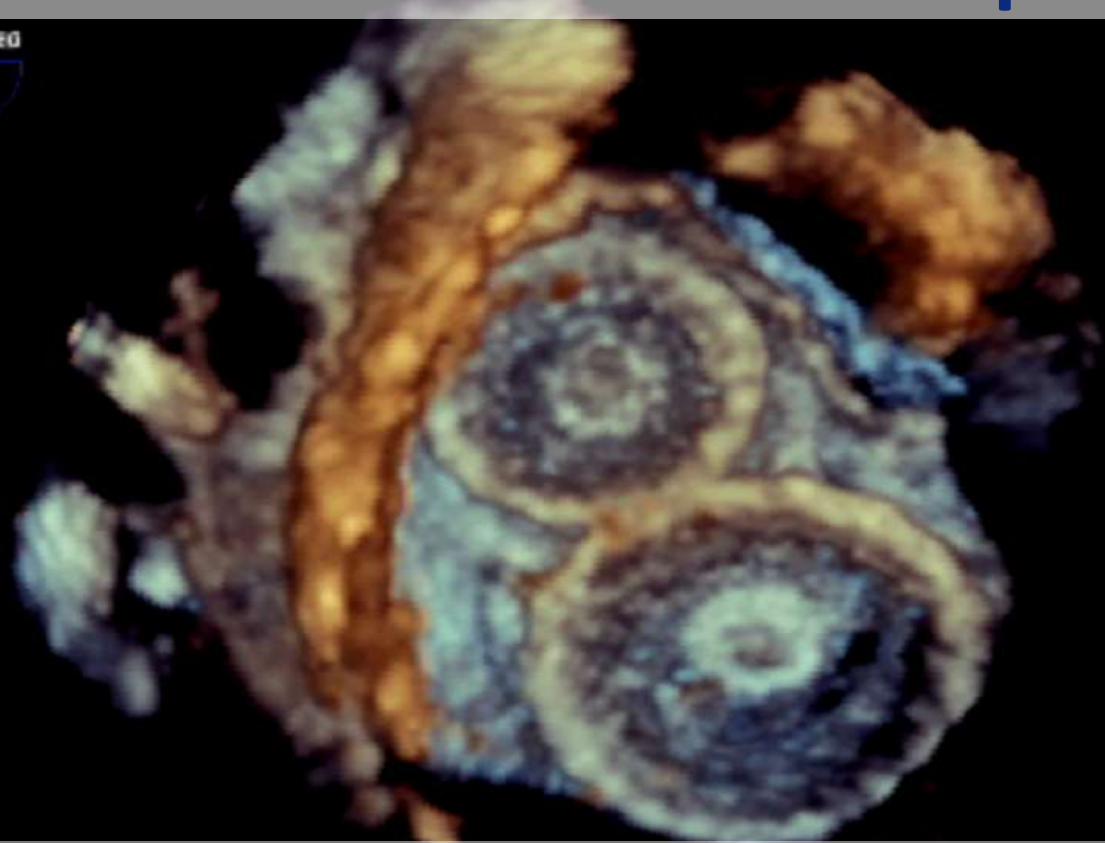




Therapeutic Strategy for Transcatheter Closure of Multiple ASDs

FR 5Hz
6.1cm

Live 3D
3D 13%
3D 40dB
Gen



M4

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Presenter Disclosure Information

***I have no conflict of interest
in relation to this presentation.***



Multiple ASD Closure

- *Considerations for Treatment Options* -

Expected outcome : comparison to surgery

- ✓ *Safety – short & long-term AE*
- ✓ *Efficacy*
- ✓ *Others – patient's comfort, cosmetic outcome, cost, better utilization of medical facility /equipment, etc.*



Challenges in Closing Multiple ASDs

- ✓ **Number of defects :**
small additional defect may be missed
- ✓ **Size of defects :**
reciprocal change in sizes of adjacent defects
- ✓ **Location/Spatial relationship**
among defects, cardiac structures/ defect-containing area
- ✓ **Supporting rim / Intervening septum**
compliance (flimsy/mobile/mesh-like..), too short, etc.
- ✓ **Other morphologic characteristics**
aneurysm, multiple perforations
- ✓ **Interference between devices**



How to Solve the Problems?

✓ RT3D guidance

Instantaneous understanding of the anatomy

Identification of complex shapes and multiple defects

Superior recognition of spatial relationship

Comprehensive appearance of deployed device

✓ Test occlusion of key defect(s) with sizing balloon

Better visualization of additional defect

Prediction of changes after device placement

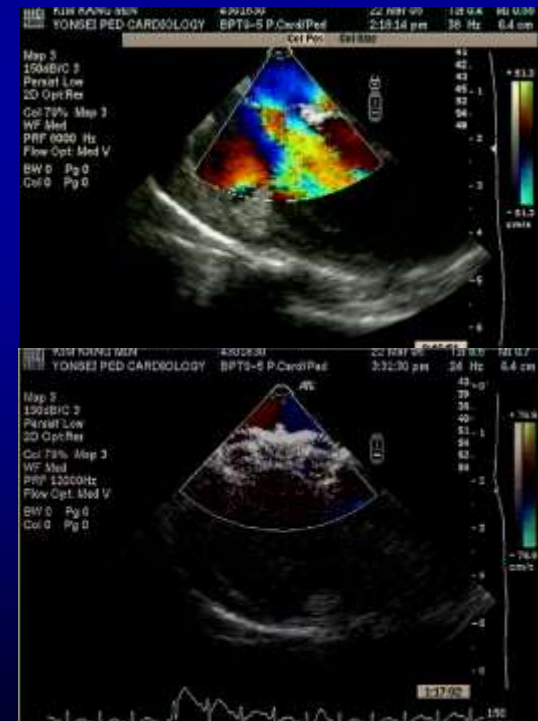
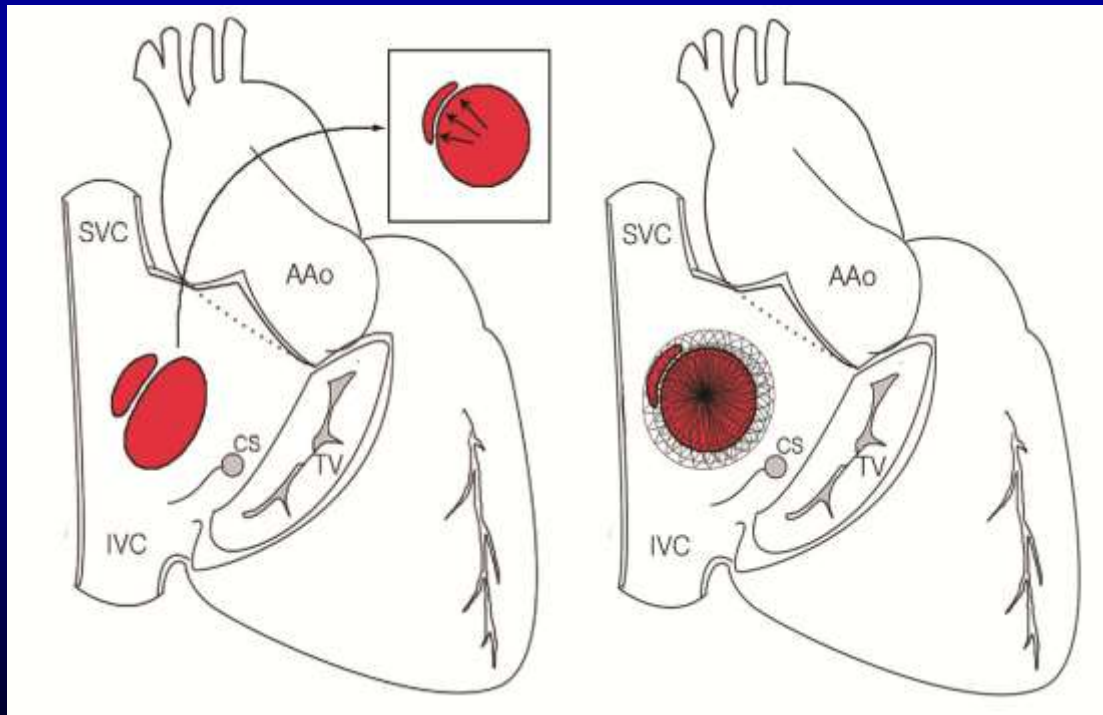
Compliance of surrounding rims and intervening septum

✓ Consider interference between devices

→ choose optimal combination of devices

2 defects with small additional defect in close distance (<7mm) : single regular device

- Similar closure rate as in single defect, if the distance between 2 defects <7mm *Szkutnik M et al. CCI 61:237, 2004*
- Balloon sizing may give an idea ; squeeze additional hole *Roman KS et al. J Interv Cardiol 15:393, 2002*



Sizable 2 defects in close distance (<7mm) **: multiple devices (2 regular or regular + cribriform)**

- Consolidation into a single defect has been reported**

Carano N et al. CCI 2001, Chun TUH et al. Pediatr Cardiol 2004

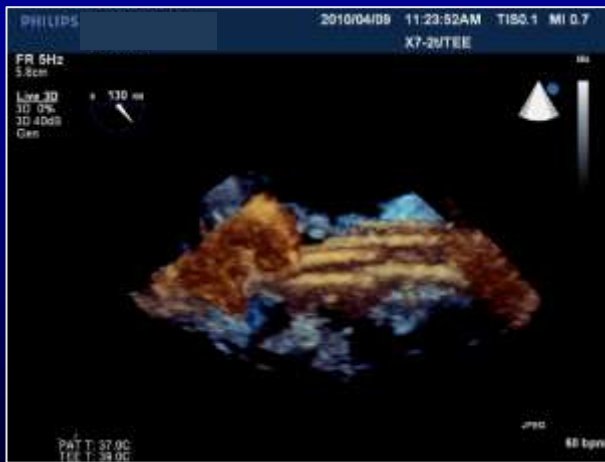
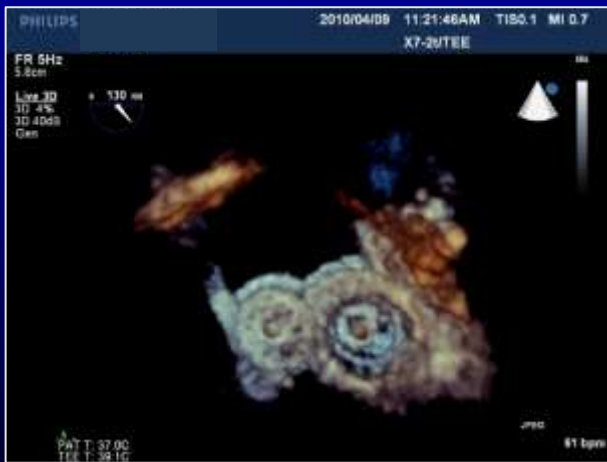
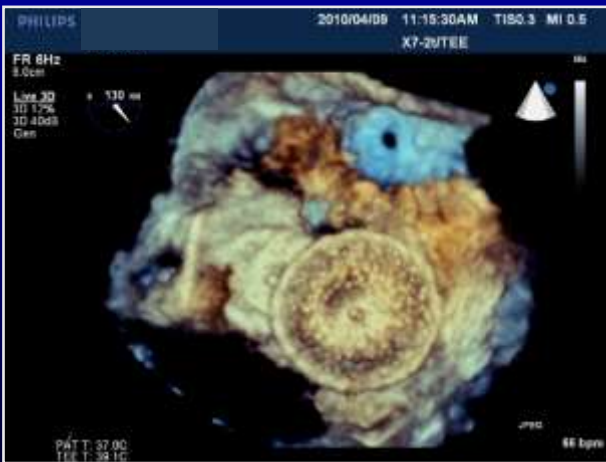
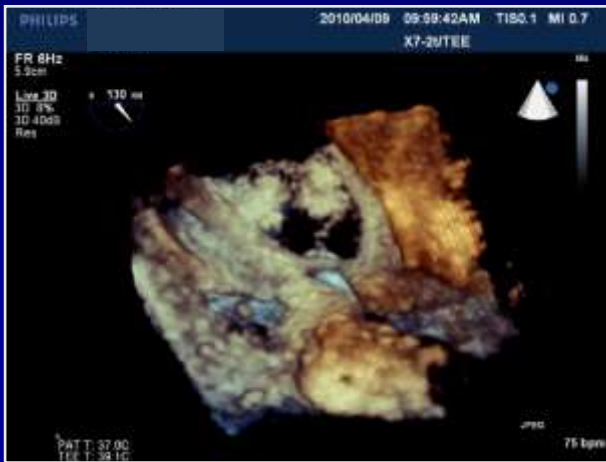


ICE guided closure of sizable nearby 2 defects



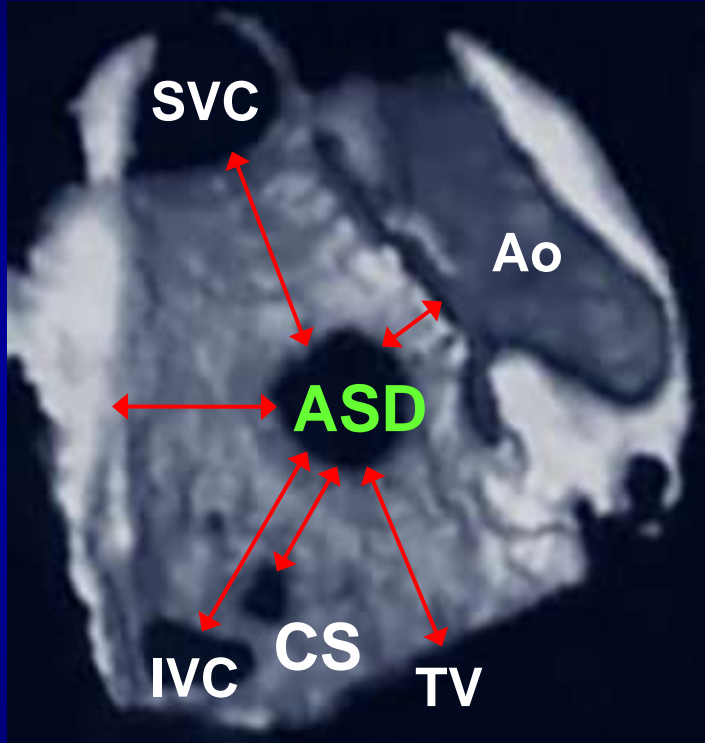
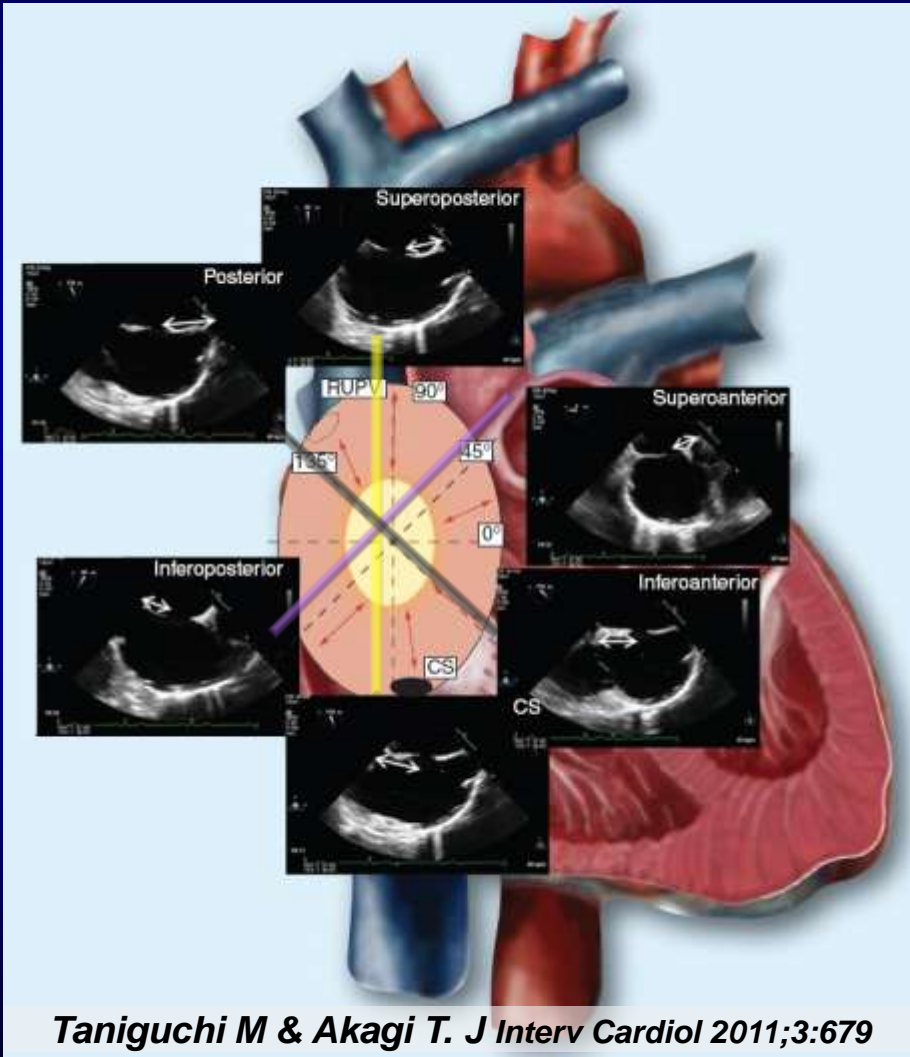
Sizable 2 defects in close distance (<7mm) : 2 regular devices or regular + cribriform

- Role of 3D echo in the closure of multiple ASDs -



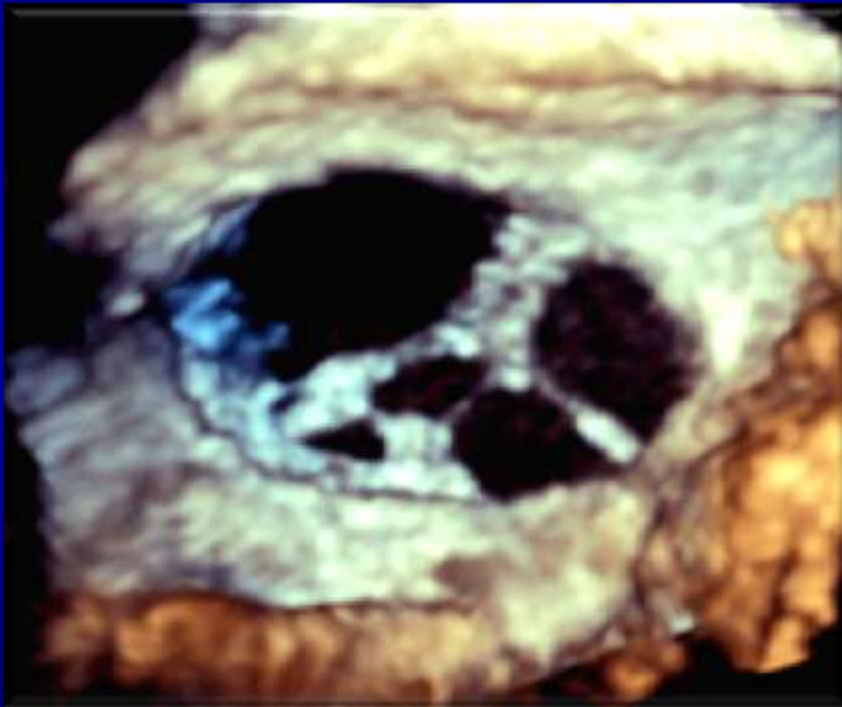


Advantage of RT3D TEE in closing multiple ASDs : Integrated information from single echo image

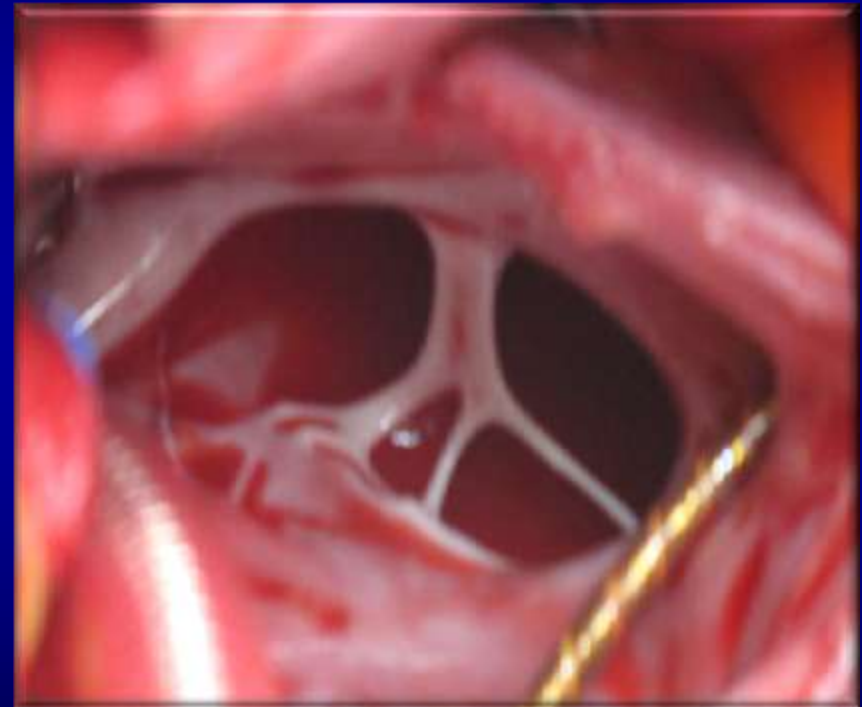




Unfeasible Multiple Defects screened by RT3D TEE before procedure

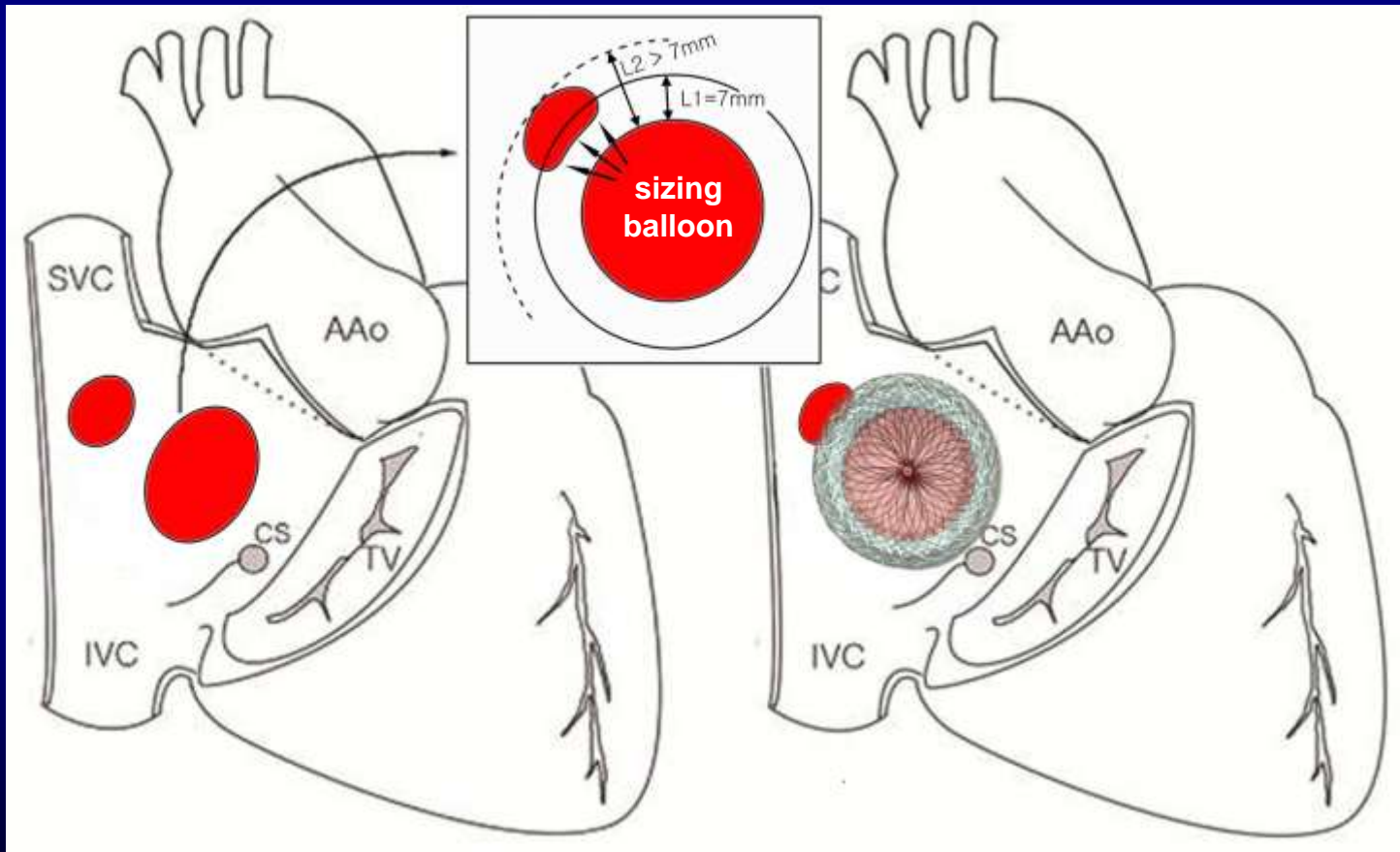


RT3D TEE



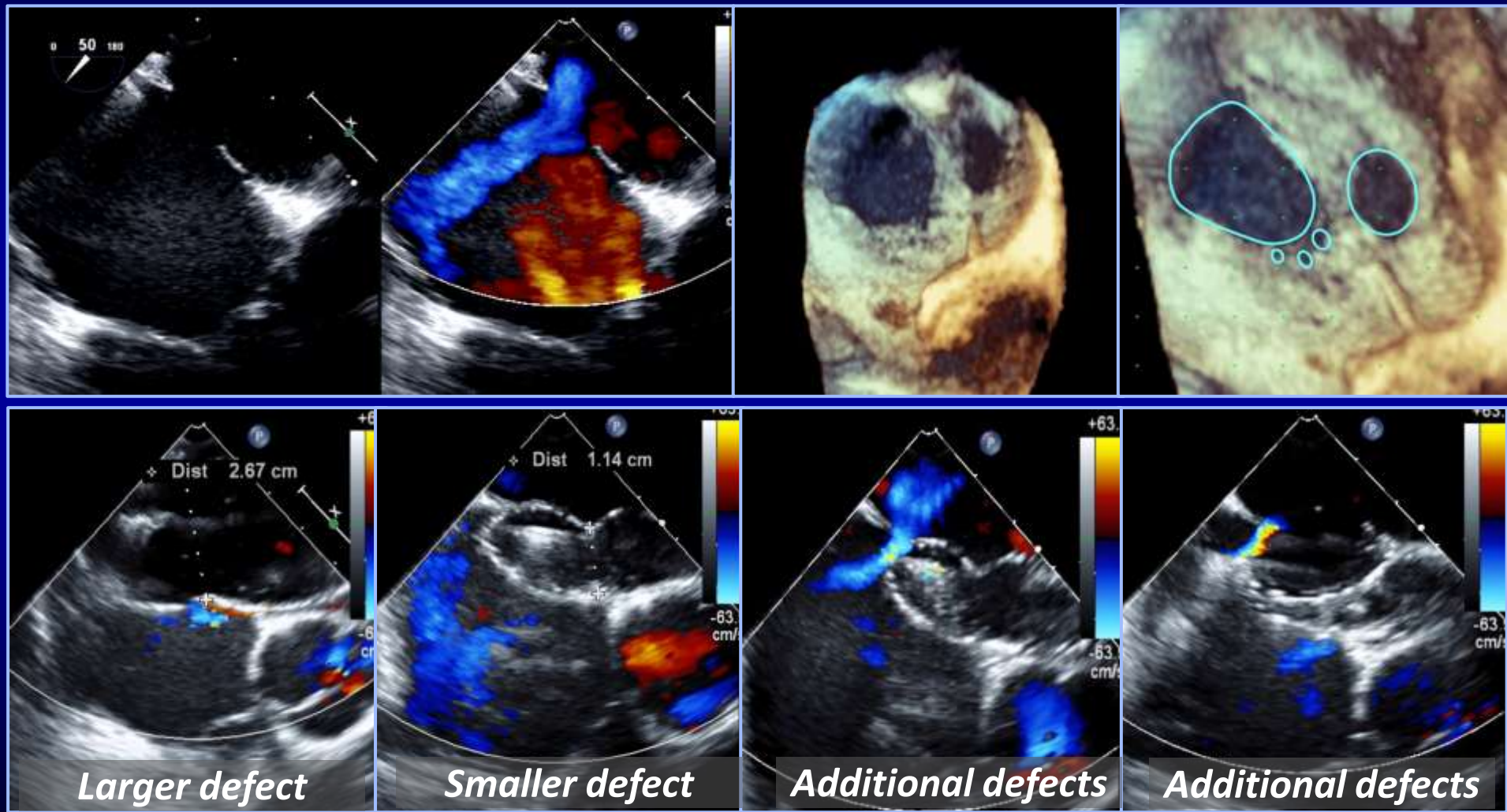
Intraoperative finding

Prediction of residual shunt by sizing-balloon placement





Case : multiple defects in equivocal distance - compliance of intervening septum -



Larger defect

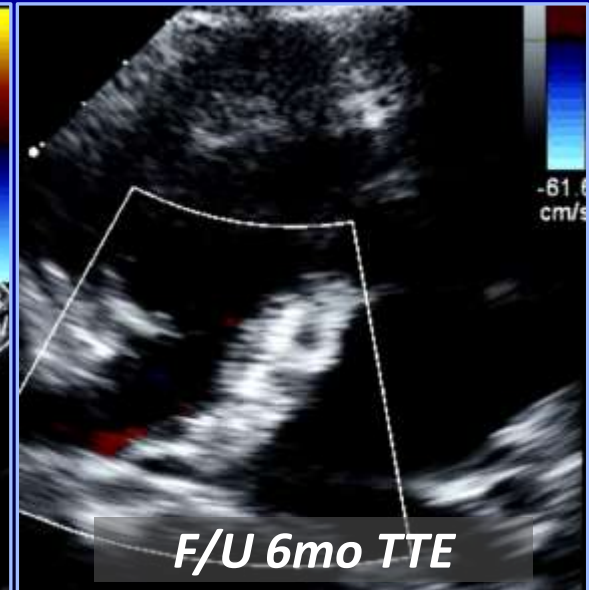
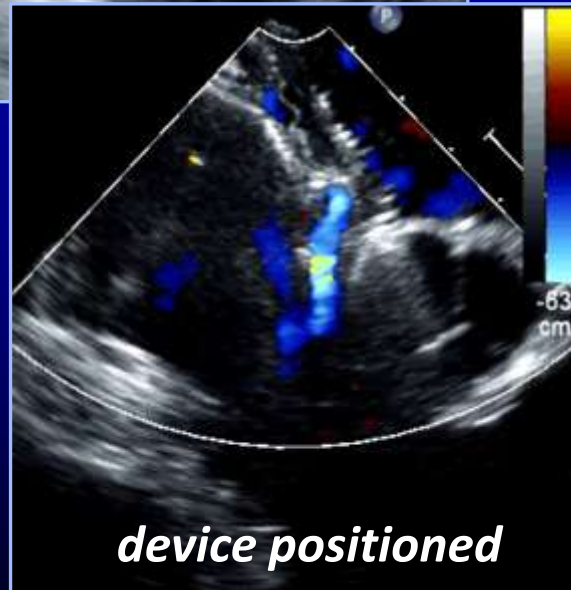
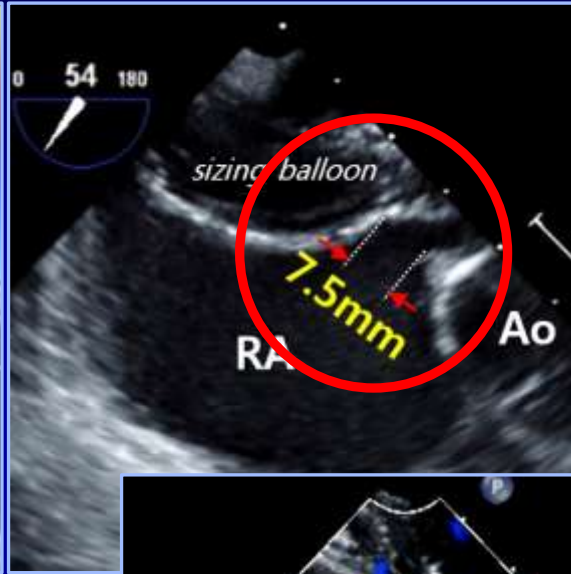
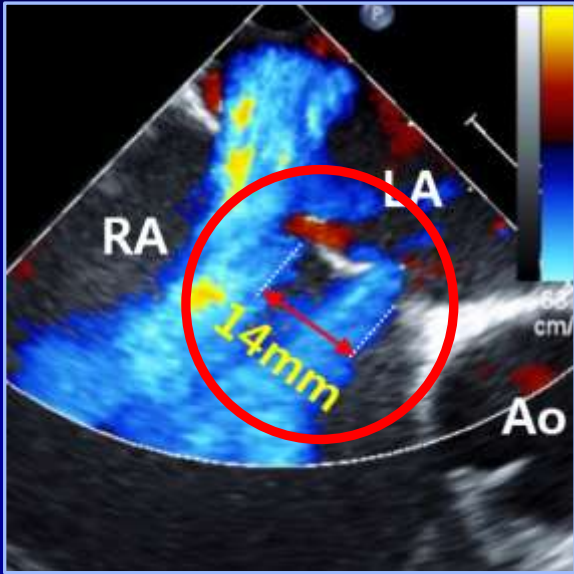
Smaller defect

Additional defects

Additional defects



Case : multiple defects in equivocal distance - compliance of intervening septum -





2 defects apart from each other (>7mm)

: 2 regular devices (occ. regular + cribriform)

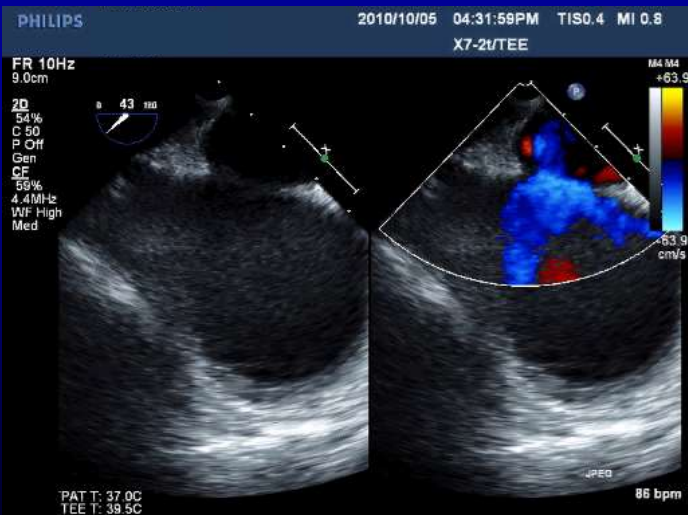
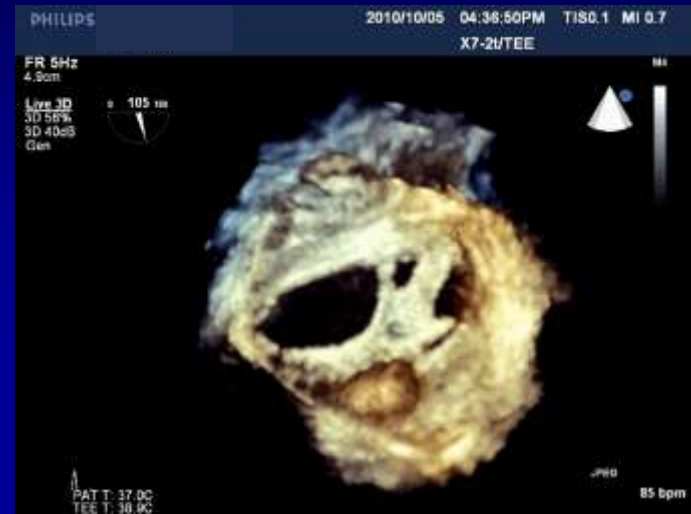
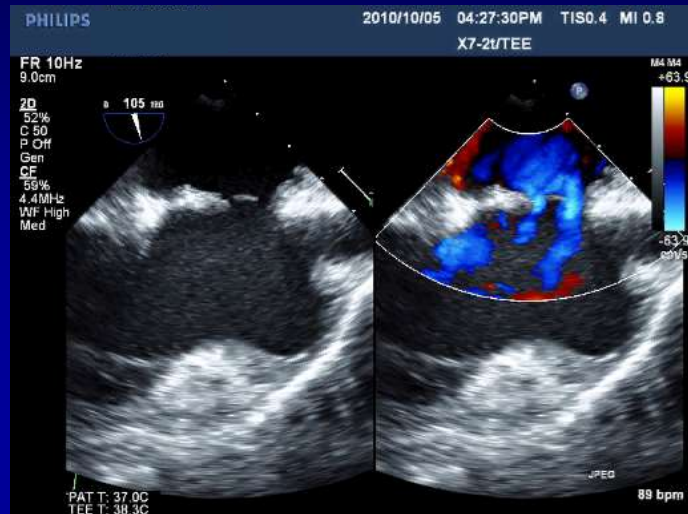
More than 3 discrete defects

: 2 or more regular devices (or regular + cribriform)



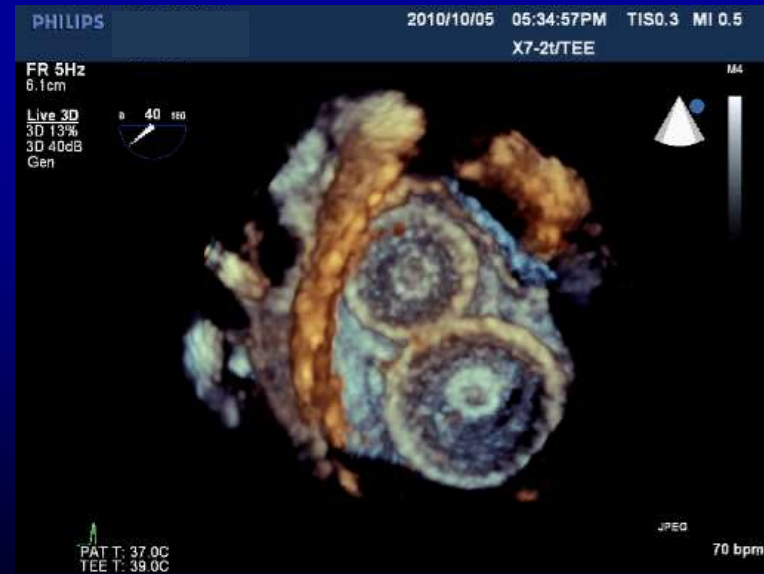
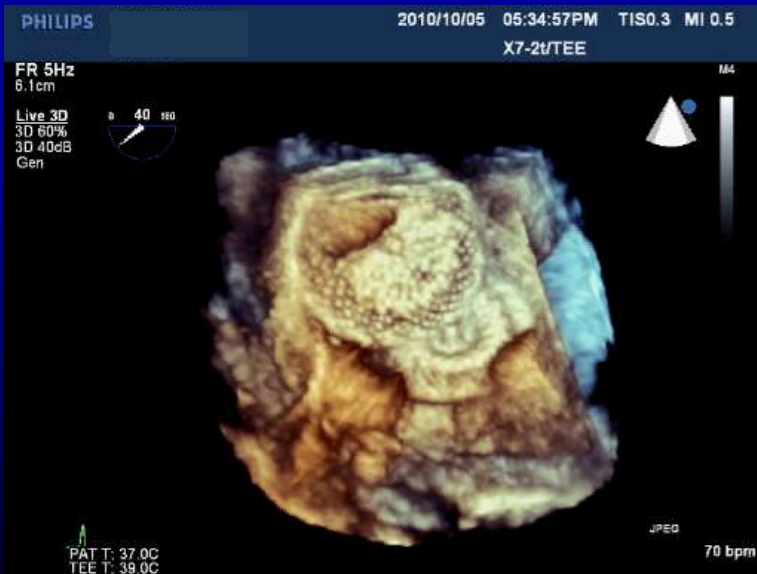
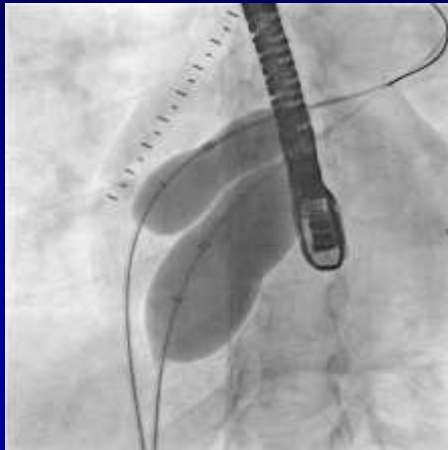


2 defects apart from each other (>7mm) Or ≥ 3 discrete defects : multiple devices





2 defects apart from each other (>7mm) Or ≥ 3 discrete defects : multiple devices

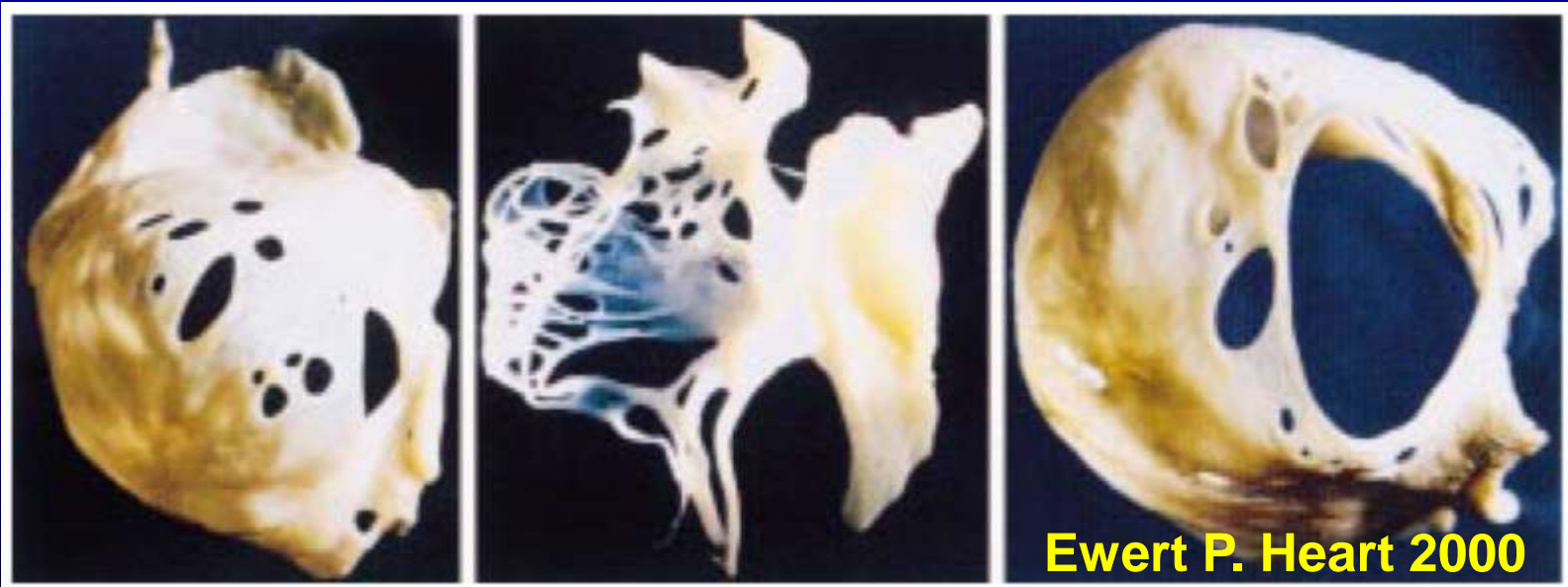




Multi-fenestrated defects +/- septal aneurysm **: cribriform device +/- additional device** **(or balloon/blade consolidation)**

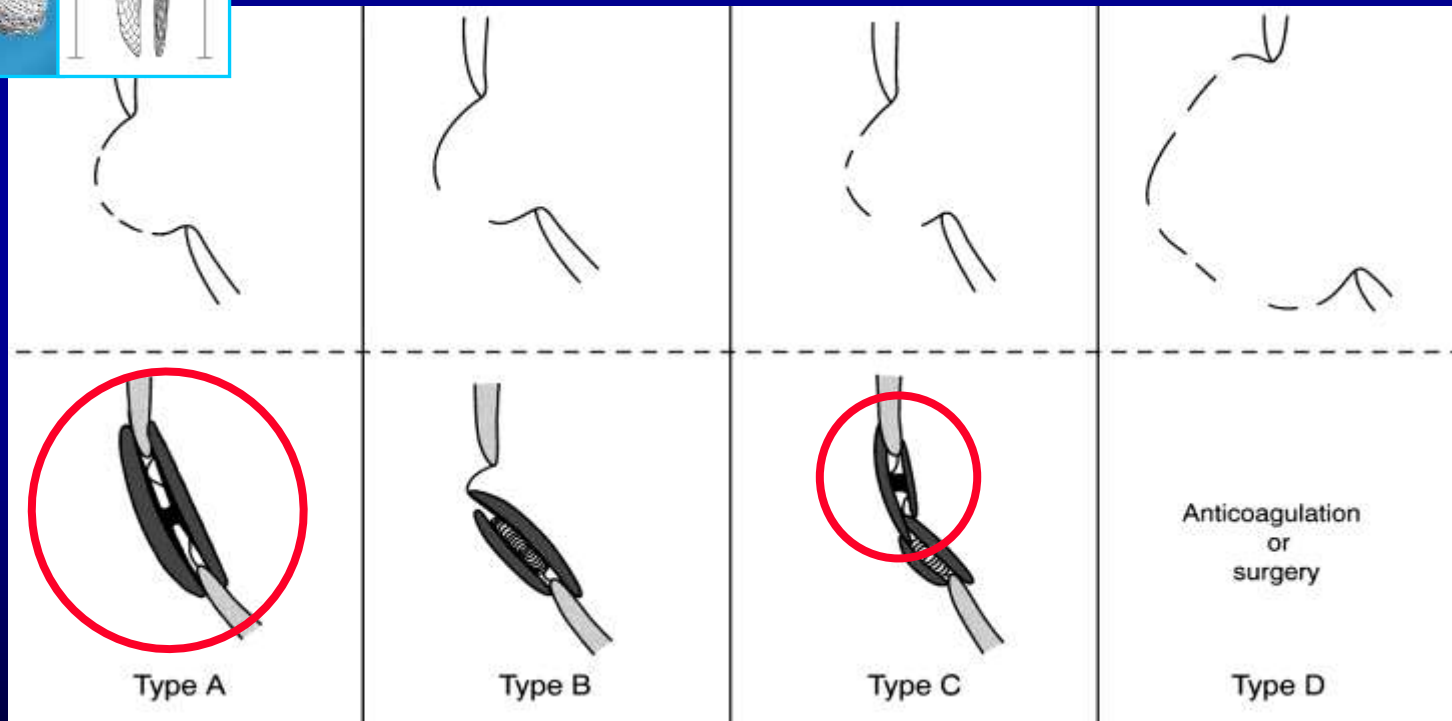
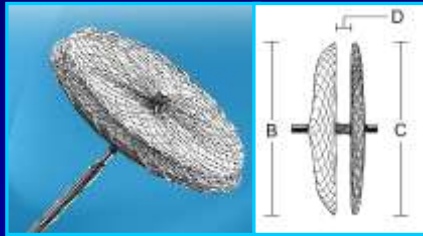
Numan M et al. *Pediatr Cardiol* 2008;29:530

- 81% procedural success, 92% complete closure at 1yr





Multi-fenestrated defects +/- septal aneurysm : cribriform device +/- additional device



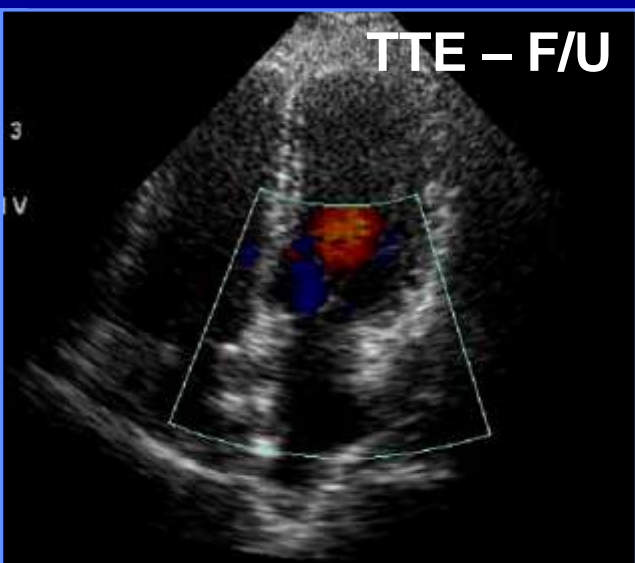
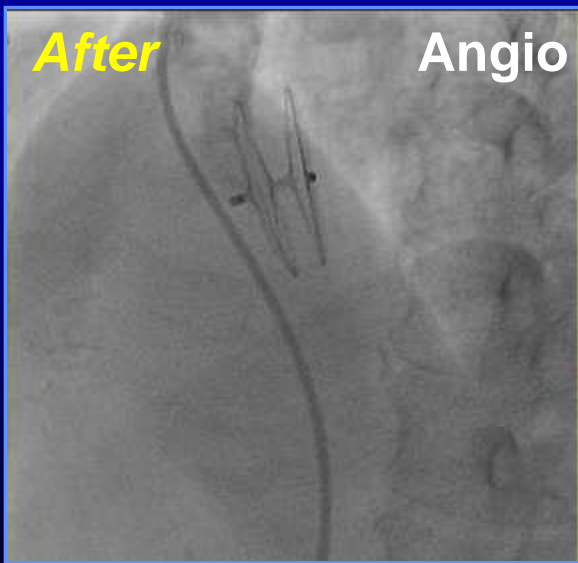
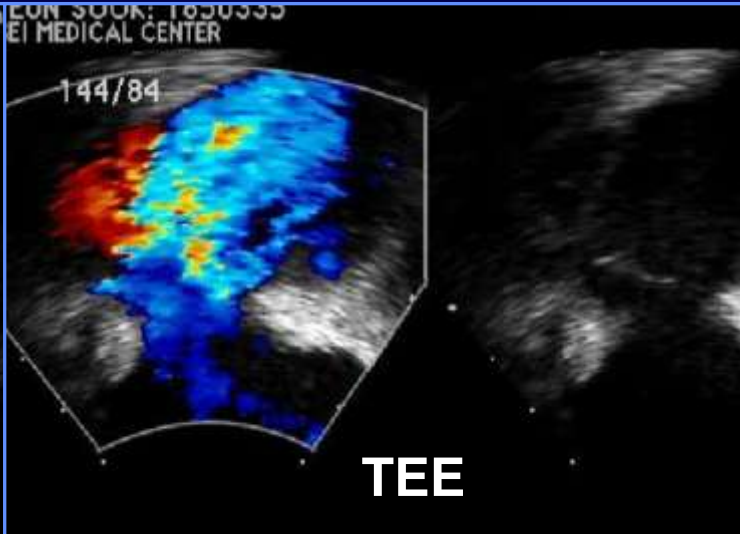
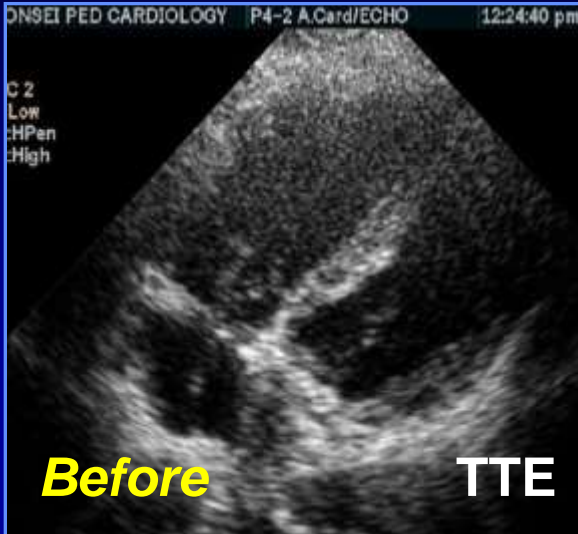
Modified from Ewert P et al. Heart 2000



Case: Cribriform Device for Multi-perforated ASA

CARDIOVASCULAR SUMMIT
TCTAP 2015

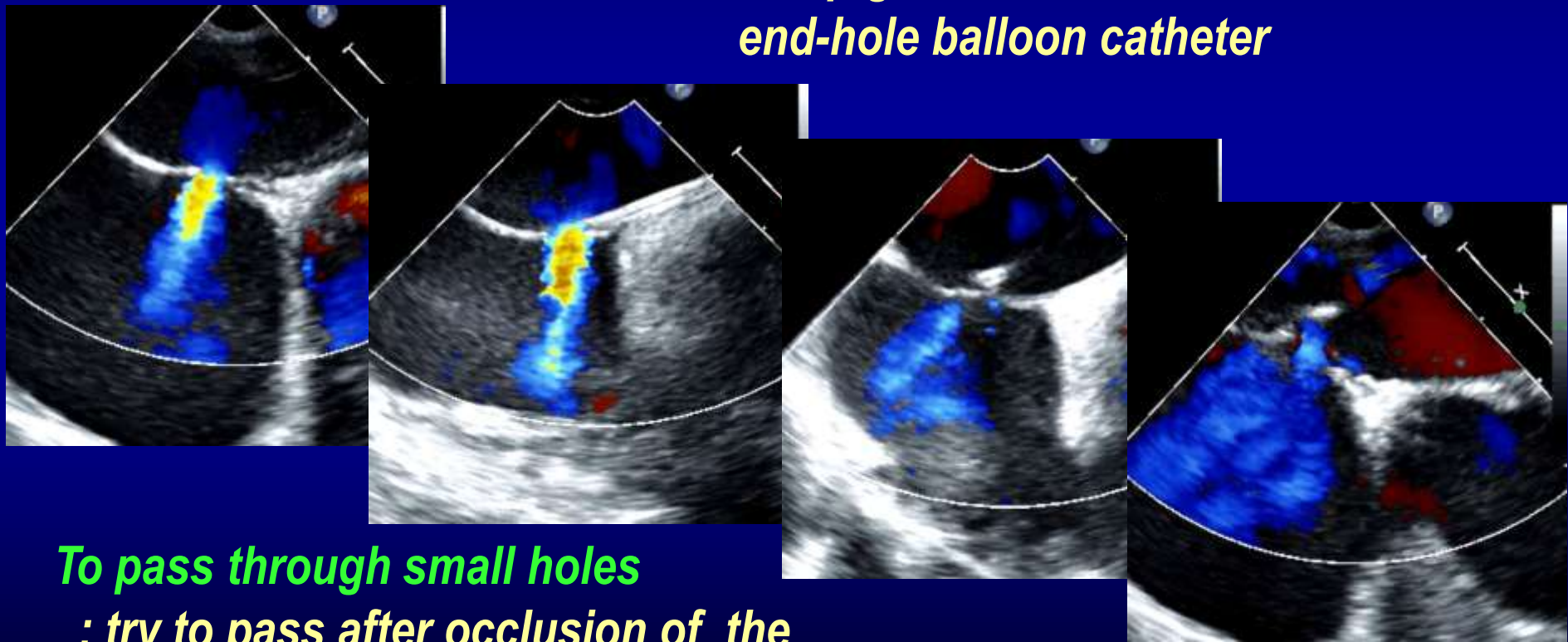
- F/56, DOE (+), Ht:155cm, Qp/Qs=2.5





**Selecting the right hole may be demanding..
however, this is a crucially important step!**

**To pass through the large hole
: use pig-tail catheter or inflated
end-hole balloon catheter**

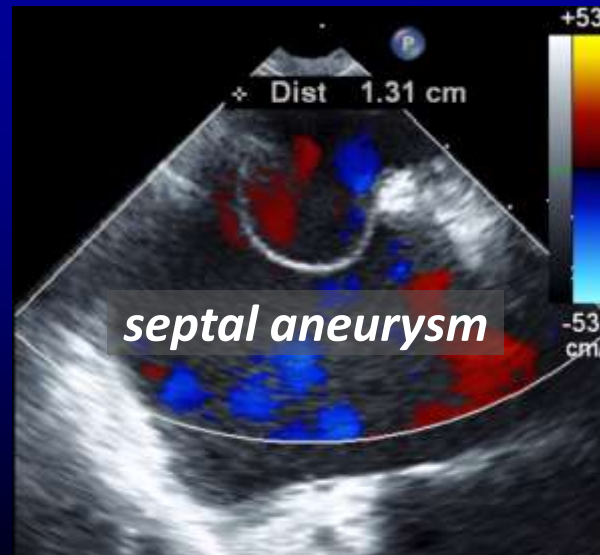
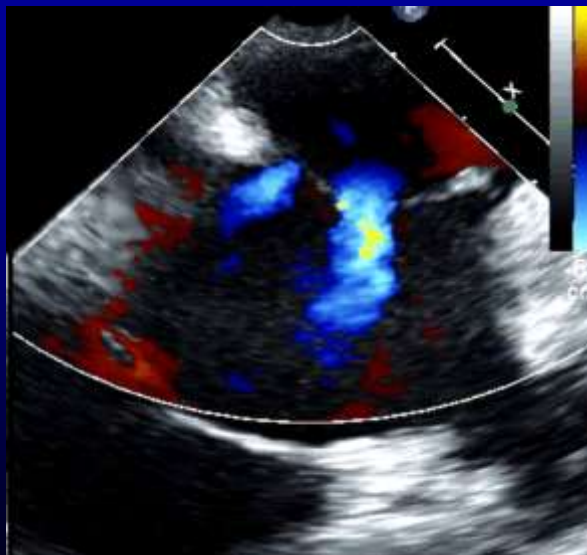
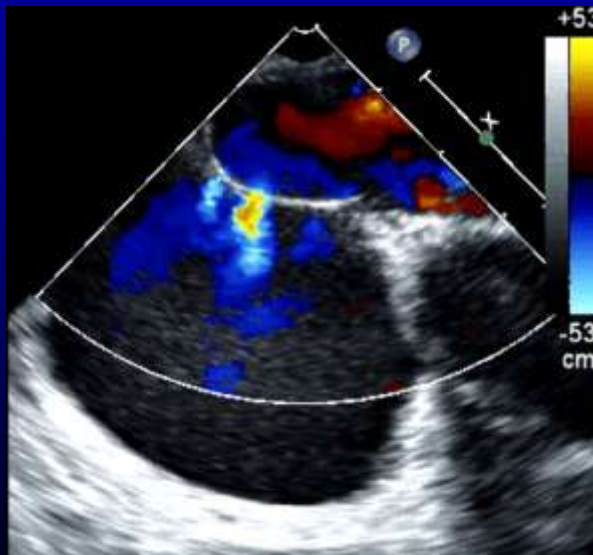
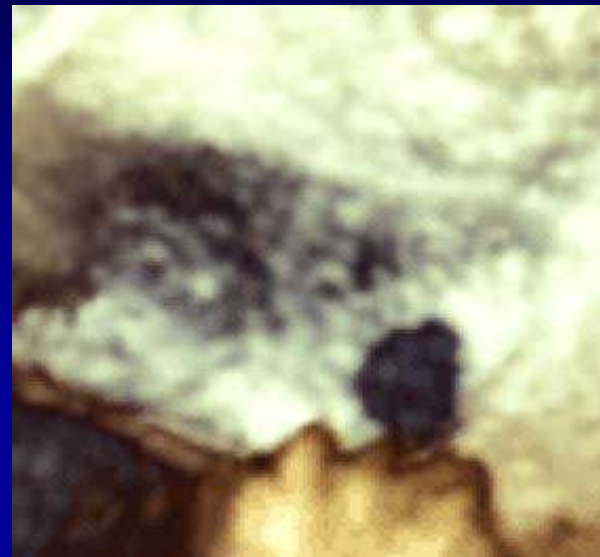
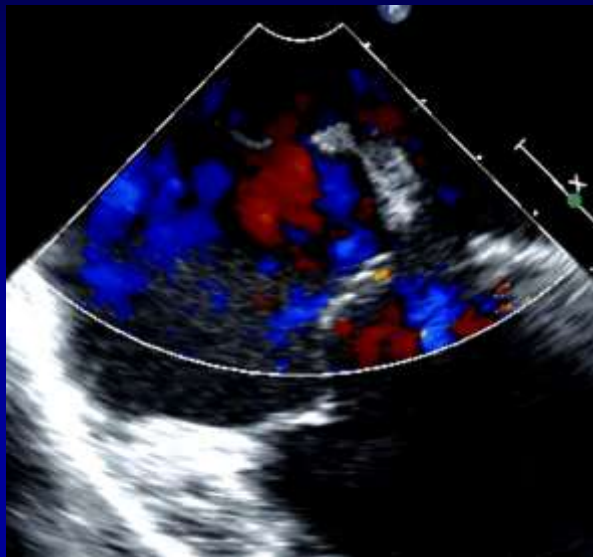


**To pass through small holes
: try to pass after occlusion of the
large hole(s) with inflated sizing-balloon**



Mixed or Complex

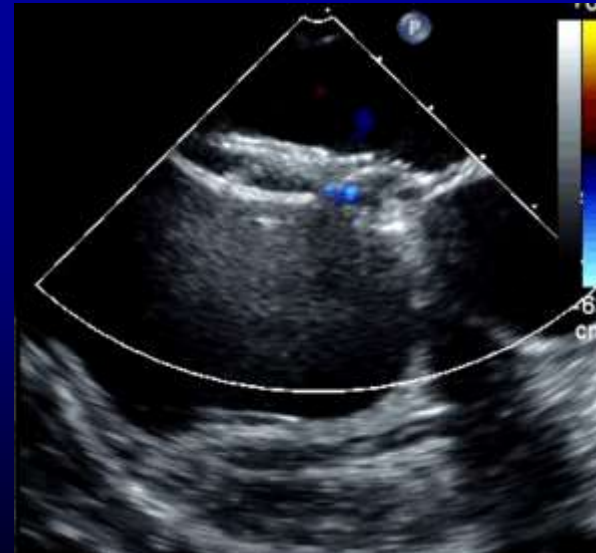
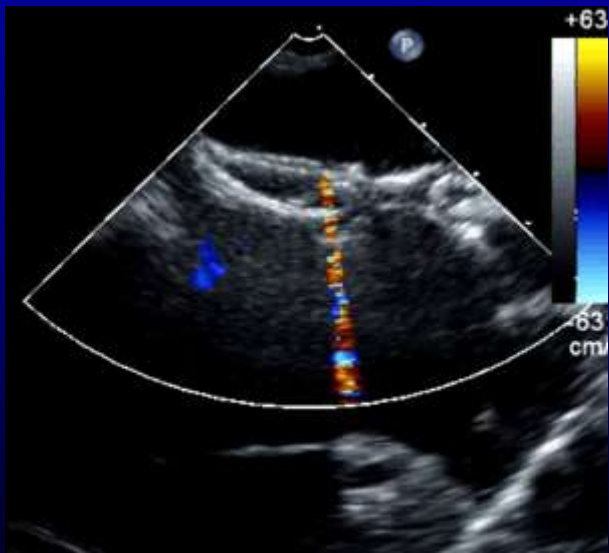
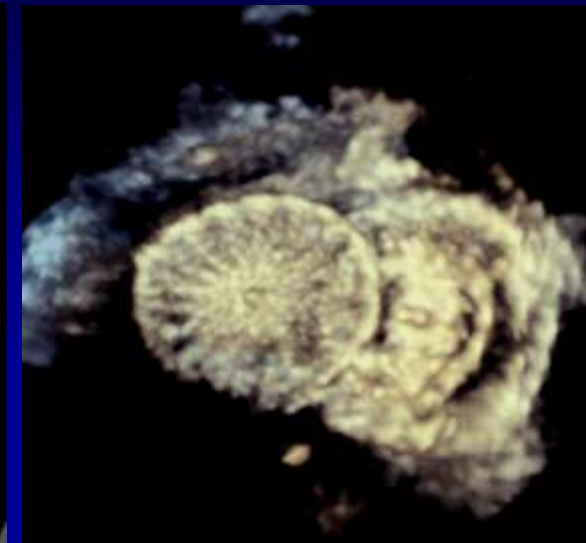
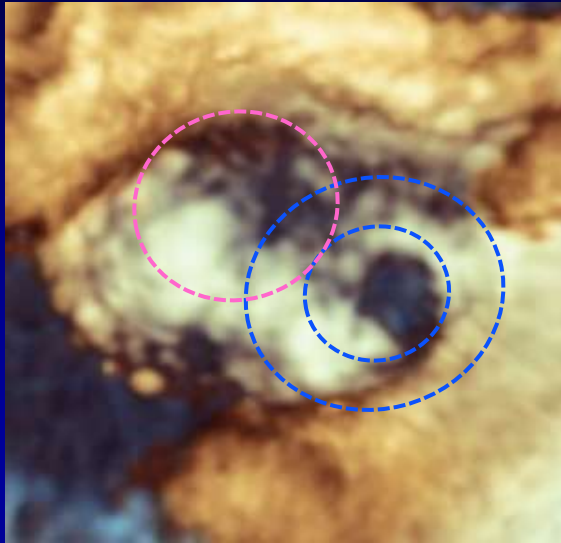
Case : multiple devices (regular + cribriform)





Mixed or Complex

Case : multiple devices (regular + cribriform)





Techniques for Closure of Multiple Defects Using Multiple Devices

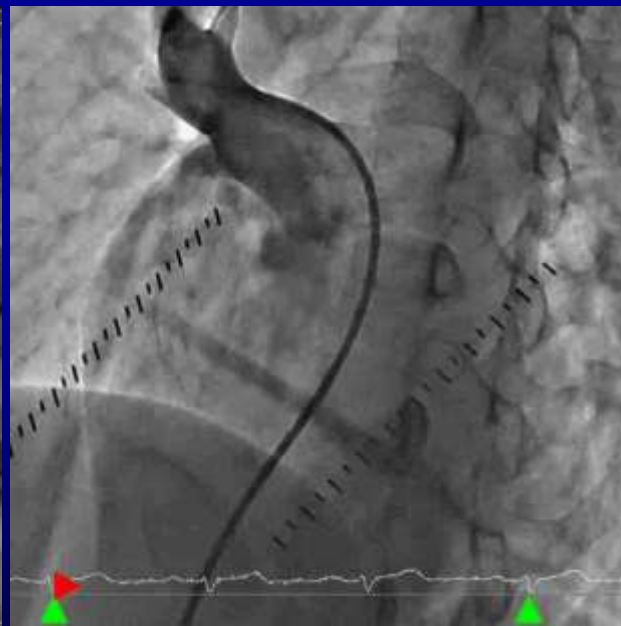
- **Mid to long-term complete closure rate : 88~100%**

Awad SM et al. CCI 70:265, 2007, Mahadevan VS et al. IJC 133:359, 2009

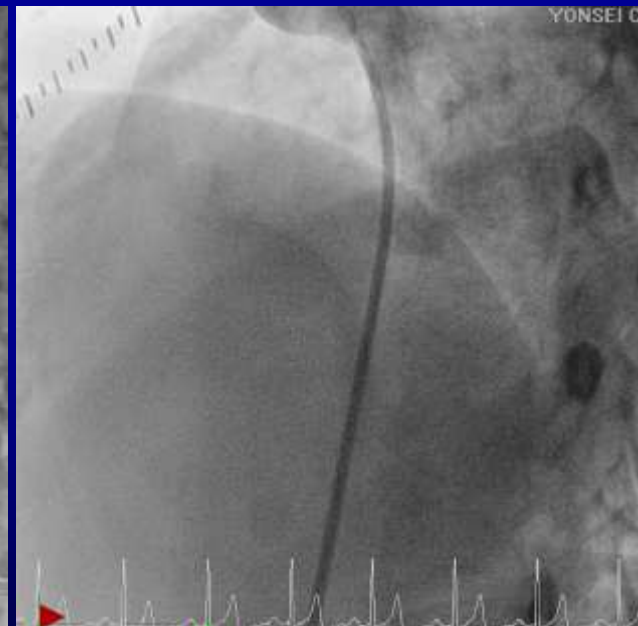
- **Needs more sophisticated strategy than single-device closure**



Interleaving

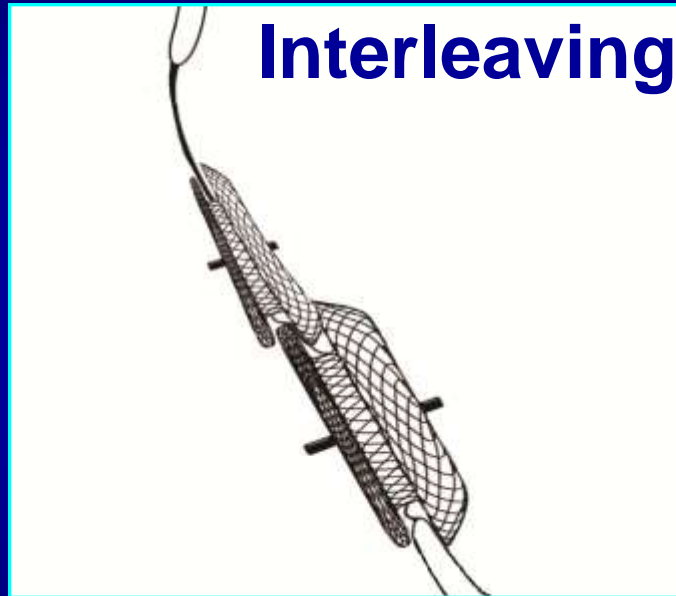
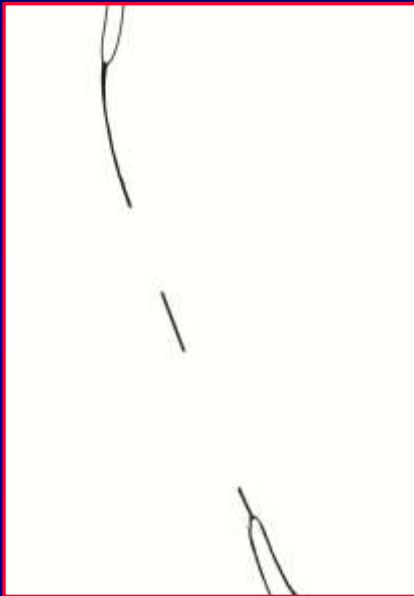


Overlapping



Classic + Cribriform

Techniques for Closure of Multiple Defects using multiple devices



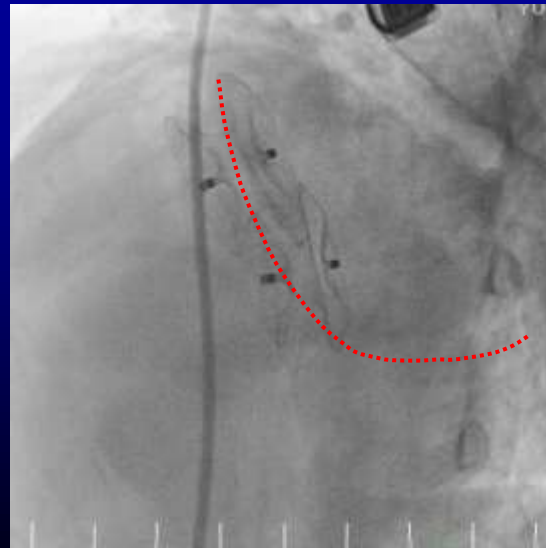
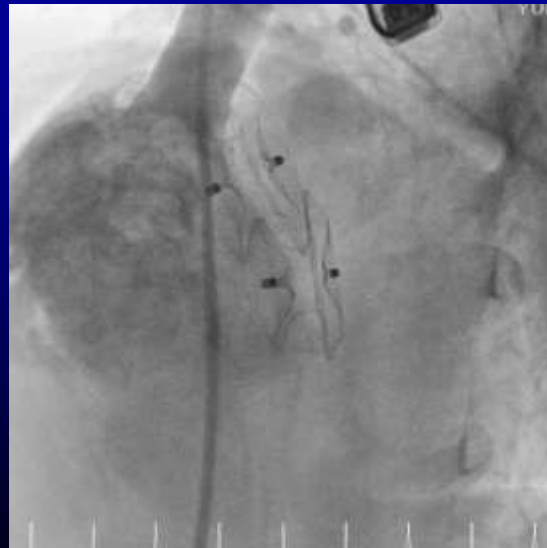
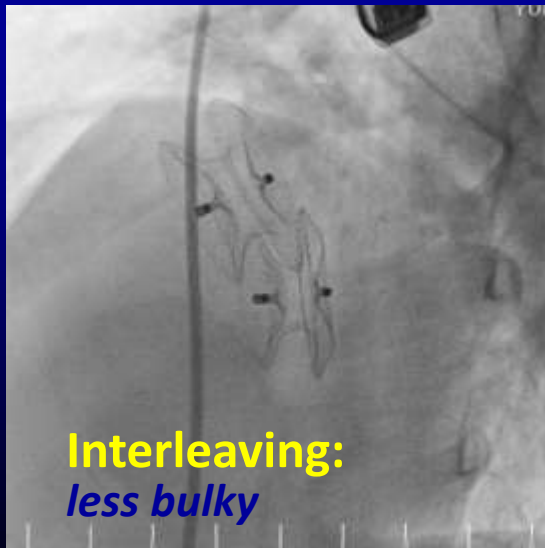
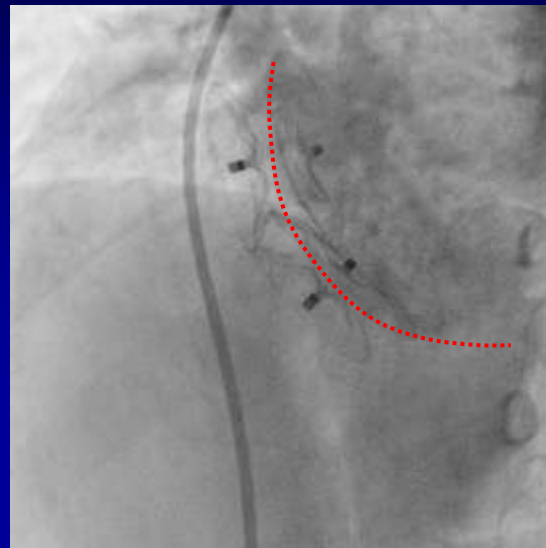
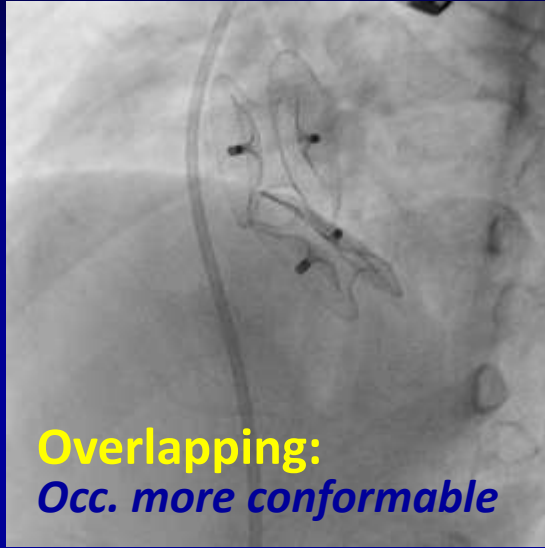
- lower profile
- theoretical advantage of less thrombogenicity

*Roman KS et al.
J Interv Cardiol 15:393, 2002*

- both atrial discs of smaller device in between the discs of larger device
- applicable for residual shunt after prior procedure

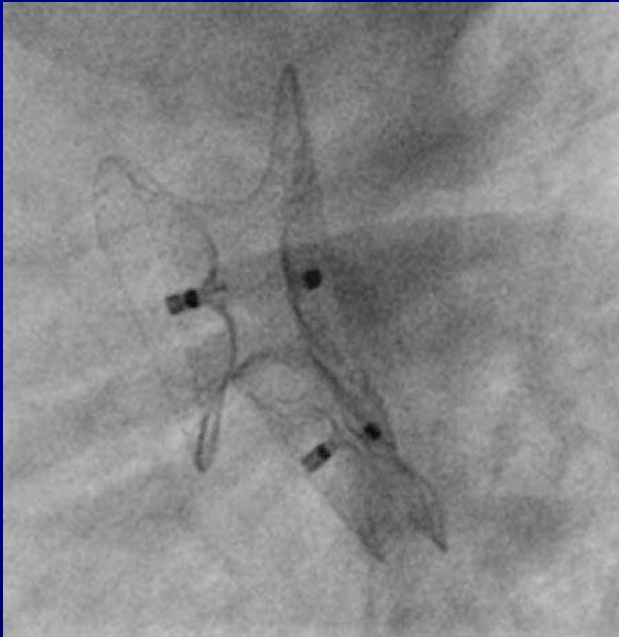


Is Interleaving Technique Always Better?





Interference between Devices relevant to Implantation Techniques



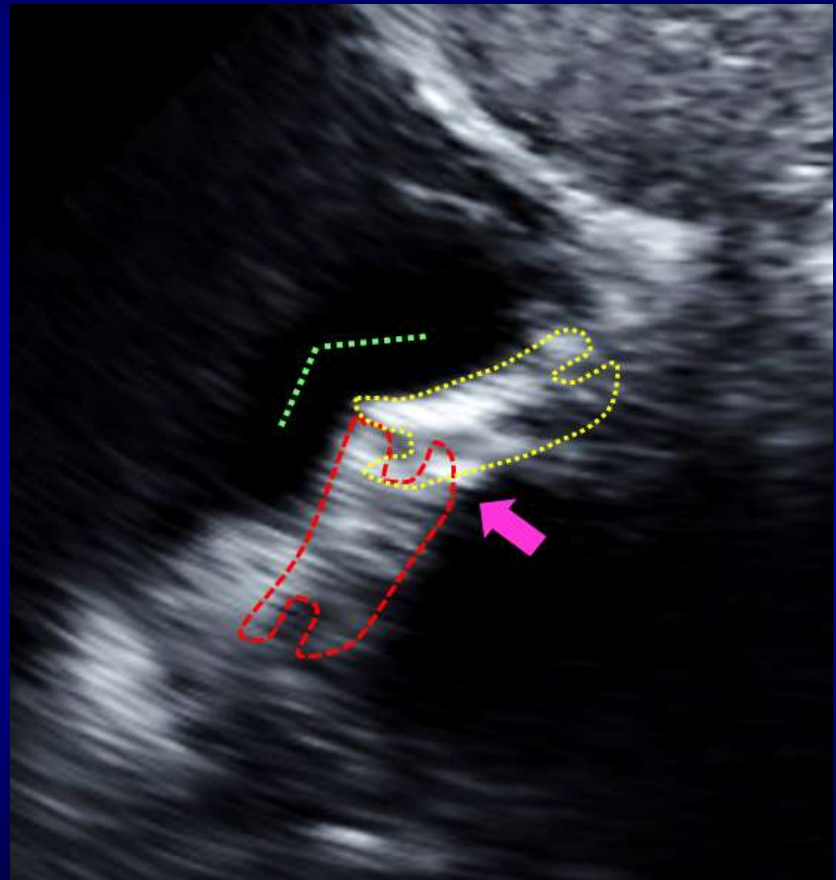
✓ **Incomplete approximation of both atrial discs**

1. Oversizing
2. Defective product
3. ???

unacceptable interference between devices

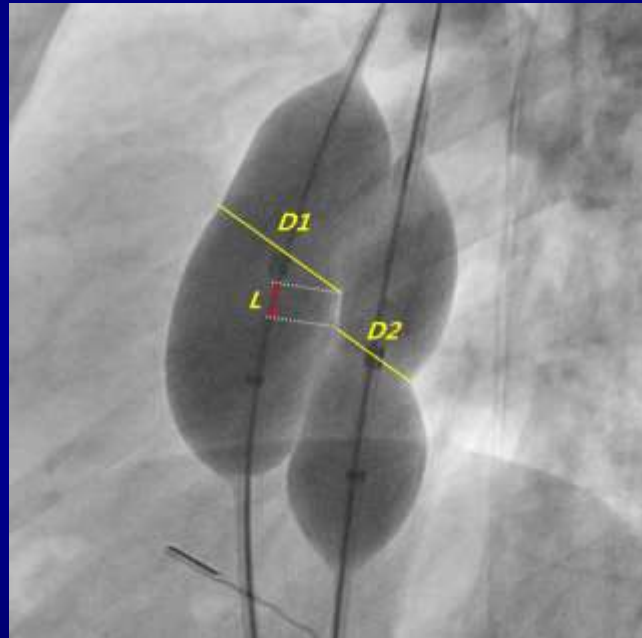
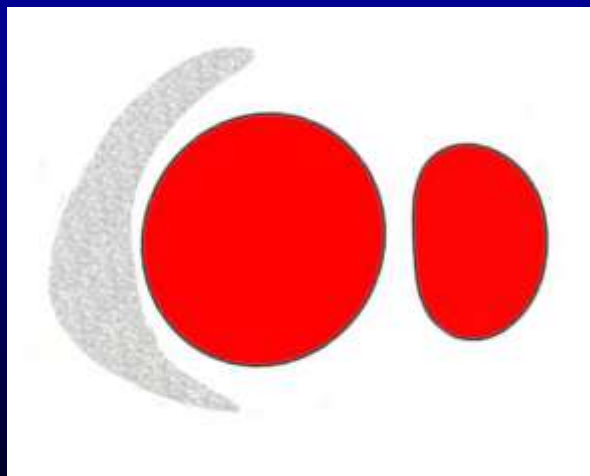
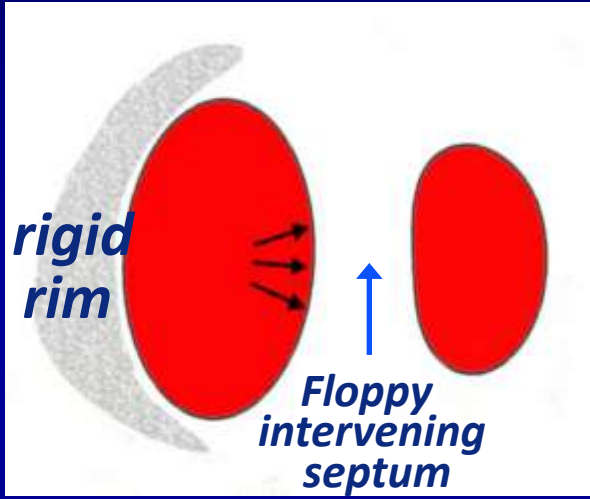


Undesirable Device Interference : mechanism and how to minimize?

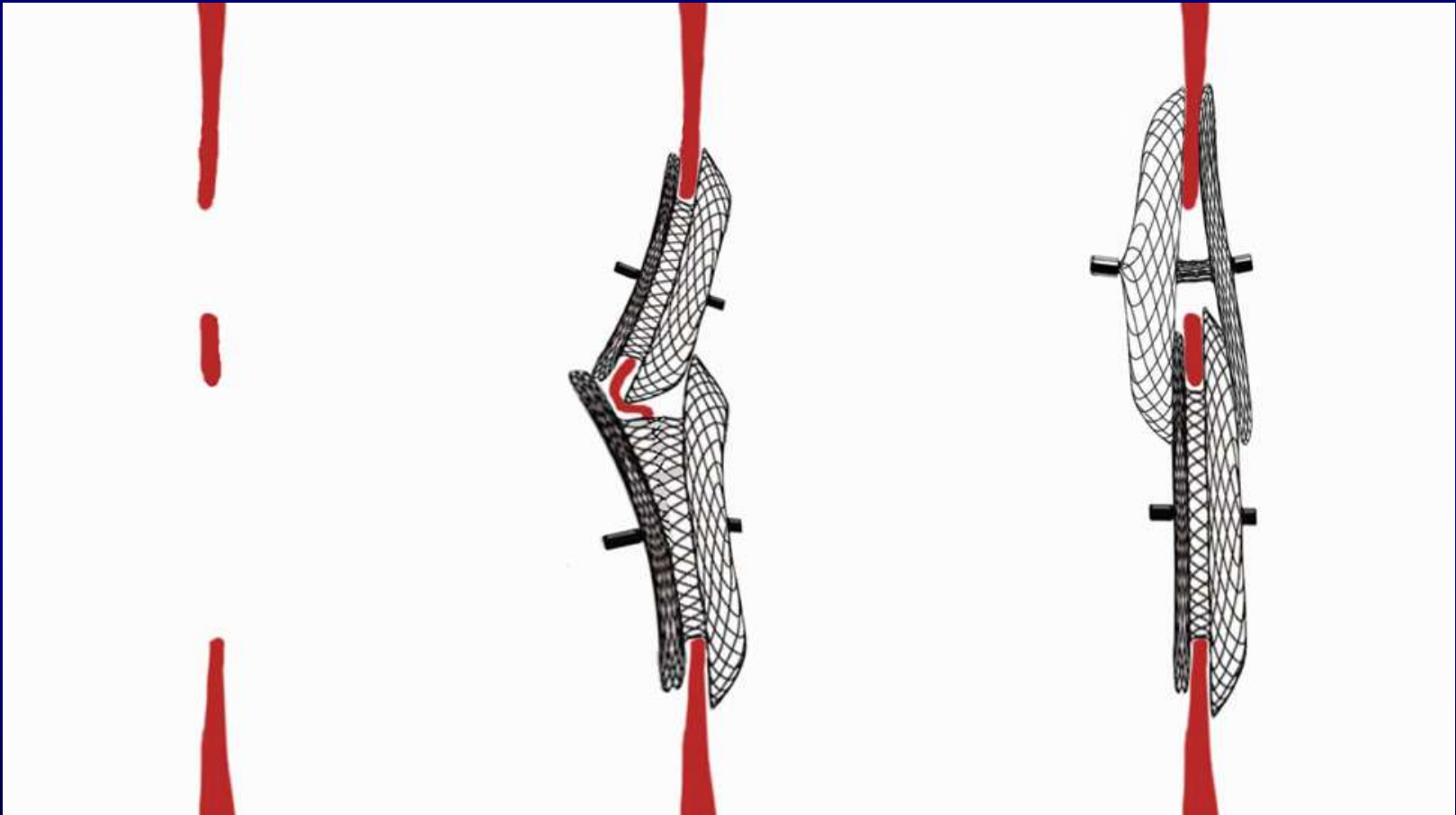




Physical properties of surrounding rims & intervening septum



How to Minimize Interference btw Devices?





Conclusion

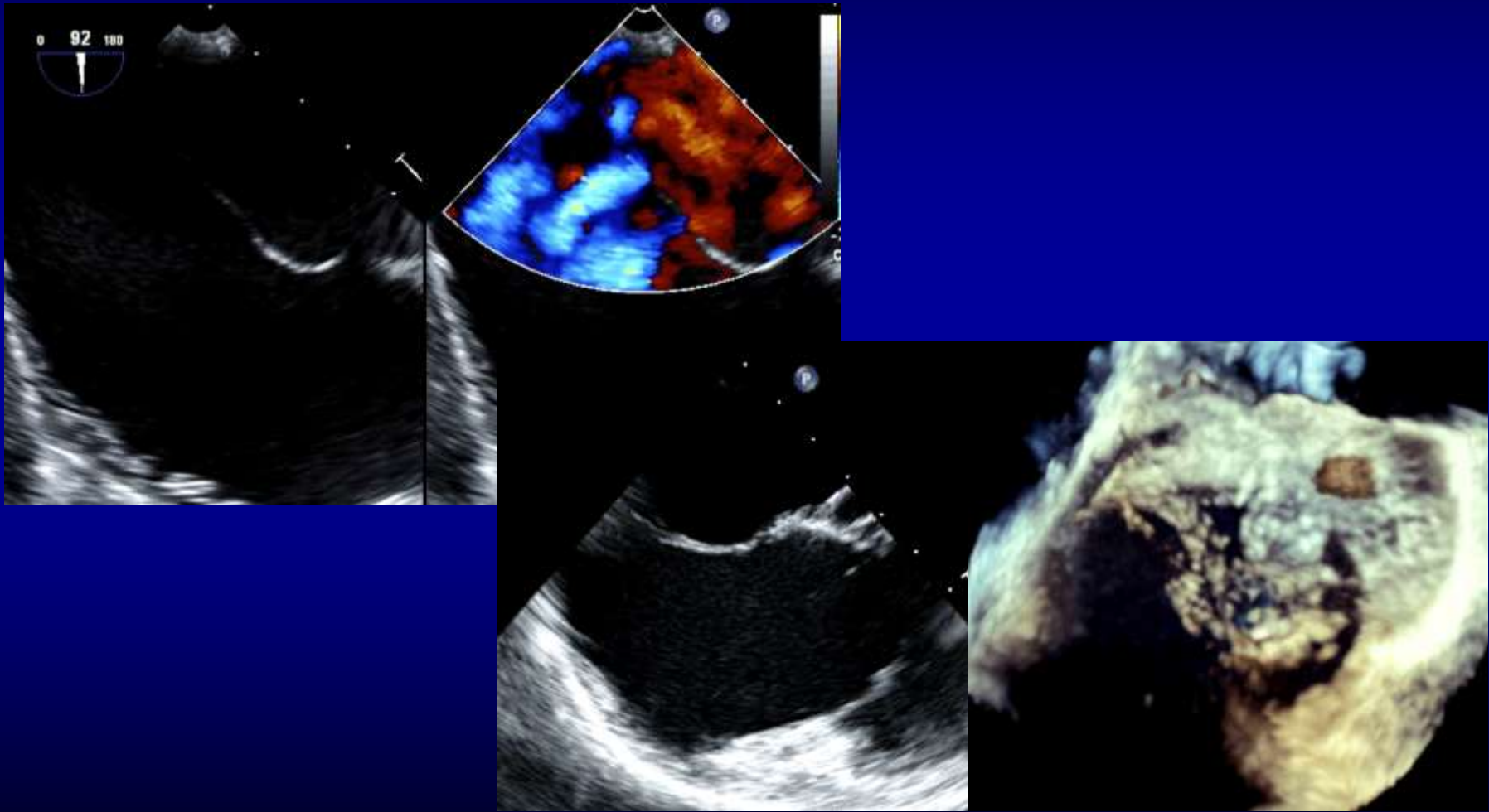
- ✓ Be aware of the basic principles to closed multiple defects
- ✓ Be familiar with the strengths & limitations of equipment / techniques
- ✓ Don't burn your boat
: *Surgery is a good alternative!*
- ✓ Meticulous and individualized strategy for each patient are mandatory to maximize the efficacy and safety
: *Think creatively!*



*Thank you
for your attention !!*

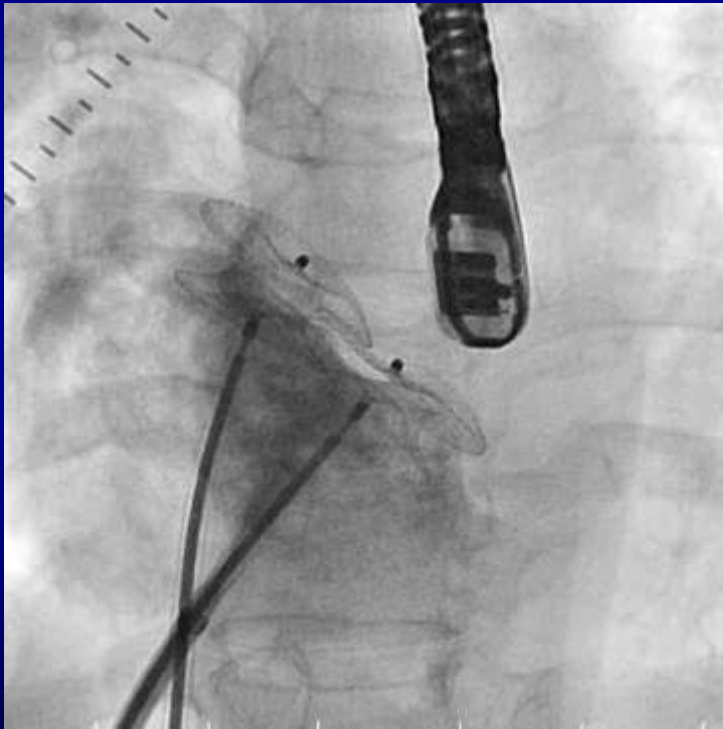


**Case : multiple defects with
extensive defect-containing area
& mesh-like intervening septum**





**Case : multiple defects with
extensive defect-containing area
& mesh-like intervening septum**





**Case : multiple defects with
extensive defect-containing area
& mesh-like intervening septum**

