

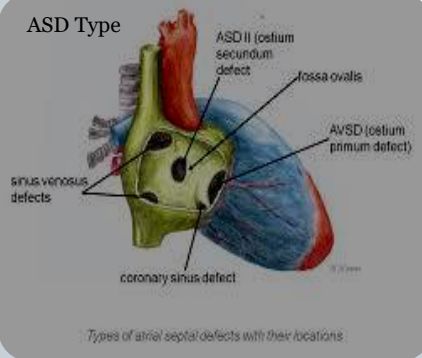
# TRANS-CATHETER ASD CLOSURE TIPS & TRICKS

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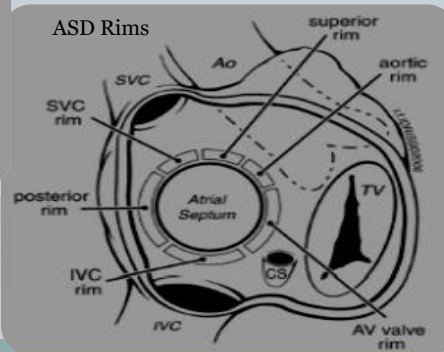
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## Terminology

### ASD Type



### ASD Rims



## Complex Ostium Secundum type (ASD):



- large ASD Secundum with max diameter of  $\geq 34\text{mm}$
- Dimensions of total septal length smaller than LA disc of chosen device (Small child)
- Unusually placed ASD ( eccentric = deficient rims): Deficient aortic and posterior rims, deficient IVC , or AV rim
- Multiple ASDs , Multifenestrated septum
- ASDs with redundant (floppy ), flimsy and aneurysmal septal rims.
- Prominent Eustachian valve and Chiari-malformation

□

## Potential Difficulties (Challenging)

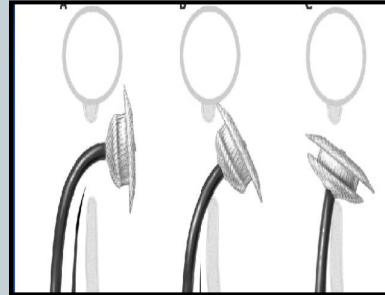


(Pathophysiology/ Decision related, difficult access)?

- Interrupted IVC.
- Pulmonary HTN.
- Old adult with LV dysfunction.
- Arrhythmia .
- Small children and infant.

- However, in complex ASDs with deficient rims, the classical implantation technique of ASD device can result in failure.

- One of the most crucial problems related to this technique is the perpendicular orientation of the left atrial disk on the atrial septum resulting in prolapse into the right atrium.



- Compared to simple defects, transcatheter ASD closure is relatively challenging in these cases, and different techniques have been defined to increase procedure success.

## Acceptable limits of device sizing

### Children:

- 8-10 Kg: < 15 mm
- 10-15 Kg: < 20 mm
- 15-25 Kg: < 28 -30 mm

### Adults:

- 40 -46 mm

(Kannan BRJ, Anil SR, Sivakumar K, Kumar RK, Transcatheter closure of the very large atrial septal defects using the Amplatzer septal occluder, Catheterization and Cardiovascular Interventions 2003;59:522-527)

## Echocardiography

- TTE:  
Patient selection
- TEE:  
Important in patient selection  
Guide implantation and assess correctness of position
- ICE:  
Anatomy of postero-inferior secundum ASD  
Capture of the postero-inferior rim by the device
- 3-D:

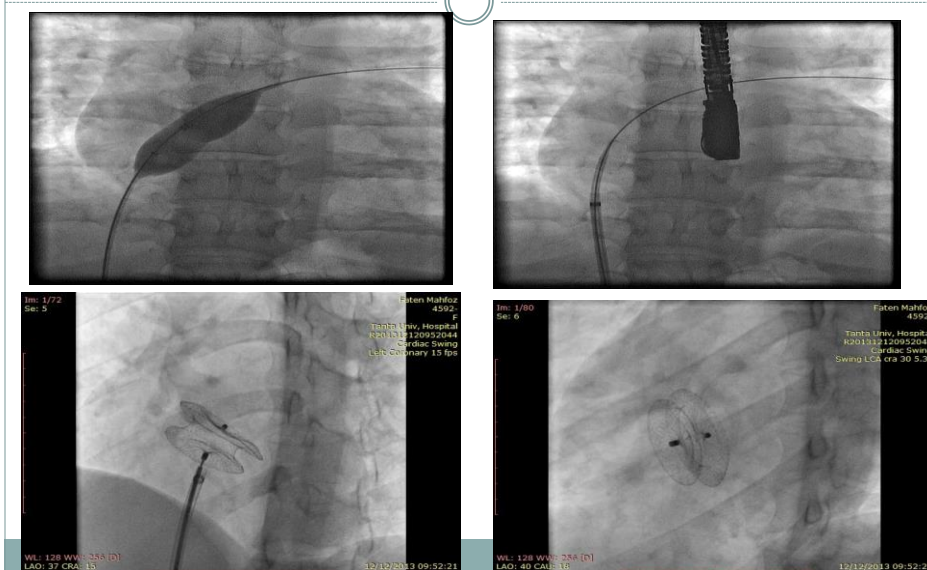
## Data required from echocardiography

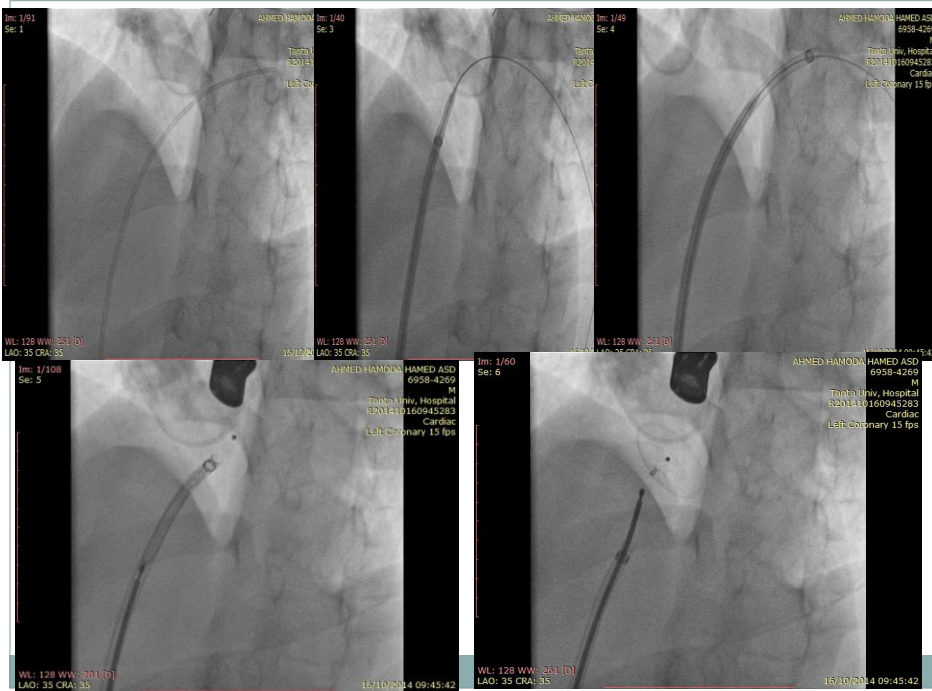
- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Type of ASD</li> <li>• Pulmonary veins (at least two one right and one left)</li> <li>• RV pressure</li> <li>• Mitral valve regurgitation</li> <li>• <b>Measurements</b></li> </ul> | <ul style="list-style-type: none"> <li>• <b>What to measure?</b></li> <li>• Number of ASDs</li> <li>• Size of ASD</li> <li>• Total septal length</li> <li>• Rims</li> </ul> |
|--|---|

## Balloon Sizing

- Useful .... Most defects are oval
- Balloons can falsely stretch the ASD – Oversize
- **Balloon stretched diameter** needs avoiding
- Stop flow technique
  - Inflate the balloon until no shunt on Colour
  - Deflate the balloon until shunting appears
  - Re-inflate to eliminate the shunt (stop flow diameter of ASD).
- Pull back technique
- Amin Z. Catheter Cardiovasc Interv 2006;68:588-94

## Stander Technique





## Why standard approach does not work?

- Floppy inferior rim
- Deficient rims
- Small LA size
- Abnormal LA curvature

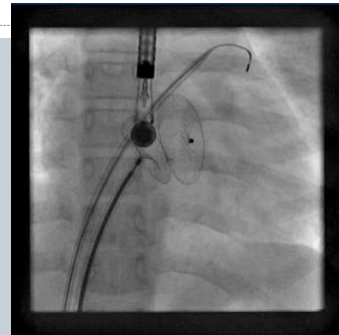
## Tips and Tricks

### How to align the left atrial disc?

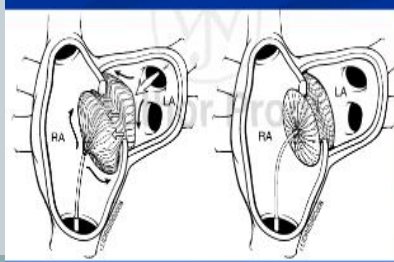
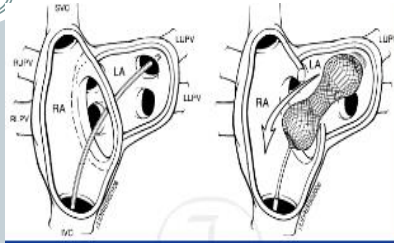
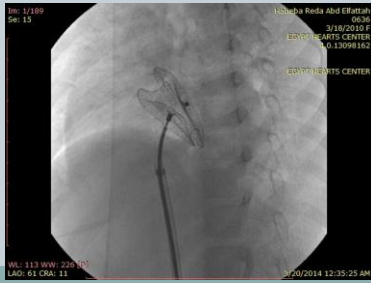
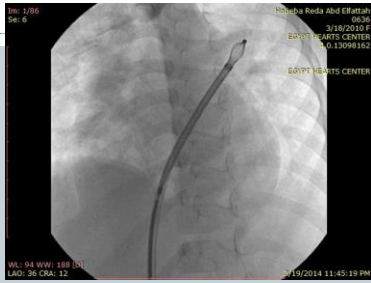
- Look at TTE or TEE, not fluoroscopy
- Keep the anterior edge of the device away from the septum
- Sheath should point Posteriorly and the tip towards the pulmonary veins
- Rotate the sheath (and the delivery cable) to keep it pointing posteriorly

## Deficient Aortic rim

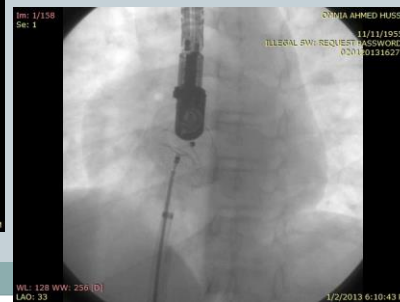
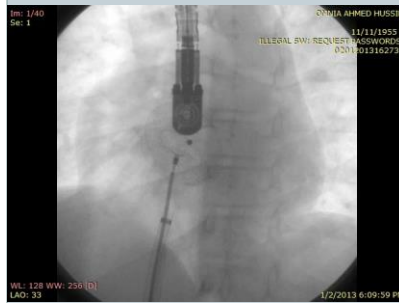
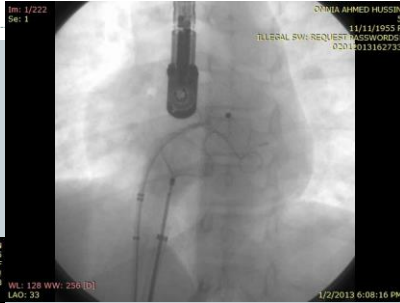
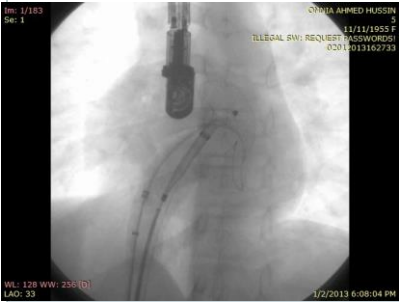
- Catheter/Dilator tip (Wahab technique)
  - Over the wire or assisted delivery
  - Hausdorff sheath
  - Left Upper pulmonary vein technique
  - Balloon assisted technique (BAT)
- Wahab HA, Almossawy A, Al Bitar I, Hijazi ZM. Tips and tricks to prevent prolapse of the Amplatzer septal occluder through large atrial septal defects. Catheter Cardiovasc Interv 2011;78:1041-4



# LUPV



# BAT

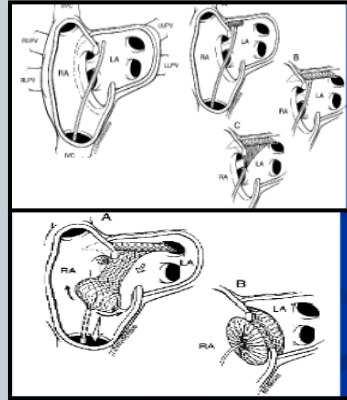




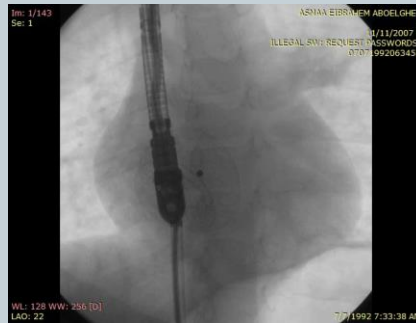
## Deficient posterior rim

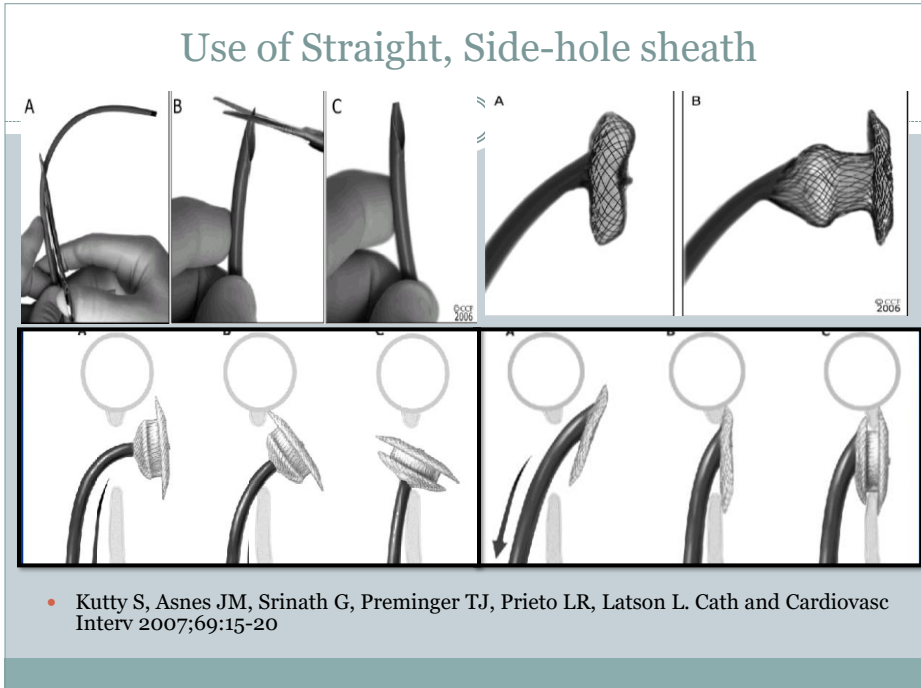


- Right upper pulmonary vein technique
- Left atrial roof technique



## RUPV





## Avoidance of complications

- Air embolism
- Secondary bleeding/haematoma
- Arrhythmias
- Device embolisation
- Thromboembolism
- Erosions/perforation

## To Sum Up



- ASDs as large as 36 - 38 mm diameter can be closed
- The size, rims and stability of the septum define Limits
- Use of an adequate size device that safely fits

## Large but unsuitable ASD' s



- Absent IVC or deficient both IVC and posterior margins, AV rim also must be considered
- ASD II but Larger than 38mm

## Closure of large ASDs

- Safety shall be paramount



- I can do it but shall I do it

## Take Home Message (Tips & Tricks)

- Standard deployment may not be adequate in large challenging ASDs
- Different methods/manoeuvres needed:
  - ✓ Device deployed in RUPV or LUPV
  - ✓ Device loaded over a Guidewire & deployed in a PV
  - ✓ Device deployed with assistance from a catheter/dilator/ balloon assisted technique
  - ✓ Hausdorf Sheath / Straight side - hole sheath
- Most complications are well understood, hence avoidable

## Take Home Message (Tips & Tricks) Large ASD's

- Almost all large ASD's have no anterior rim :  
**No problem!**
- They may have a small inferior or posterior rim:  
**May be critical but you still can try**
- If they do not have a cranial rim:  
**Be careful!**

## What Determines Results of Catheter Closure of ASD?

<b>Anatomy of Defect</b>	<b>Patient characteristics</b>
<ul style="list-style-type: none"> <li>• Size</li> <li>• Location</li> <li>• Margins</li> <li>• Neighboring structures</li> <li>• Associated lesions</li> </ul>	<ul style="list-style-type: none"> <li>• Weight</li> <li>• Age</li> <li>• Co-morbidity</li> </ul>

## What Determines Results of Catheter Closure of ASD?

Equipment	Operator(s)
<ul style="list-style-type: none"> <li>• Echocardiography</li> <li>• Devices</li> <li>• Delivery systems</li> </ul>	<ul style="list-style-type: none"> <li>• Imaging guidance</li> <li>• Experience</li> <li>• Hand-eye coordination</li> </ul>

## Avoidance of complications

<ul style="list-style-type: none"> <li>• Device embolisation</li> <li>• Risk varies 0.5-1%: Under-sizing Improper deployment</li> <li>• Especially failing to recognize deficient IVC rim</li> <li>• Constant pull and push</li> <li>• If device is not parallel to septum, it must be recaptured and redeployed</li> </ul>	<ul style="list-style-type: none"> <li>• Erosion/Perforation/PE</li> <li>• Incidence of haemodynamic compromise 1/1000</li> <li>• Deficiency of aortic rim/superior rim</li> <li>• Oversizing</li> <li>• Edge of RA or LA disc eroded through free atrial wall</li> <li>• If extended to aorta, tamponade was rapid</li> <li>• Majority occurred within 05 days</li> <li>• Shape memory may play a role</li> <li>• Rarely aorta to RA or LA fistula</li> </ul> <p>Amin Z, Hijazi ZM, Bass JL et al. Cath and Cardiovasc Interv 2004;63:496-502</p>
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