

# Advanced Tips for Closure of Atrial Septal Defects



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# Thank you !



Dr. Jae Young Choi

I would like to express my many thanks for his very kind assistance and help to prepare this presentation.

Most of the slide courtesy from Dr. Choi

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# Technical difficulties to close defect

## ✓ Complex anatomy

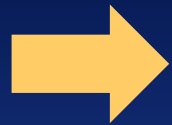
- deficient rim
- large defect
- multiple defect
- vascular access - IVC occlusion

## ✓ Complex clinical condition

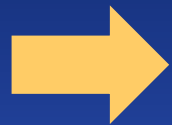
- small children +/- large defect
- elderly with impaired LV diastolic function
- ASD + PAH

# Large Defects ± Deficient Rim(s)

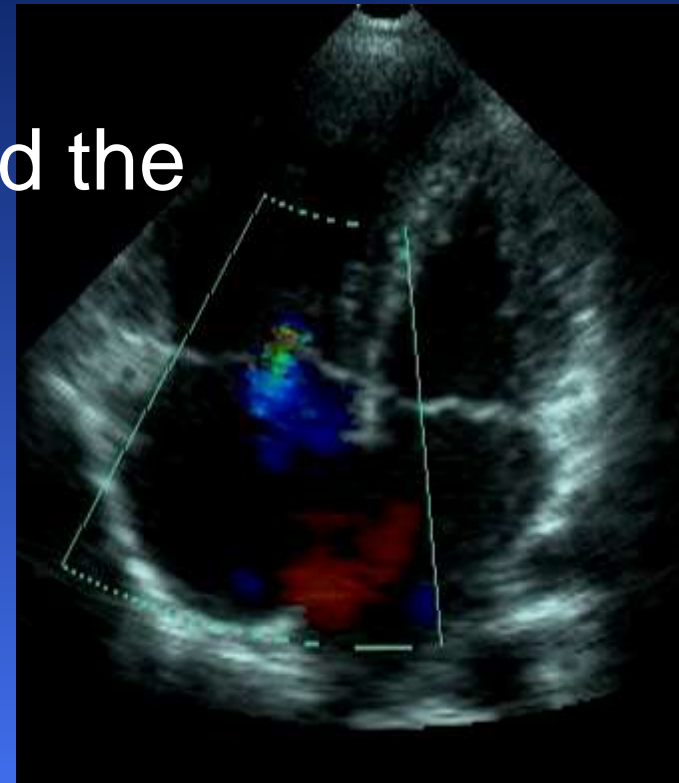
- Difficulties in device implantation



Prolapse of LA disc to RA

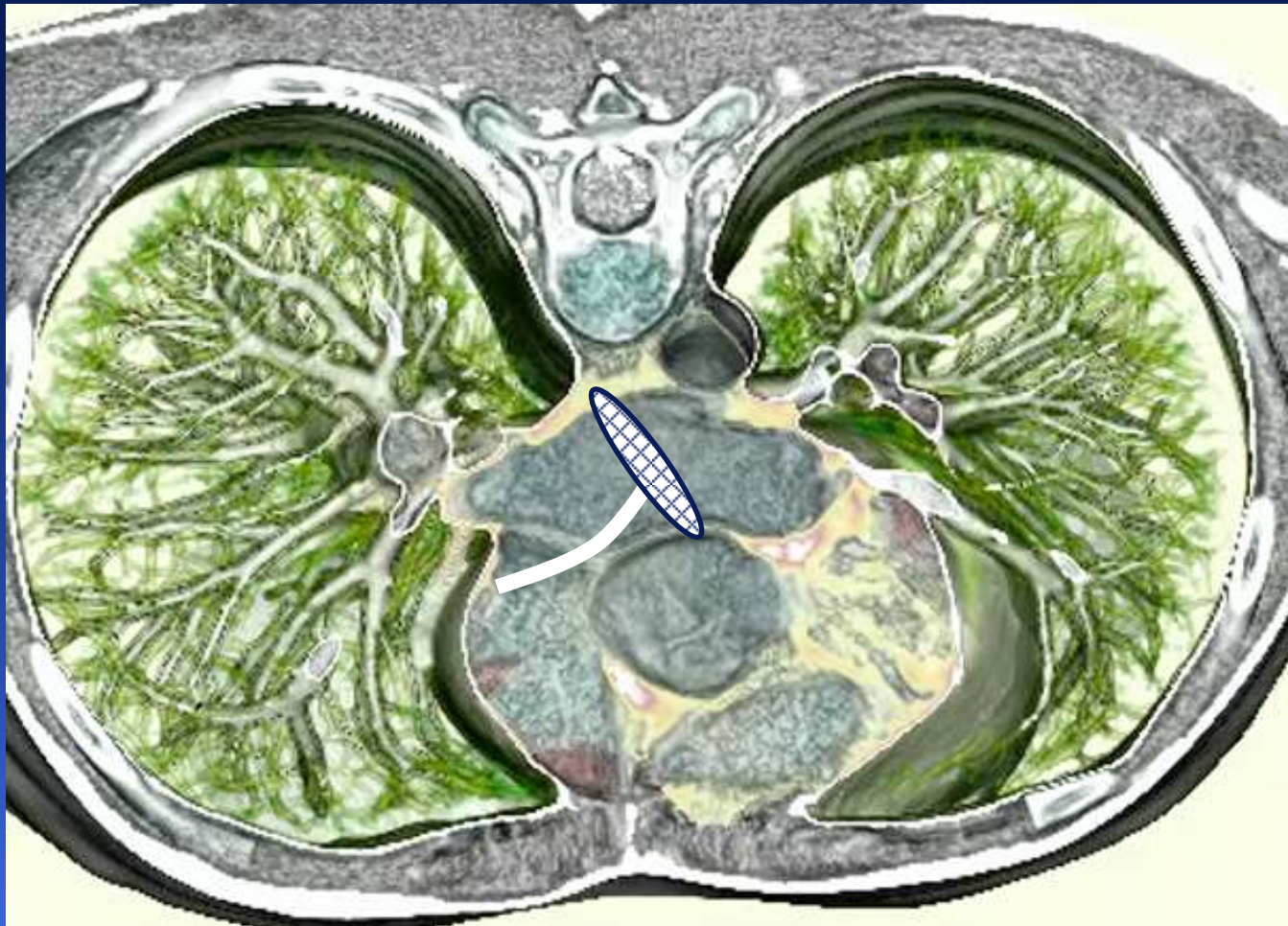


Difficult to grab/hold the floppy or thin rim



# Large Defects ± Deficient Rim(s)

- Misalignment of Disc to atrial septum



# Large Defects $\pm$ Deficient Rim(s)

Misalignment of ASO disc to atrial septum

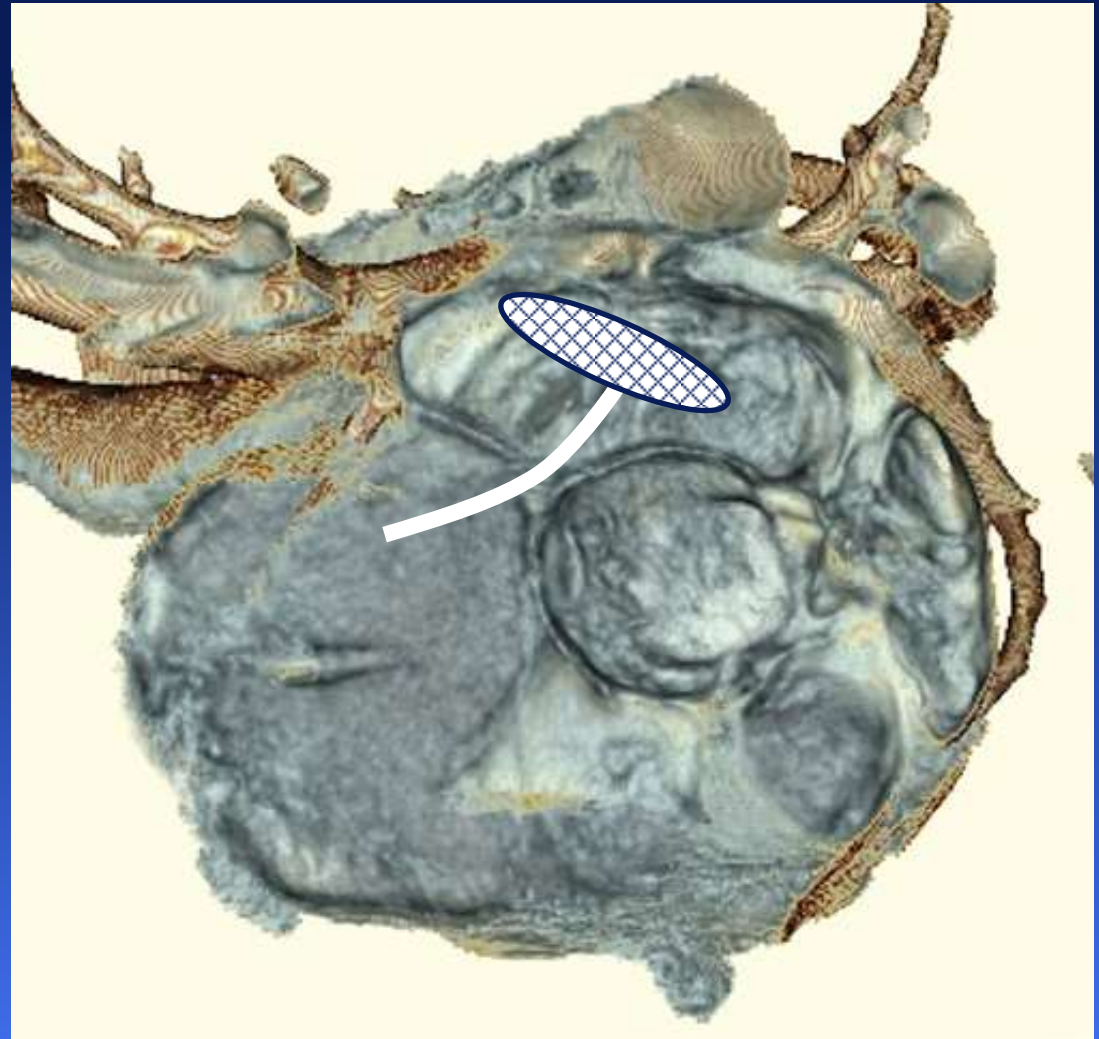


Set the plane of ASO disc parallel to that of atrial septum to prevent the prolapse of the disc



# Large Defects $\pm$ Deficient Rim(s)

- Set the Disc in the plane of atrial septum



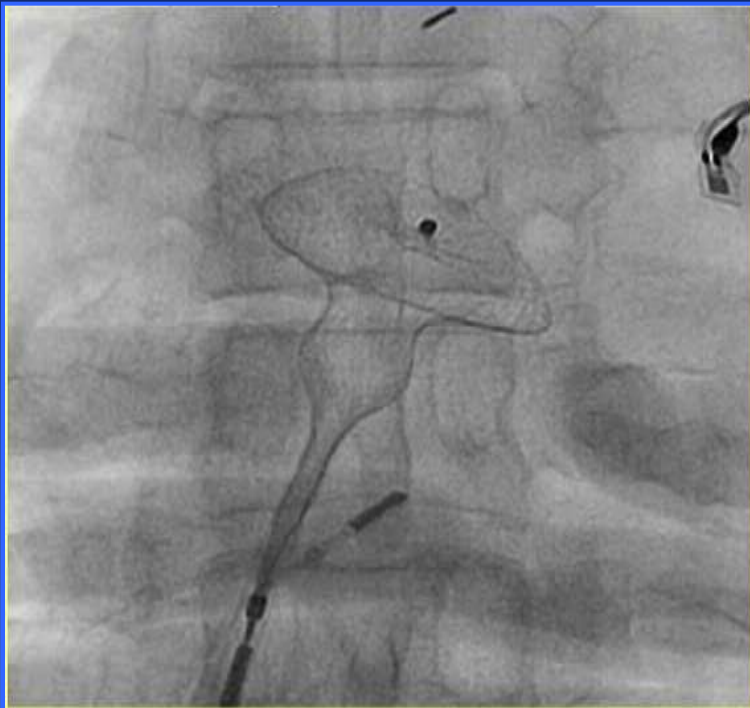
## - Advanced tip of Technical Modifications-

1. Waist deployment in LA
2. Rotation of sheath in LA
3. RUPV technique (hypomochlion technique, LA roof technique)
4. LUPV technique
5. Stiff sheath (dilator) technique (Wahab technique)
6. Bending (pre-shaping) / cutting of sheath tip
7. Use of Hausdorf-Lock sheath
8. Balloon-assisted technique
9. Straight side hole sheath technique
10. Steerable sheath technique
11. Use of JR guiding catheter
12. Transhepatic approach



## - Open Waist in LA -

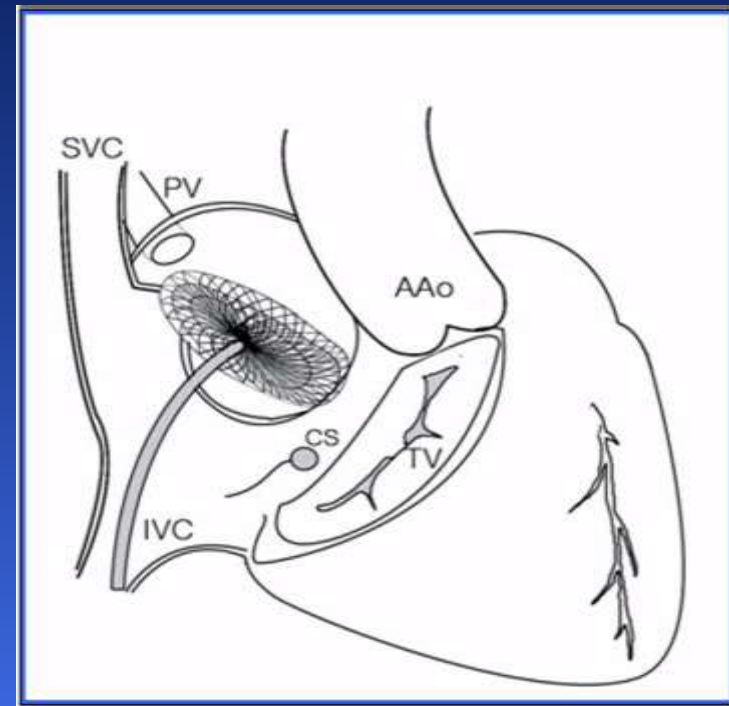
- **deploy the waist of the device ( part of RA disk) before pulling the device back from LA into the defect (promotes self-centering in the defect)**



## - Rotating the Sheath -

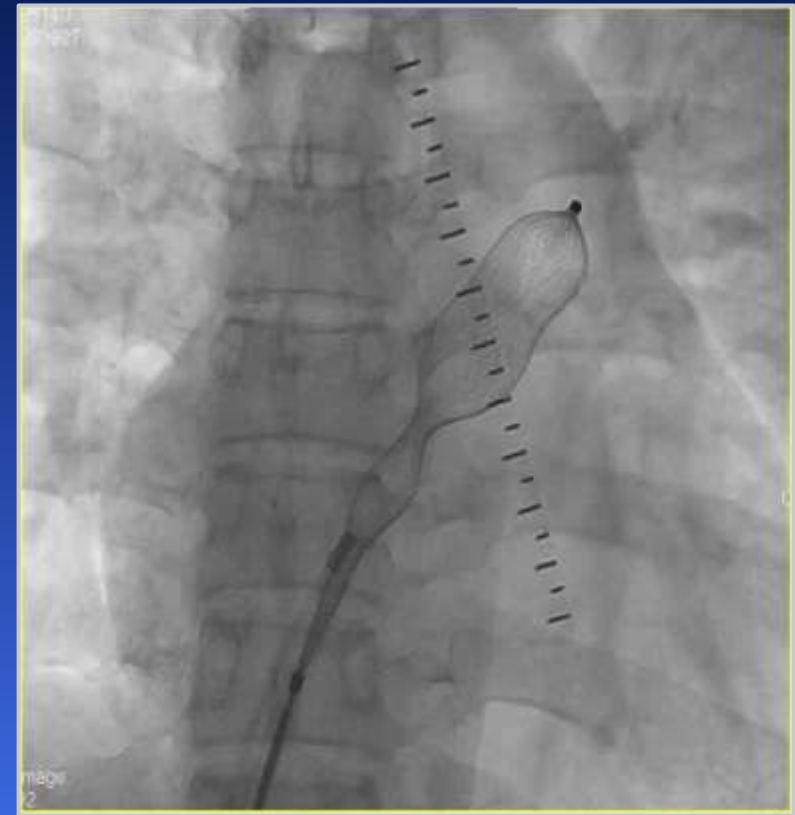
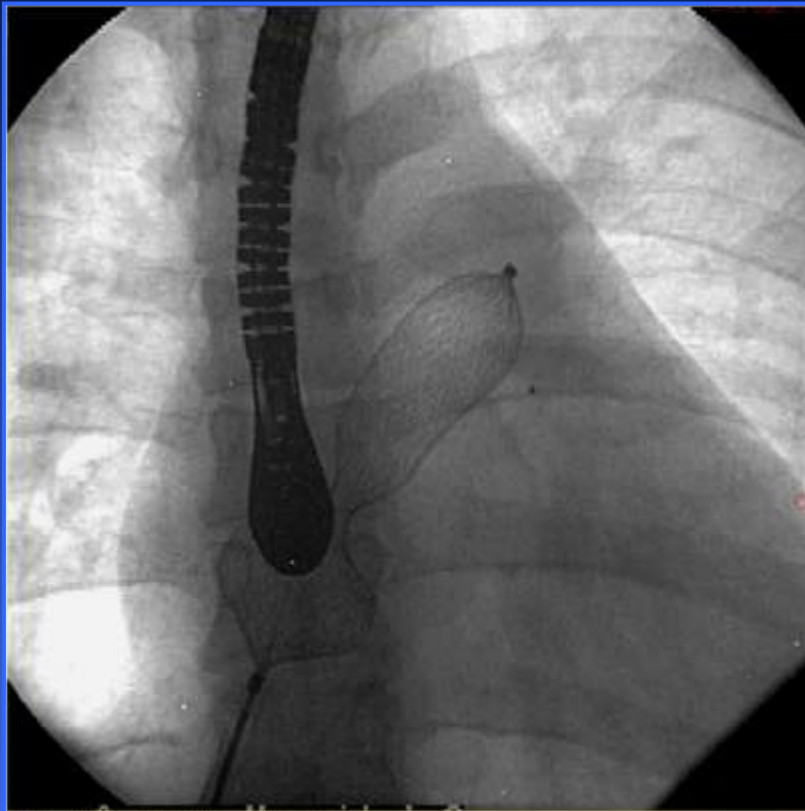
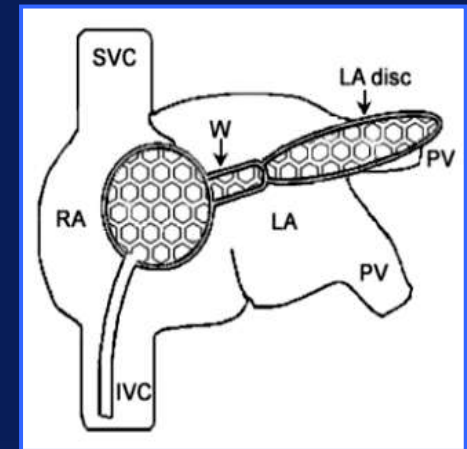
- Clockwise rotation of the sheath may redirect LA disk to be more parallel to the septum
- Counterclockwise rotation from the mouth of atrial appendage : grip aortic root better

*Harper RW et al. CCI 2002;57:508*



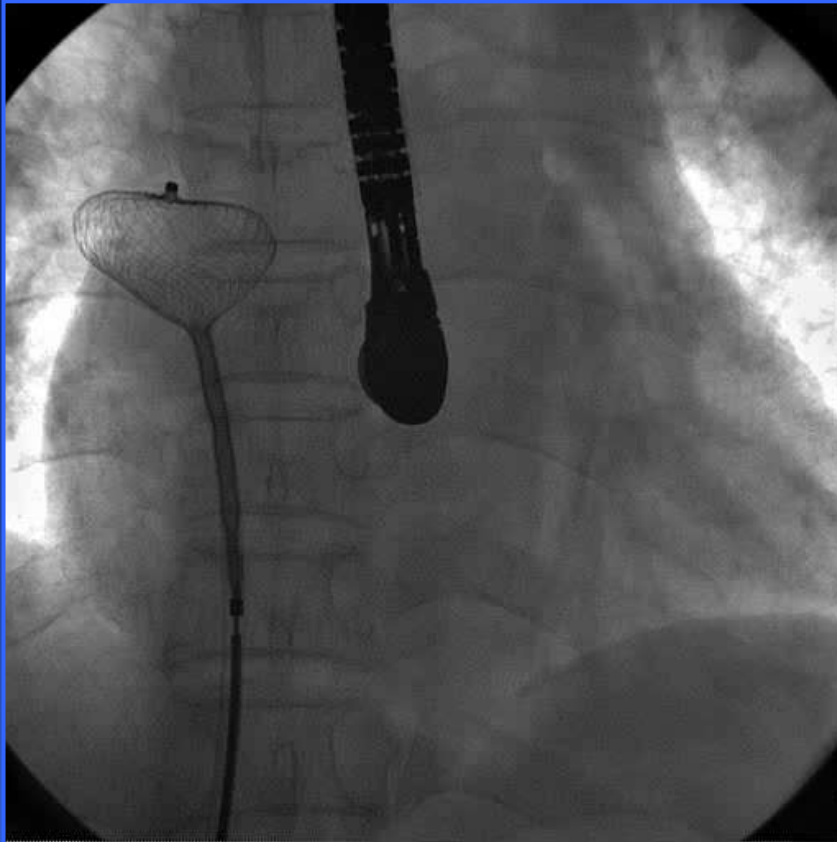
# LUPV Technique

American Football Technique

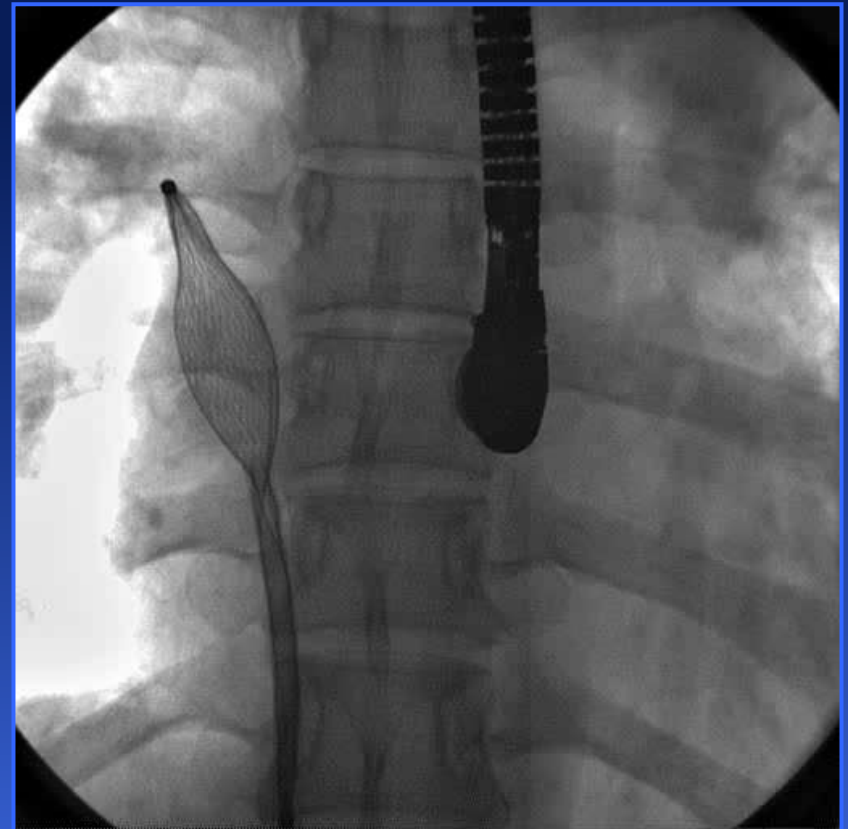


# - RUPV Technique -

from the **orifice** of RUPV



from the **inside** of RUPV



Berger F et al. *J Interv Cardiol* 2001;14:63

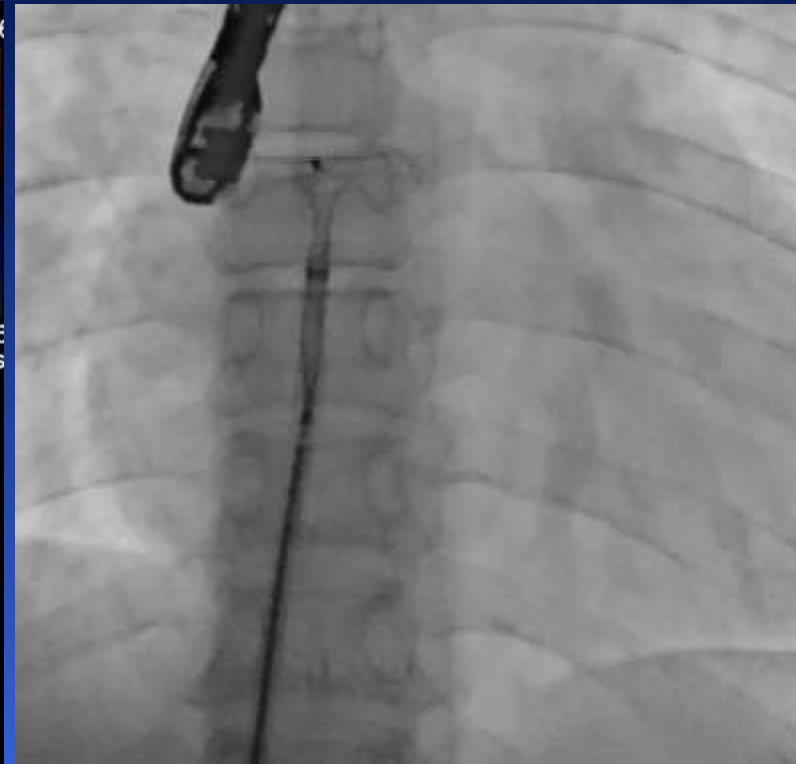
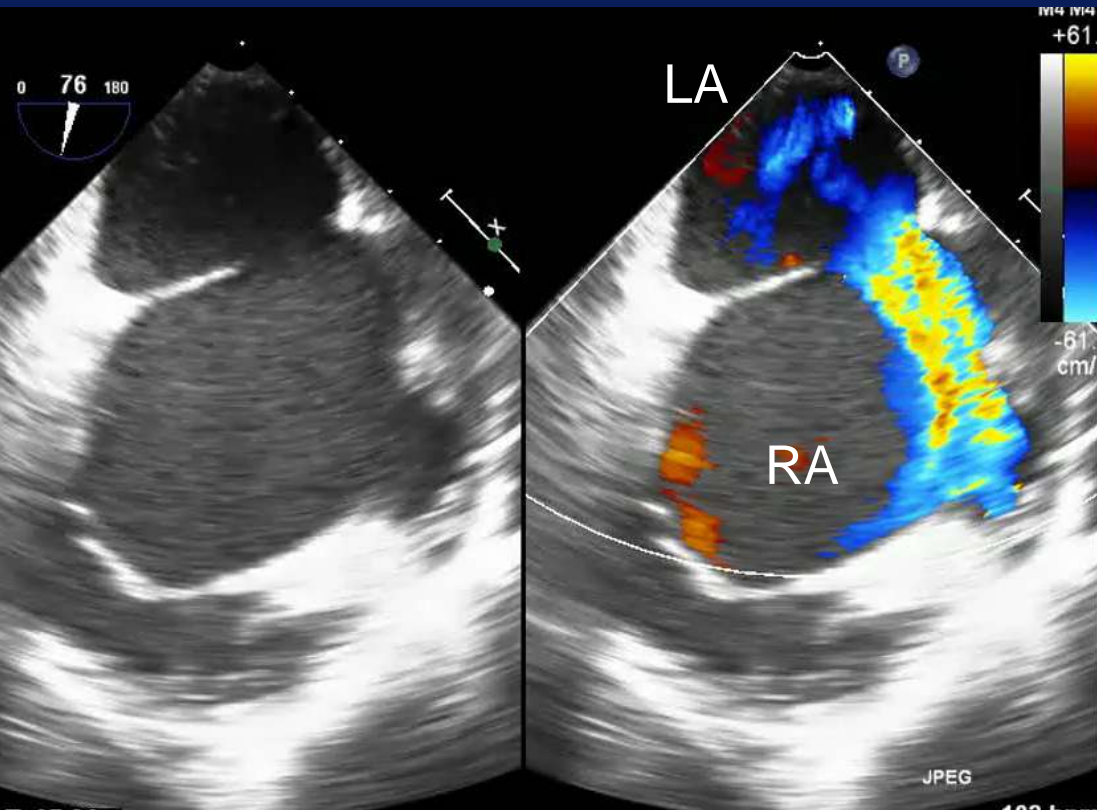
Kannan BR et al. *Catheter Cardiovasc Interv.* 2003;59:522

Varma C et al. *Catheter Cardiovasc Interv* 2004;61:131

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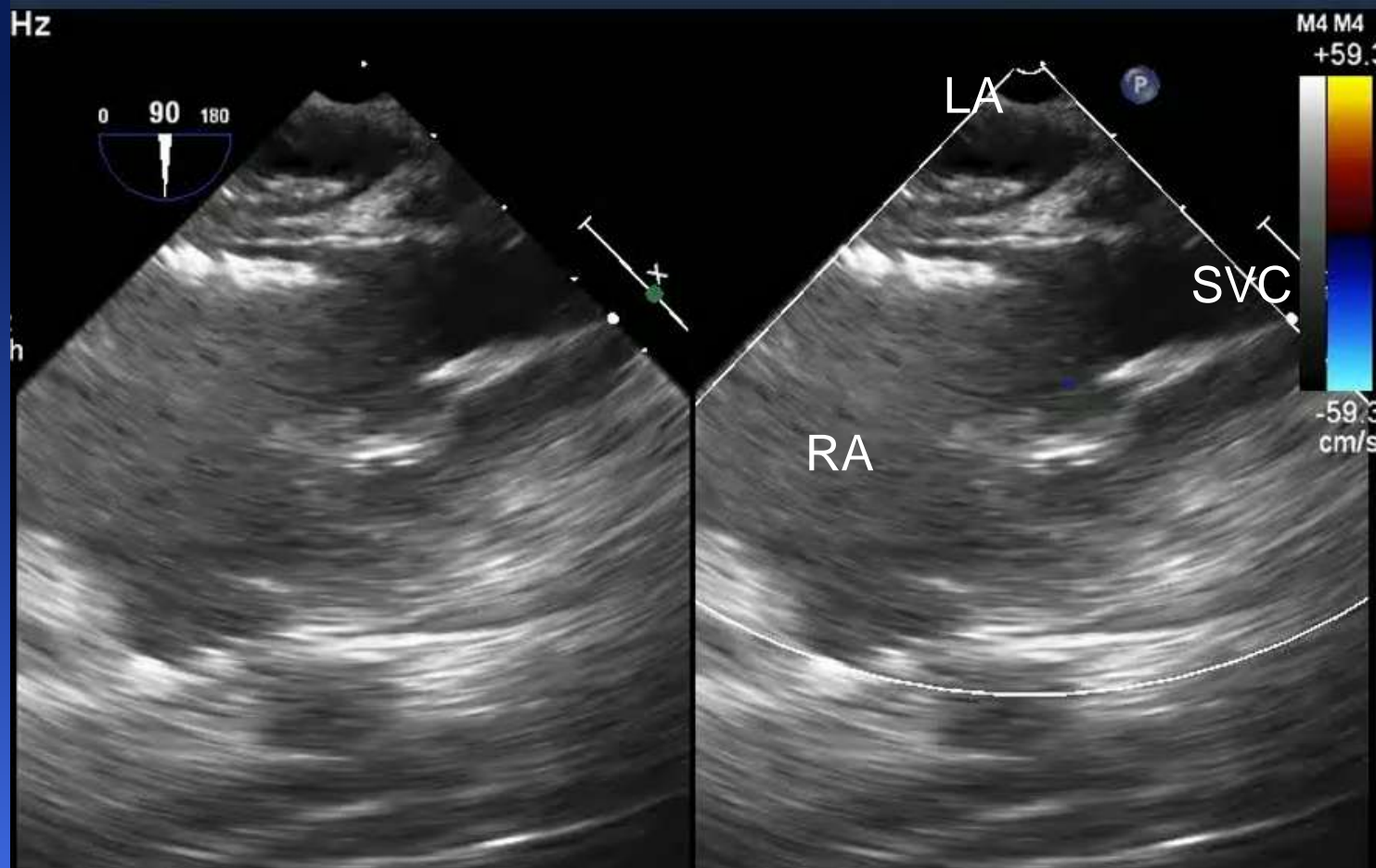
# Clockwise rotation technique

## LA roof technique



# Clockwise rotation technique

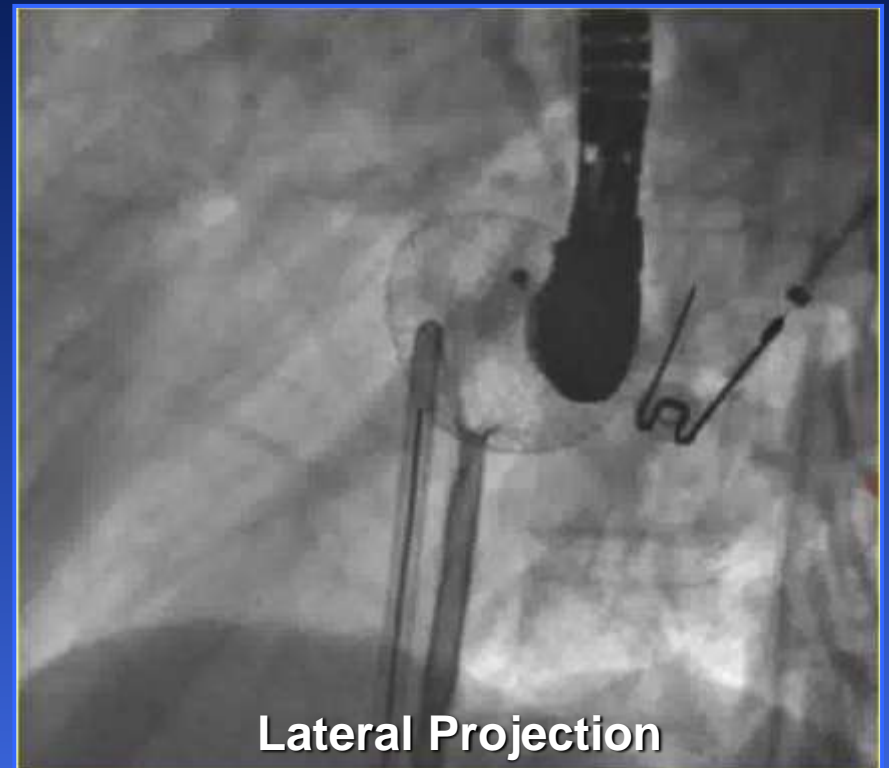
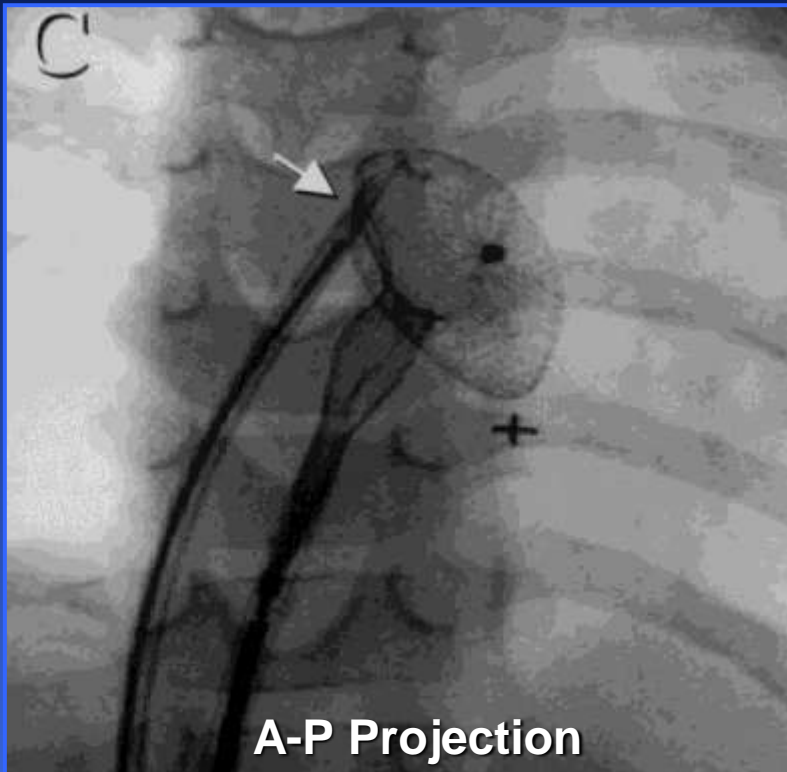
## LA roof technique





# - Stiff Sheath (Dilator) Technique -

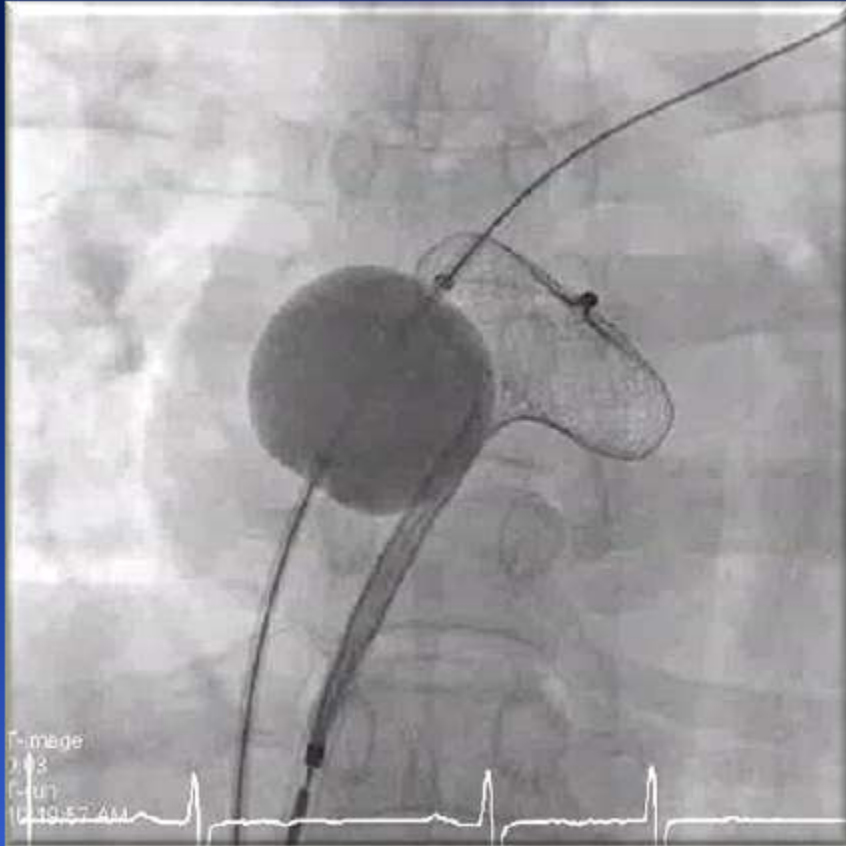
- Deploy LA disc in left atrium
- Advance dilator of delivery sheath and hold superior anterior portion of LA disc in LA  
: *to ensure anterior-posterior orientation, → lateral projection may be helpful*
- Deploy the waist and RA disc
- Withdraw dilator back



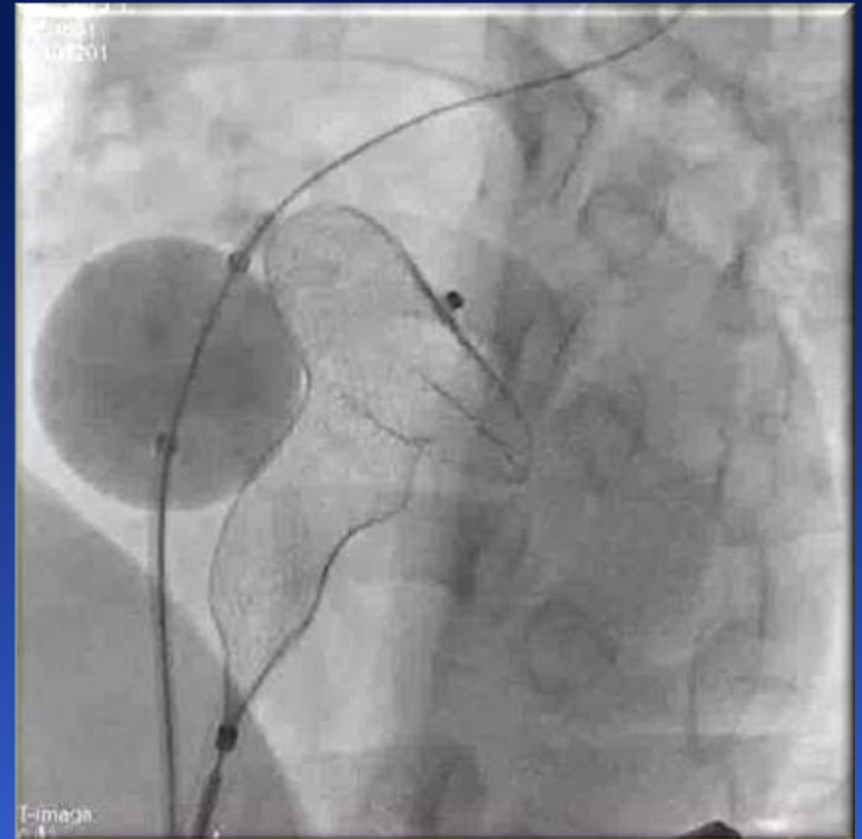


# - Balloon assist Technique -

AP-View



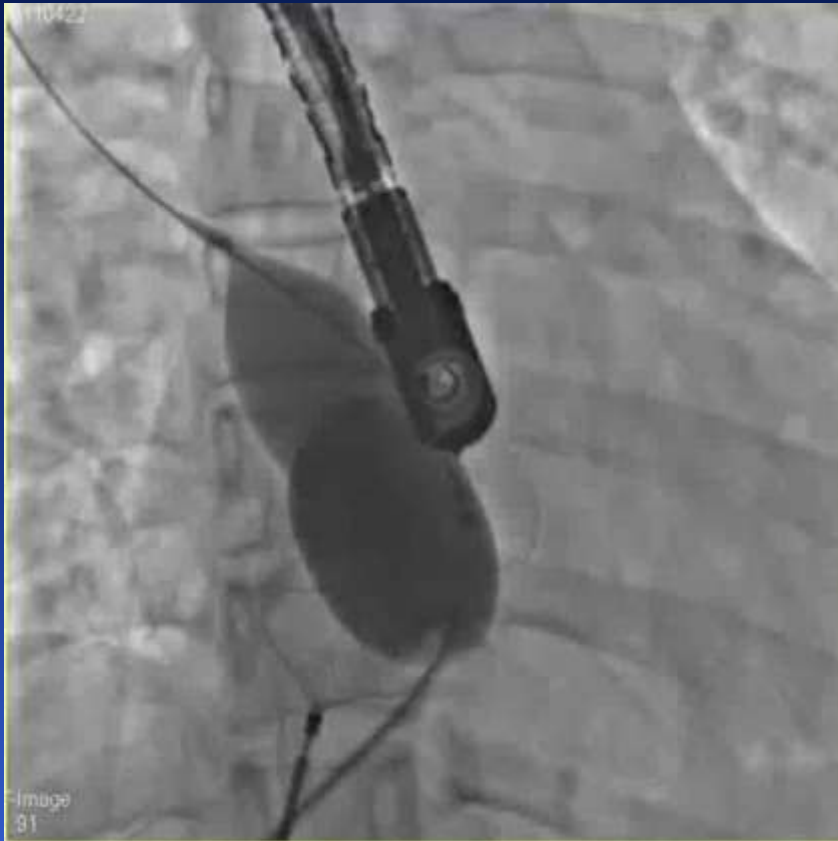
lateral-View



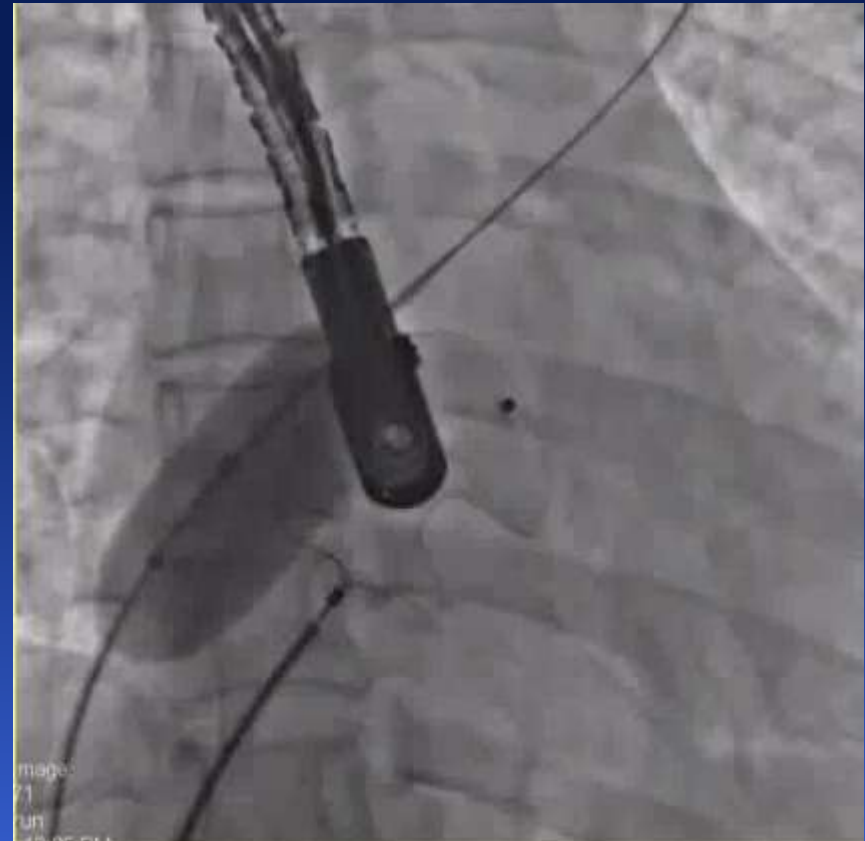
- Meditec Equalizer Balloon Cath. (*BostonScientific*)
- Extrastiff wire (*Amplatzer, Lunderquist, Meier..*)

# - Balloon assist Technique -

RUPV approach



LUPV approach



- Sizing Balloon Cath. (AGA or NuMed )
- Tyshak balloon cath. can be used (lower profile for small children)
- Amplatzer Extrastiff wire

## - Advanced tip of Technical Modifications-

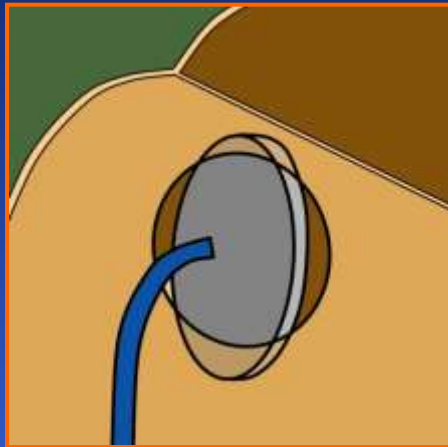
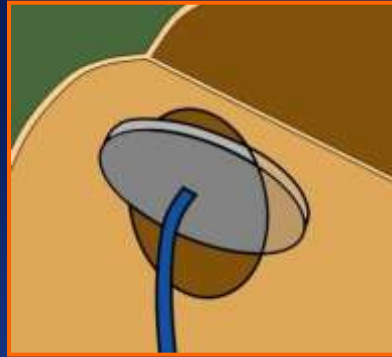
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# Modification of delivery sheath

- Bending or Cutting of Sheath Tip -

## Bending of sheath tip

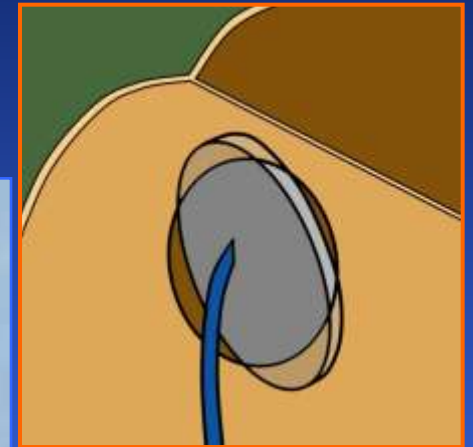
*Harper RW et al. CCI 2002;57:508*



- Stiff device / cable inside sheath:  
→ may straighten curvature
- Kinking of sheath may occur while remold the sheath

## Cutting of sheath tip (Boosfeld tip)

*Spies C et al. CCI 2007;70:286*

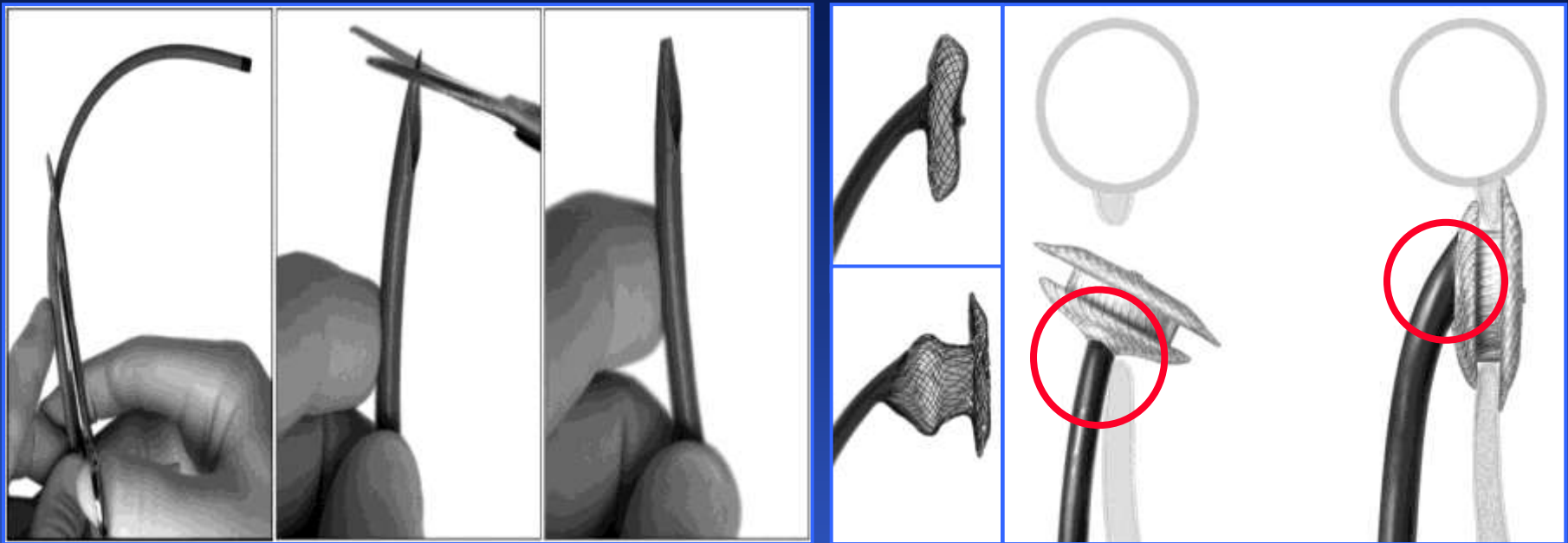


- Sharp edge of sheath :  
→ should be careful to avoid damage to heart / vessel

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# - Straight Side Hole Sheath -

Creating straight side-hole sheath from Mullin's transseptal sheath



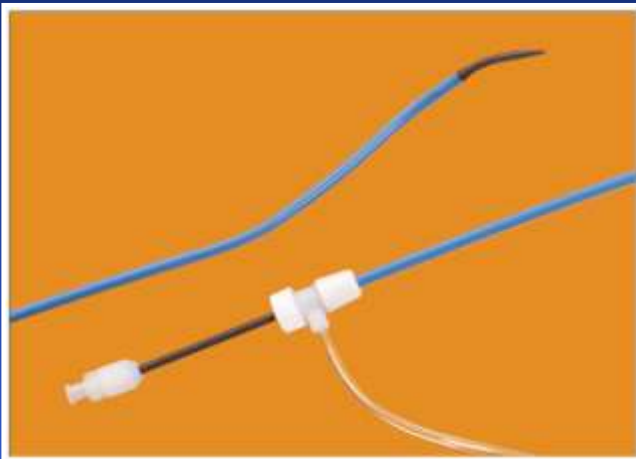
*Kutty S et al. Catheter Cardiovasc Interv 2007;69:15*

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# Modification of delivery sheath

- Specially Designed Delivery Sheath -

1. Housdorf-Lock sheath (Cook) 10-12F
2. Judkins Rt. Coronary guiding catheter
3. New "steerable" sheath: Agilis



Hausdorf sheath



JR Guiding Catheter



Steerable sheath

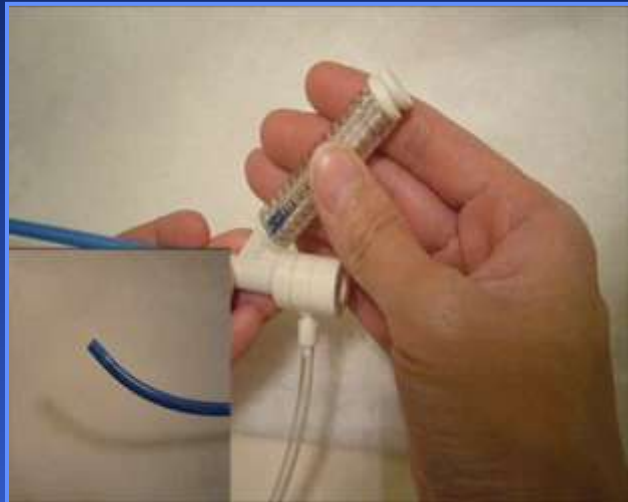
*Staniloae CS et al. J Invasive Cardiol 2003 / Varma C et al. CCI 2004 /  
Pedra CAC et al. J Invasive Cardiol 2004 / Nagm AM et al. J Invasive Cardiol 2004  
Fu YC et al. J Cardiovasc Med 2007;8:30*

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# Modification of delivery sheath

- Steerable Sheath Technique -
- **FuStar Steerable Introducer (Lifetech Scientific)**
  - Available size : 5-14Fr
  - FDA approval in Feb 2011

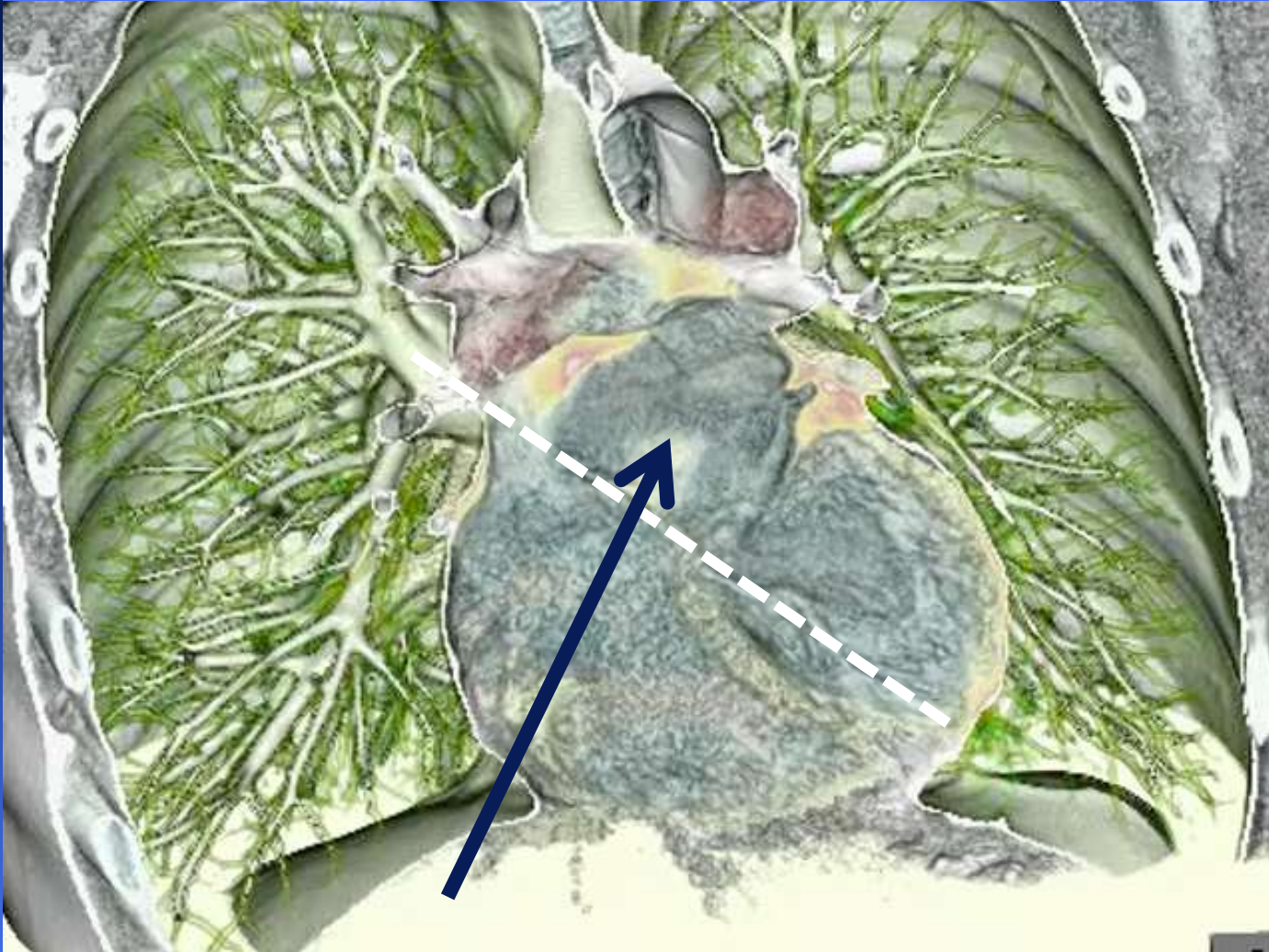


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# Transhepatic approach

ASO cable perpendicular to IAS



# Transhepatic approach

Echo-guided puncture  
of hepatic vein



ASO cable perpendicular  
to IAS



# Fenestrated ASD

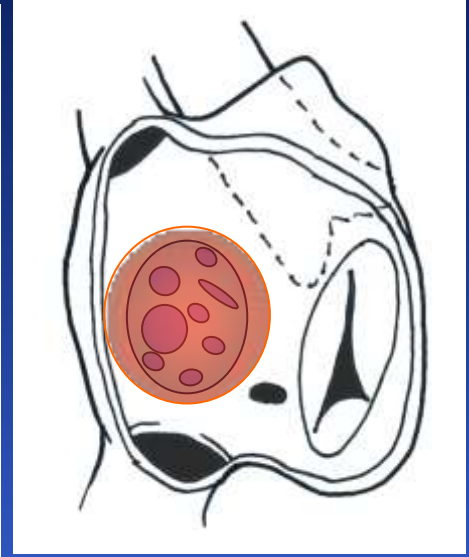
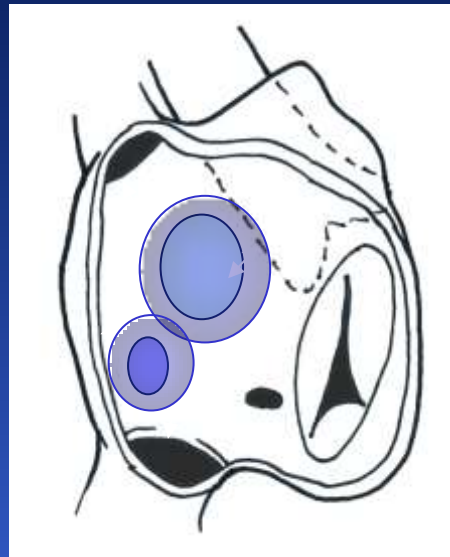
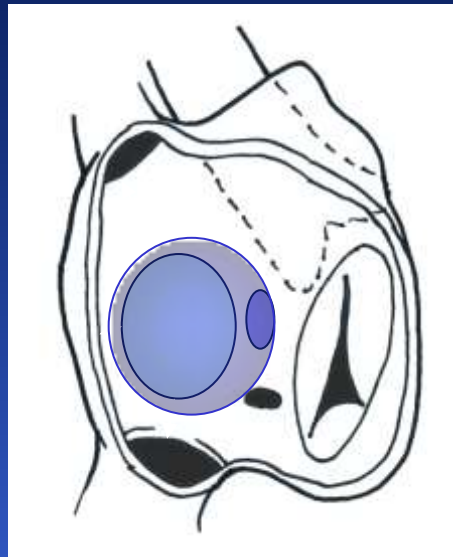
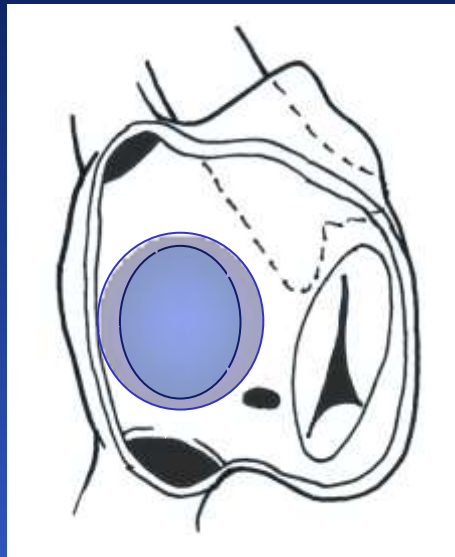
# Transcatheter closure of ASD Defects

ASD

ASDs  
Adjacent type

ASDs  
separate type

ASDs  
fenestrated type



ASO

ASO

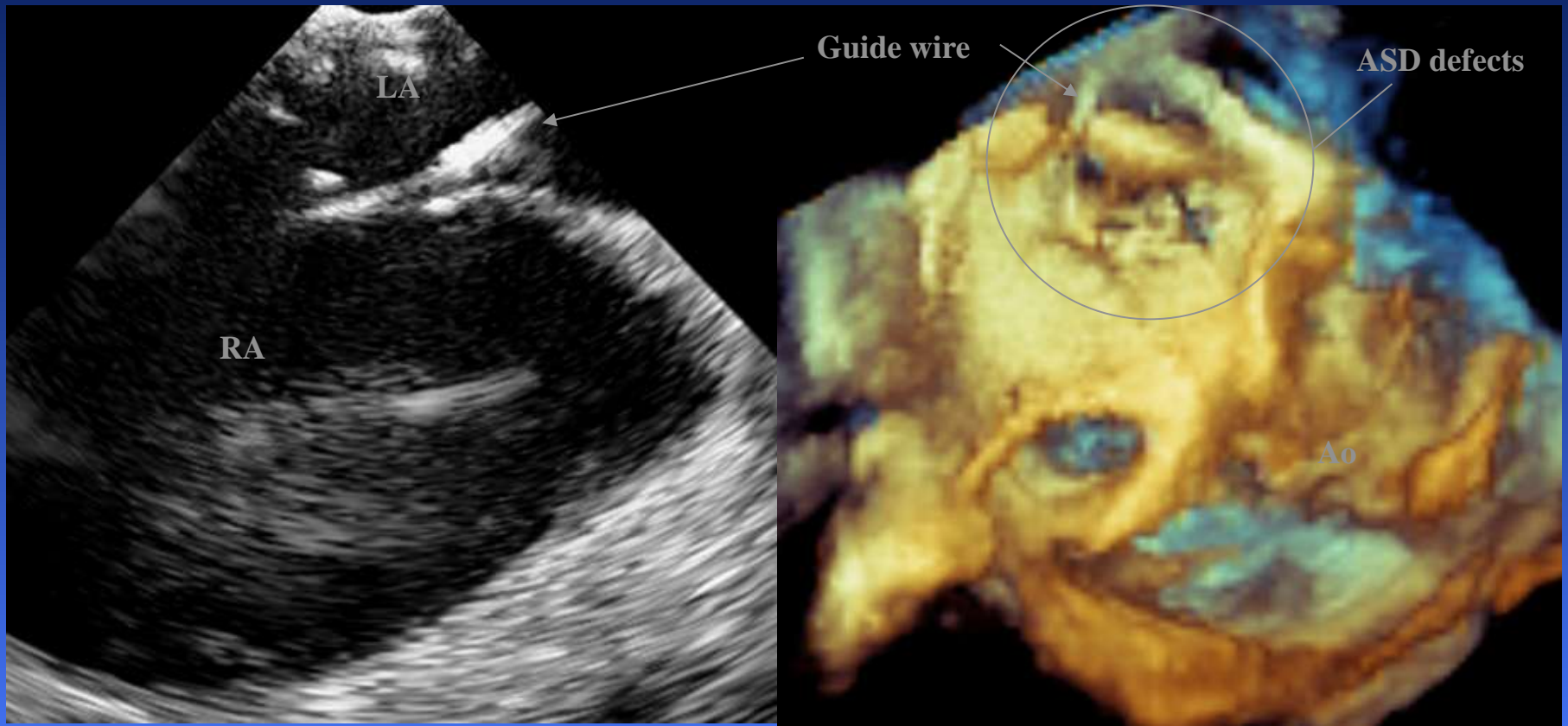
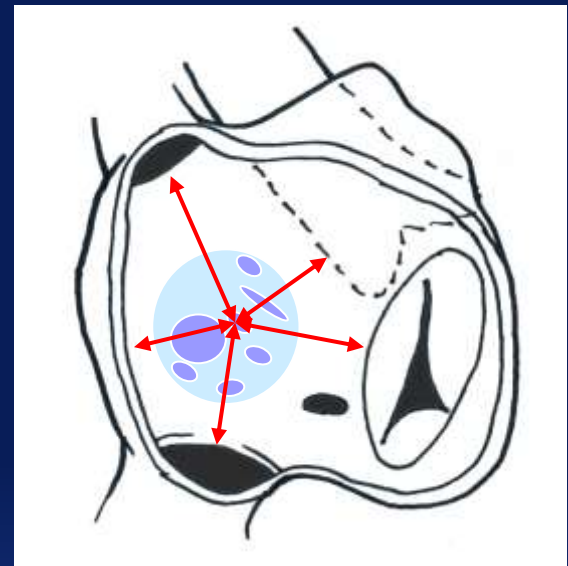
2xASO

Cribriform

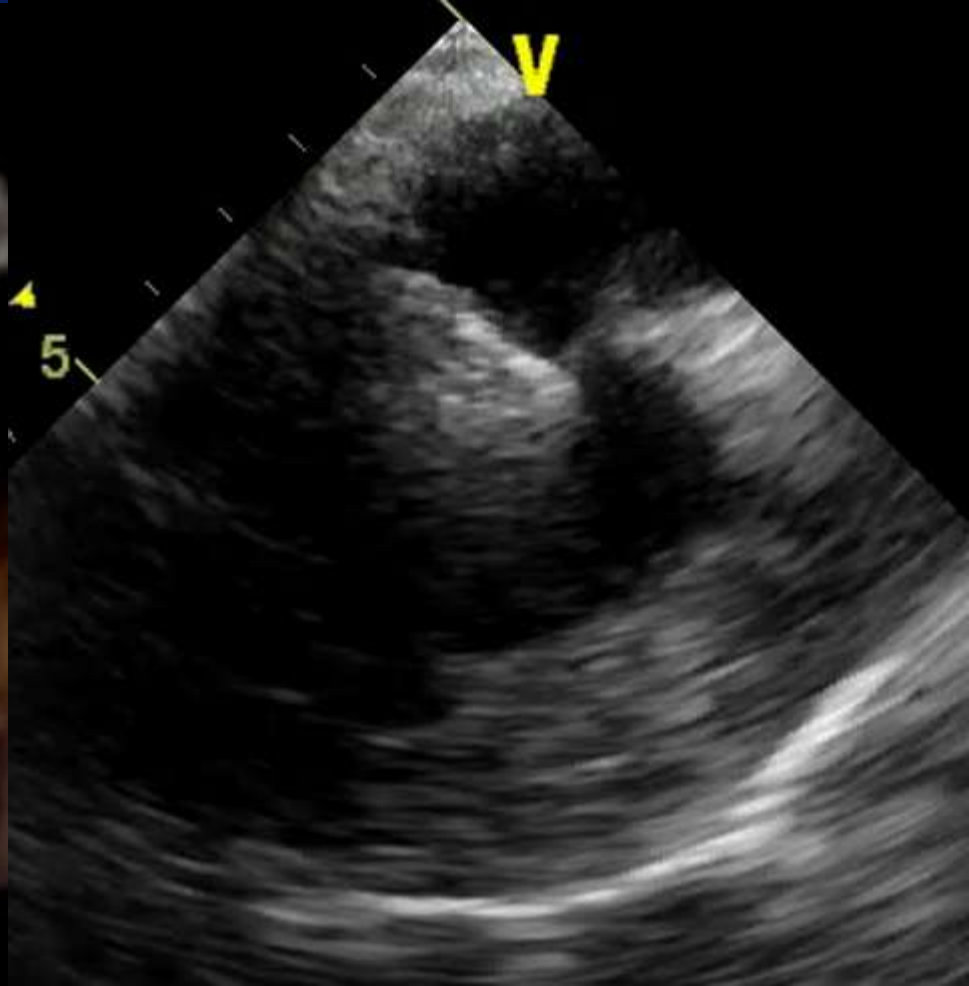
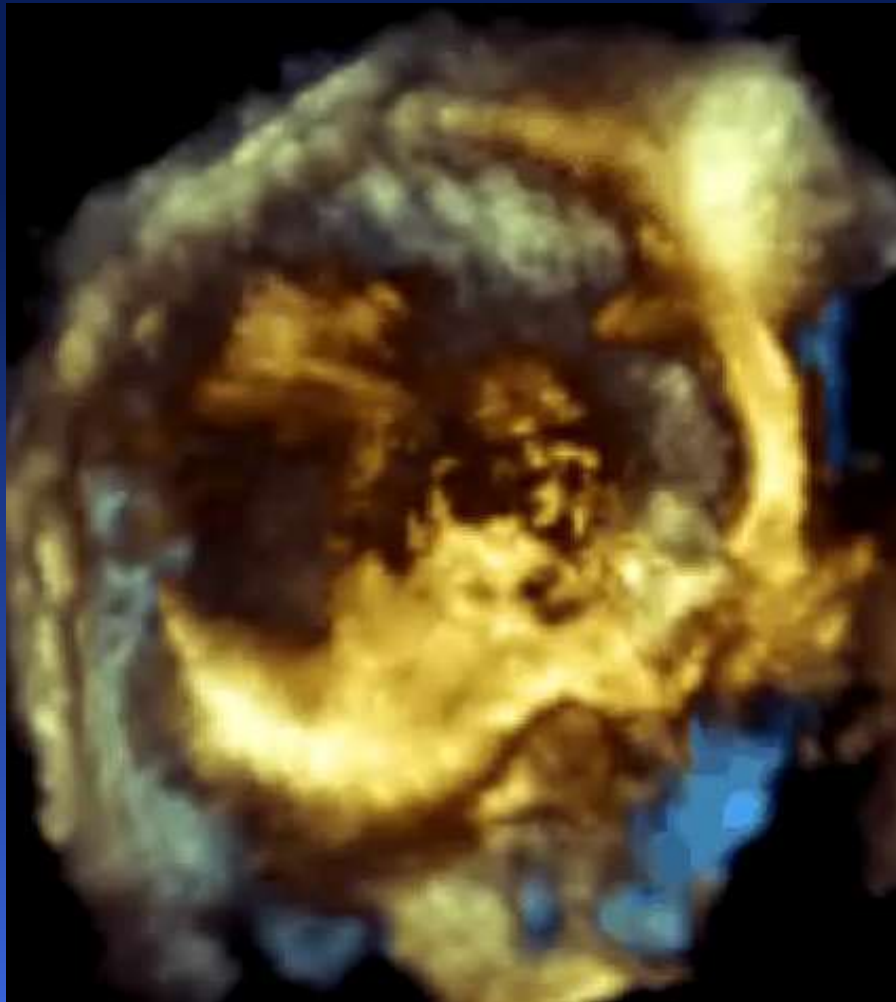


# Fenestrated ASDs

Cable should be passed at the center of fenestrated ASD to cover all fenestration ( < 4mm size preferred)



# Fenestrated ASDs



# Advanced tips to overcome the difficulties of closing ASD by ASO

## 1. Alignment of device to AS to prevent prolapse of disc

- modification of delivery sheath
- Device deployment technique: LPRPT
- Disc assistant technique

## 2. Multiple ASDs

- covering by one large device
- overlaps vs interleaving

# Take home message

- ✓ **The key of successful device closure of ASD is to understand the 3D morphological features of ASD and its adjacent structures in each each patients.**
- ✓ **The basic concept of tips in successful deployment of devices is to set the disc of devices in same alignment/plane with atrial septum to prevent its prolapse.**
- ✓ **Meticulous and individualized approach for each patient are mandatory to maximize the efficacy and safety of this versatile therapy**