



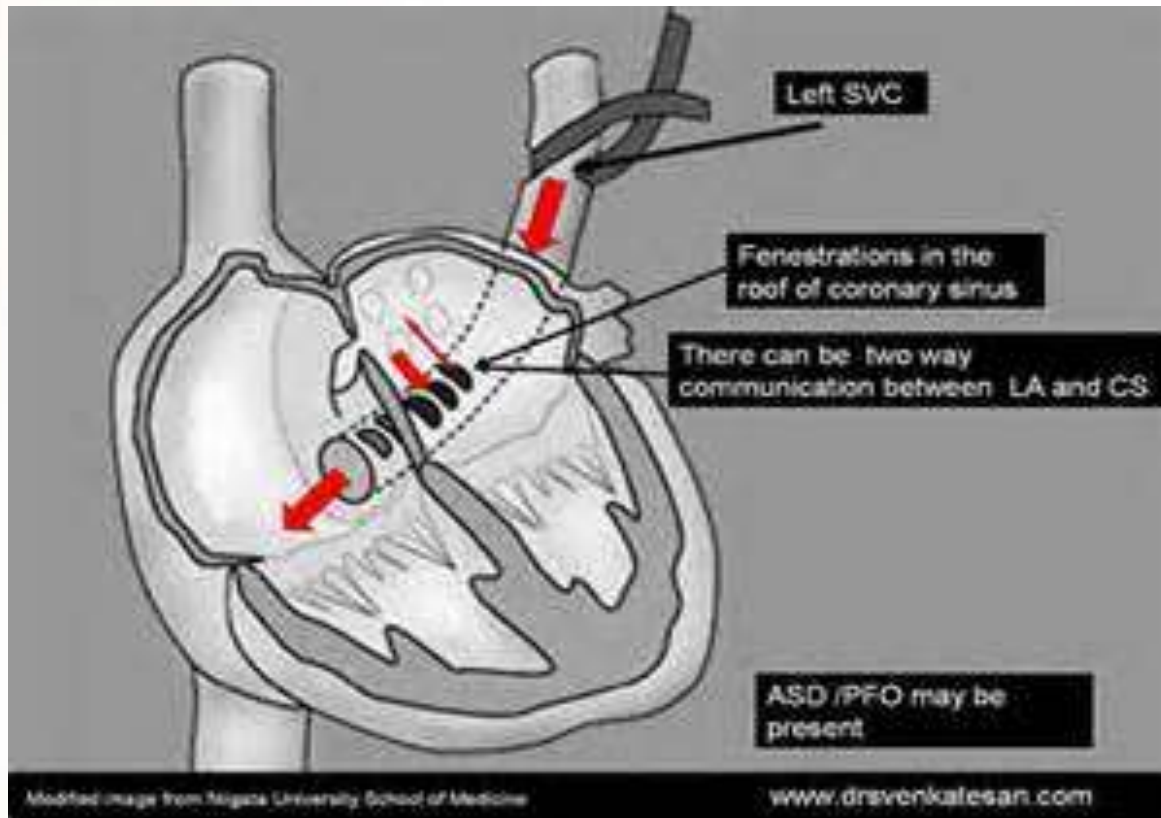
# Transcatheter closure of unroofed coronary sinus defect

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# Unroofed CS







# Unroofed coronary sinus defect

- A defect on the roof of coronary sinus, allowing communication between LA and RA
- Left-to-right shunt at atrial level
- association with persistent LSVC



# Morphological types of unroofed coronary sinus

- Type I: completely unroofed CS with LSVC
- Type II: completely unroofed CS without LSVC
- Type III: partially unroofed mid-portion of CS
- Type IV: partially unroofed terminal portion of CS



# Difficulties encountered in CS management

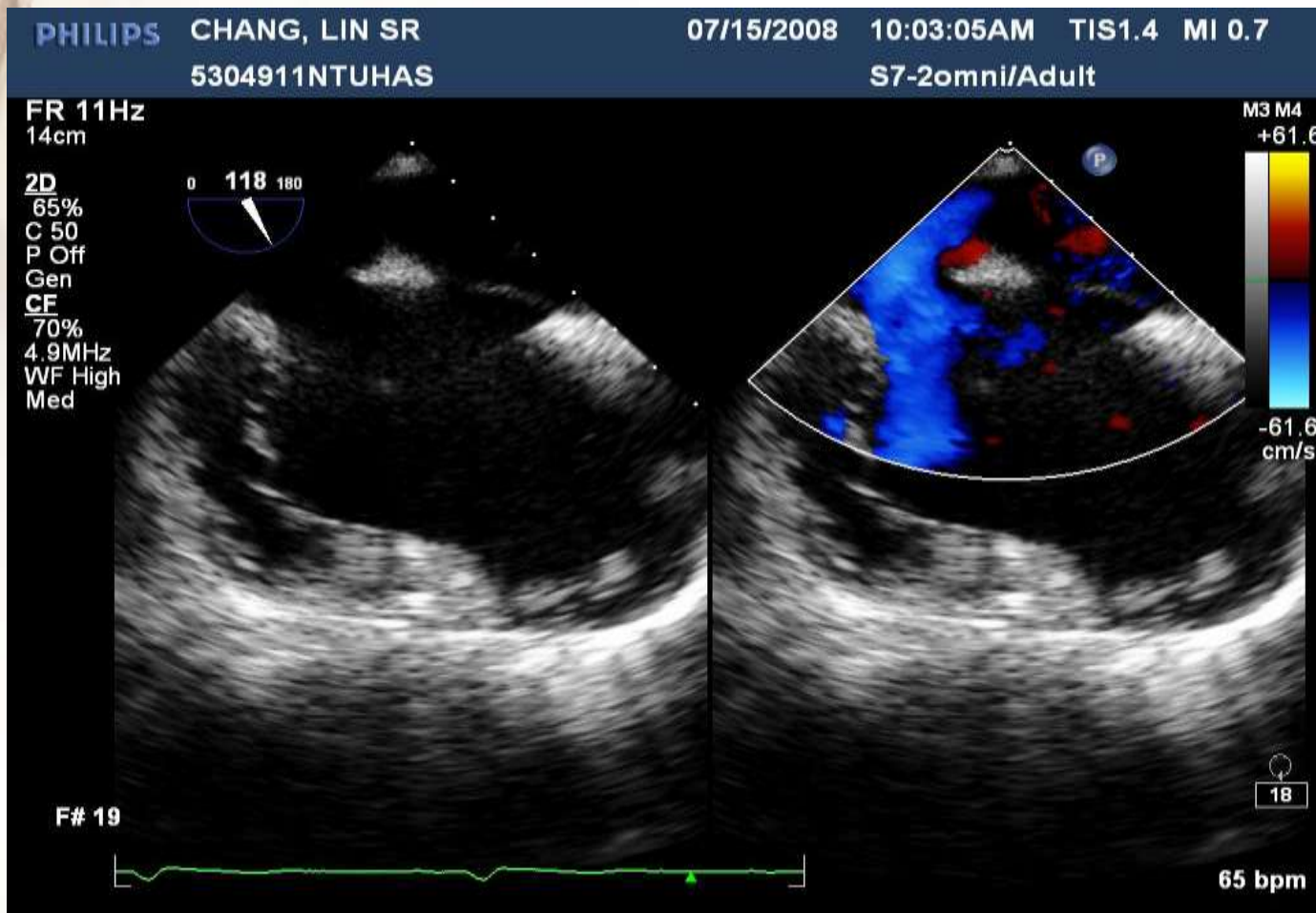
- precordial echo frequently inadequate to make the diagnosis
- transcatheter closure: very rare reports technical aspects not well described, Contraindication for catheter closure in AHA guidelines *circulation* 2011;123:2607



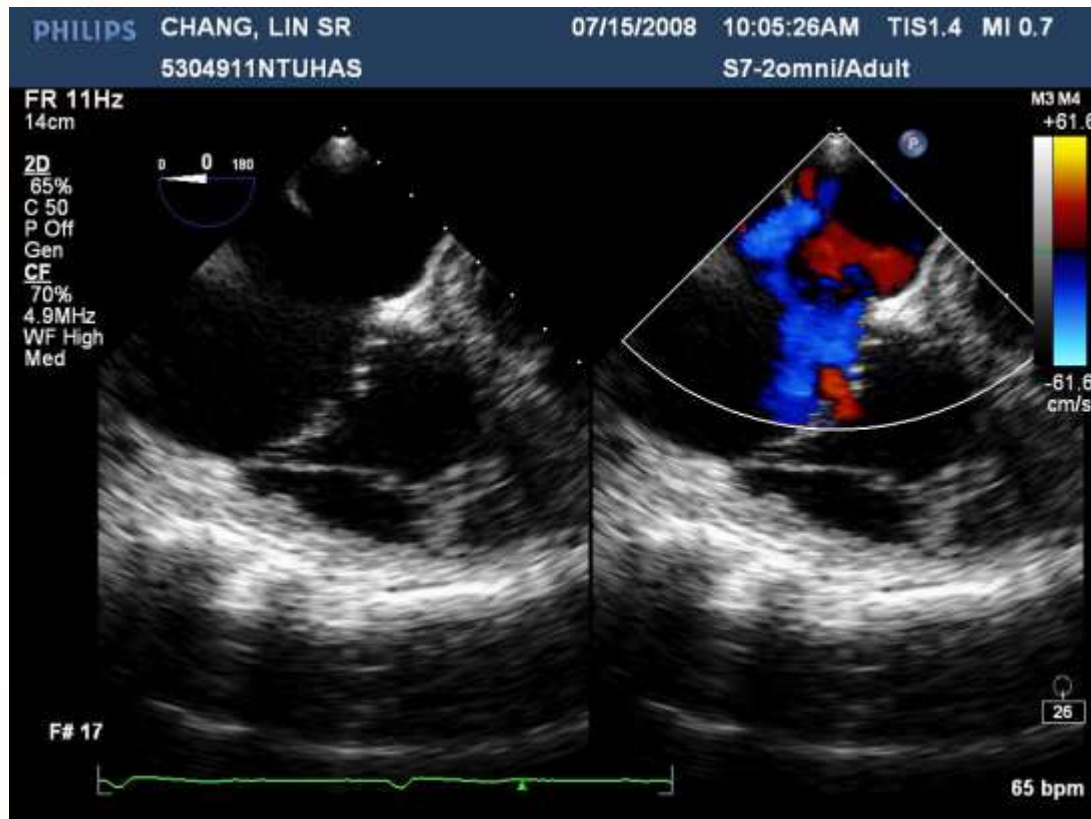
# TEE monitoring of CS defect or ostium closure

- TEE provides better images of CS defect than TTE
- The device position can be well delineated with TEE
- CS blood flow return can be traced

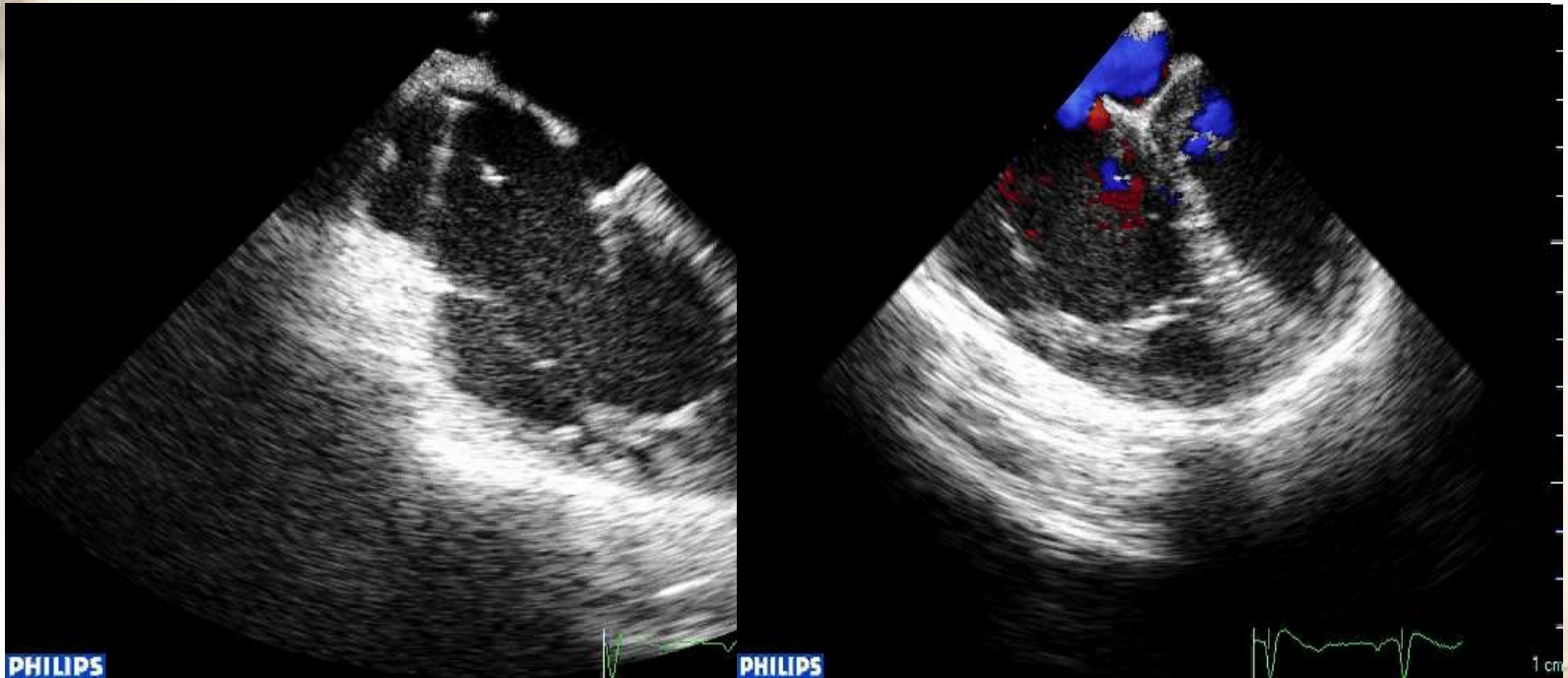
# TEE images of unroofed CS







# Complete form unroofed CS defect



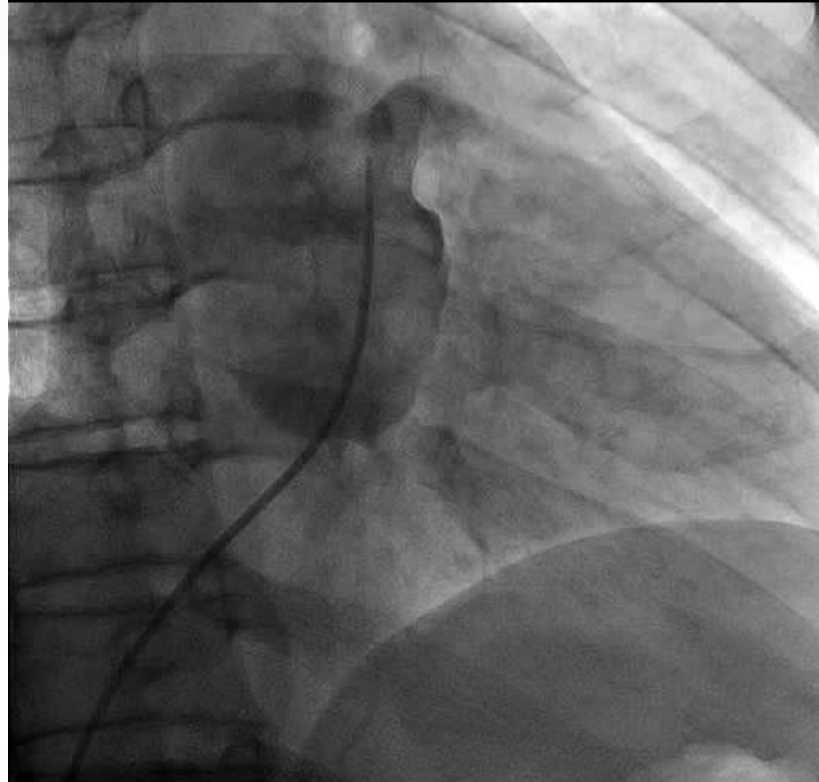


# Procedures of transcatheter closure of unroofed CS (I)

- hemodynamics & angiograms
- G/A & TEE images
- pass a right Judkins to LA or LUPV  
→ ASD G/W

# RAO view

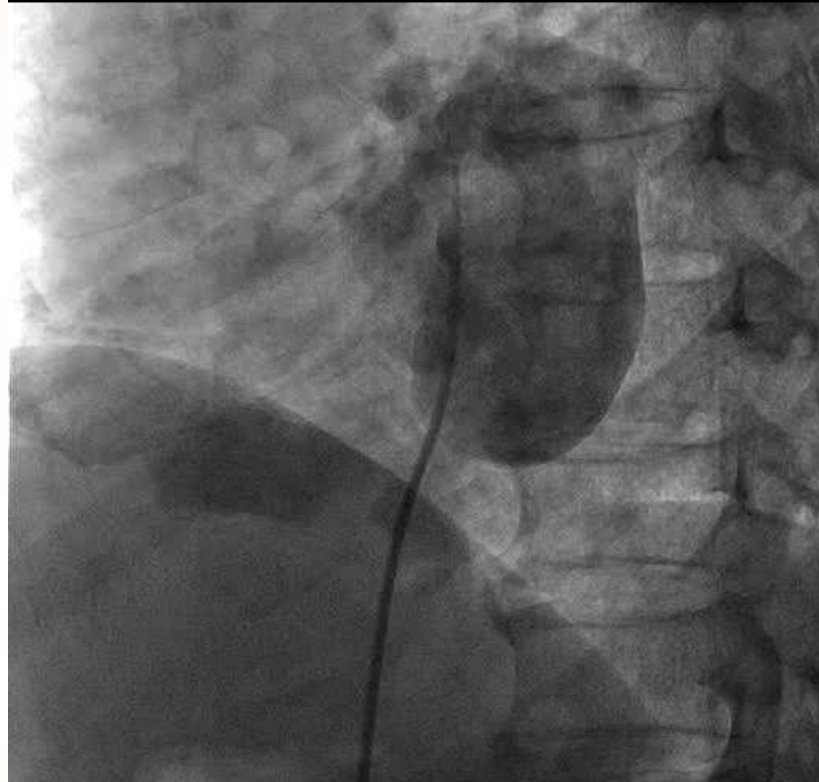
Lossy compression - not intended for diagnosis





# Mid-portion unroofed CS

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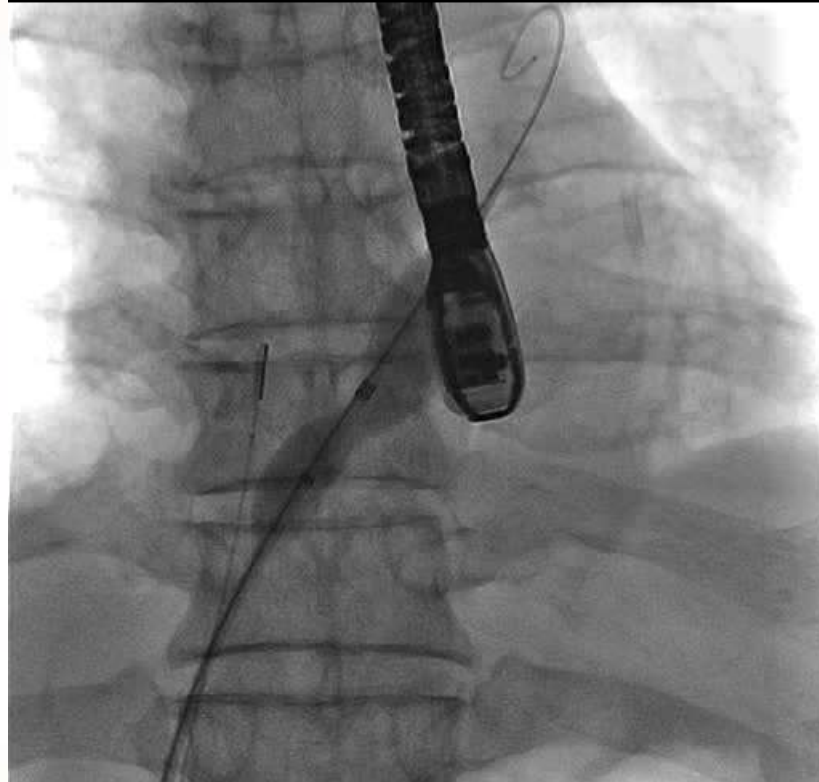


## Procedures of transcatheter closure of unroofed CS (II)

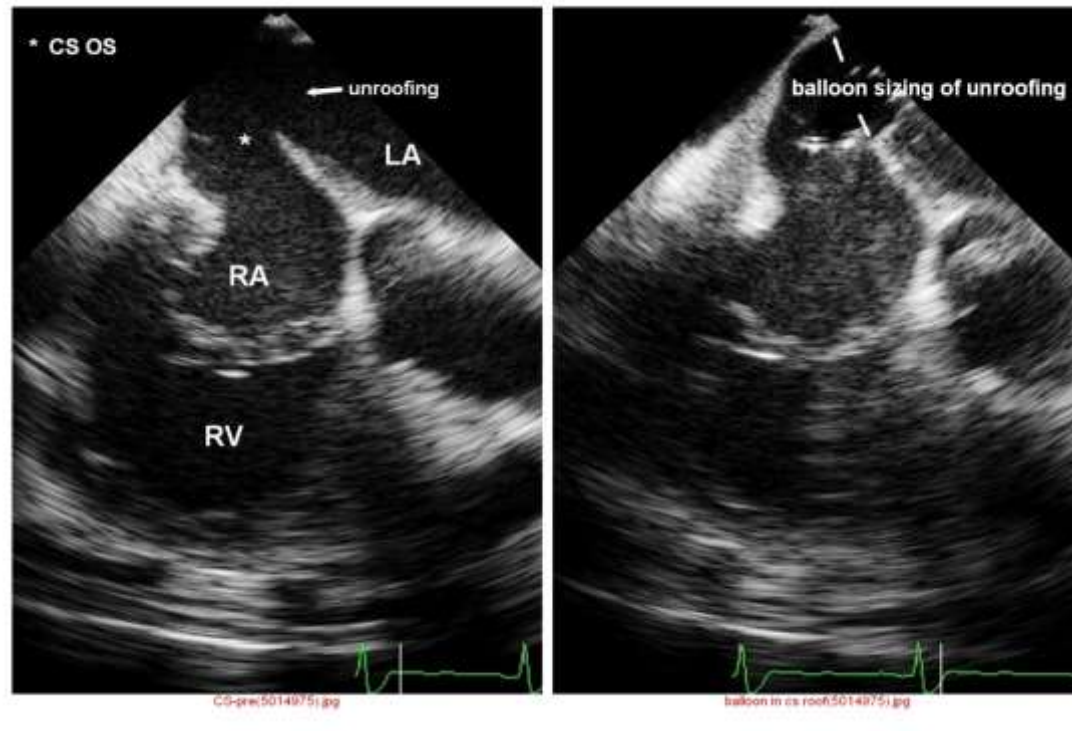
- Balloon sizing?
- Select a device within 2 mm larger
- deploy the device at CS ostium or defect
- TEE/ angio check position

# Balloon sizing

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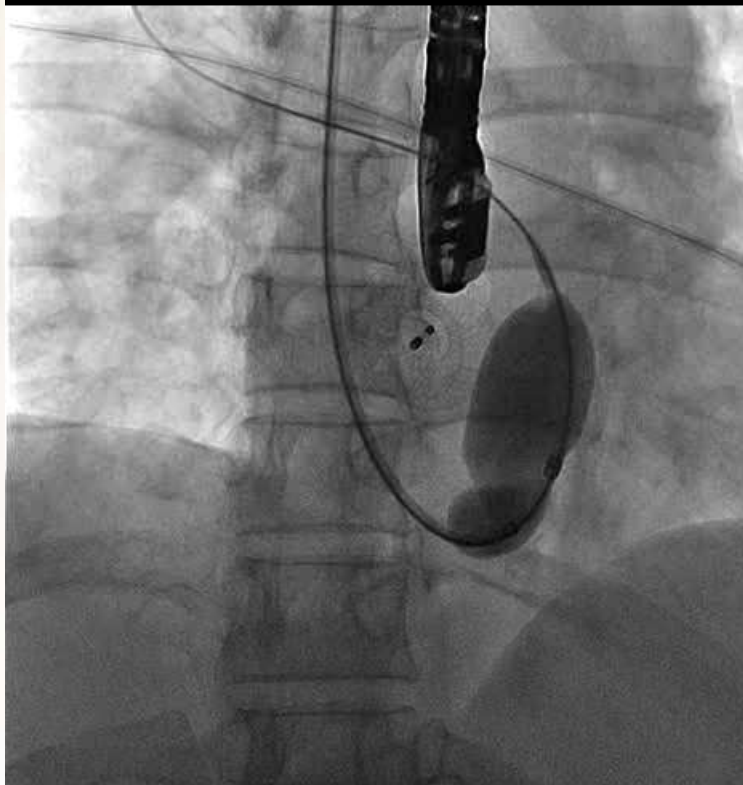
# Balloon sizing



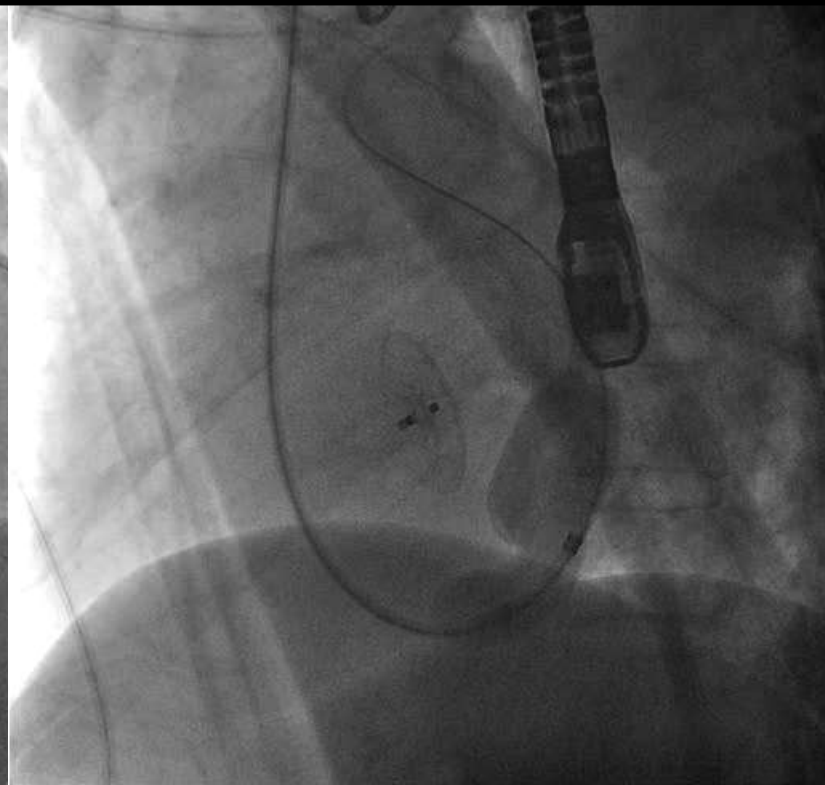


# Balloon sizing mid-portion CS defect

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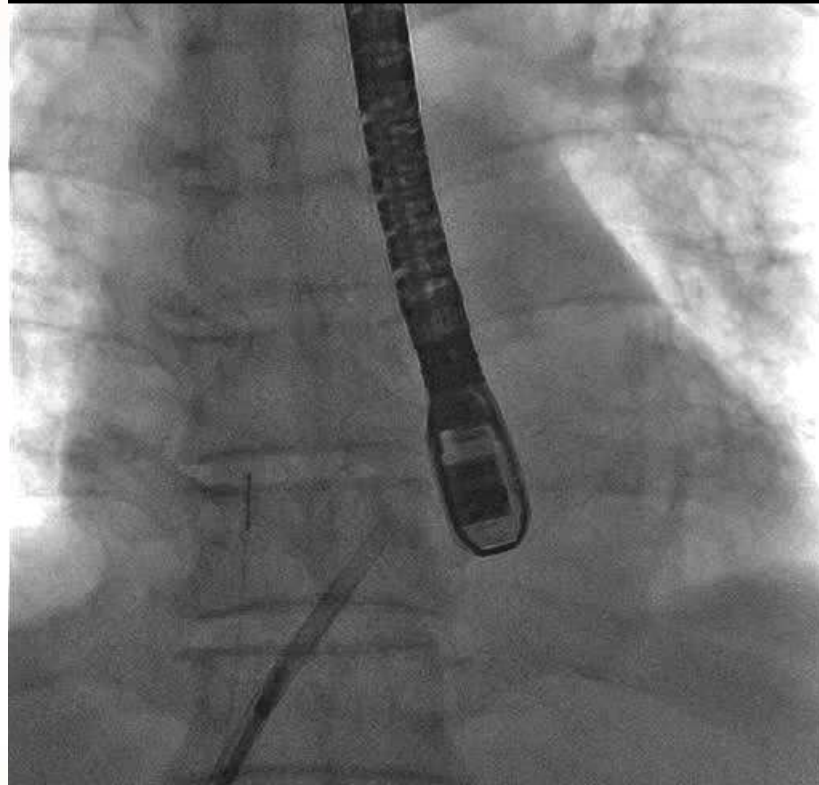


Lossy compression - not intended for diagnosis



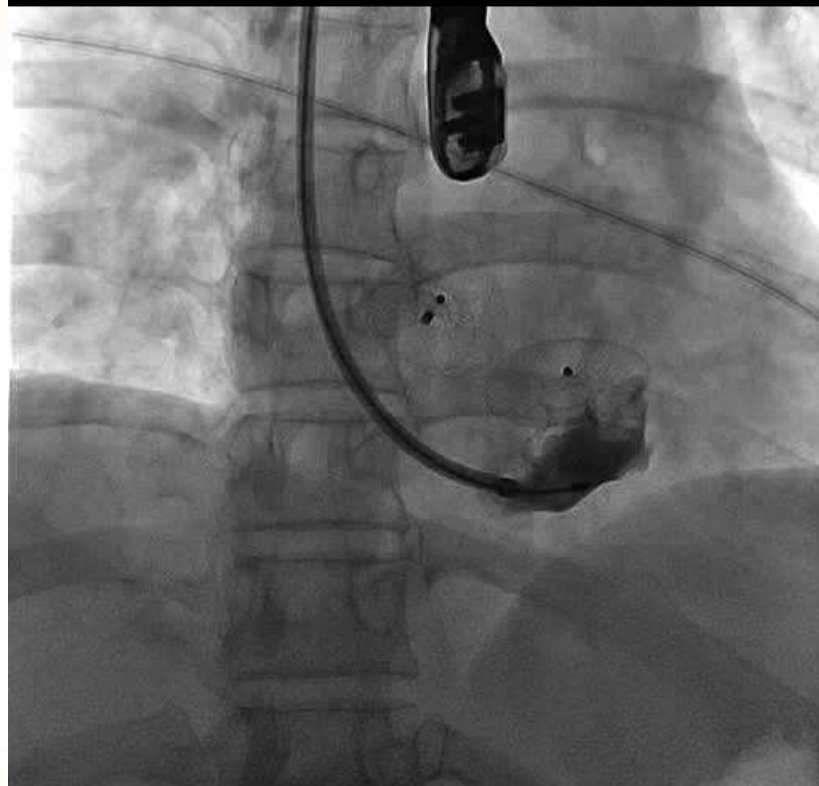
# Deploying device in defect

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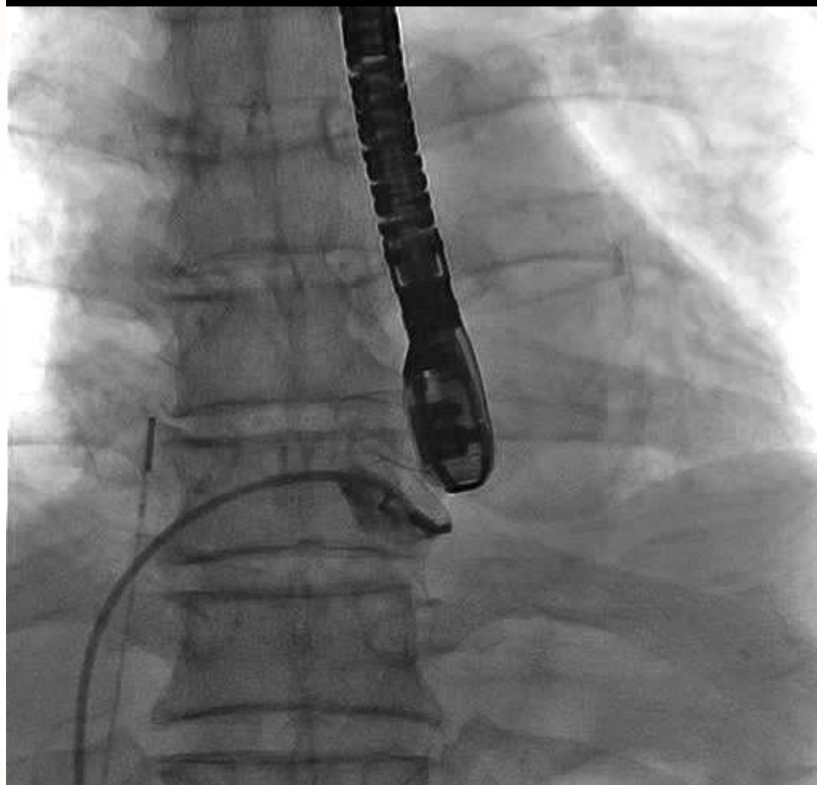
# Post deployment

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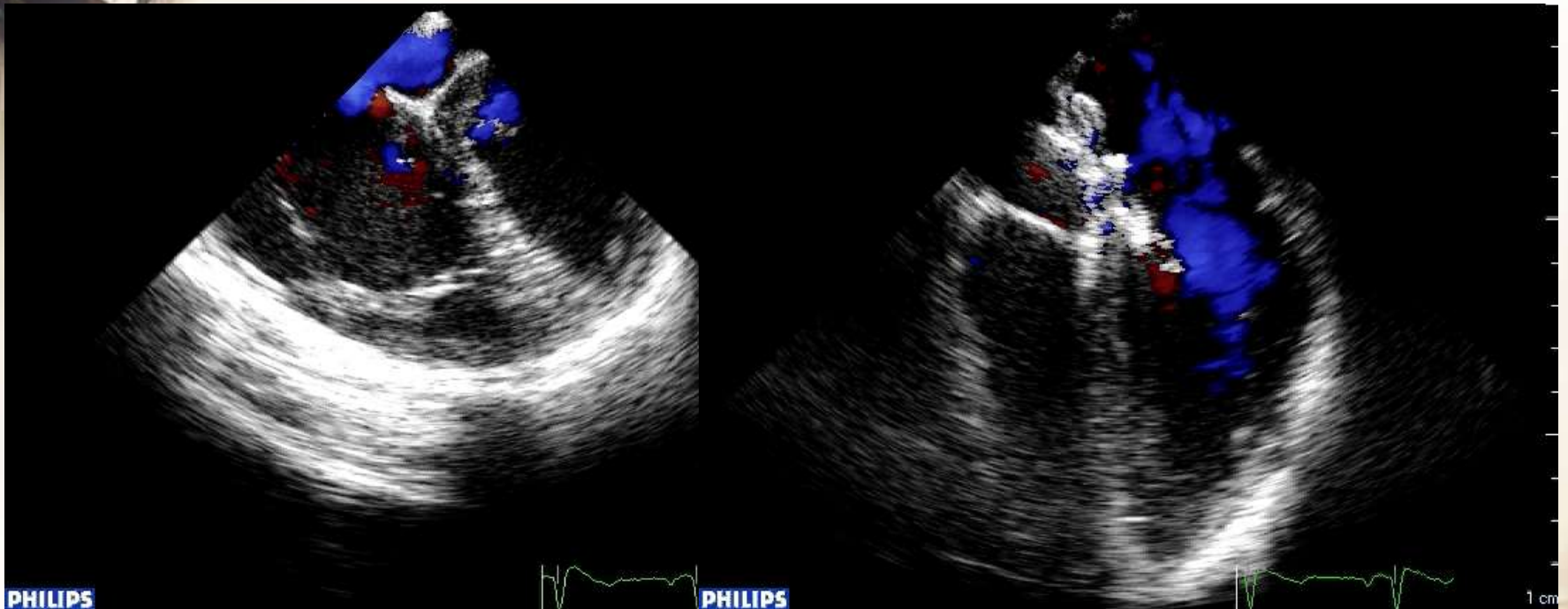
# Post deployment angio

Lossy compression - not intended for diagnosis





# Complete form defect closure






# Deploy the device at CS ostium vs in the defect

- which is better?  
theoretically close the defect is better
- presence of PLSVC  
→ deploy at the defect
- But, “terminal portion defect” without PLSVC, no rim toward CS ostium  
>> close the CS ostium



# Deploy the device at CS ostium vs in the defect

- Deploy a covered stent to close the defect
  - Deploy device in the defect is anatomical as well as physiological closure, especially, PLSVC
  - Closure of CS ostium >> drain CS venous return to LA
- 



# Our experiences (I)

- 12 patients (7M, 5F) age 5-61 years, median 39 years
- Qp/Qs  $2.4 \pm 1$
- mean PASP  $35 \pm 19$  (21-77)mmHg
- 2 complete form, others partial form
- balloon sizing n= 10, no sizing n= 2



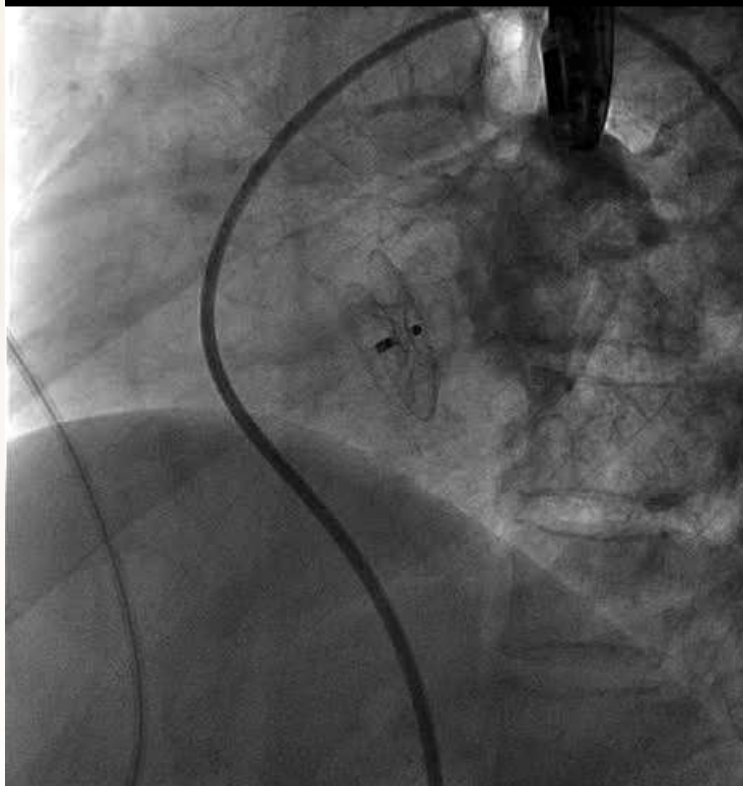


## Our experiences (II)

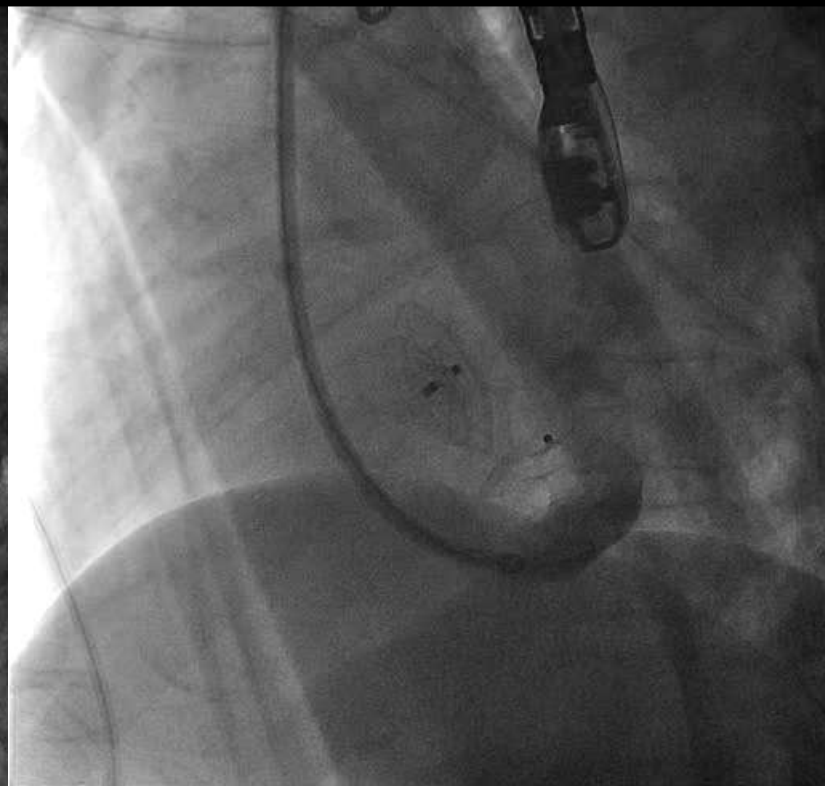
- Deploy at CS ostium in 8, at defect in 3, failure in 1( large defect with extension to primum type)
- Device size (ASO, occlutech)  $21 \pm 3.6$  mm (16-28 mm)
- 4 required 1-2 size larger device because of failures

# Mid-portion CS defect

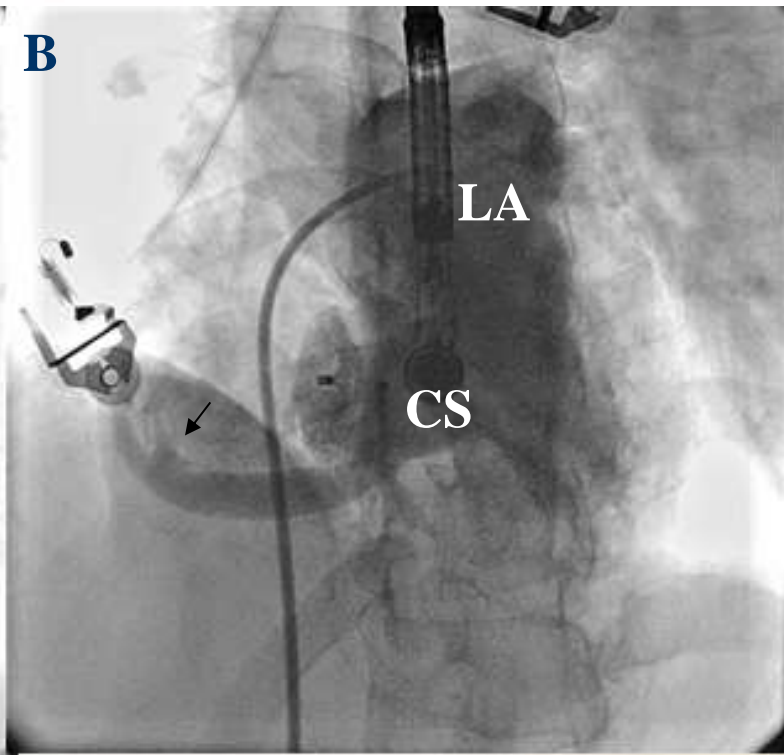
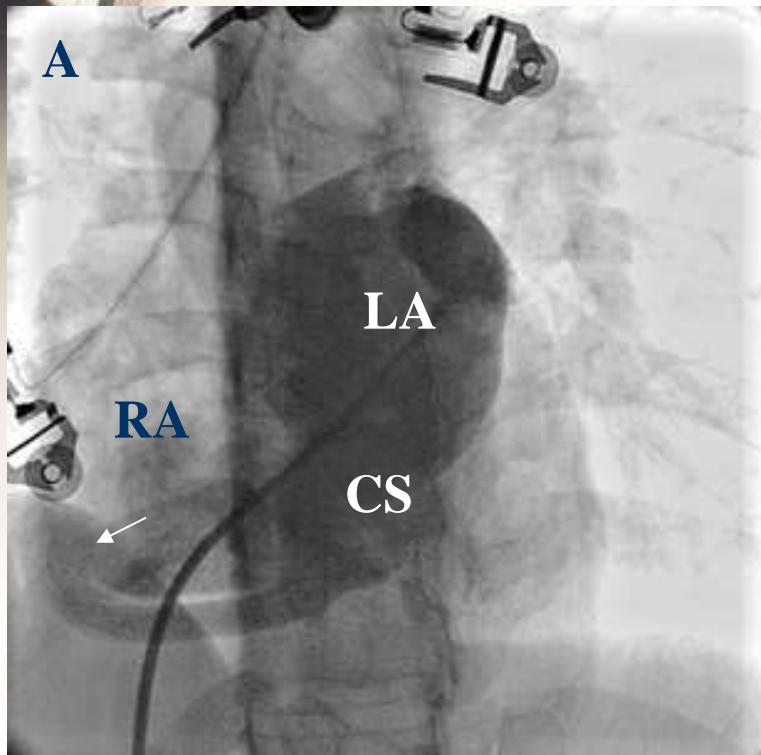
Lossy compression - not intended for diagnosis



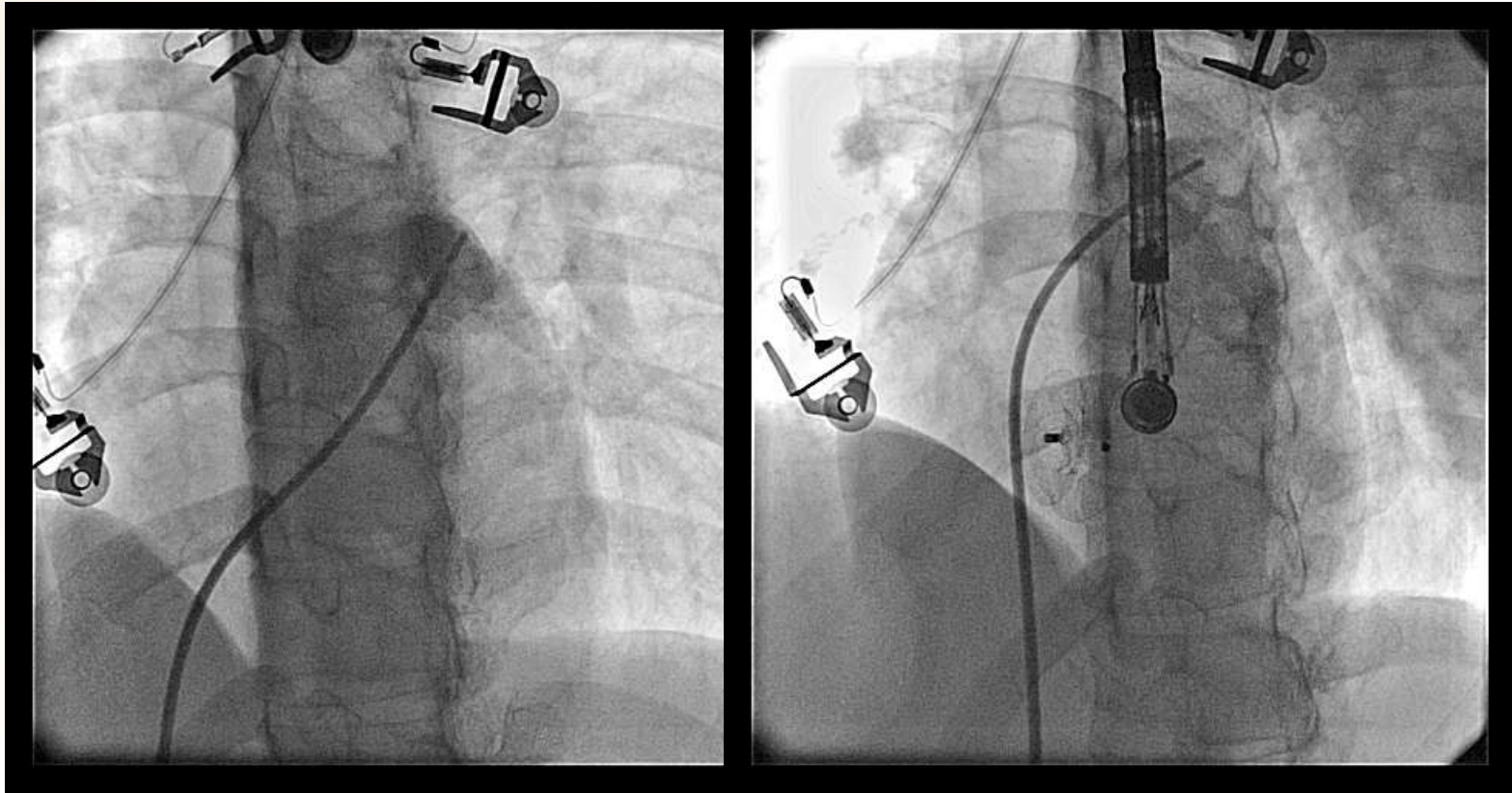
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# Unroofed CS s/p CS ostium closure



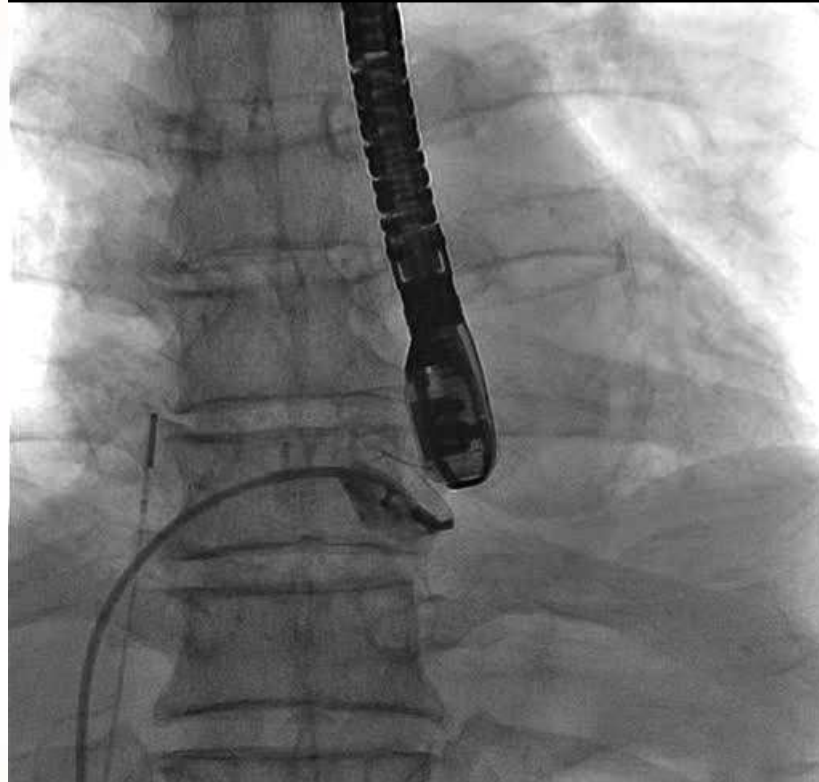
# Terminal portion CS defect





# Unroofed CS defect s/p closure

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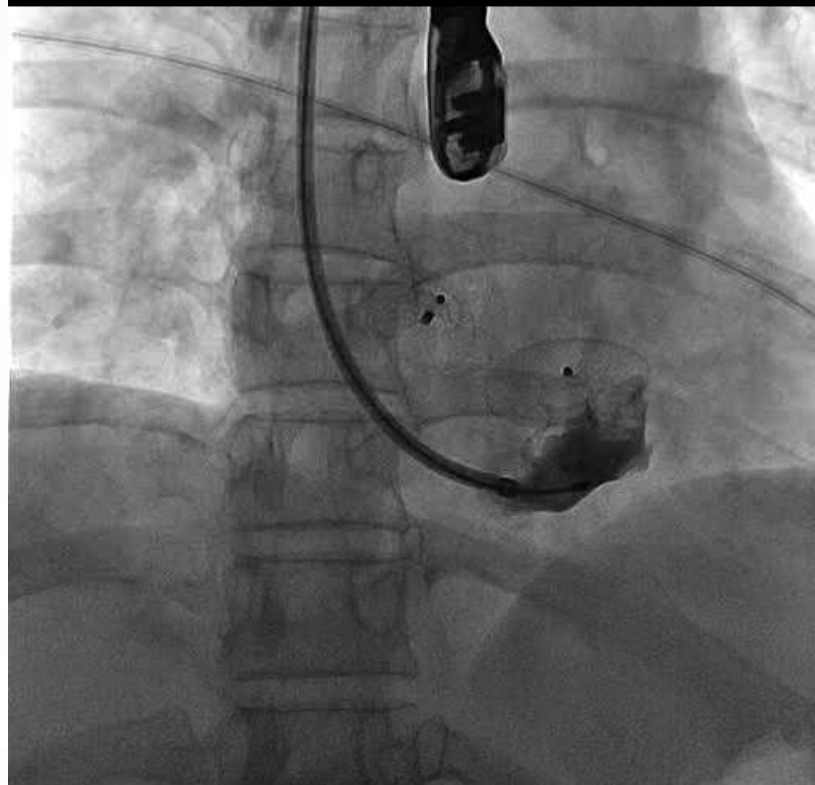




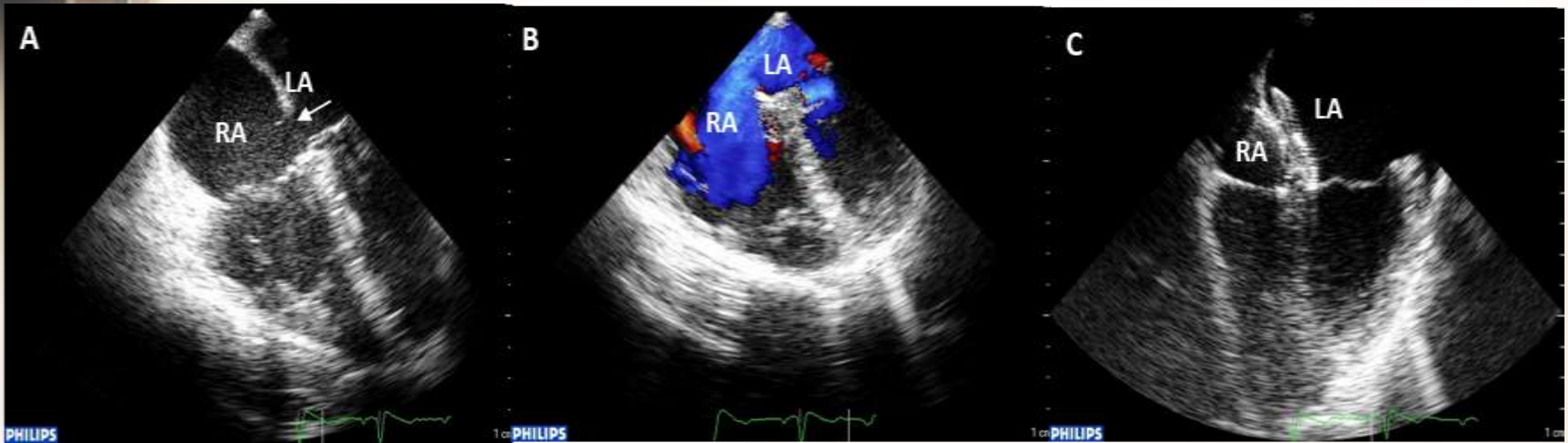


# Mid-portion CS defect closure check venous return of coronary veins

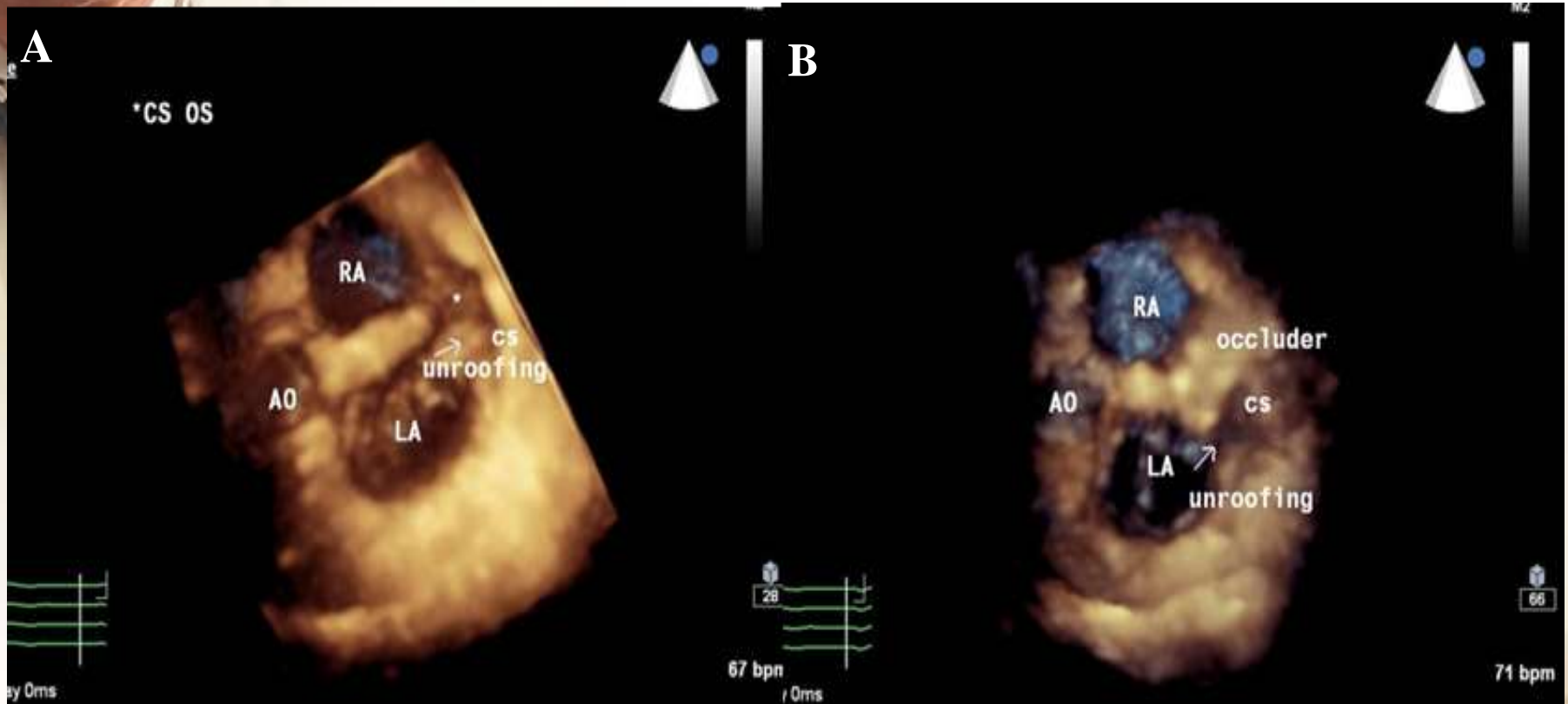
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# Complete form CS defect closure



# 3-D images of CS defect closure






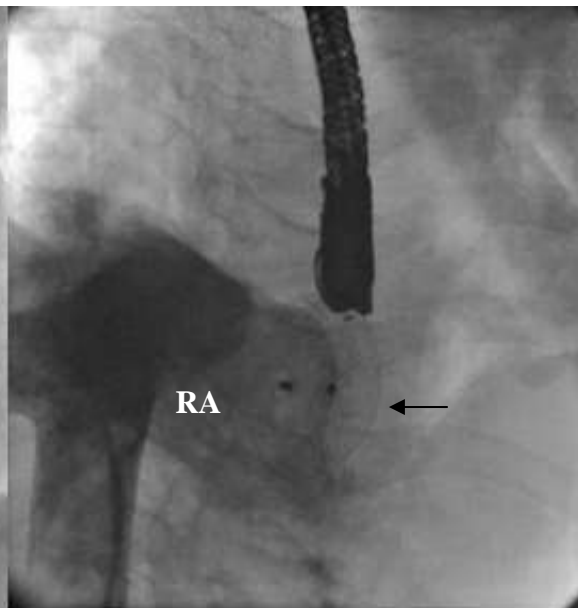
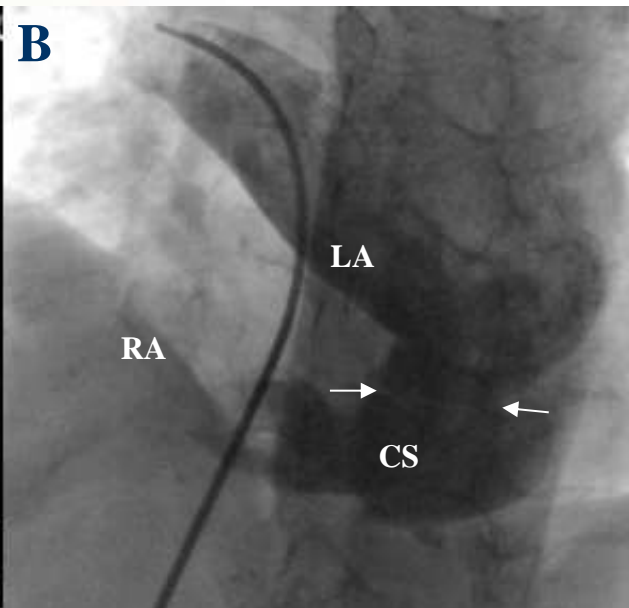
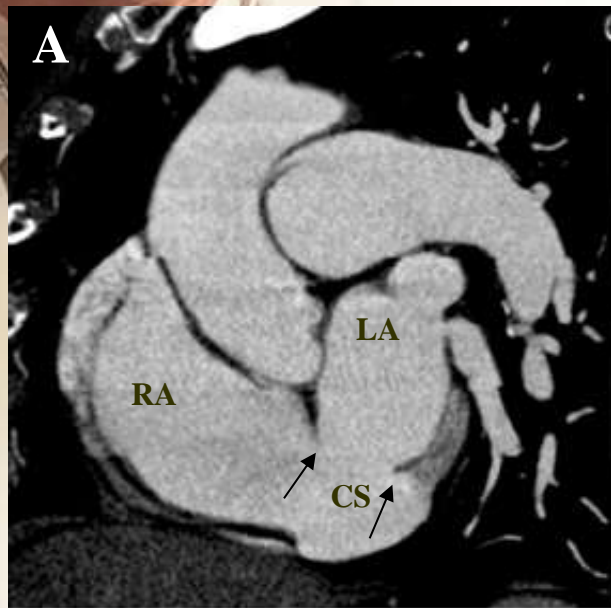




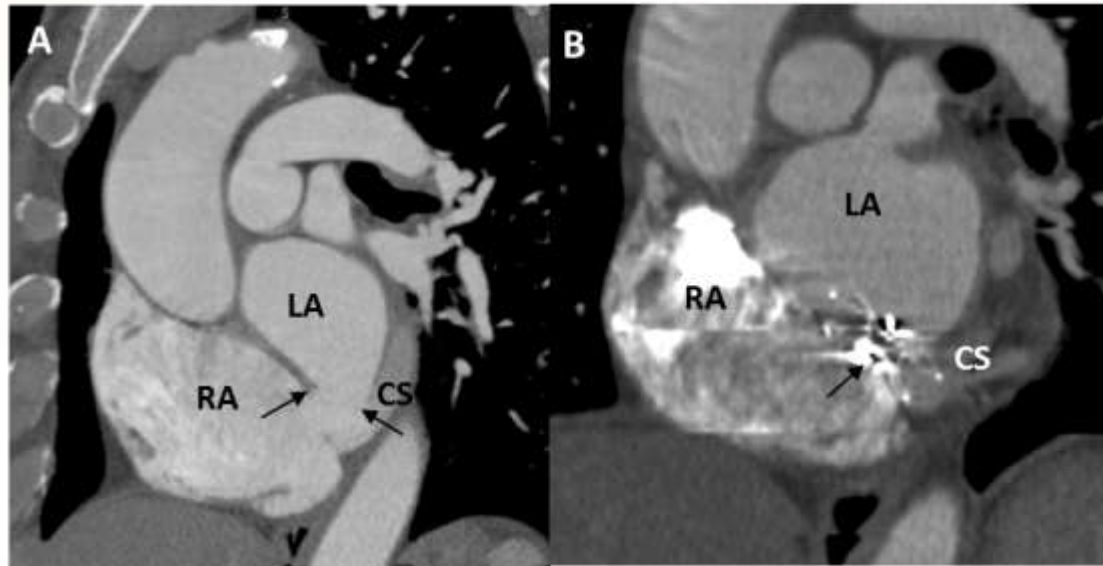
# CT (MRI) images

- as a tool for planning the procedure
  - F/u the position of the device
  - to detect the presence of CS flow obstruction
- 



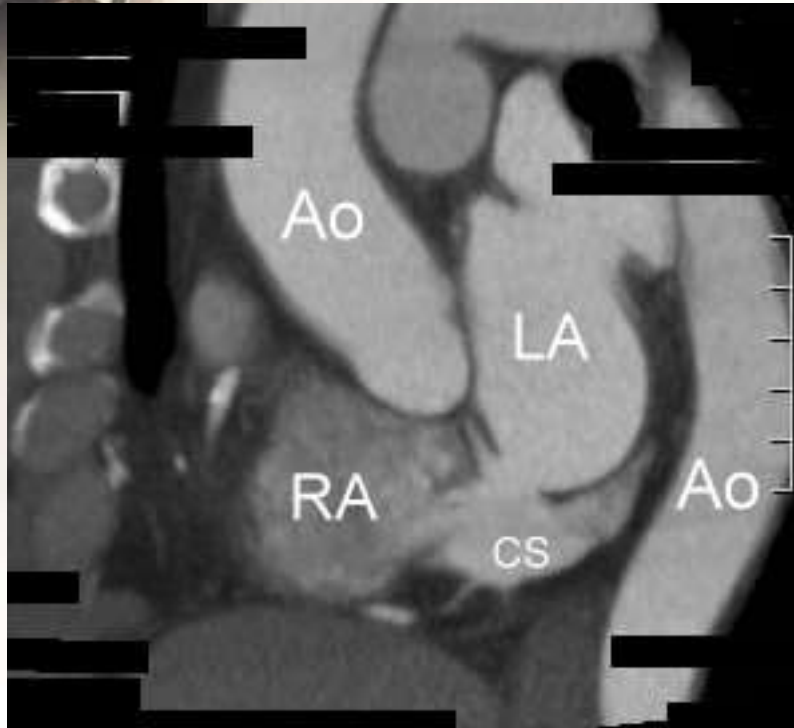


# CT image CS closure

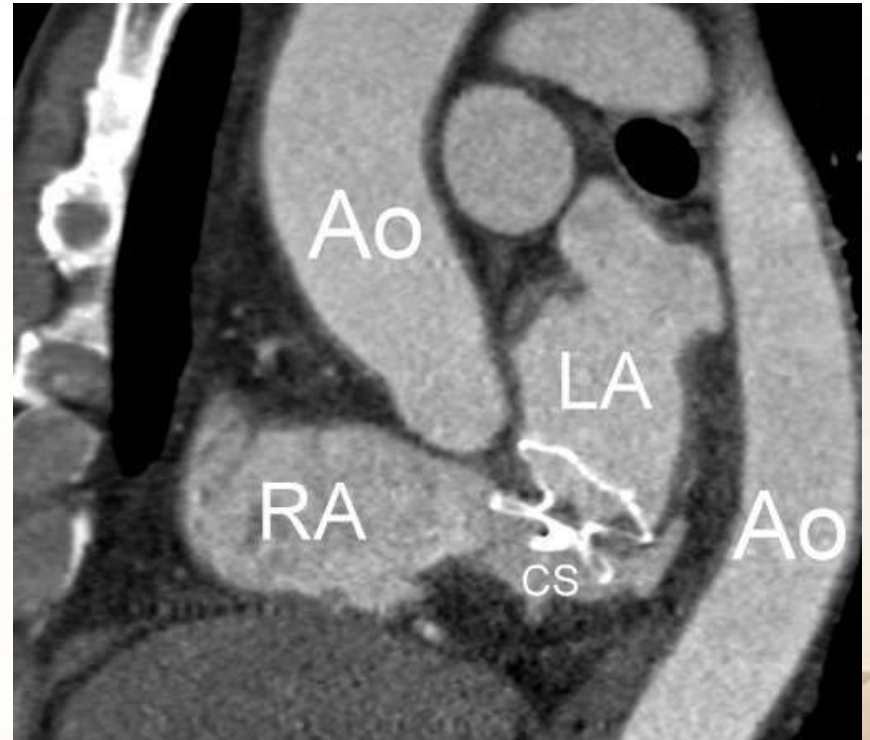


# Unroofed CS defect s/p closure CS return patent

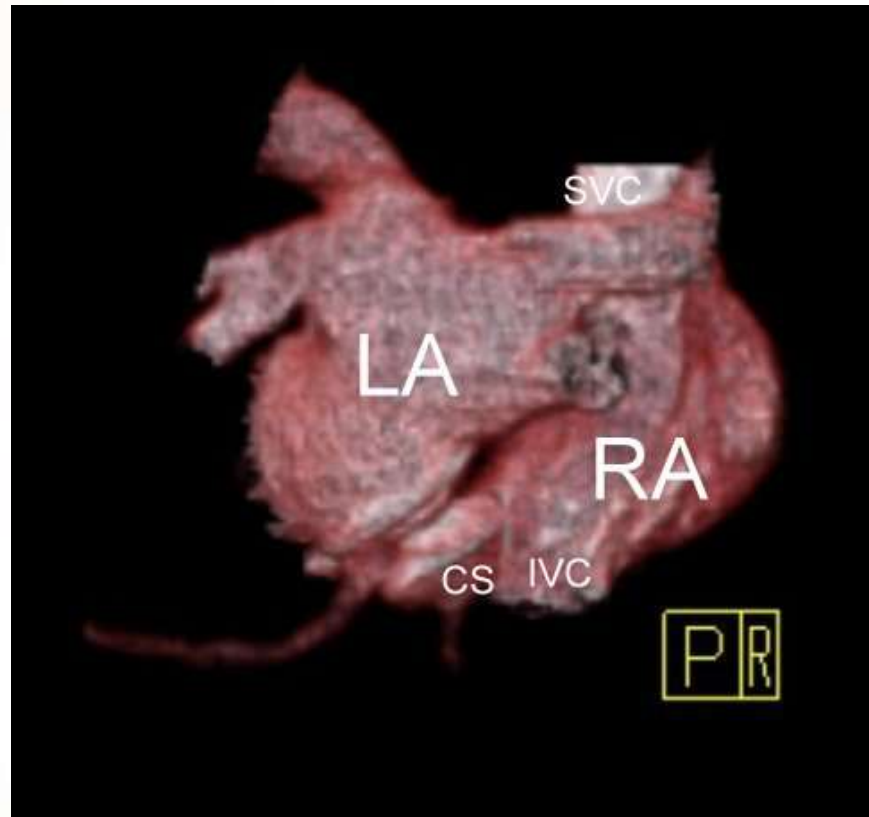
pre



post



# Device within the defect

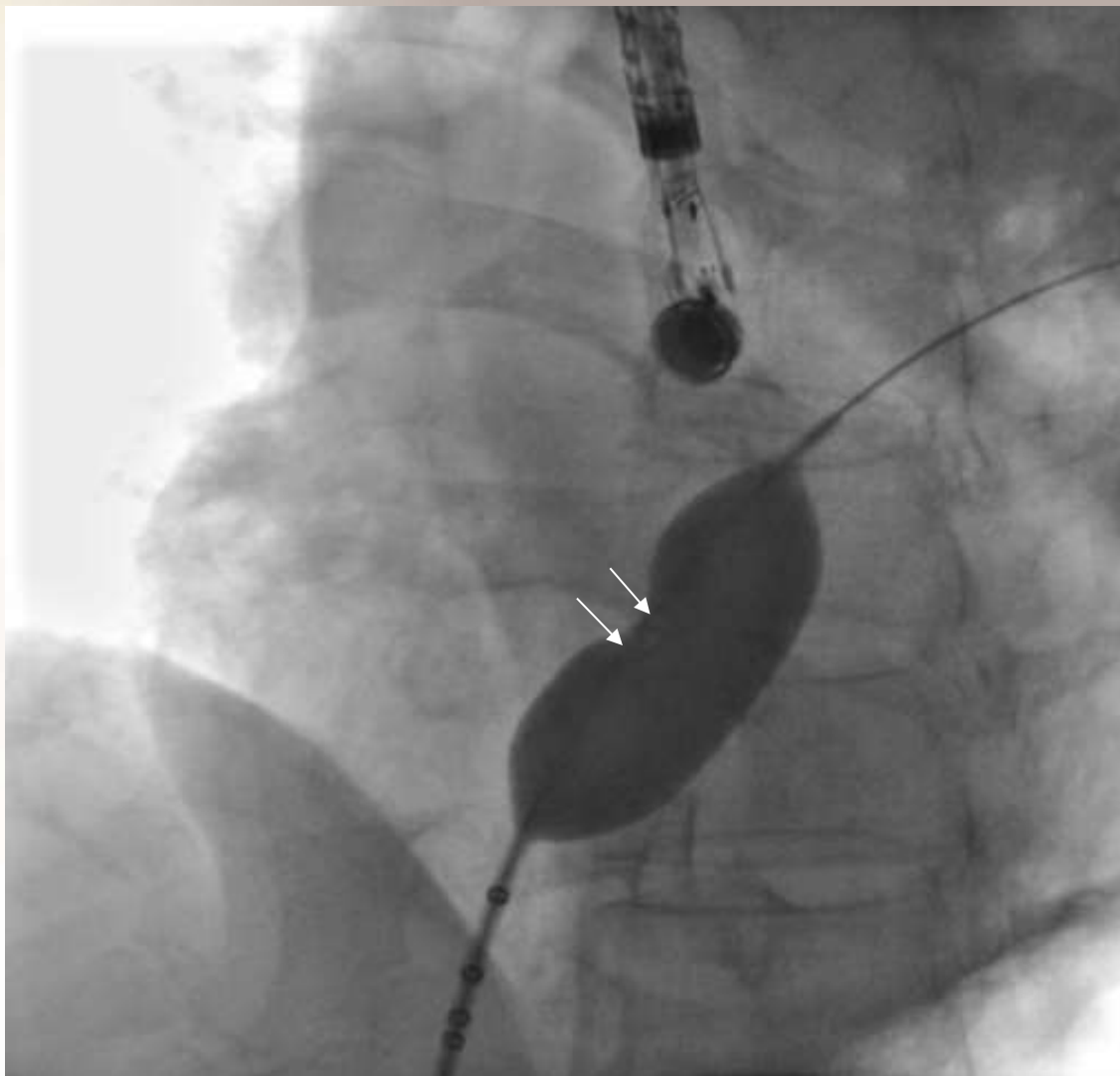




# Balloon sizing for CS defect

- Two waist can be observed sometimes  
→ defect & ostium of CS
- In 4 patients, a larger size device was required. This can be explained by the fact that CS ostium instead of defect was occluded








# Disadvantages of closing CS ostium

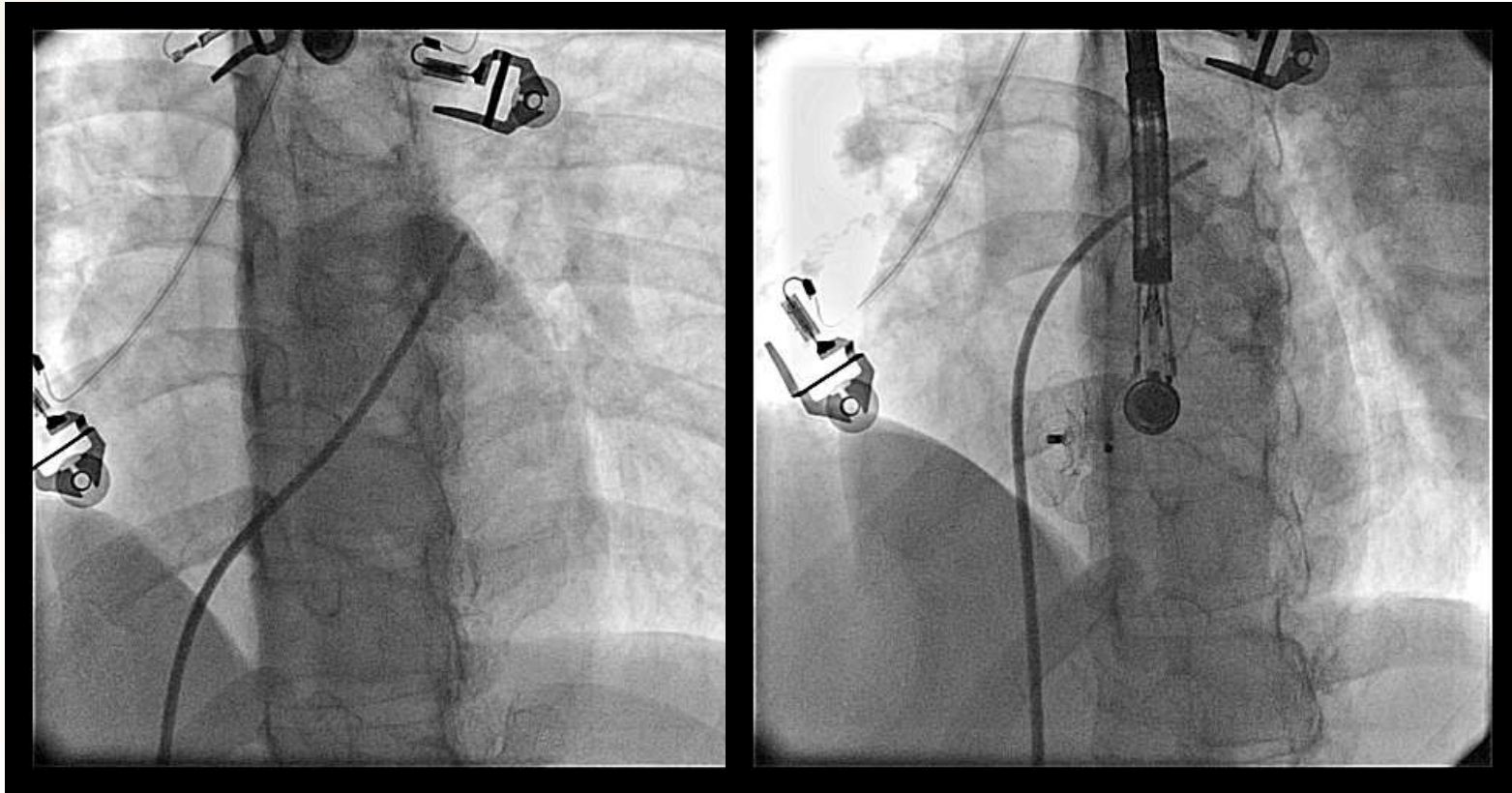
- redirecting CS blood flow to LA
- obstruction in CS blood flow return
- conduction system
- contradicted when PLSVC is present



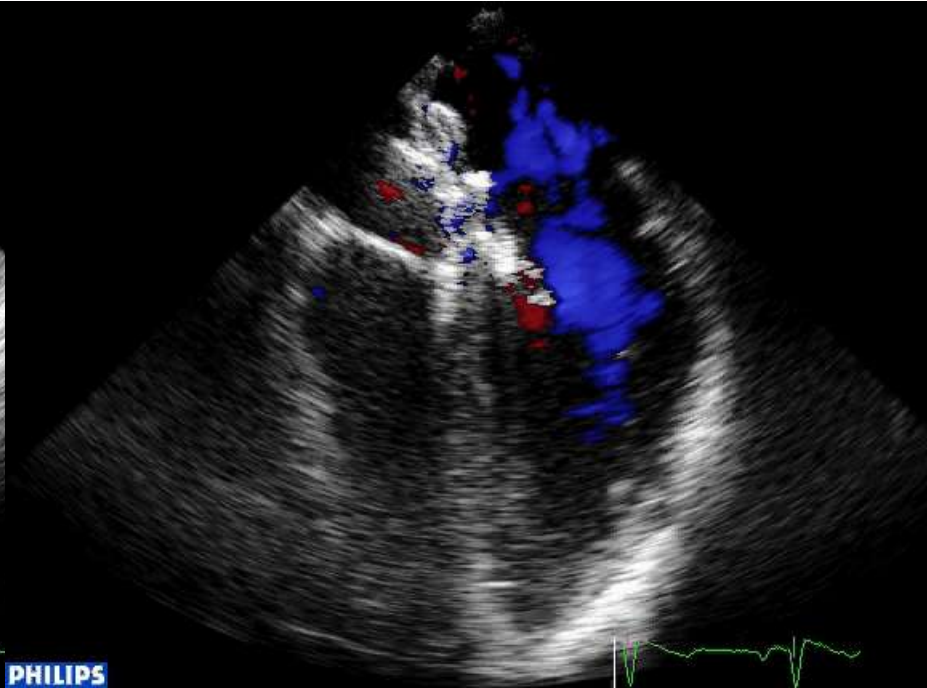
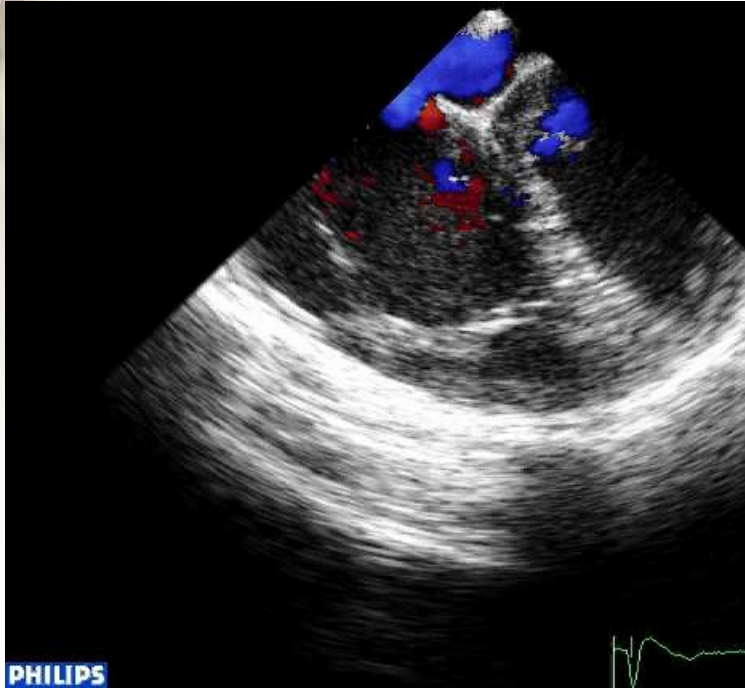
# Conclusions

- Most unroofed CS defect can be managed with transcatheter technique
  - close the defect or CS?
- 

# Terminal portion defect



# Complete form unroofed CS defect







# Device deployment

- In the defect ?
  - At the coronary sinus ostium ?
- 