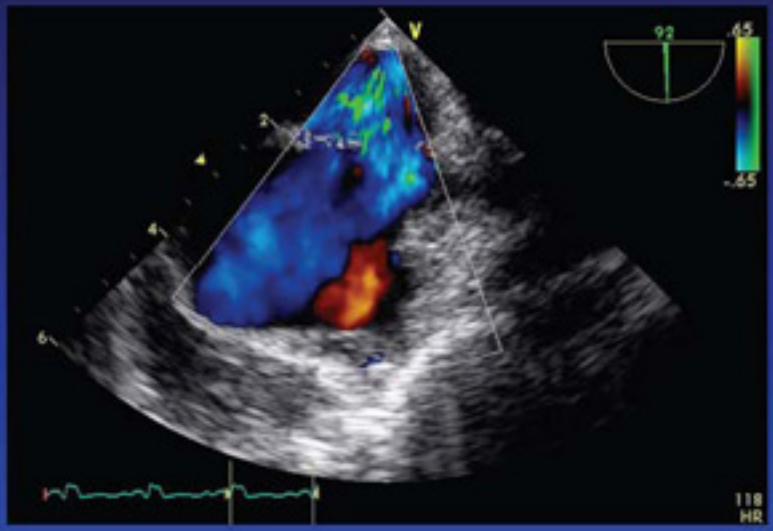




Deficient superior rim

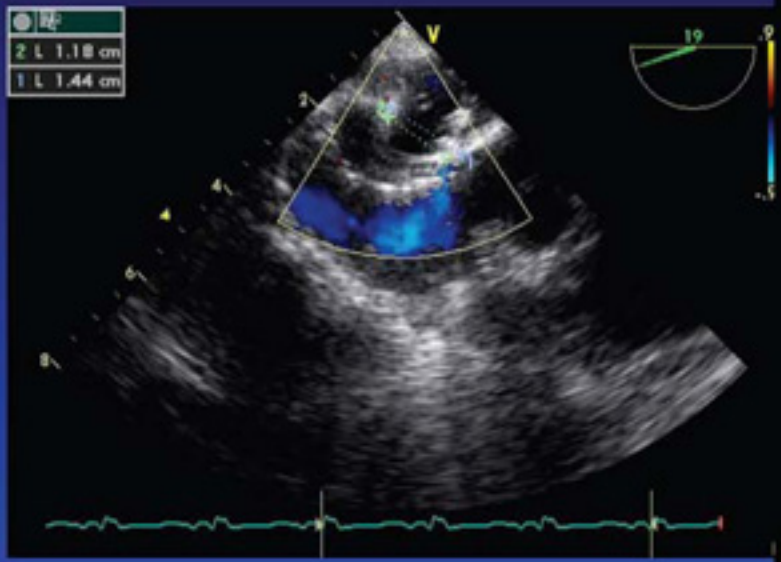
Also deficient posterosuperior rim by SVC

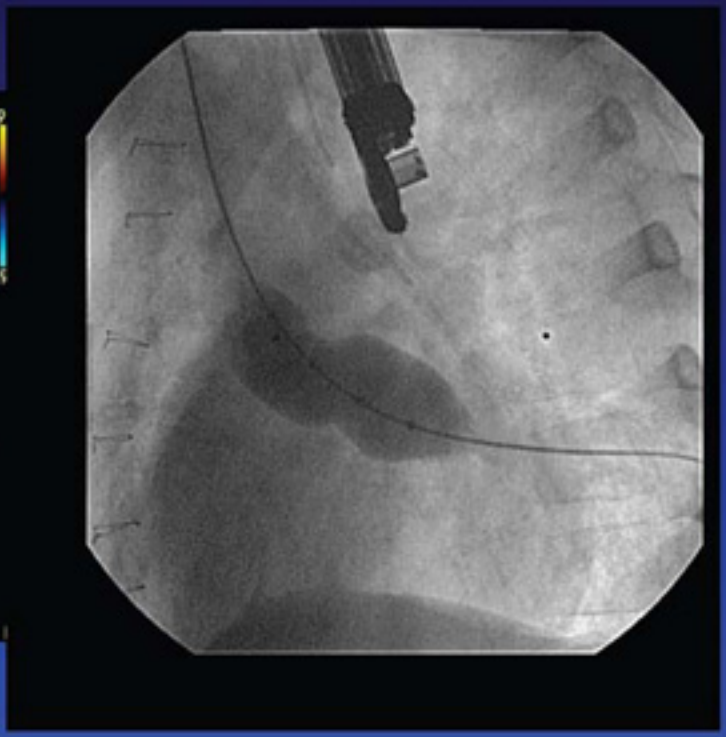




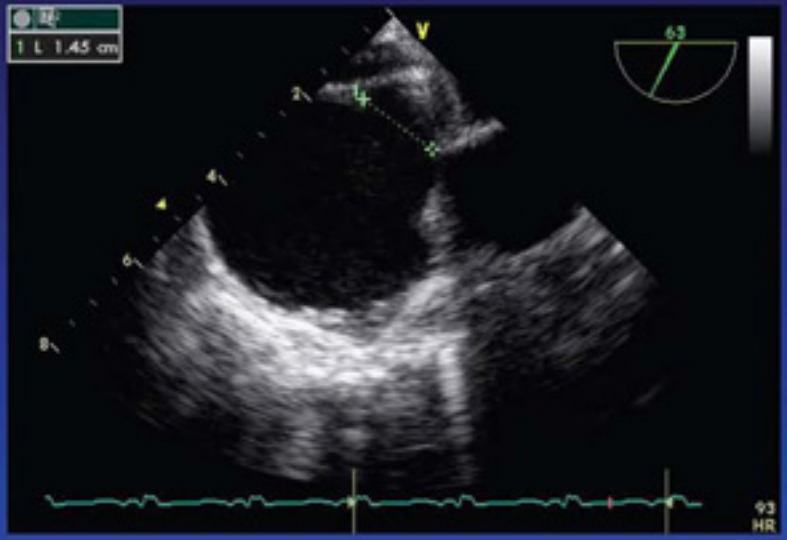
Balloon sizing

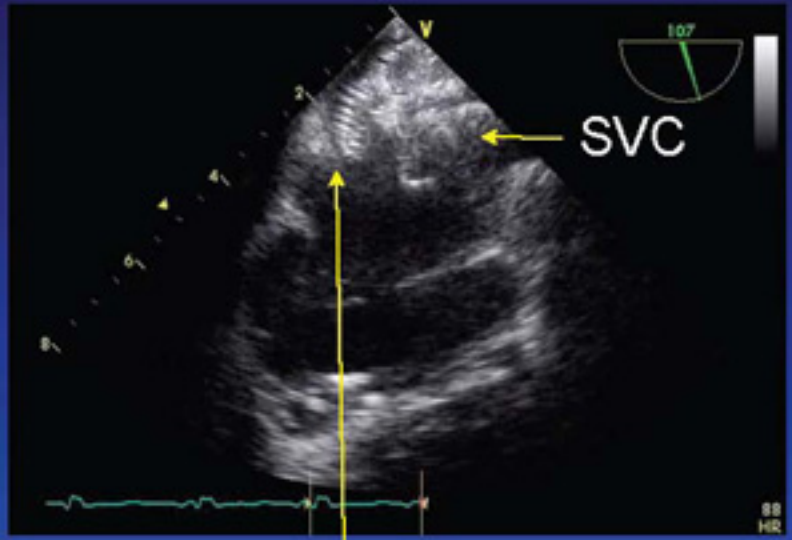
Diameter: 11.8-14.4 mm





Implant 15 mm Amplatzer ASD occlusion via RIJ

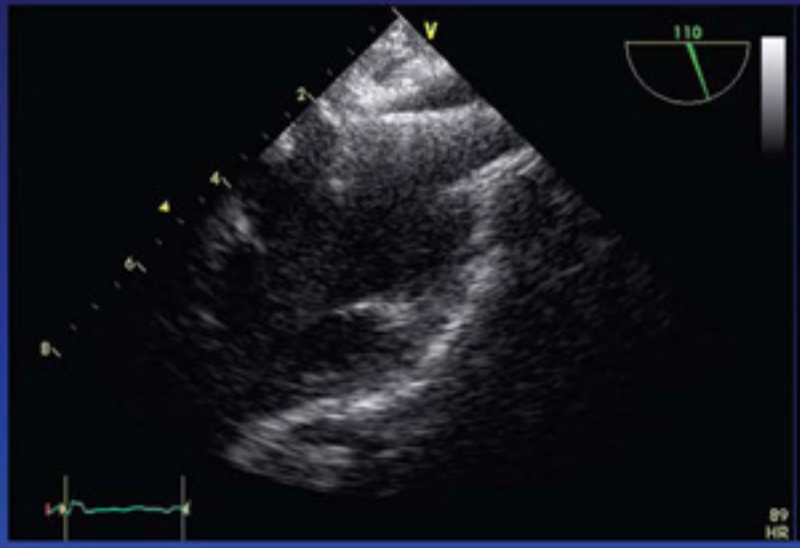




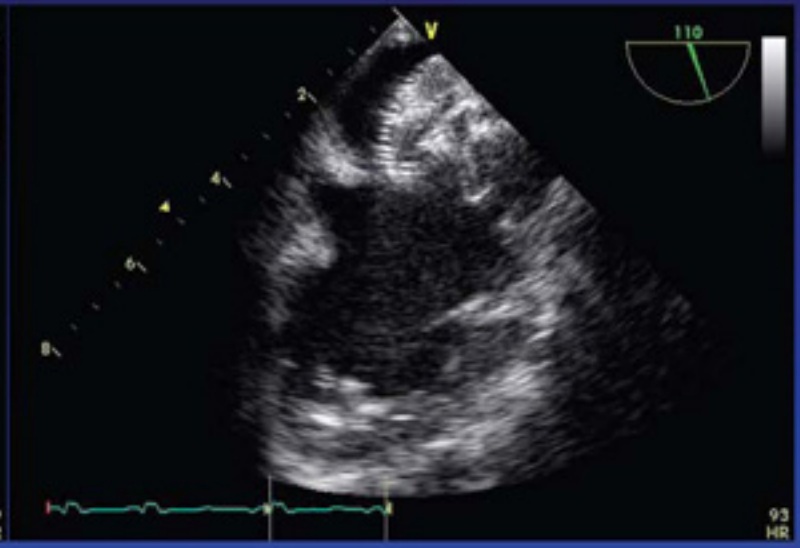
Inferior LA disk comes into contact with septum first during delivery

Testing device stability

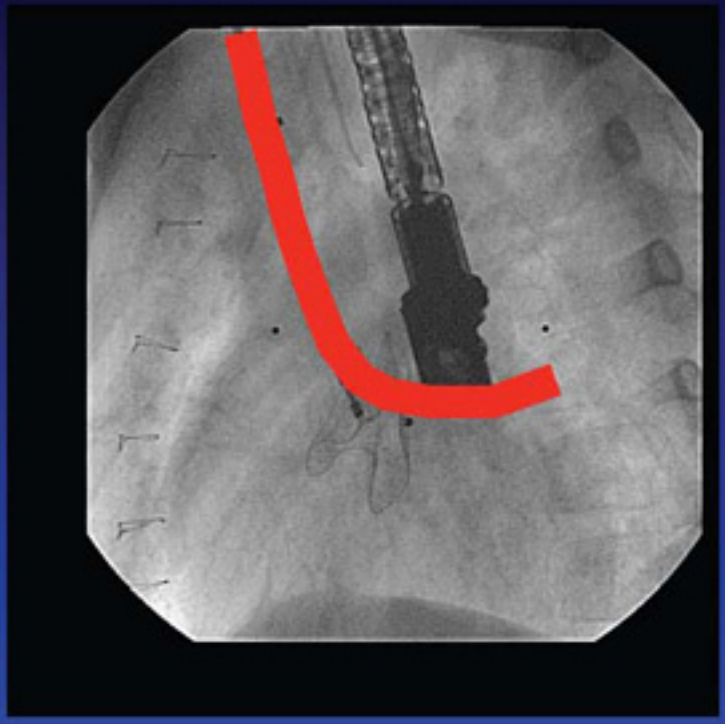
Push

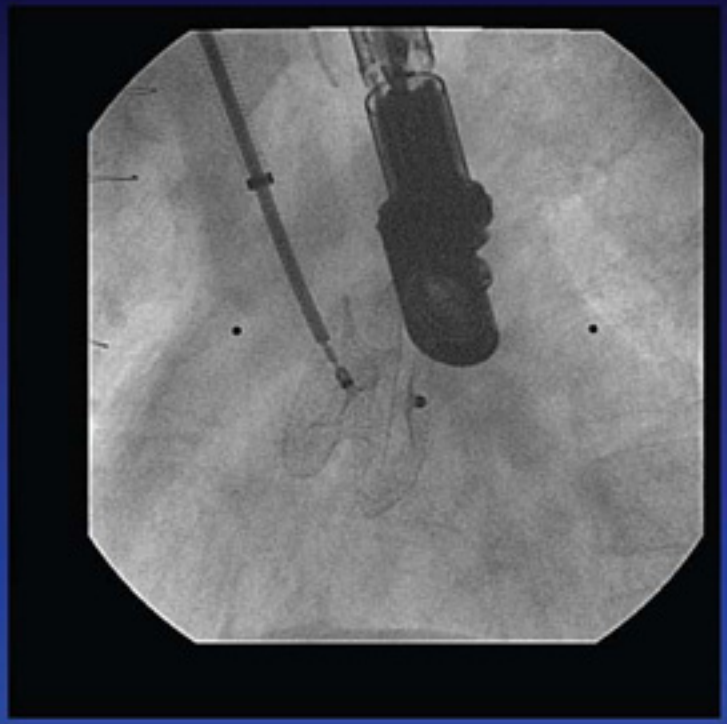


Pull



Testing device stability & release





Helpful hint: pre-curve sheath to 180º with hot water or heat gun

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Post angiogram and TEE

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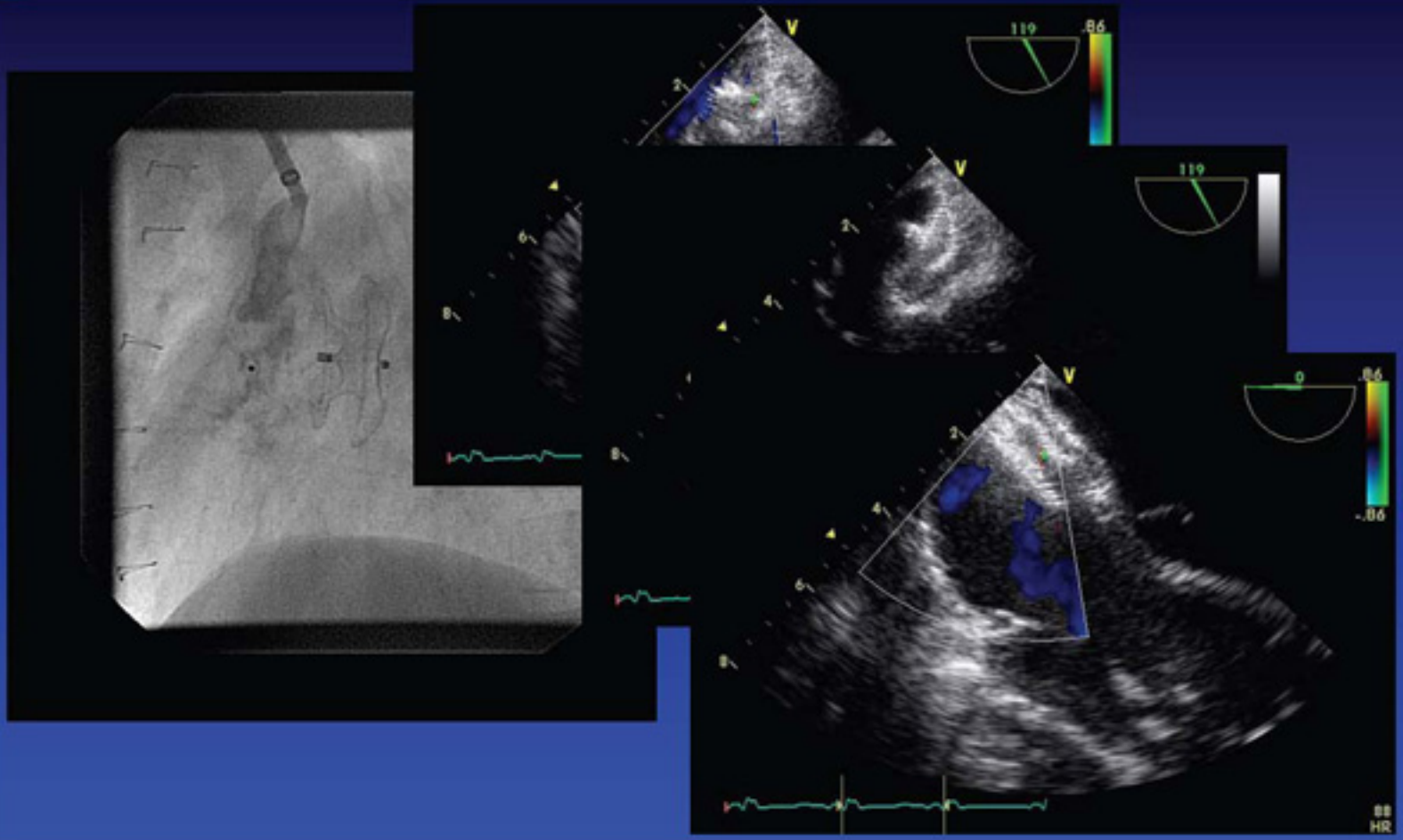
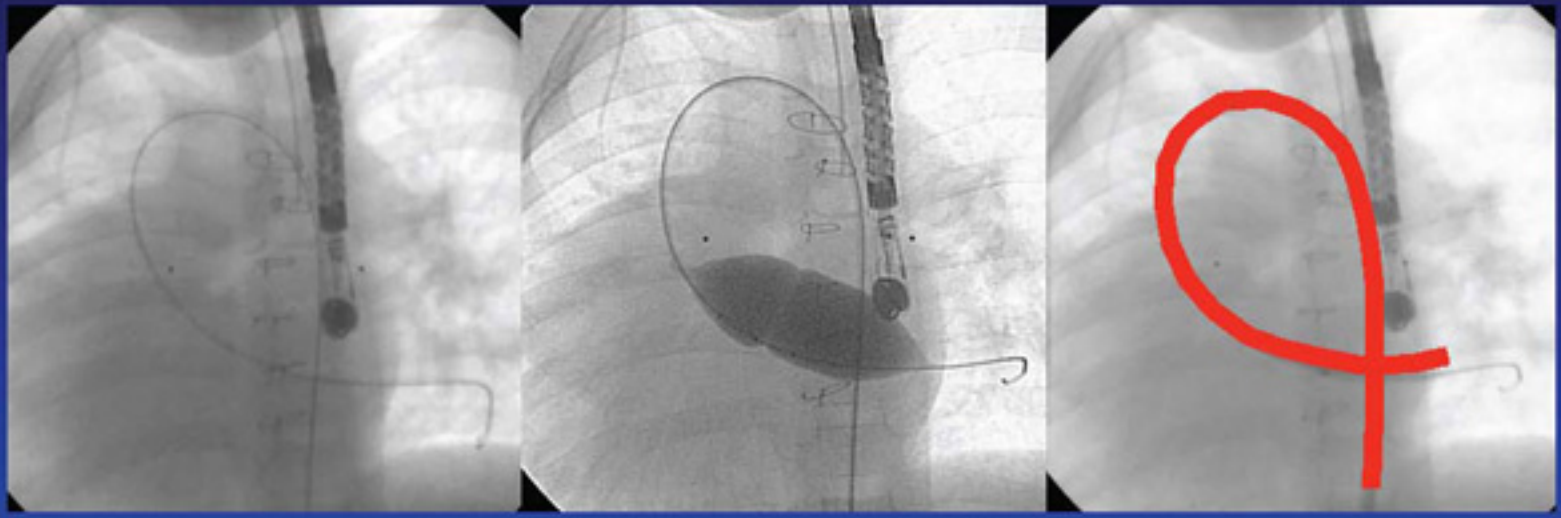


Interrupted IVC with azygous continuation to SVC

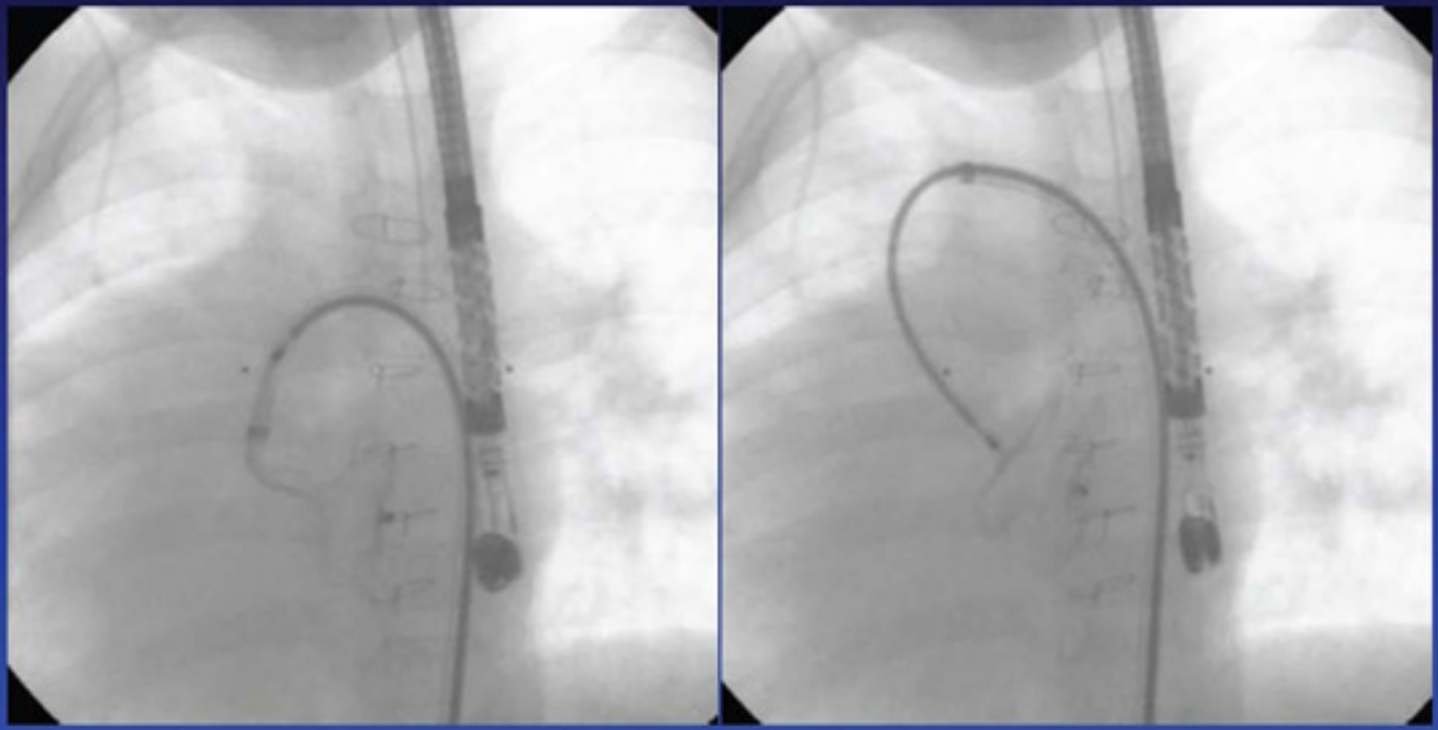
TEE ASD diam 13.1 mm

360° turn of wire & sheath

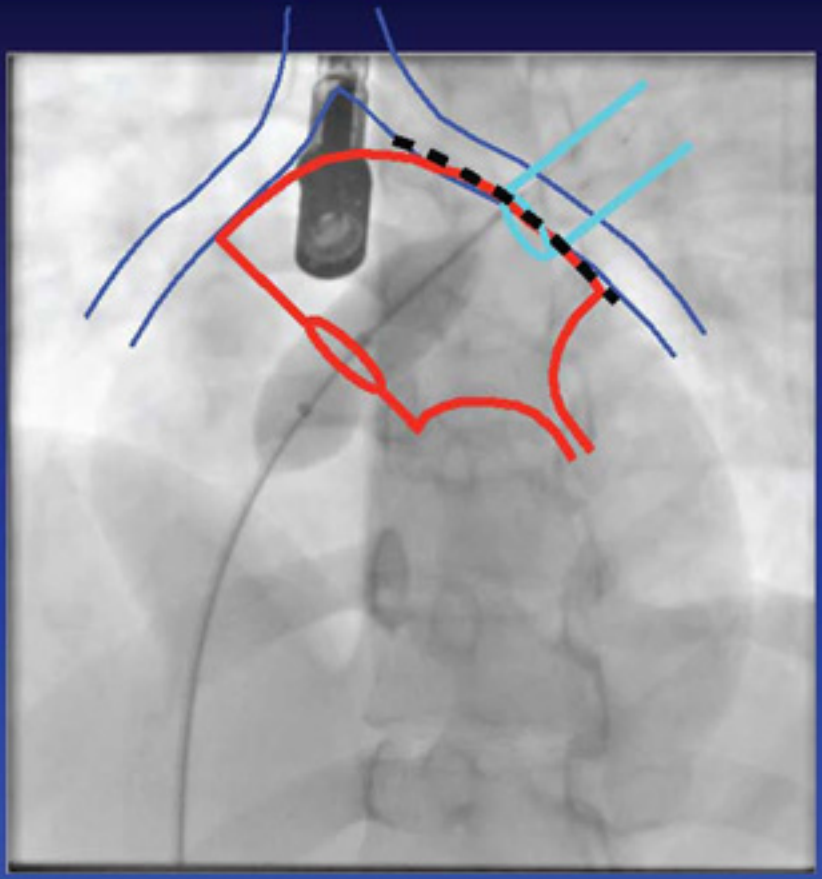


Helpful hint: pre-curve sheath to 360°
with hot water or heat gun

Delivery of ASD device

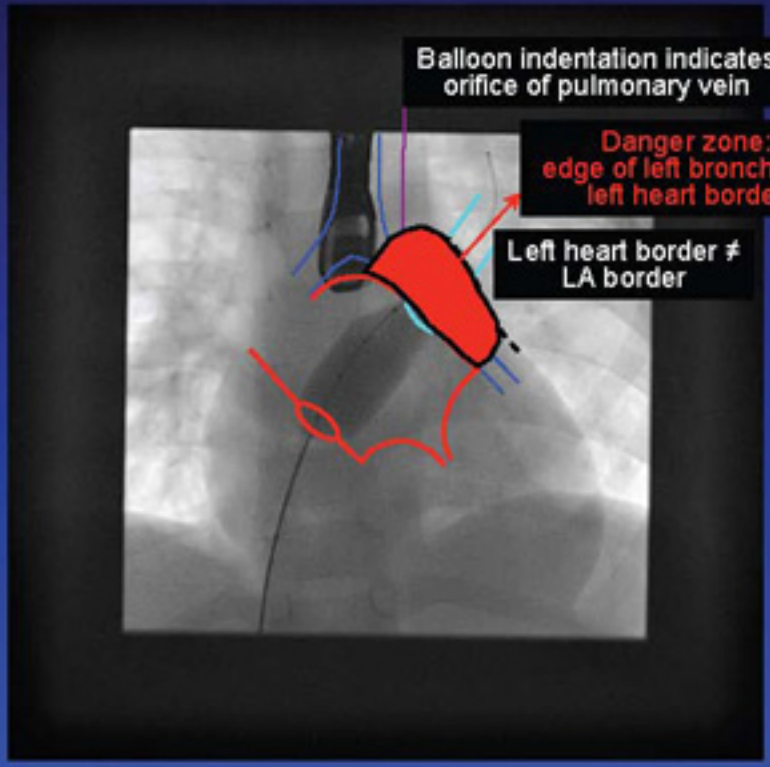


Know borders of left atrium



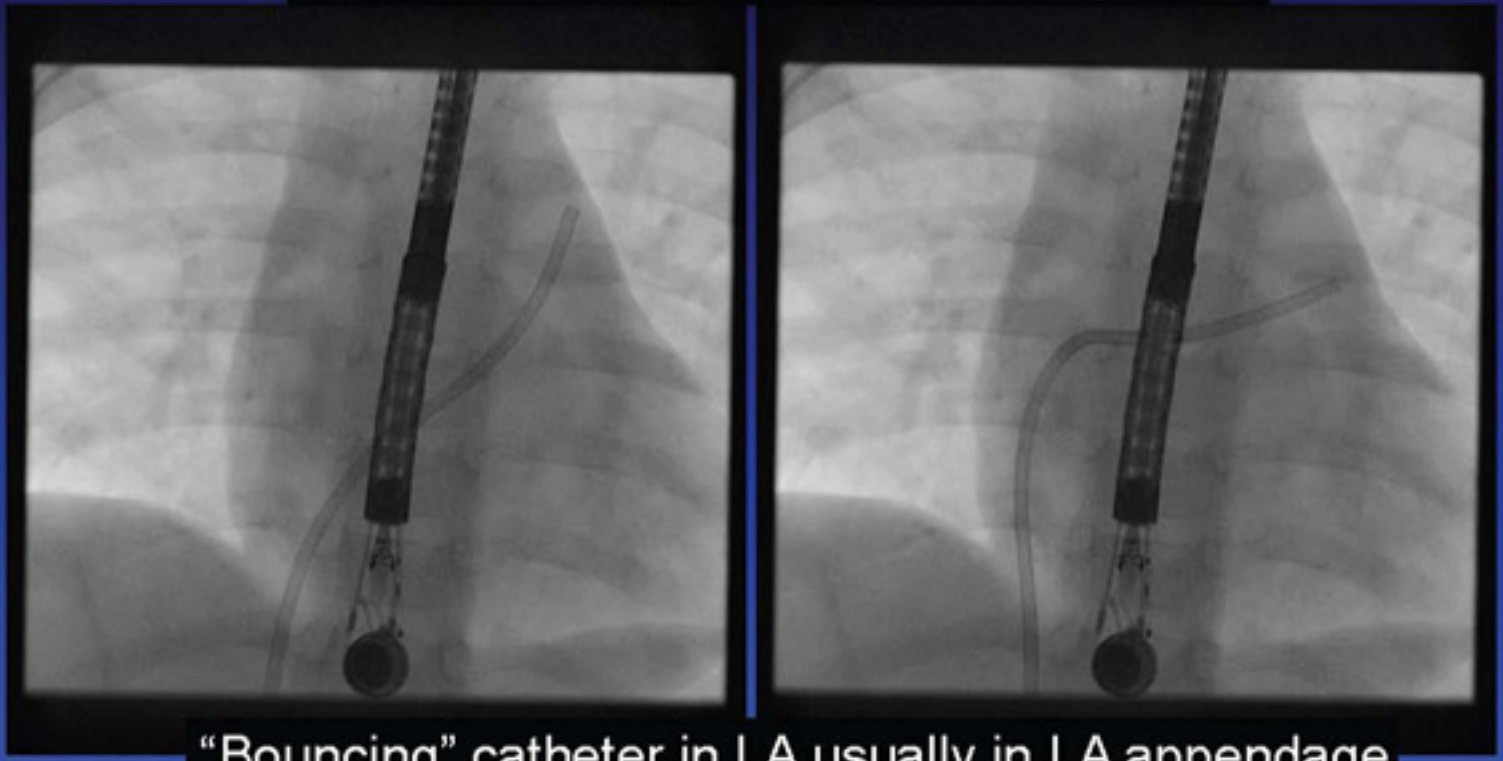
Left heart shadow ≠ LA border

Left bronchus defines back wall of LA



Know your left atrial anatomy

Position of catheter: left pulmonary vein?



"Bouncing" catheter in LA usually in LA appendage

Pre-occlusion: Sizing the ASD Stop-Flow Technique

- Using a balloon specifically designed for sizing atrial communications (i.e., AMPLATZER Sizing Balloon) the catheter is passed over the exchange guidewire directly through the skin.
- To facilitate this percutaneous entry, an assistant should apply forceful negative pressure to the balloon catheter with an attached syringe.
- Under fluoroscopic and echocardiographic guidance, the balloon catheter is placed across the defect and inflated with diluted contrast medium until the left-to-right shunt ceases as observed by echocardiography.
- The balloon is deflated until flow is seen, and then re-inflated until shunting ceases. Measurements can then be made using echocardiographic imaging or fluoroscopy.

IFU on sizing the ASD

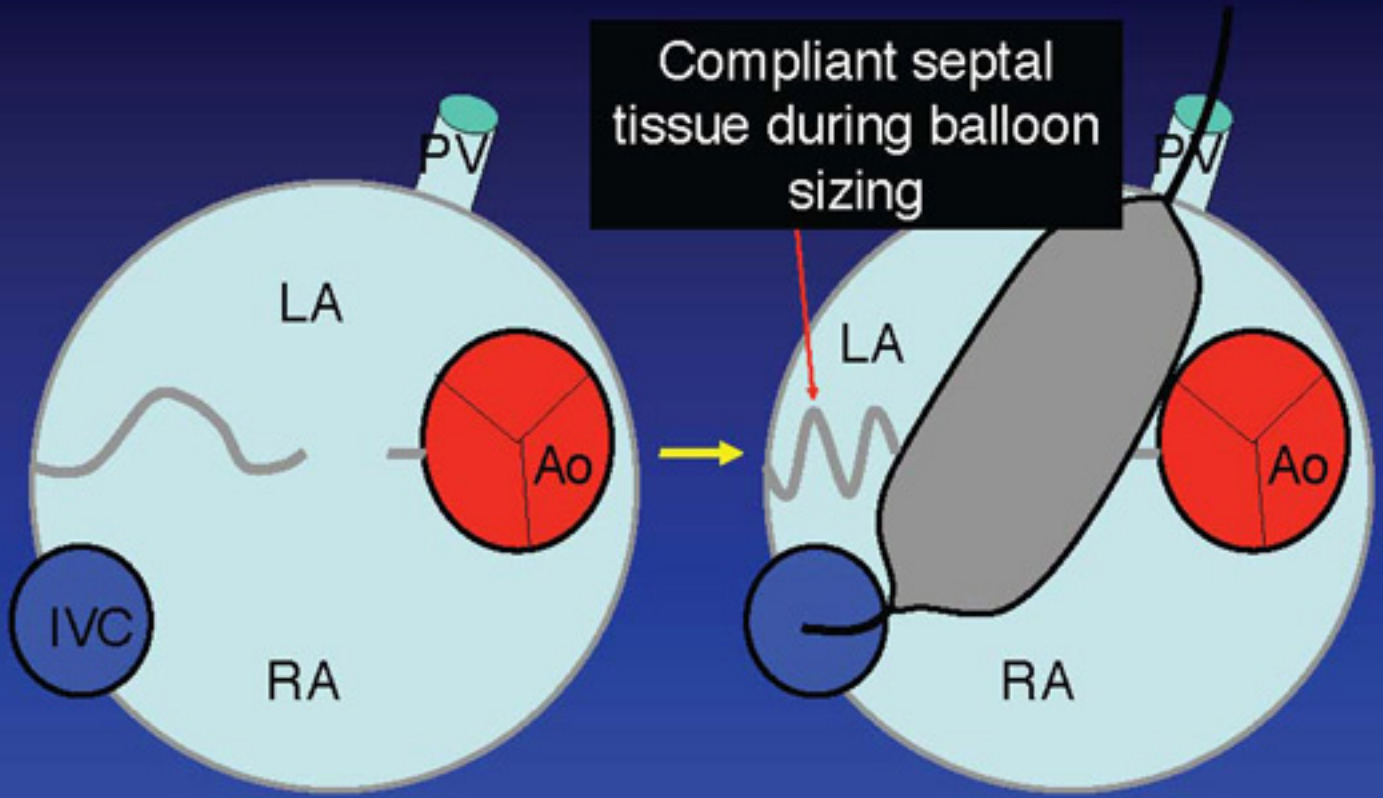
Warning: Do not inflate the balloon beyond the stop-flow point or beyond the balloon's maximum inflation volume. Inflation beyond the stop-flow point may cause distention of the defect (resulting in inaccurate sizing of the defect) and/or balloon damage.

NOTE: A waist in the balloon could appear without the cessation of flow. This would occur if there is more than one ASD. Sizing should occur based on stop-flow, not just the appearance of a waist.

Sizing ASD

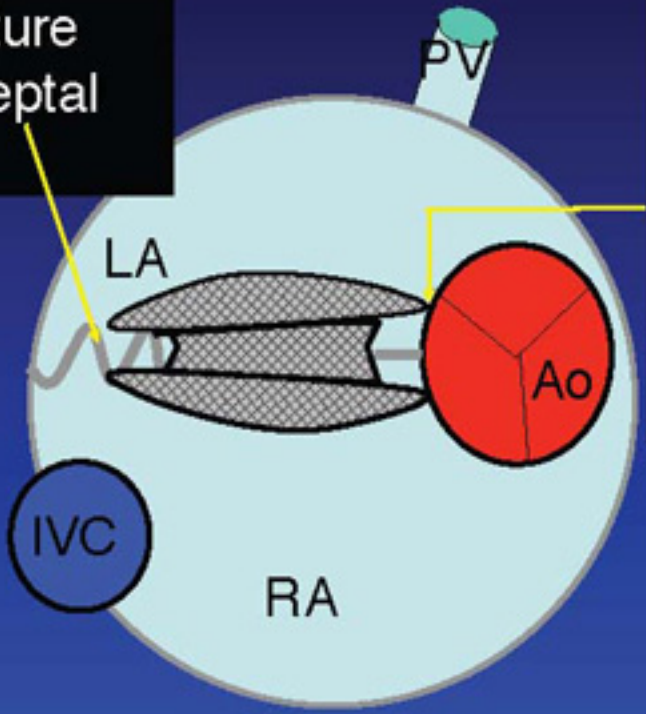
- Stretch diameter vs stop flow diameter?
- Original rationale for stretch diameter: ensure device will be secured in ASD
- Change in sizing technique due to "oversizing" leading to erosions
- Exceptions to oversizing:
  - Additional ASDs-oversize to cover other ASDs
  - Atrial septal aneurysm-oversize to cover redundant tissue
- Important to make sure device does not impinge on aorta; may need to upsize or down size device

Thin compliant septum / septal aneurysm: Low compliance



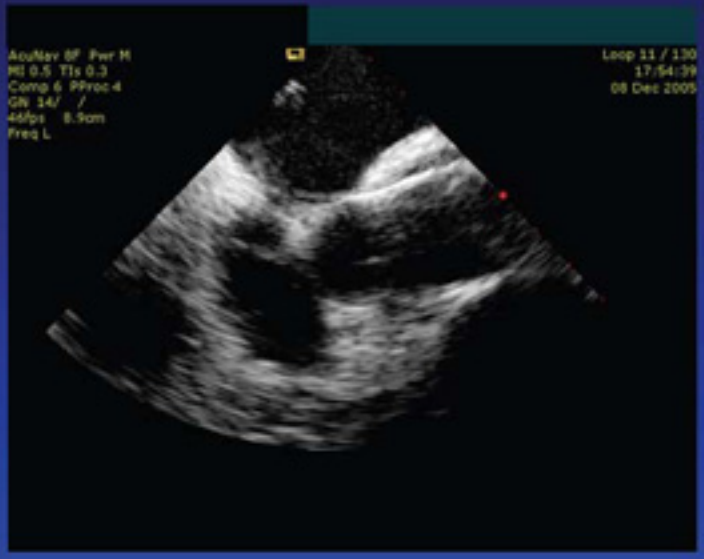
Thin compliant septum / septal aneurysm: Low compliance

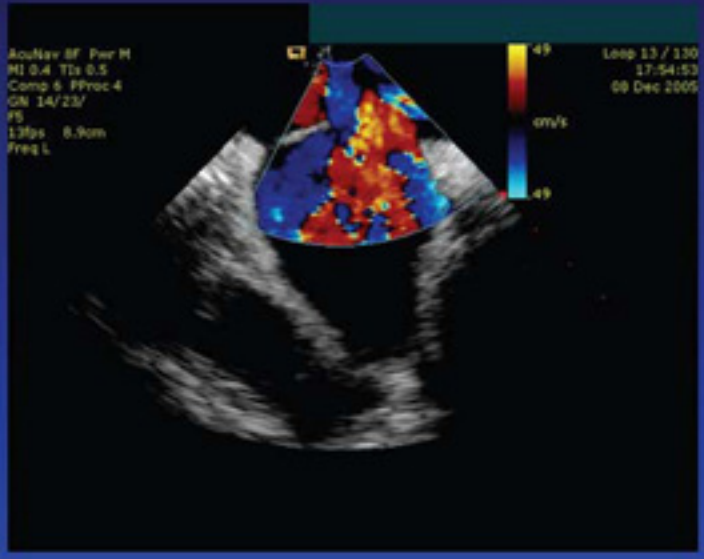
Device capture redundant septal tissue



Compliant septal aneurysm permits more posterior shift and less risk of impingement on the aorta

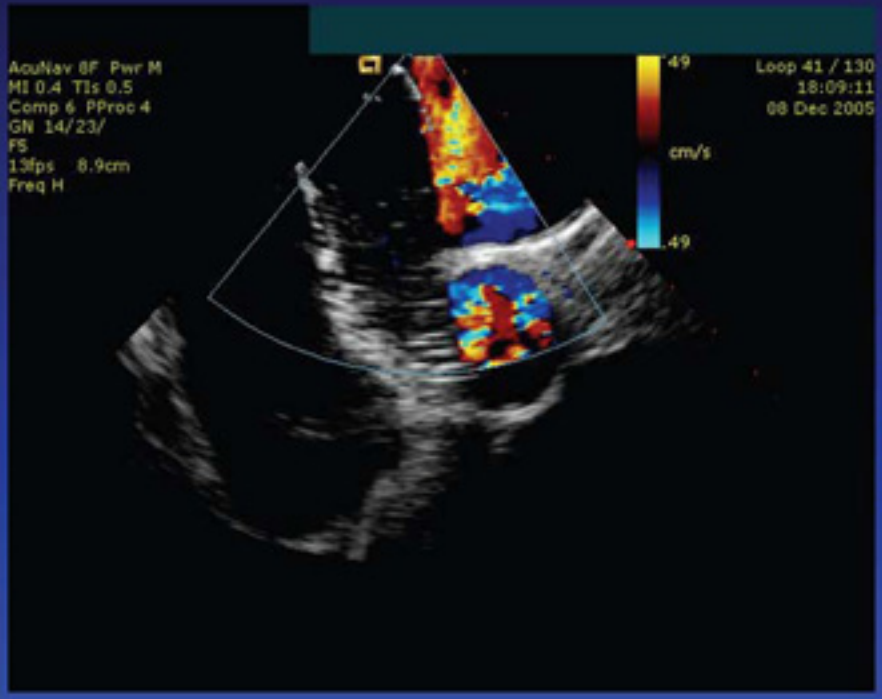
20 mm diameter ASD





Thin floppy posterior rim & absent retroaortic rim

Balloon sizing with stop flow technique



Due to floppy posterior septum, using stop-flow technique, ASD diameter was 30mm!

Proper alignment of device: "A-sign"

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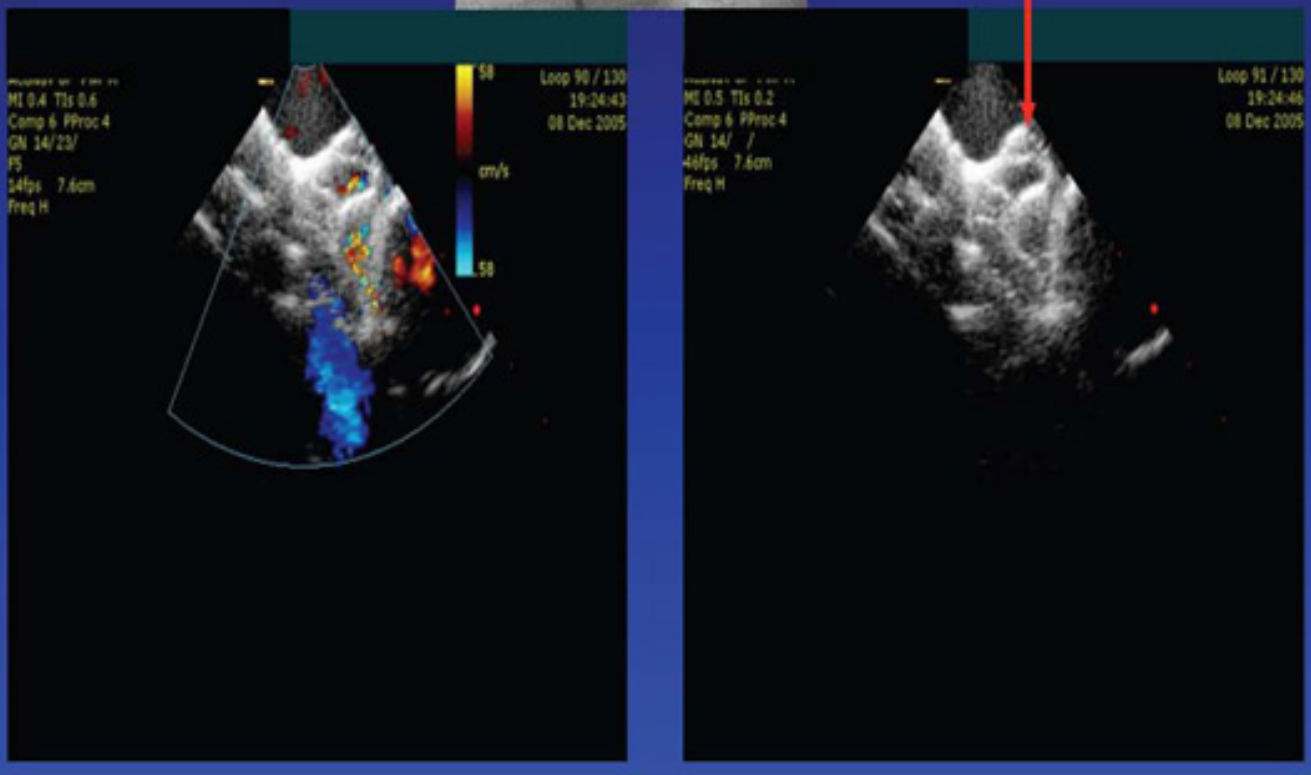
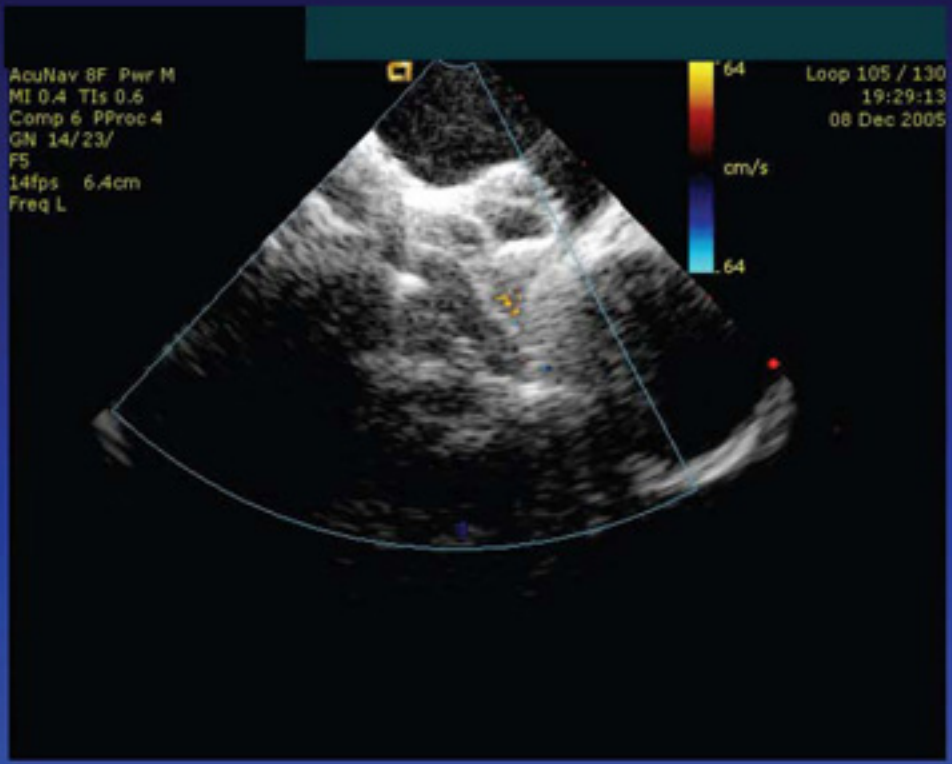
Implant 30mm ASO

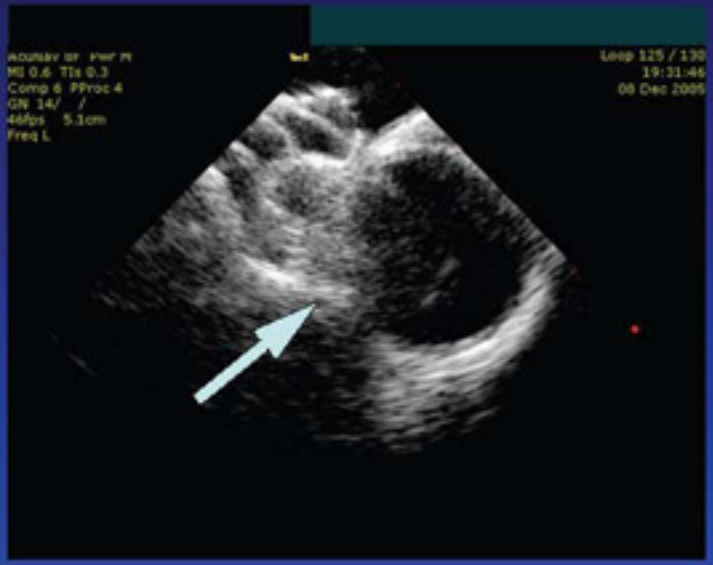


Disk moves with aortic pulsation

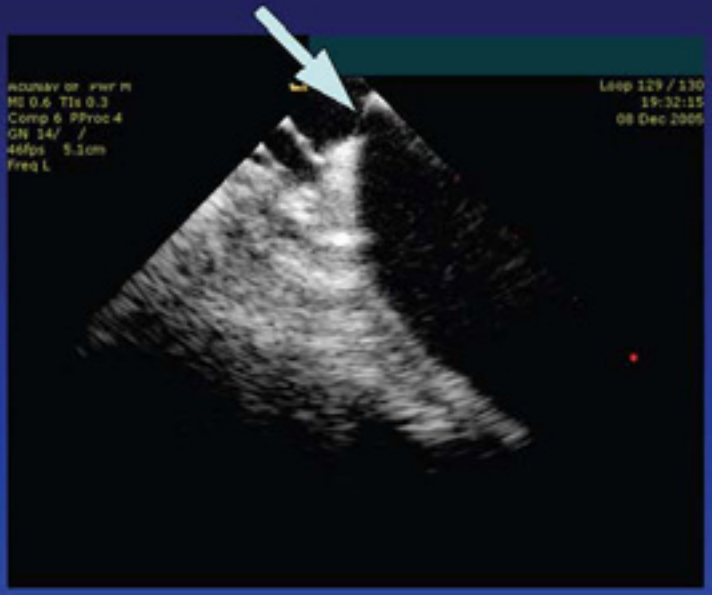


After device release- review rims

Anterior rim



Posterior rim



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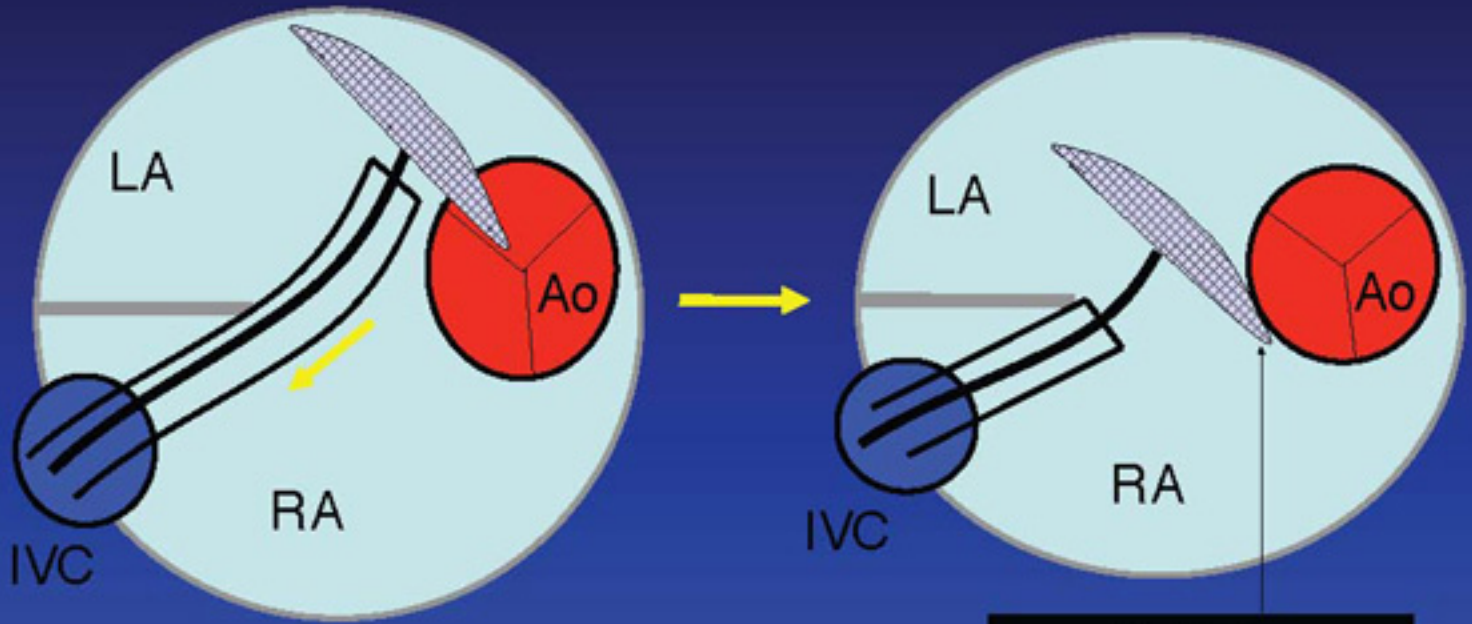
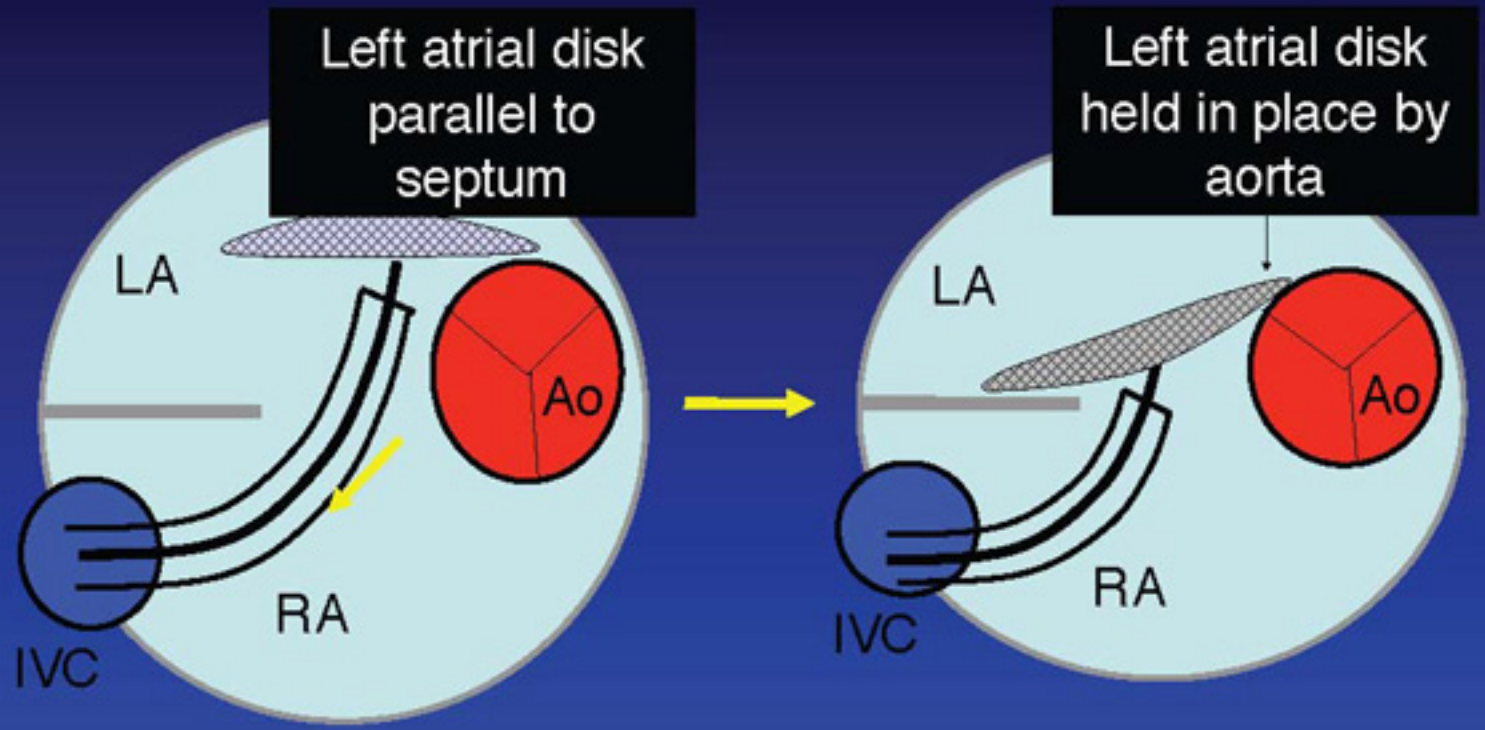
Occlusion:
Align LA disk to atrial septum

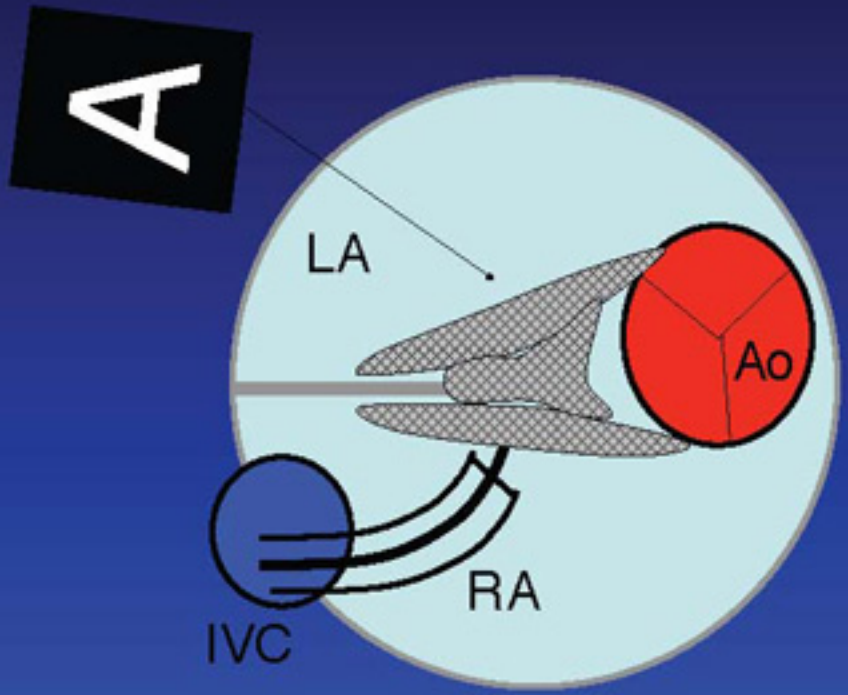
Deficient aortic rims & left atrial disk prolapse into RA



Improved curvature of sheath better aligns LA disk to septum

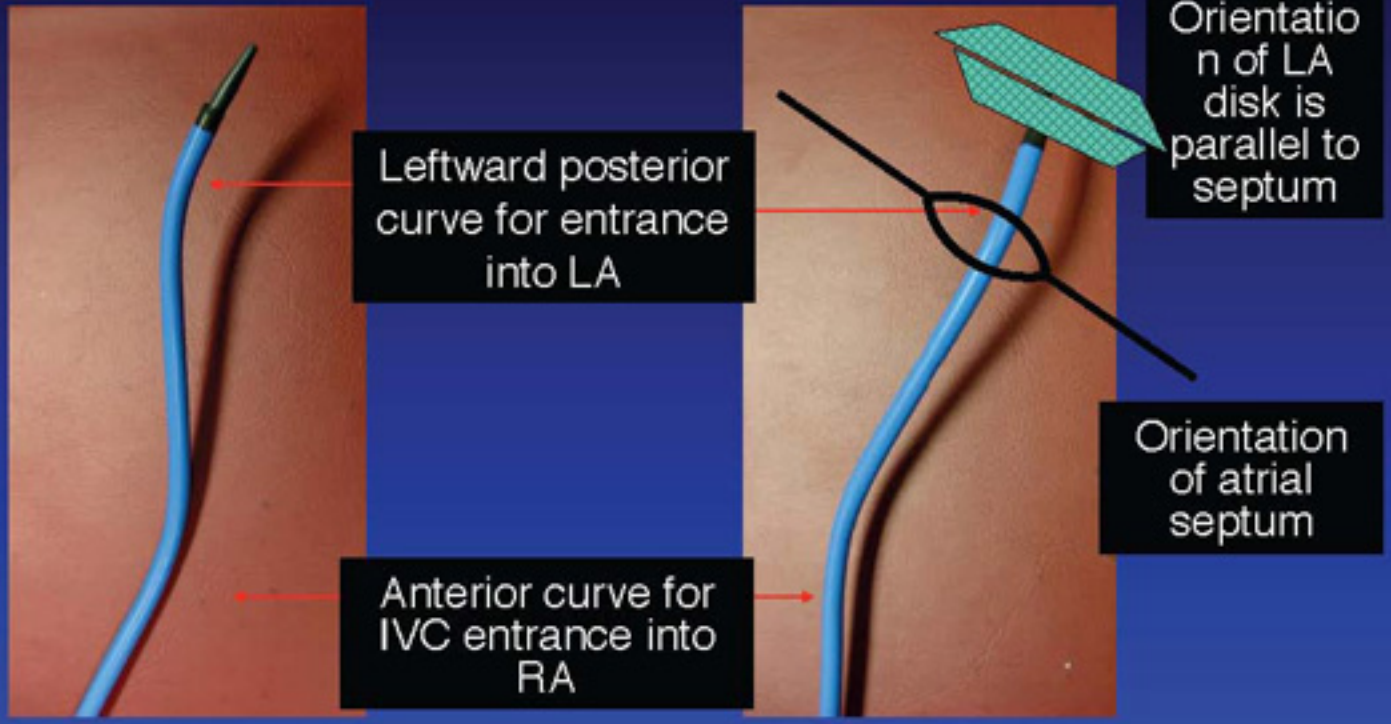


The "A-sign"



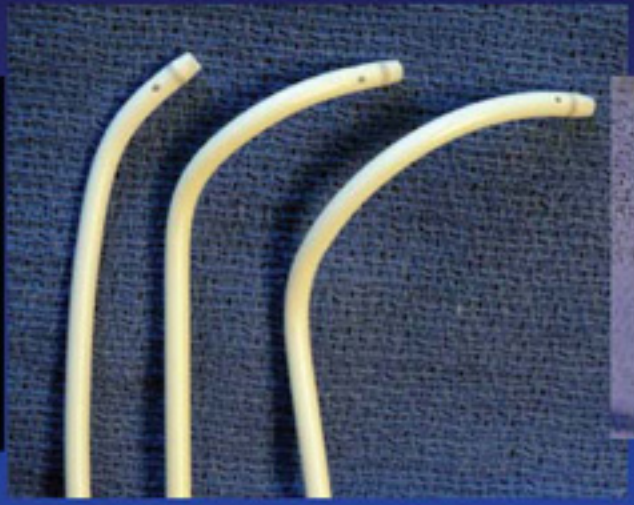
New AGA braided "shapeable" sheath

Hausdorf (Cook) sheath

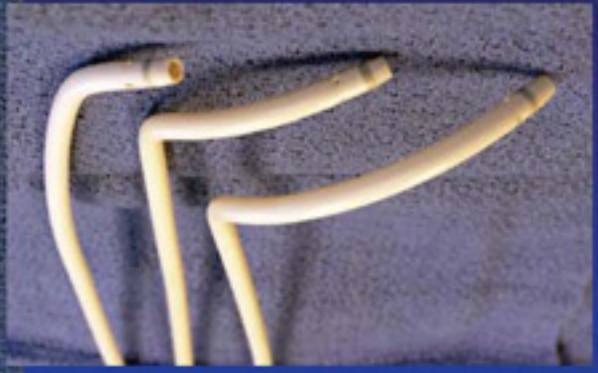


Fast-cath guiding sheaths

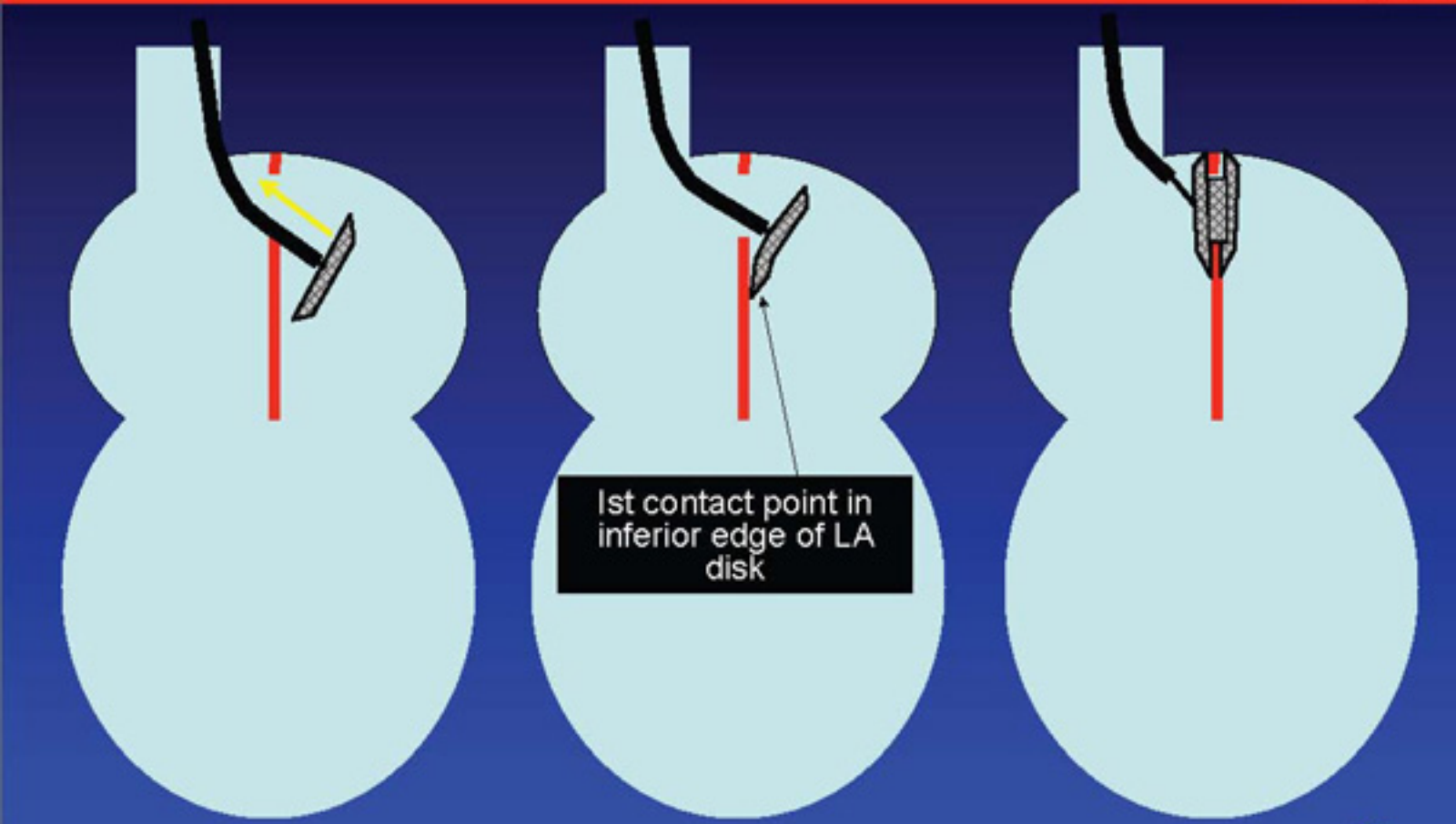
- 8 Fr
- SL1
- SL2
- SL3
- St Jude's Medical
- Can be used for up to 18mm ASD devices



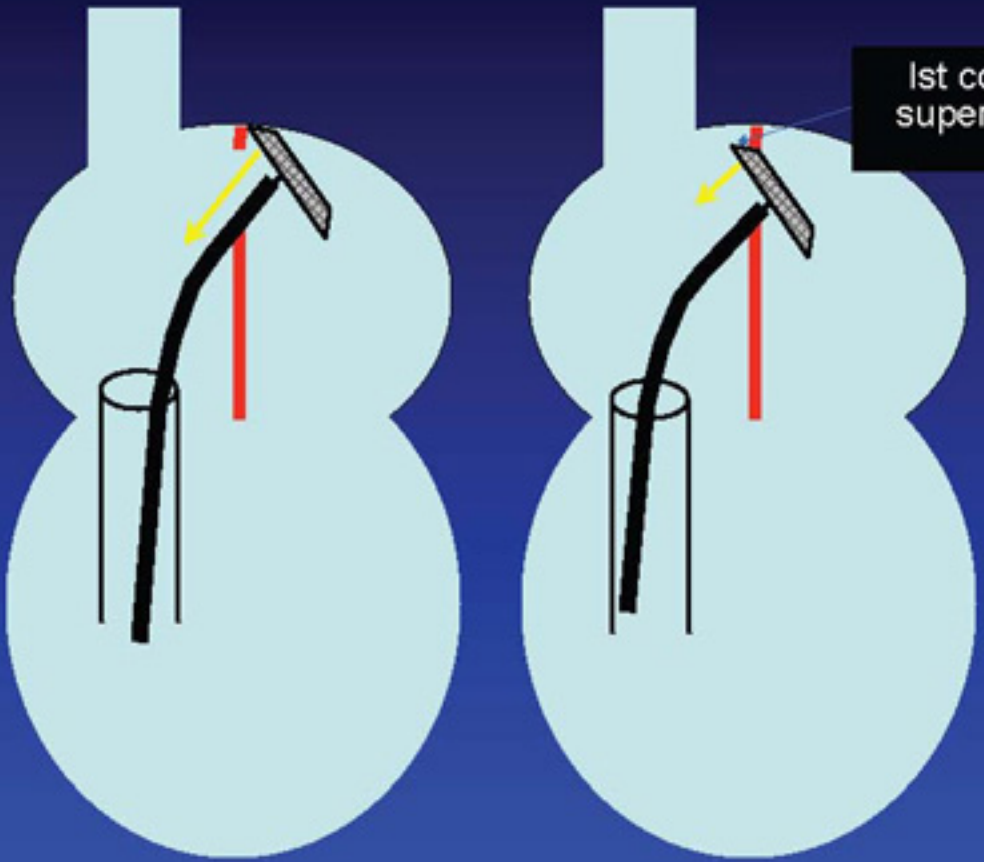
Leftward posterior curve to enter ASD



RIJ approach-angle of LA disk is favorable to anchor on inferior septum

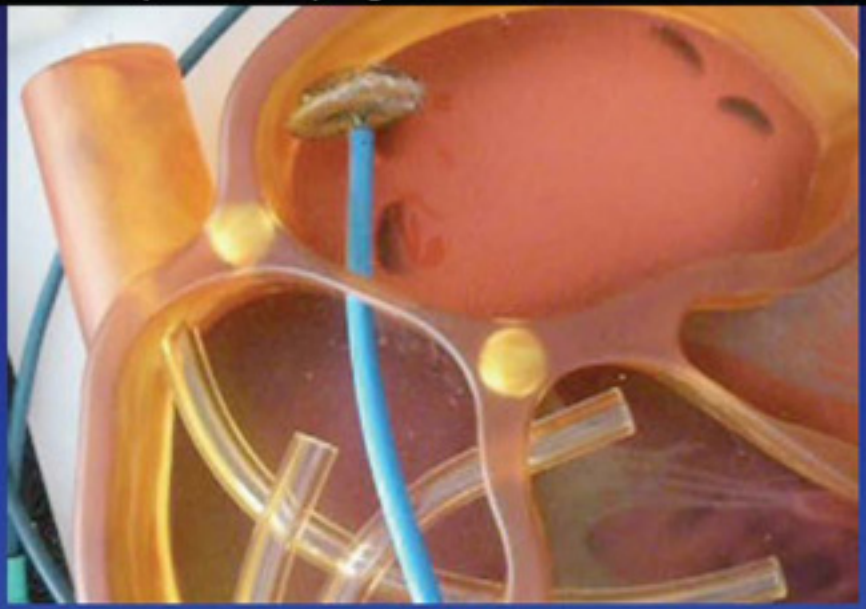


From femoral vein approach-angle of LA disk unfavorable to anchor on superior rim due to deficiency

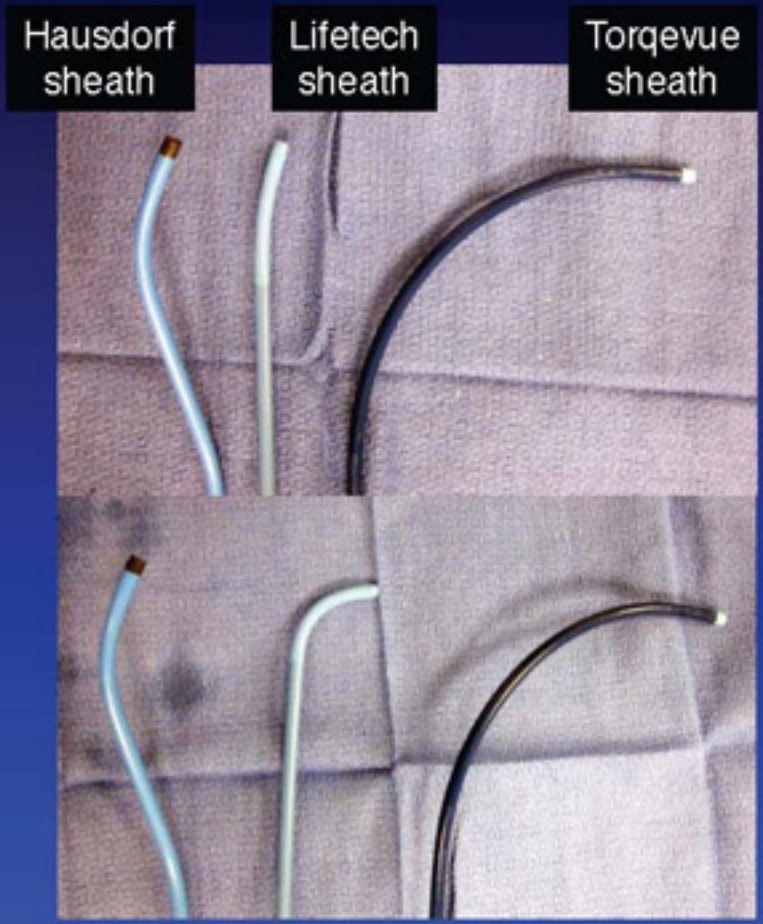


Device delivery using deflectable sheath

Flexcath steerable sheath:
10 Fr (ID 8 Fr)- good for ≤18mm device



Lifetech steerable sheath



20 mm ASD with deficient aortic rim

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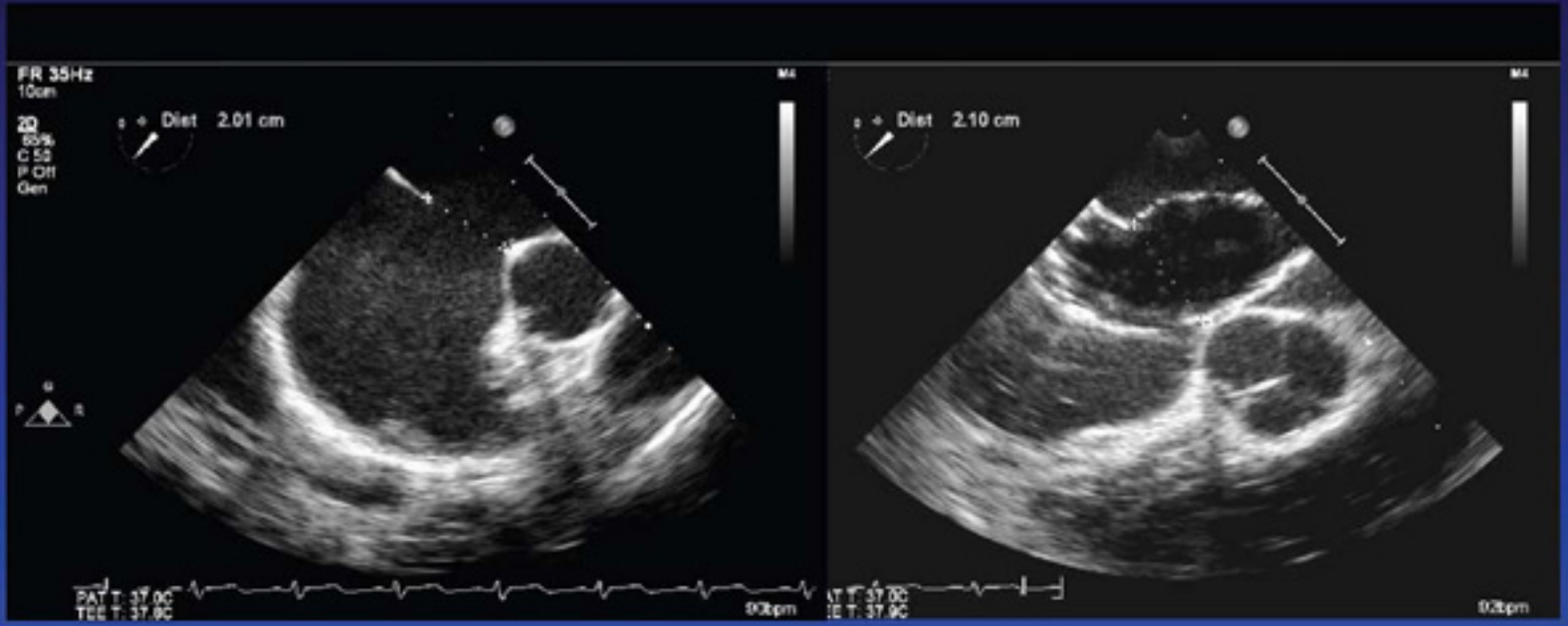
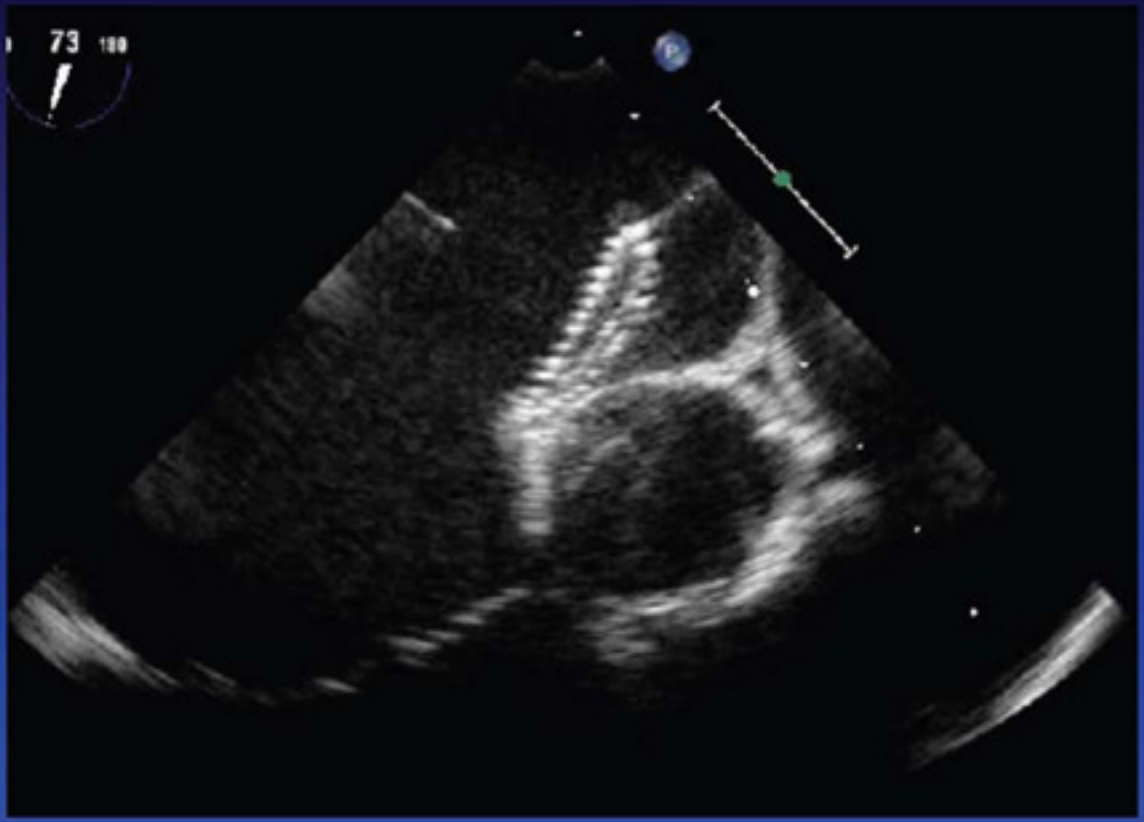
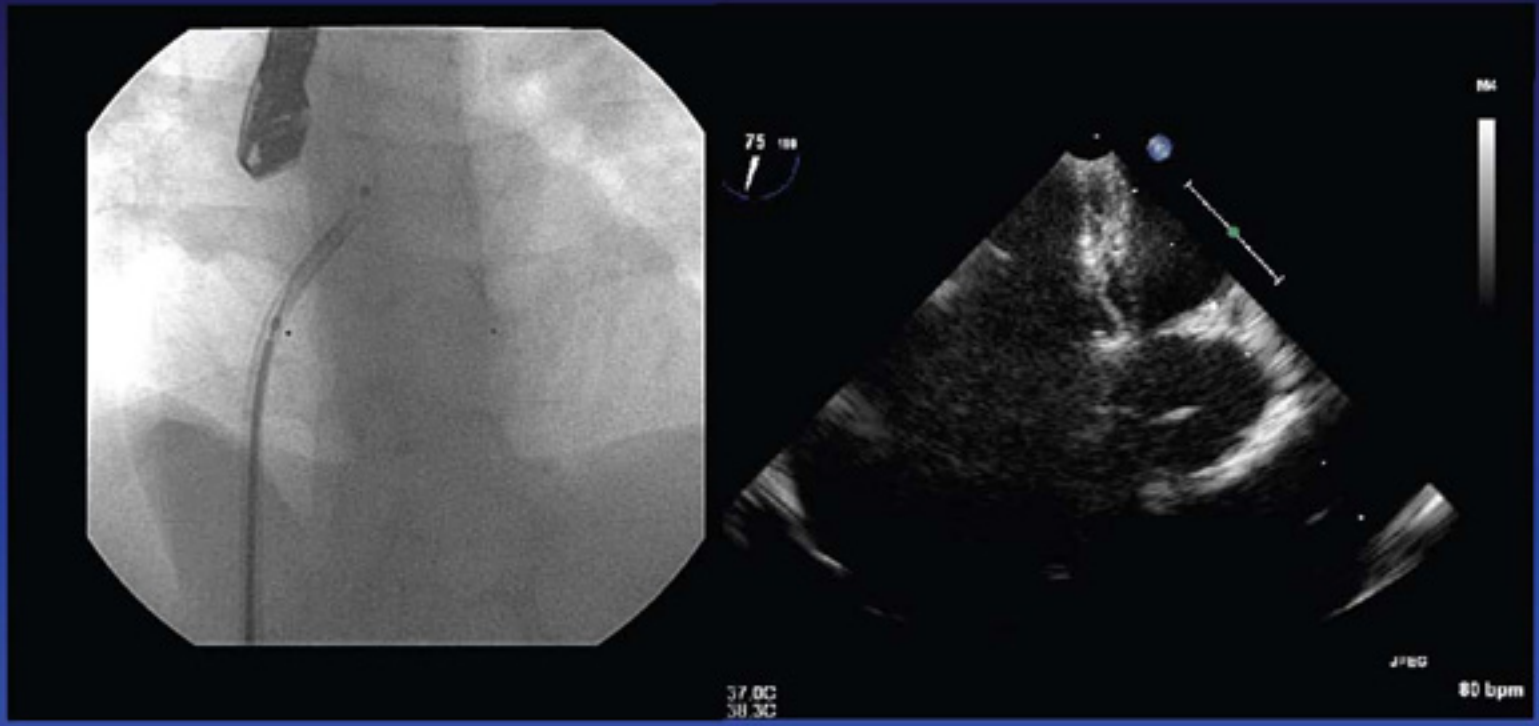
Balloon sized to 21 mm



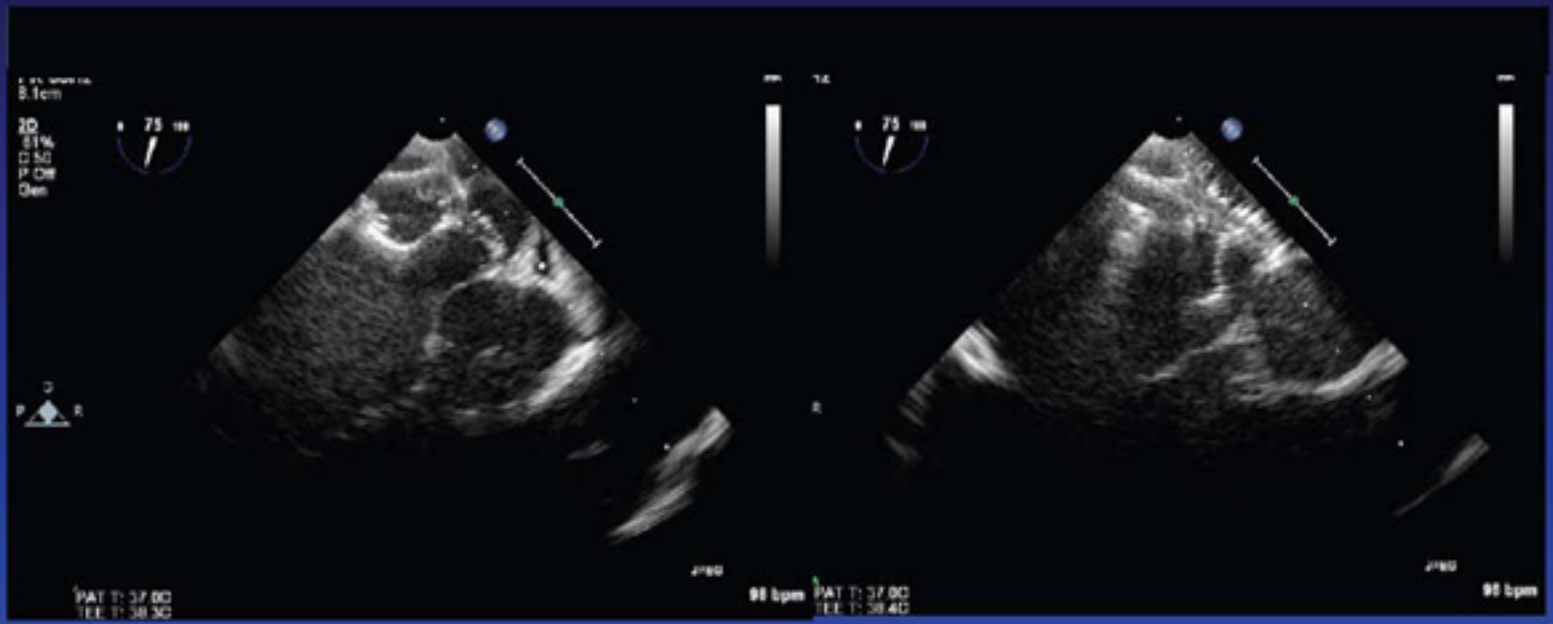
LA disk position?



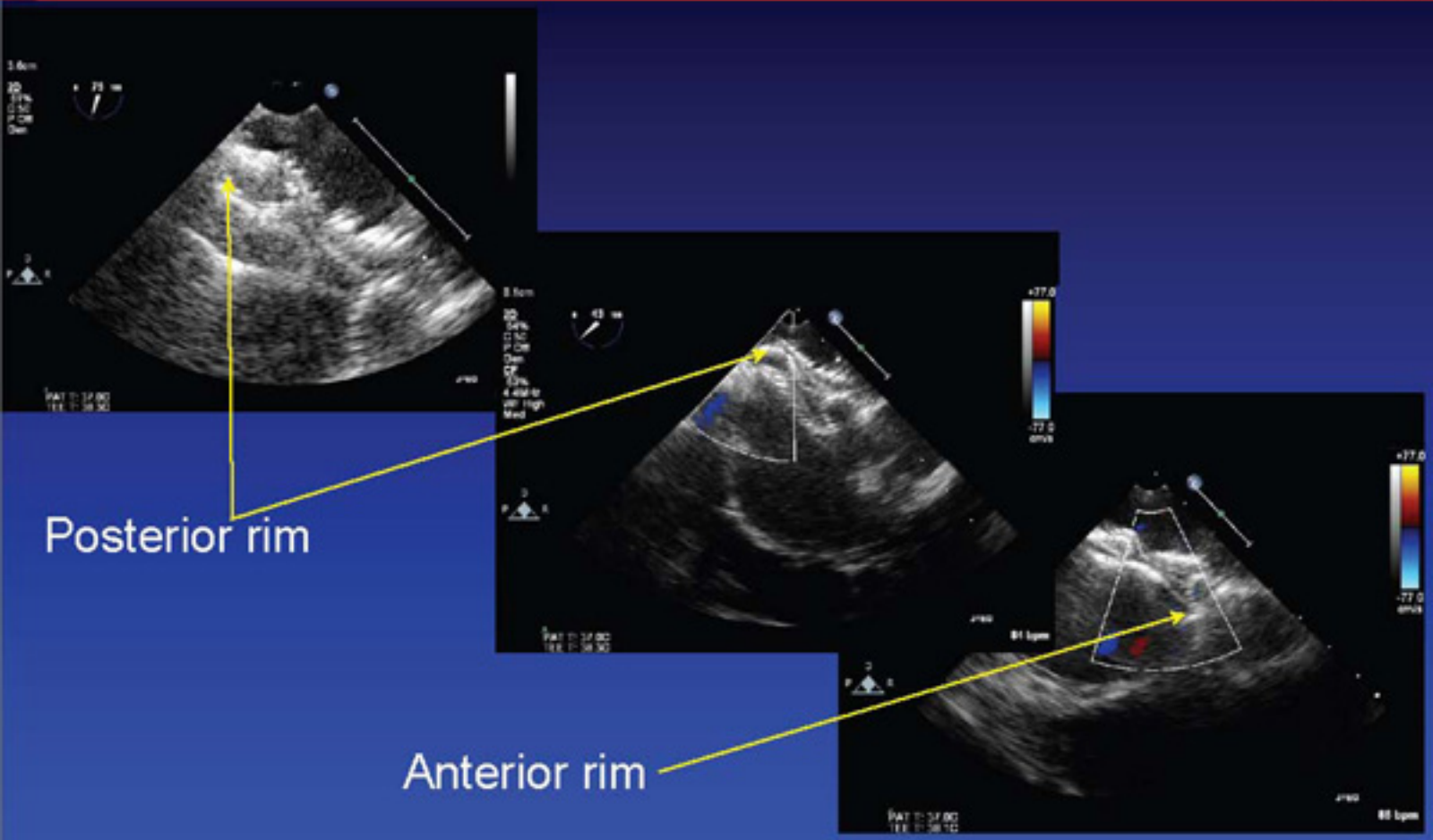
Deflect sheath for LA disk allignment



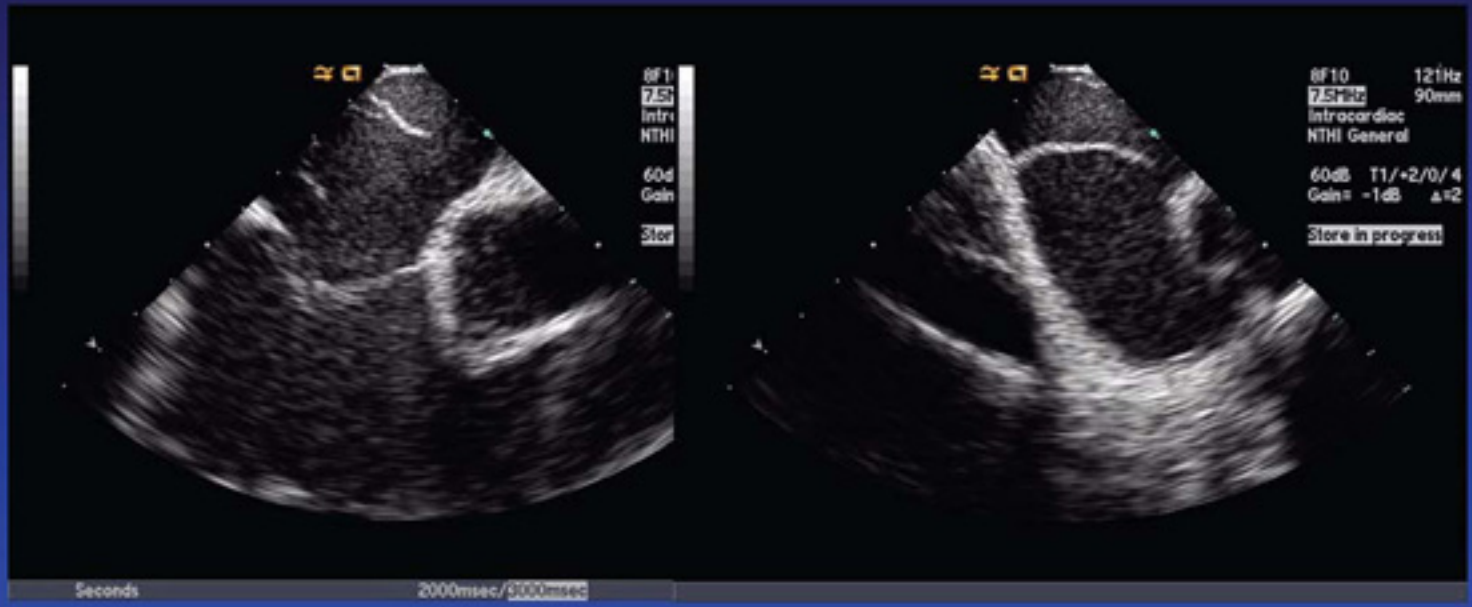
Device deployment



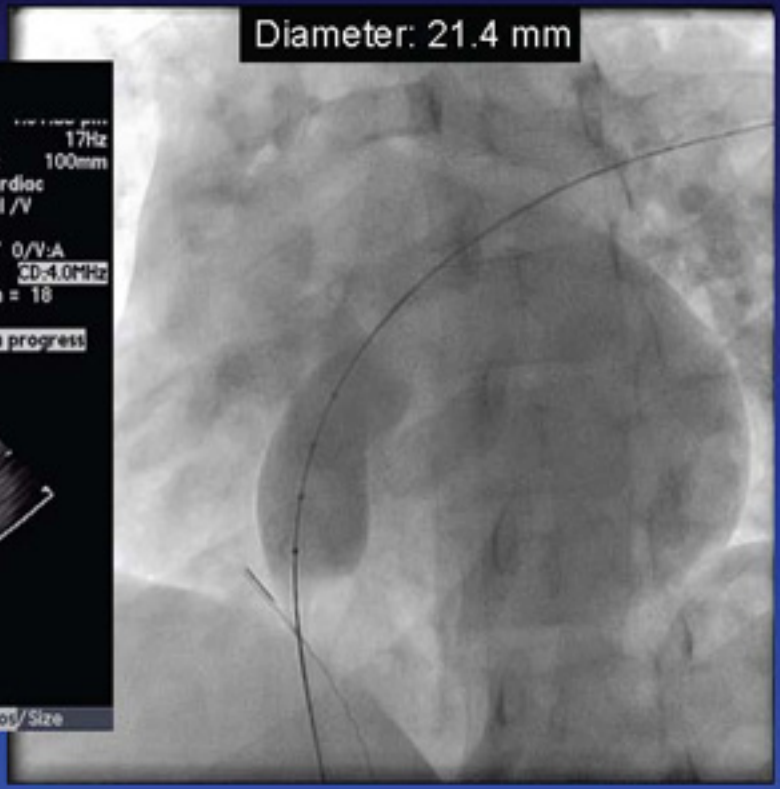
Evaluate device and rims



19 mm ASD with redundant thin atrial septum



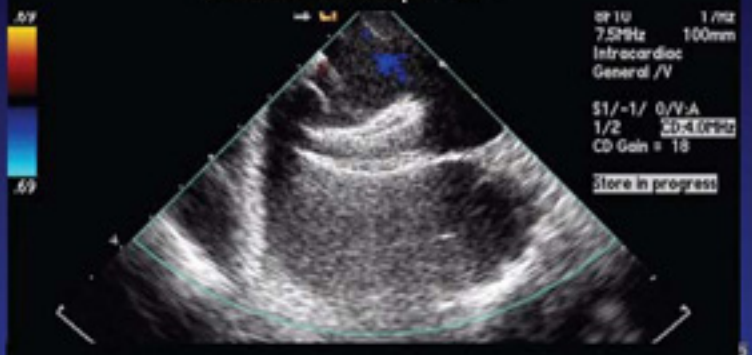
Balloon sizing



Multiple attempts to deploy device using traditional sheath

LA disk poor alignment

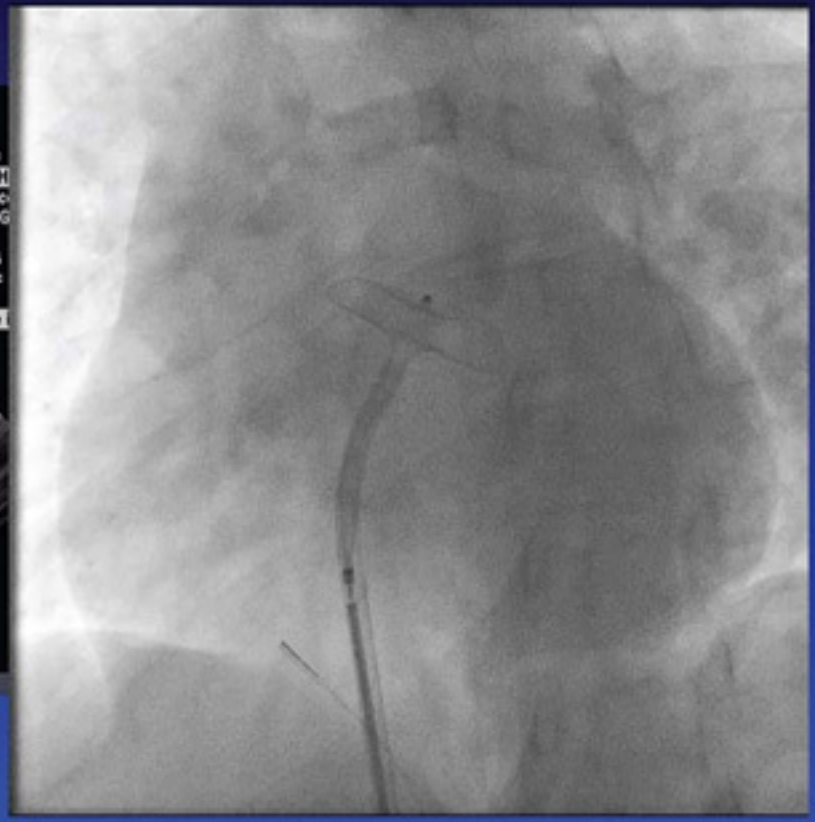
Posterior septum?



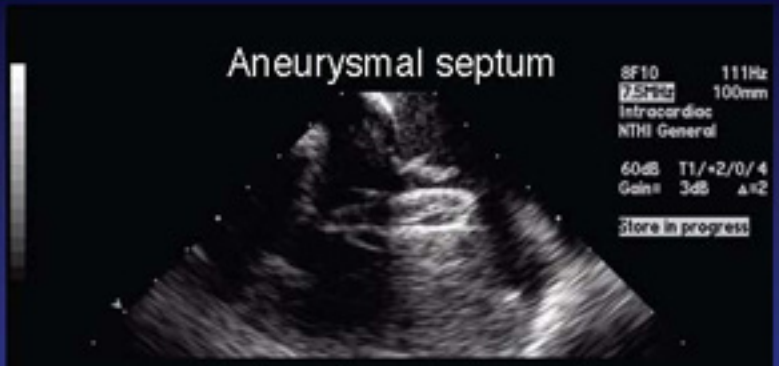
Anterior septum?

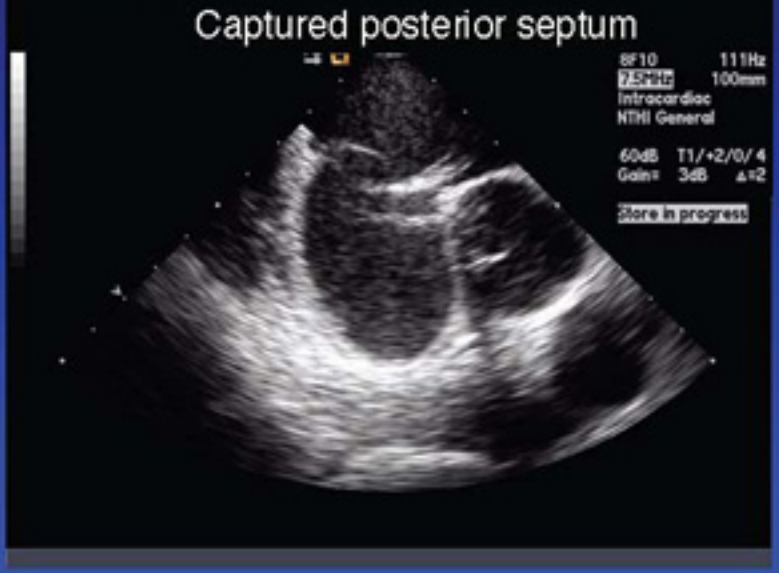
LA disk poor alignment

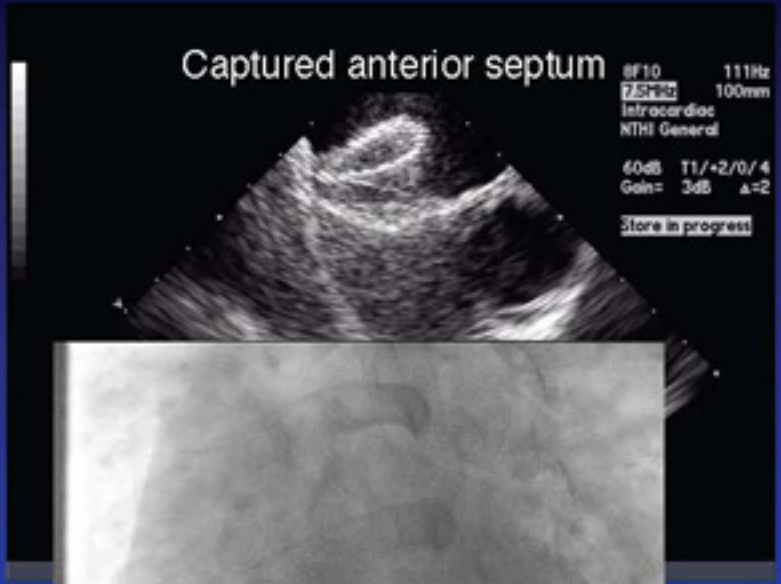
Using steerable sheath to allign LA disk to septum

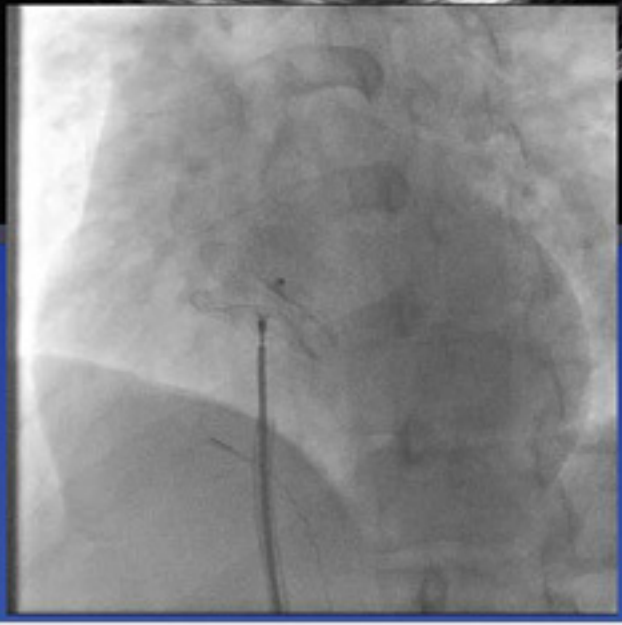


Device implant









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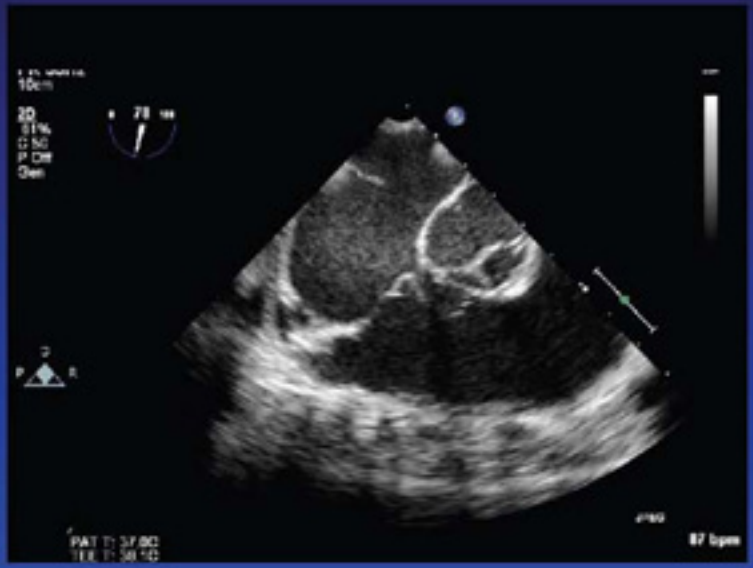
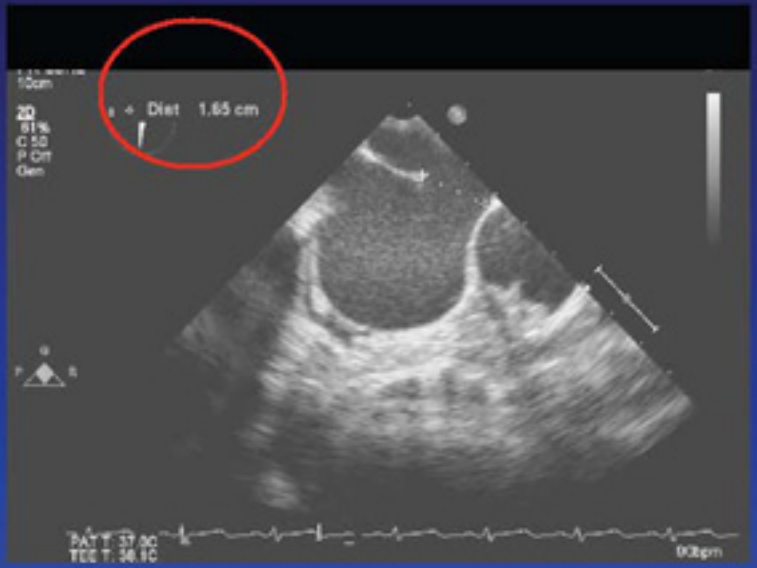
Post-occlusion device assessment:

Important to evaluate device against aorta

May need to upsize or down size device

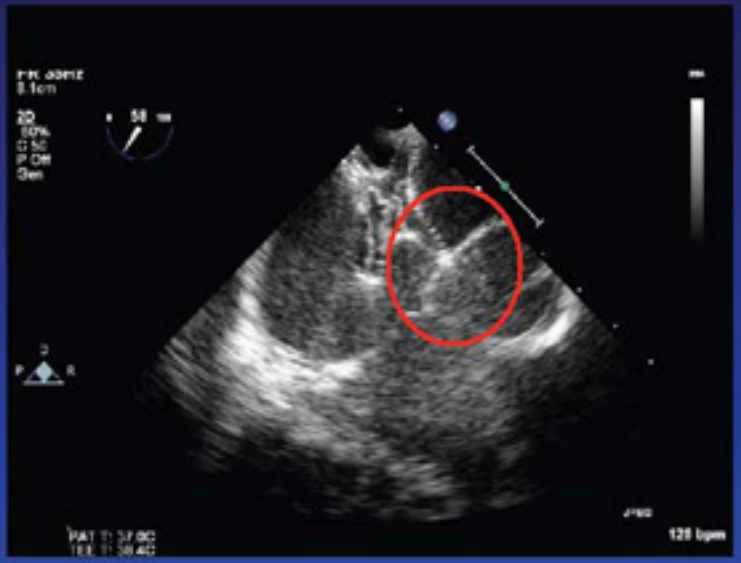
Retroaortic ASD diameter 16.6 mm

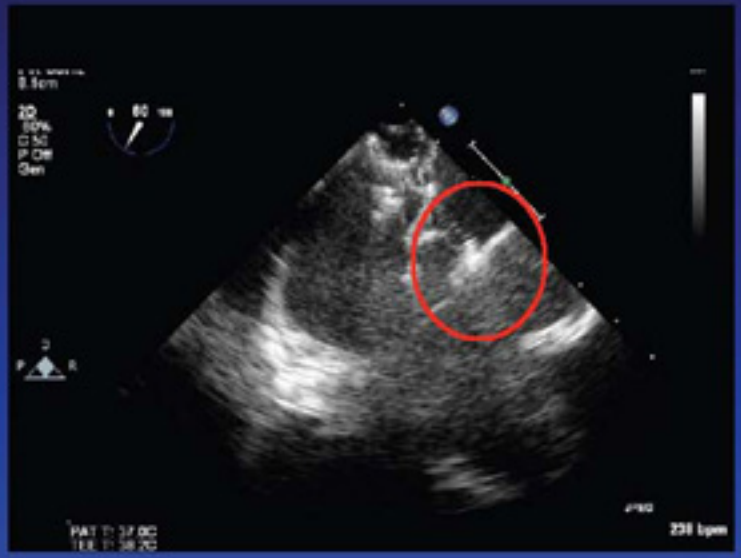




Stop-flow size 20.2 mm; Implanted 20mm Amplatzer

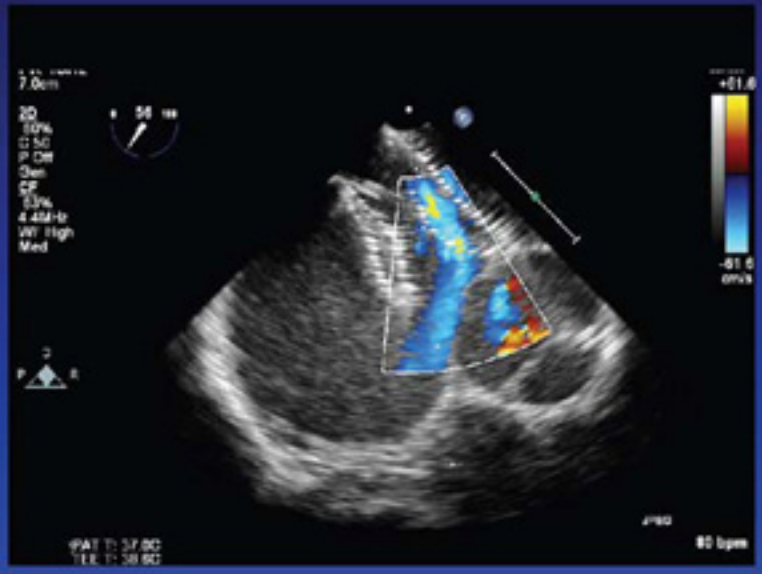
LA disk impinging against aorta even if correctly sized





Upsized to new 22 mm Amplatzer device

LA & RA disks splayed around aorta; disks moved with aortic pulsations



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ASD size 14 mm

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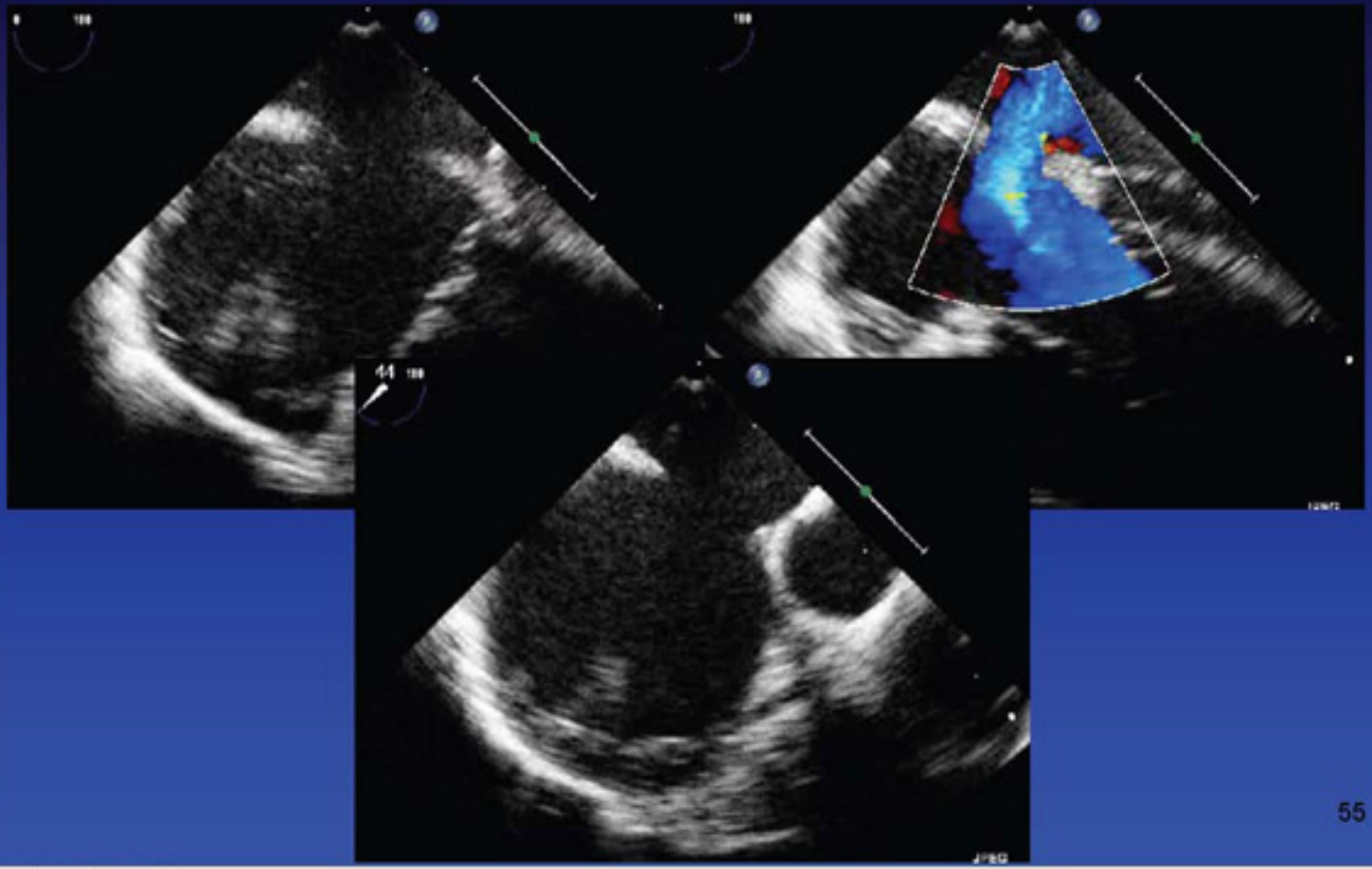
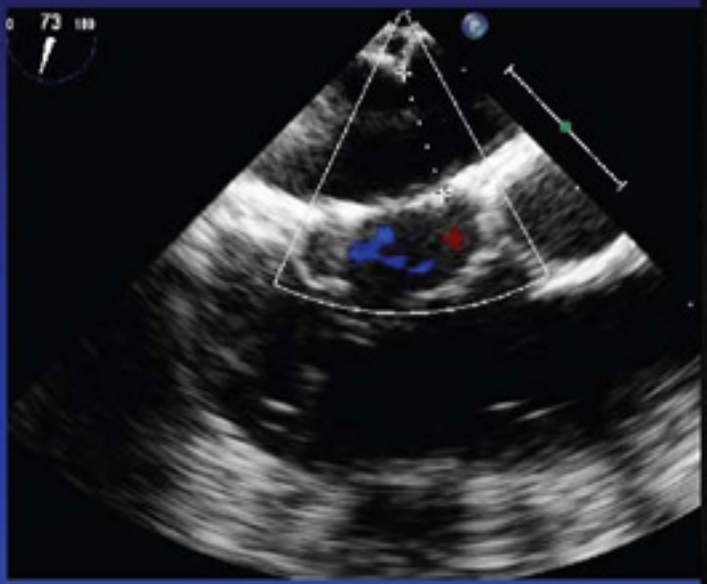
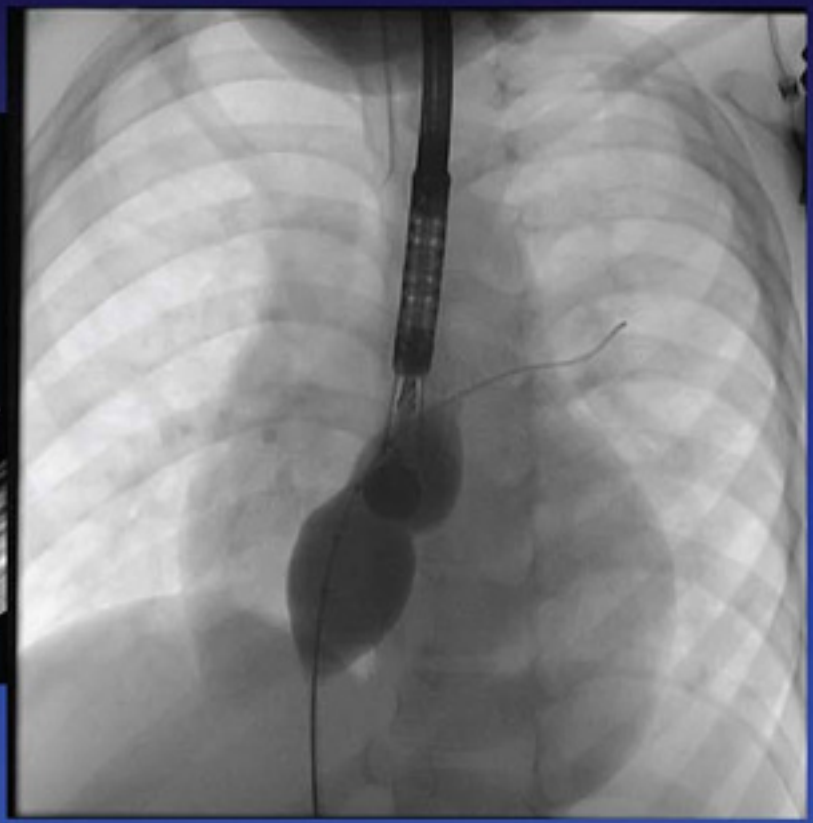
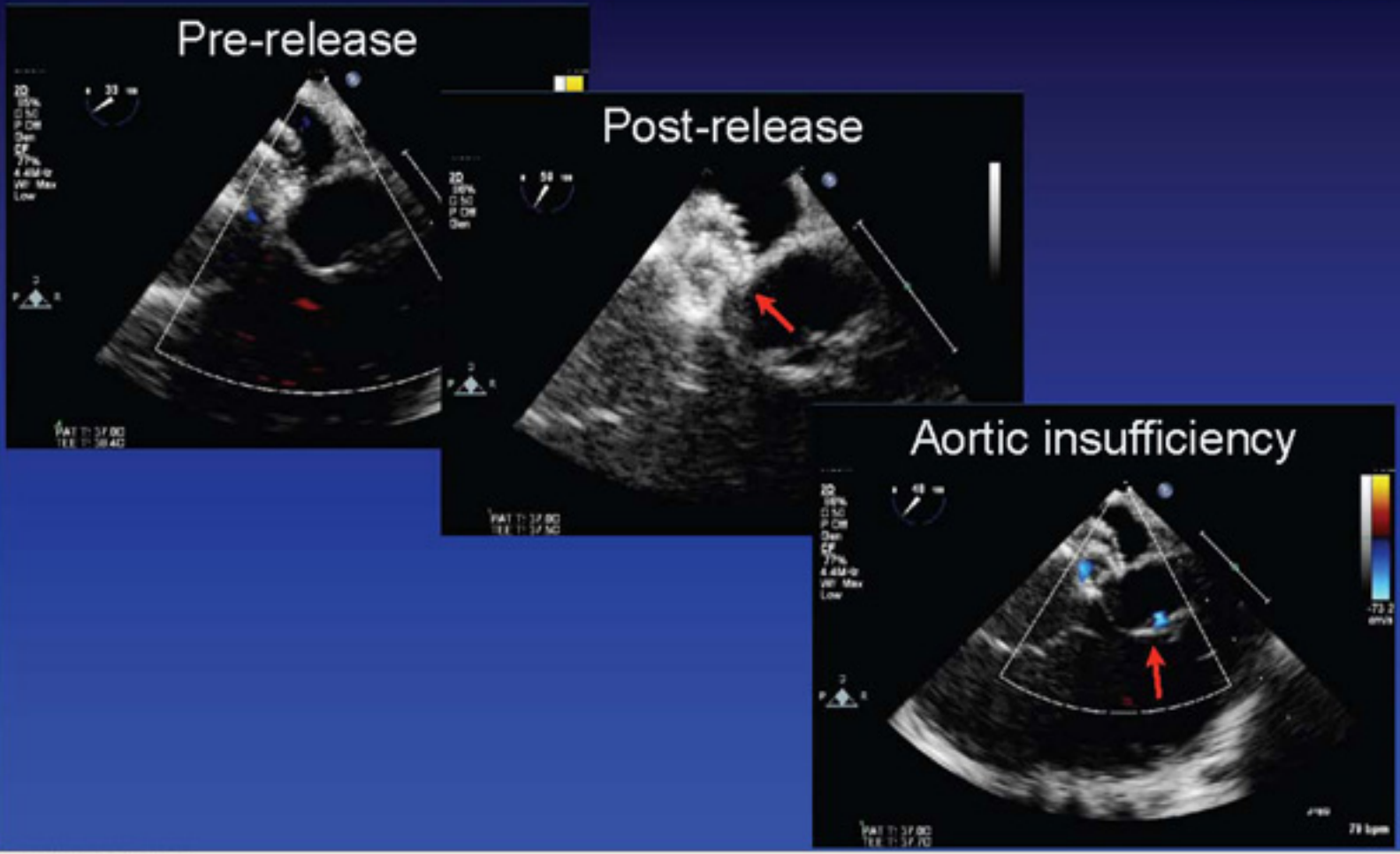


Balloon size 15.6 mm

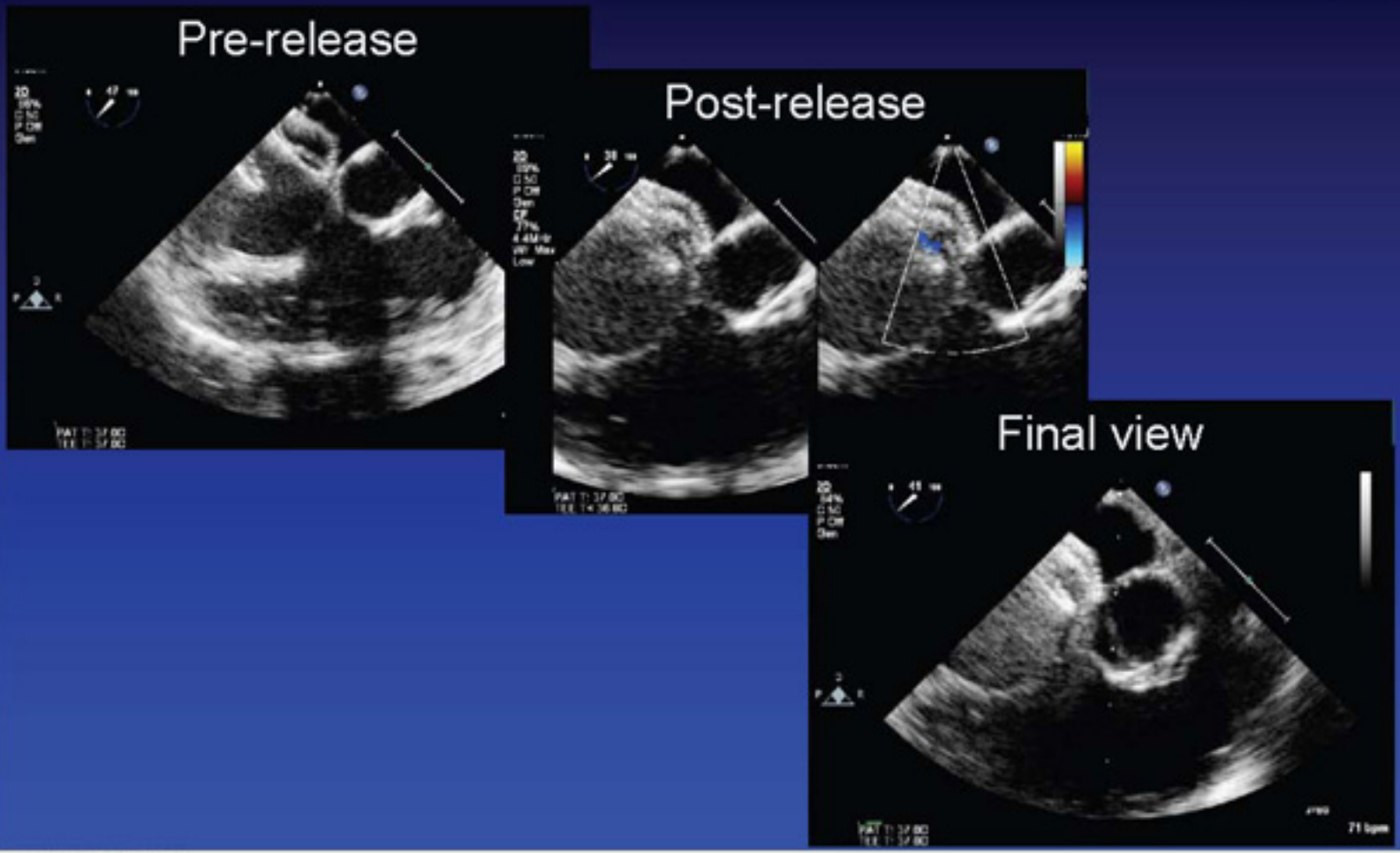




Implanted 16 mm ASO



Downsize to new 14 mm ASO



Comparing devices

16 mm ASO

14 mm ASO

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Summary

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- Many technical aspects to ASD occlusion
- Most pertains to safety of procedure to avoid device embolization and erosion
- Pay attention to small details
- Pay attention to device impingement on aorta
- Do not be afraid to retrieve device if not completely satisfied
- May need to upsize or downsize device depending on anatomy