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When not to close an ASD?

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HOW **BIG** IS THE PROBLEM?

- ASD accounts for 10% of all congenital heart disease and as much as 20-40% of congenital heart disease presenting in adulthood.
- Ostium secundum: The most common type of ASD accounting for 75% of all ASD cases, representing approximately 7% of all congenital cardiac defects and 30-40% of all congenital heart disease in patients older than 40 years.



WHEN TO CLOSE AN ASD?

- In general, elective closure is advised for all ASDs with evidence of right ventricular overload or with a clinically significant shunt (pulmonary flow [Qp]–to–systemic flow [Qs] ratio >1.5).
- The widespread use of catheter closure of secundum ASD with lower mortality and without cardiopulmonary bypass has raised the question regarding the need to close even small defects.



But When not to close an ASD?

- In order to answer this question we have to keep in mind:
 1. Weight / size mismatch
 2. Anatomical/technical considerations
 3. Physiological/pathological considerations



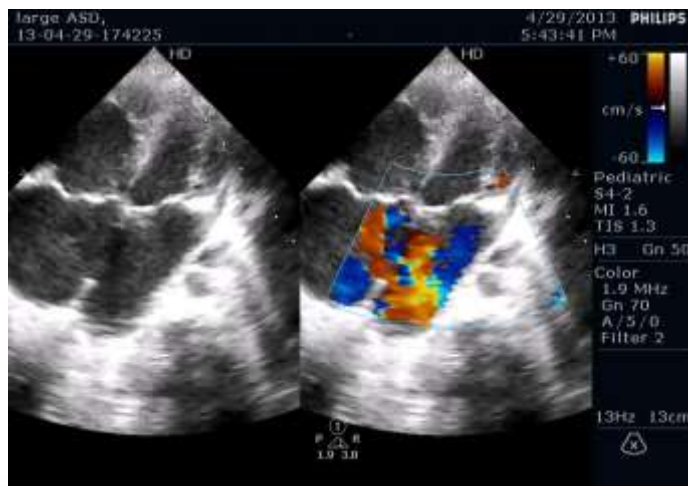
Weight/size mismatch

- The total inter atrial septal length is an important body weight dependant variable.
- The maximum device size tolerated in the early childhood period should not exceed 1.5 the body weight of the child*
- This is to make sure that the left atrial disc of the device will not exceed the entire inter atrial length.

* Personal communication Shaqeel Quoreshi



Weight/size mismatch

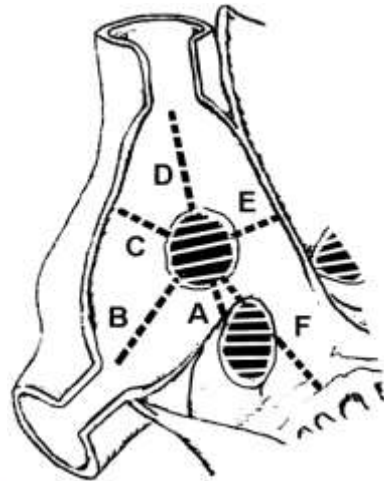


Weight/size mismatch



Anatomical/technical considerations

- Classification of rims around the ASD. **A**, Rim toward the coronary sinus; **B**, inferior-posterior rim (toward the inferior vena cava); **C**, posterior rim (toward the pulmonary veins); **D**, superior-posterior (toward the superior vena cava); **E**, anterior-superior (toward the aorta); **F**, inferior (toward the AV valves).

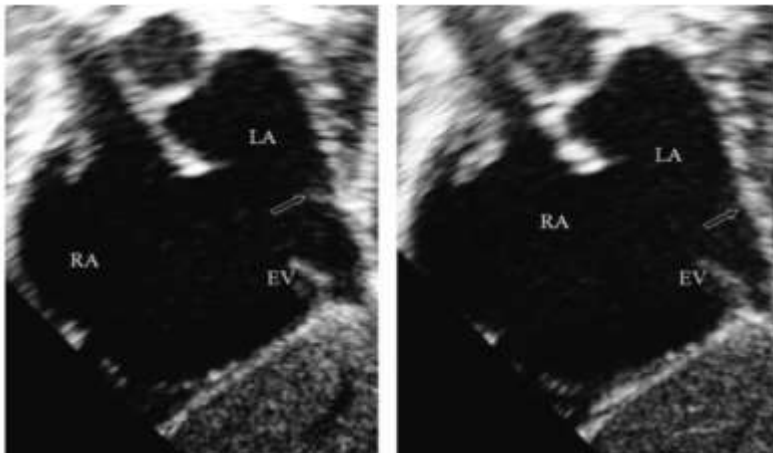


What rim matters?

- Deficiency of the posterior-inferior rim is considered a contraindication to the percutaneous approach by most operators.
- Indeed, the deficiency of the posterior-inferior rim precludes the correct alignment of the device with the septum and the lack of the posterior resistance to stabilize the distal disc causes the downfall of the device in a wrong position at 45° across the septum when the right disc is fully opened, hence the impossibility to obtain a steady anchorage of the device



What rim matters?



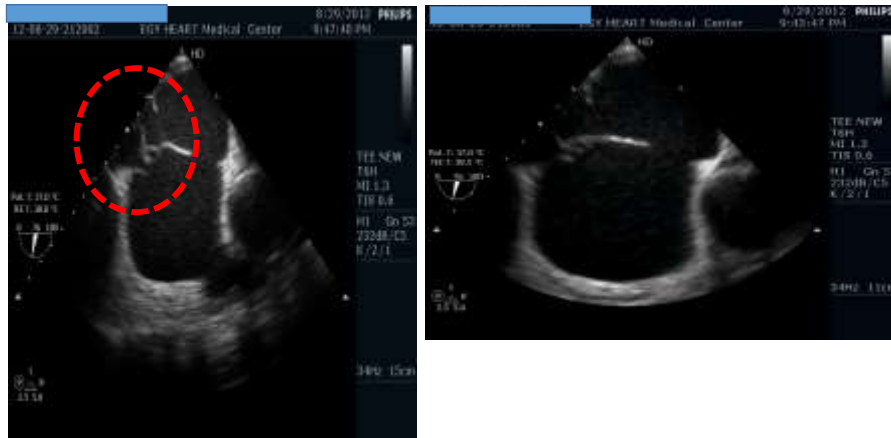
What rim matters?



Not only rims but stable rims



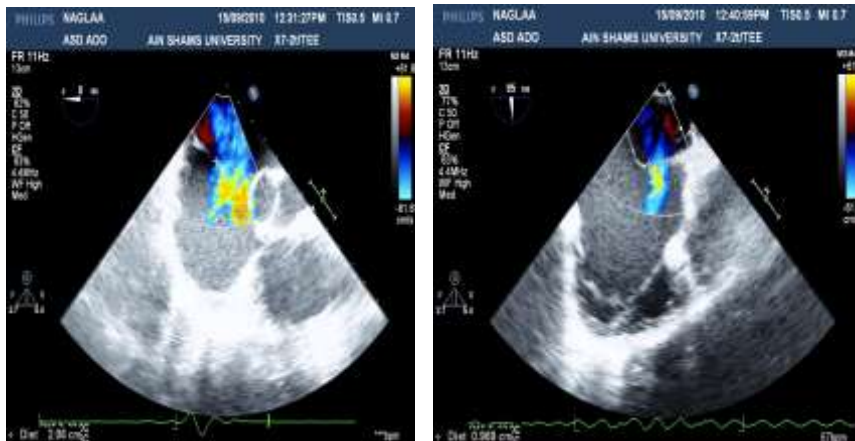
Not only rims but stable rims with suitable anatomy



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When the defect got bigger?



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When the defect got bigger?

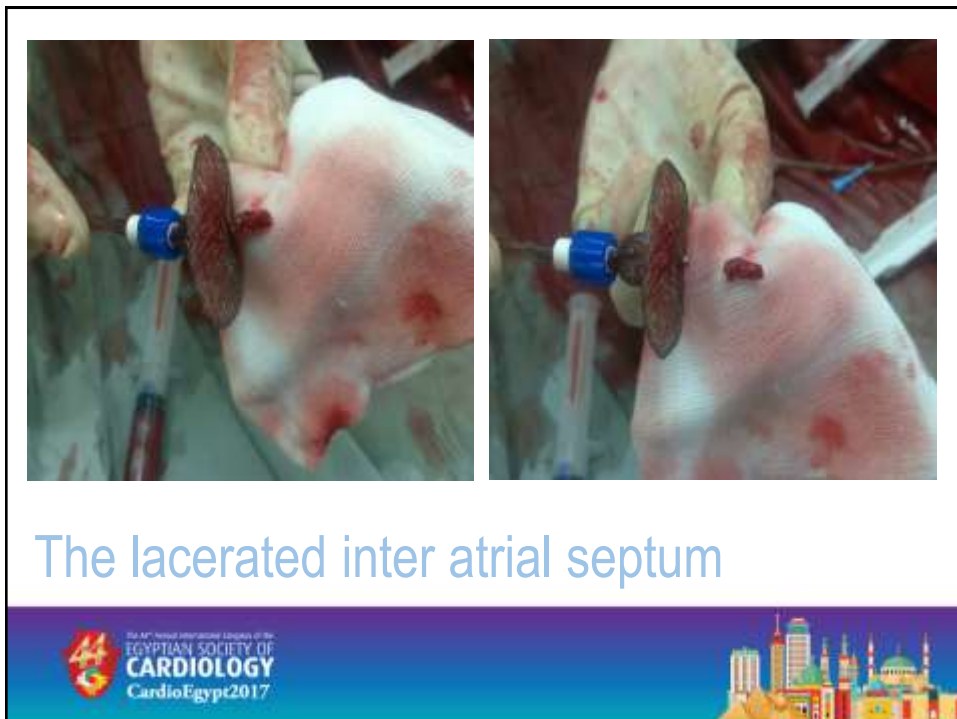
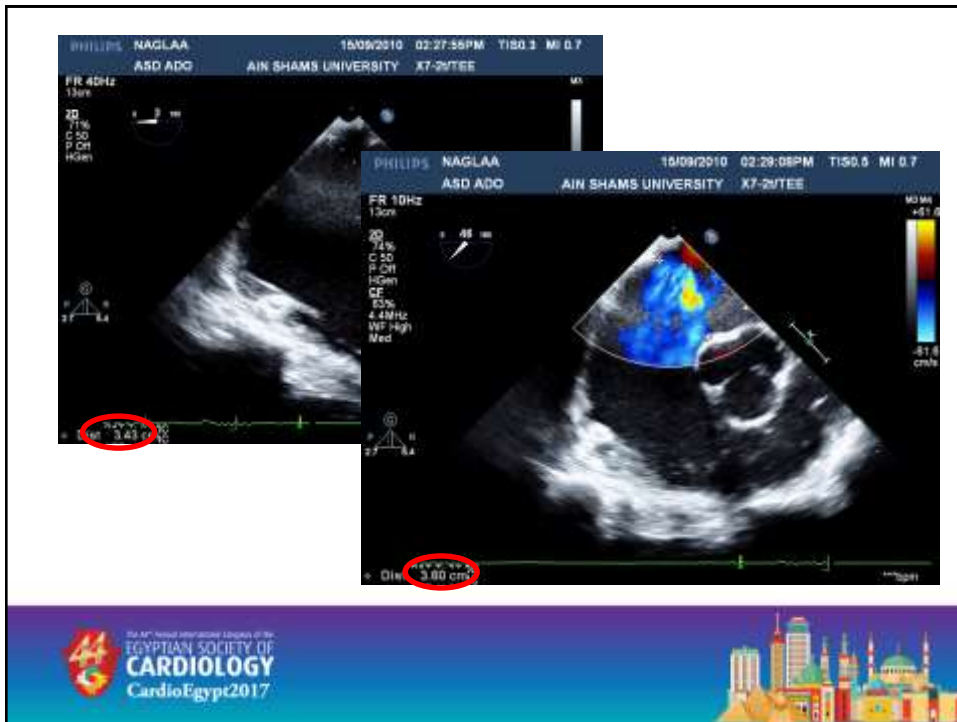


When the defect got bigger?



When the defect got bigger?







Anatomical technical considerations – what else?

- Beyond device limits; > 24 mm in patch devices and 38-40 mm in self centering devices.
- Multiple distant defects
- Encroachment on adjacent important structures causing; pulmonary venous obstruction, mitral regurgitation or heart block.

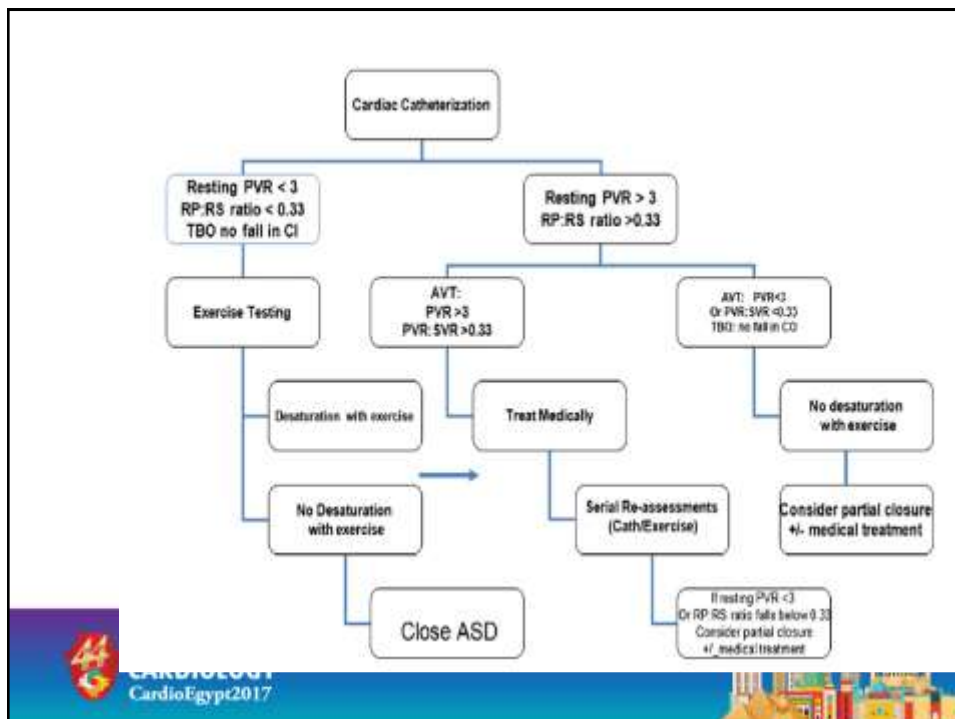


Physiological/pathological considerations

- Pulmonary hypertension:

- ❖ Special attention should be directed toward proper hemodynamic assessment of PVR and pulmonary pressure prior to attempting closure of ASD especially in adults above 40 years of age

- ❖ Patients with $PVR > 5$ wu but with pulmonary artery pressure $< 2/3$ systemic pressure and with left to right shunt are considered class IIB level C in recent ESC guidelines



Physiological/pathological considerations

- Heart failure:

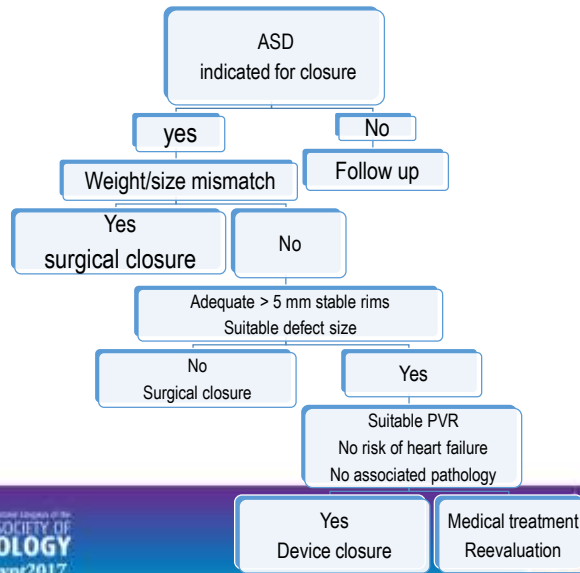
- ❖ While percutaneous ASD closure is generally considered a low risk intervention, hypertensive and elderly patients may develop pulmonary edema following the procedure because of underlying left ventricular (LV) diastolic dysfunction.
- ❖ The same applies for children in which there is comorbidity in the form of LV dysfunction secondary to myocarditis



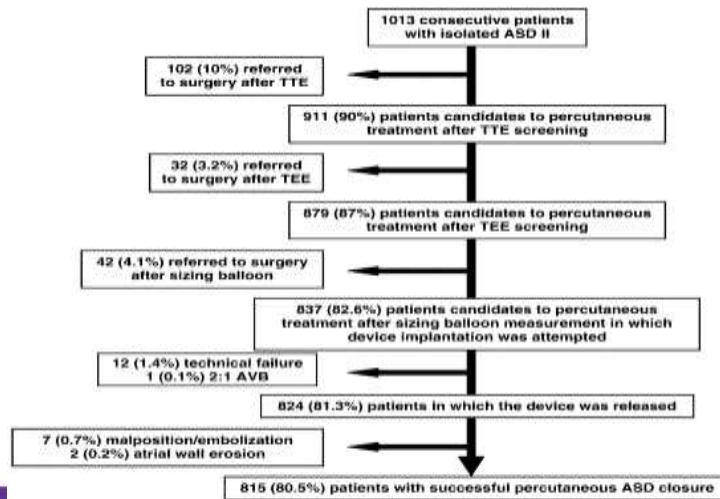
- ❖ Recent studies suggested that accurate assessment of pre closure diastolic function, such as test ASD occlusion, may help identify high-risk patients for post-closure heart failure.
- ❖ Anti-heart failure therapy before device closure or the use of fenestrated device appears to be effective in preventing post-closure heart failure in the high-risk patients.



CONCLUSION



CONCLUSION



ASD = atrial septum defect; TTE = transthoracic echocardiogram; TEE = transesophageal echocardiogram;

Take home message

Indications

ASD

Isolated secundum ASD with a pulmonary/systemic flow (Qp/Qs) ratio >1.5:1, signs of right ventricular volume overload

PFO

Cryptogenic stroke and evidence of right to left shunt*

Contraindications (absolute or relative)

Patent foramen ovale or small ASD with Qp/Qs <1.5:1 or with no signs of right ventricular volume overload

A single defect too large for occlusion (>38 mm)

Multiple ASDs unsuitable for percutaneous closure

Defect too close to the superior vena cava, inferior vena cava, pulmonary veins, atrioventricular valves, or coronary sinus

Anterior*, posterior, superior, or inferior rim <5 mm

Abnormal pulmonary venous drainage

Associated congenital abnormality requiring cardiac surgery

ASD with severe pulmonary arterial hypertension and bidirectional or right to left shunting

Intracardiac thrombi diagnosed by echocardiography

History of severe allergy to iodinated contrast agents

*Controversial.

*Circ Cardiovasc Imaging. 2009;2:141-149

- Thorough examination of each patient is a must in order to determine the suitability for device closure from the general, anatomical as well as physiological aspects.

