Echocardiography of VSD's

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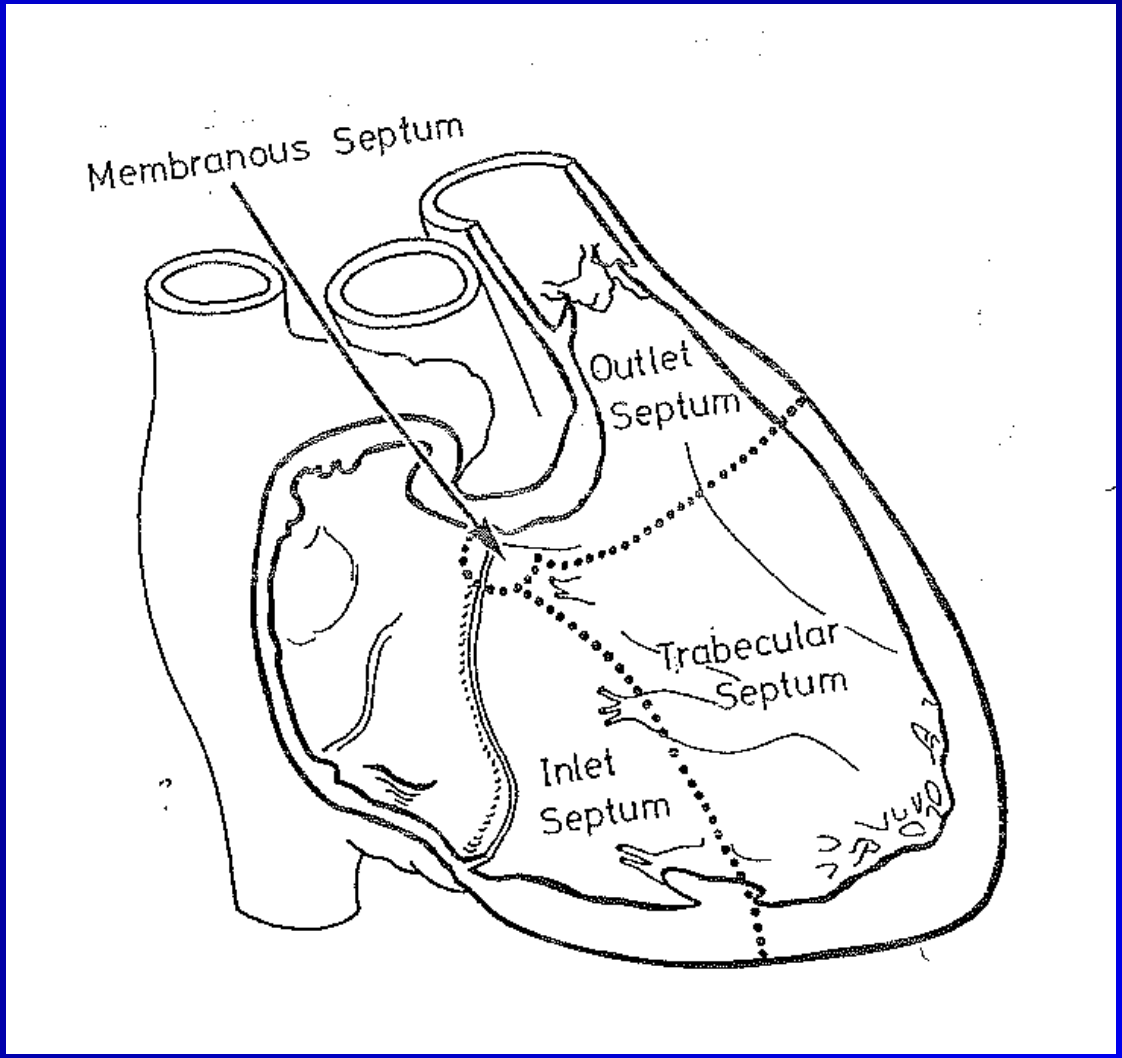
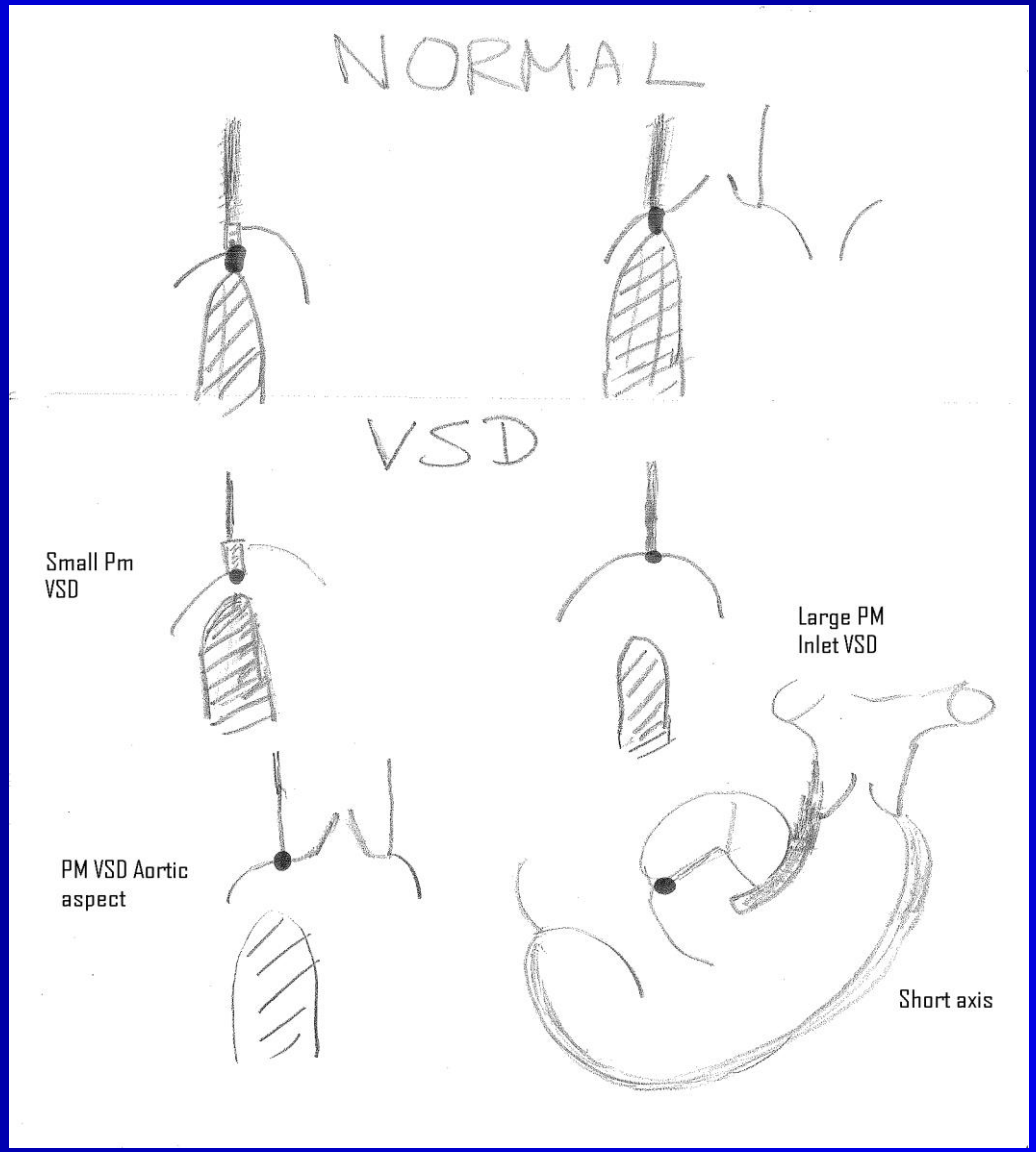
Principles of Defining VSD

- VSD ‘s are always demarcated from the right ventricular aspect (RV is Tri-partite ; Surgery)
- VSD’s are classified according to their borders, location and size
- Peri-membranous VSD : excavate up to tricuspid valve
- Muscular VSD : have entirely muscular borders
- DCSA VSD/Juxta- Arterial : Superior Border comprises Aortic and pulmonary valves

Tri-partite Nature of RV



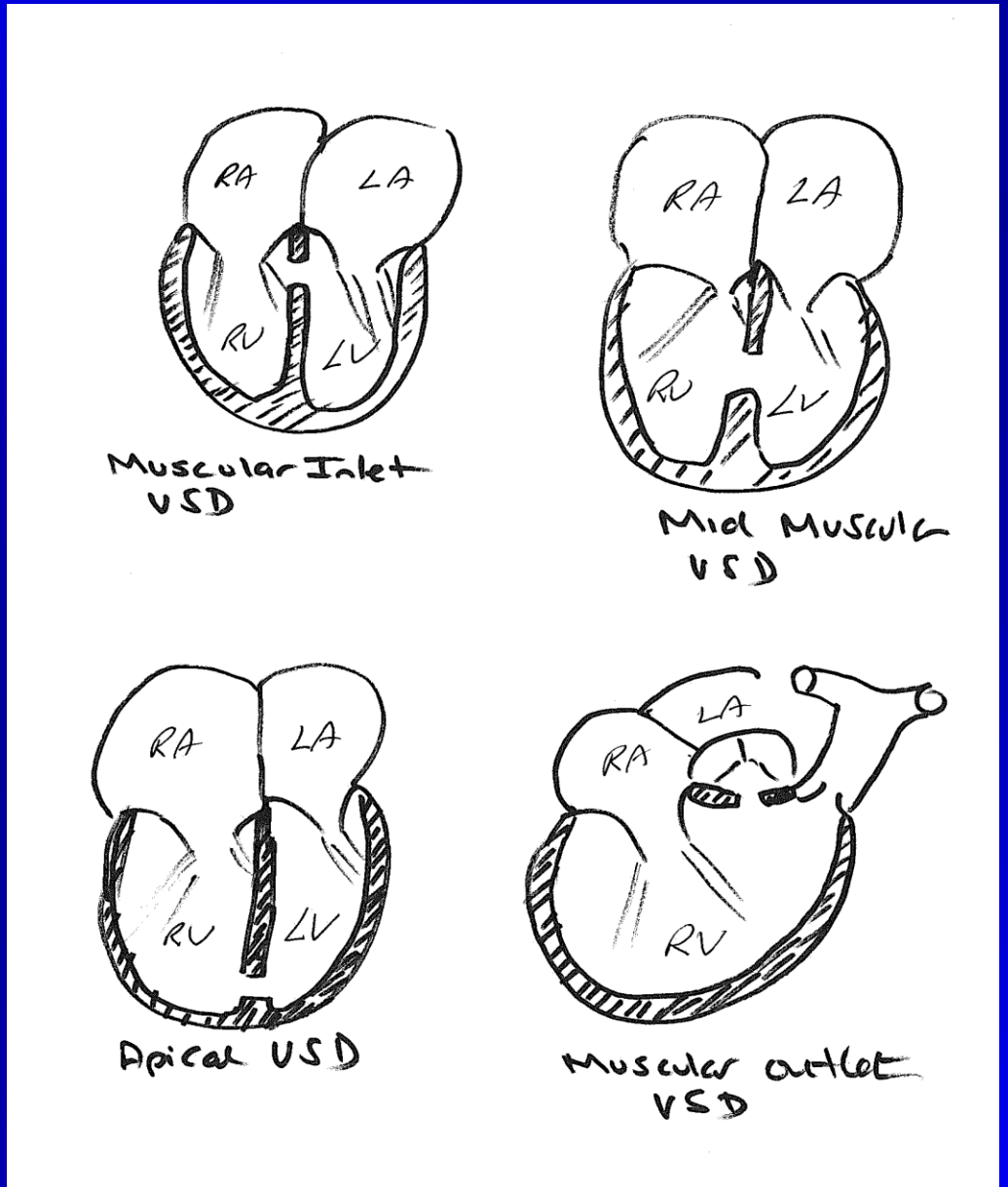
Peri Membranous VSD (what is the Memranous septum)



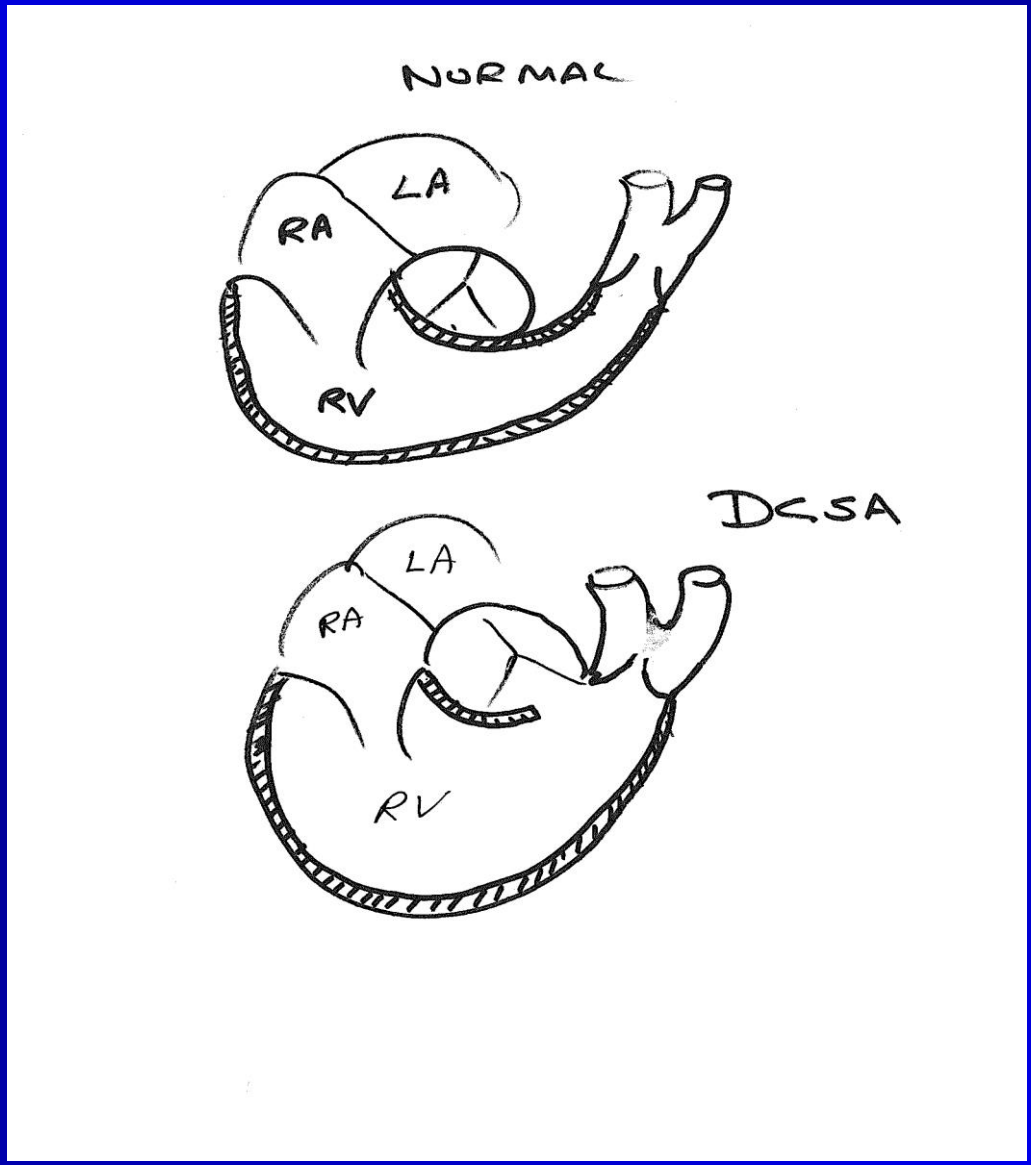
Membranous Septum on 2D Echo

Muscular VSD 's

Q *What do they have in common*



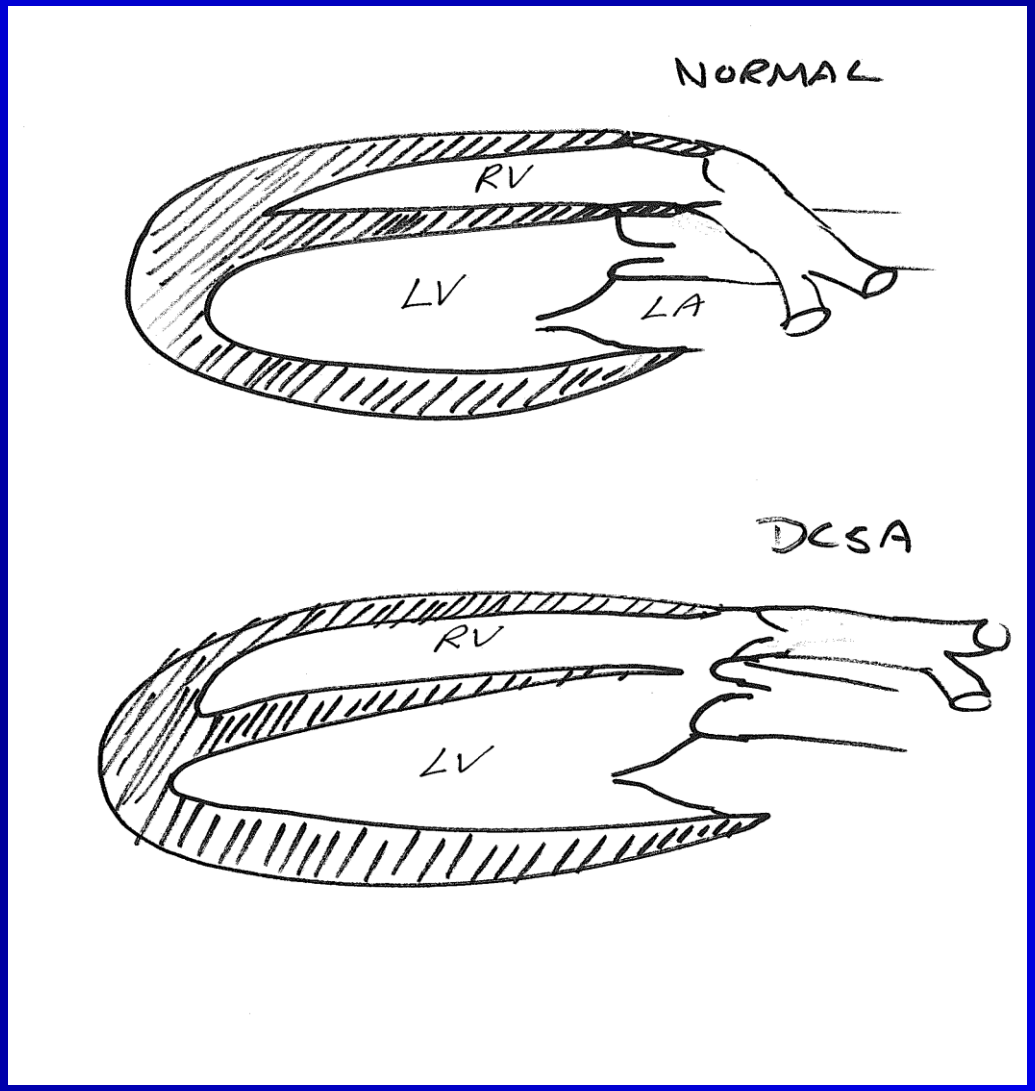
DCSA (Juxta-Arterial) VSD



Doubly Committed /Juxta Arterial VSD

- By Definition - The superior Border is made of Pulmonary and Aortic valves.
- The Pulmonary and aortic valves are said to be in Fibrous Continuity
- The Aortic and Pulmonary valves are at same level.
- There is no “Infundibular Septum”
- Difficulties for “Ross” Op

DCSA VSD (Long Axis)

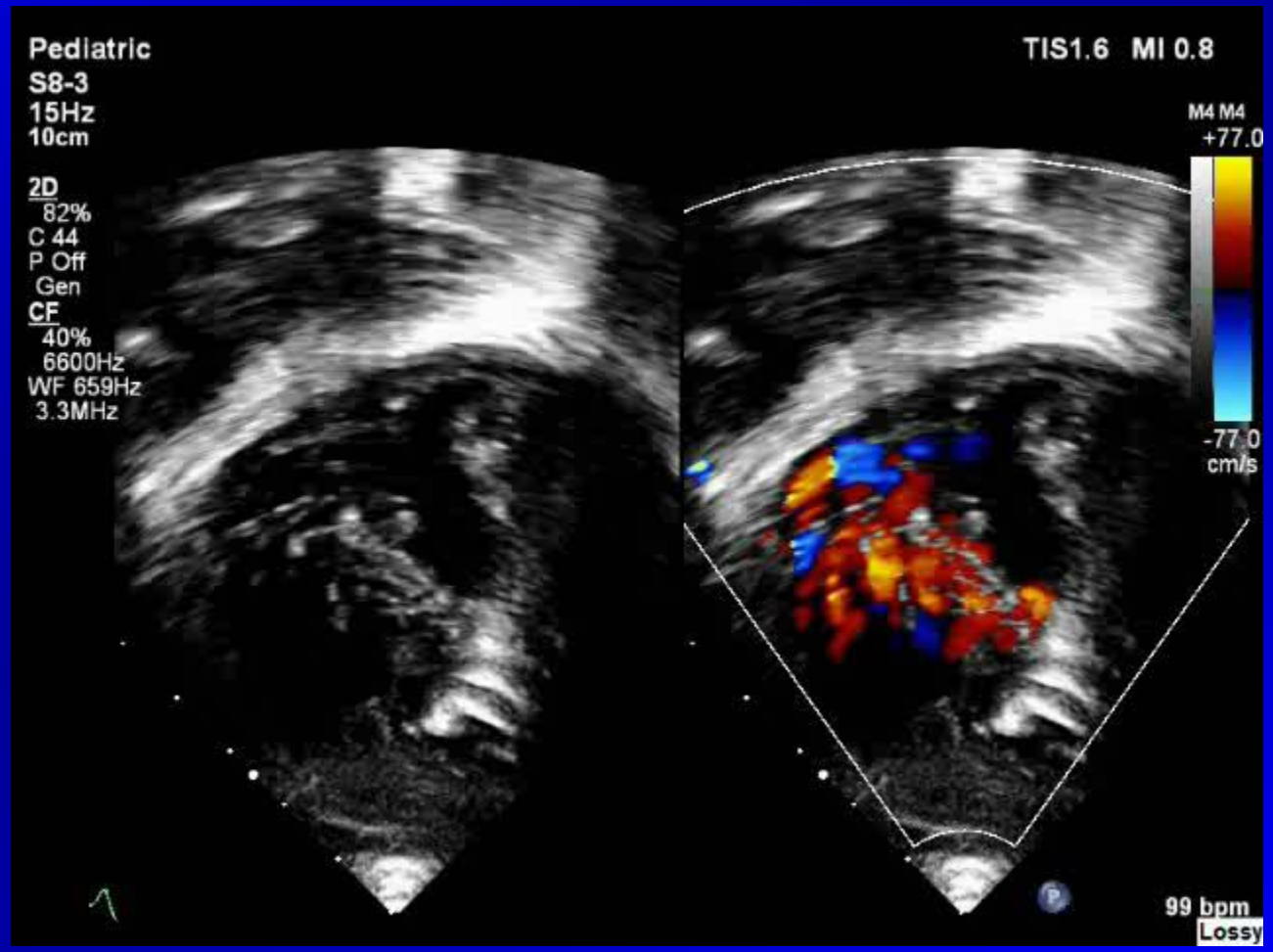


Q What type VSD- A. Peri- membranous ;
B Muscular ;C Muscular Inlet; D Apical
(4 Chamber view)

Q What are these Type VSD's commonly called

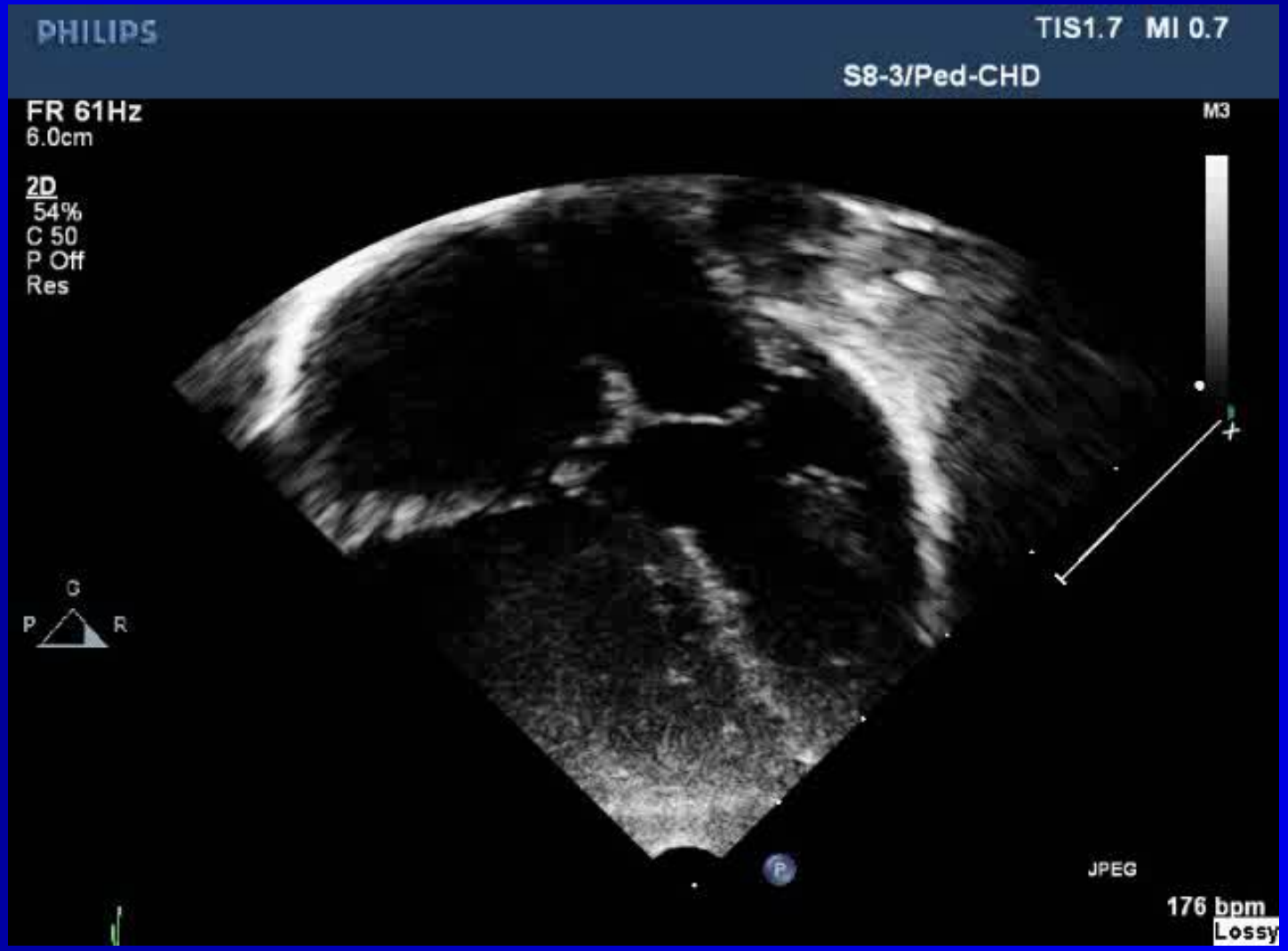
A Swiss cheese B Numerous

(4 Chamber anterior angulation)



Q What Type VSD

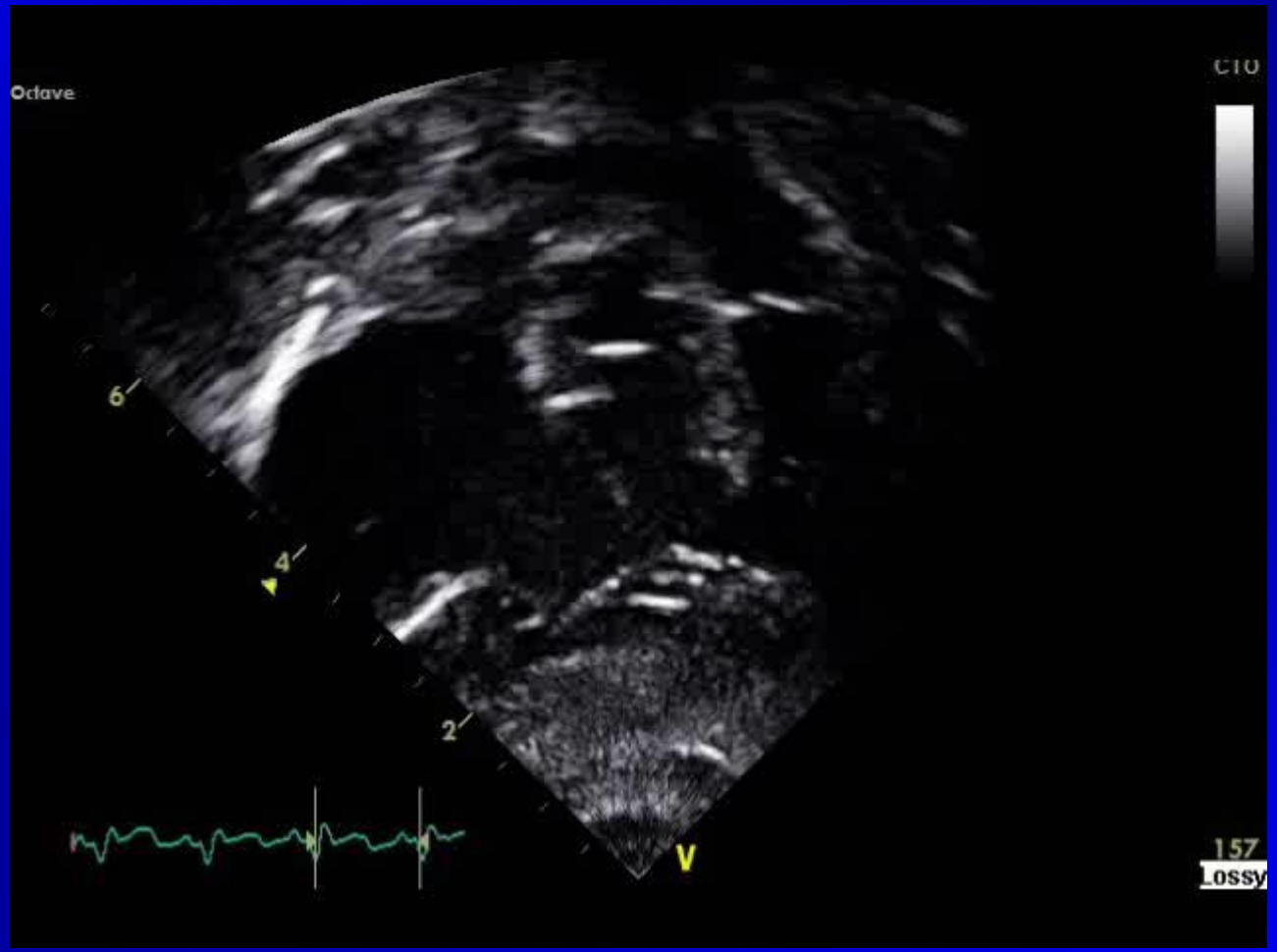
A - PeriMemb ?; B Muscular



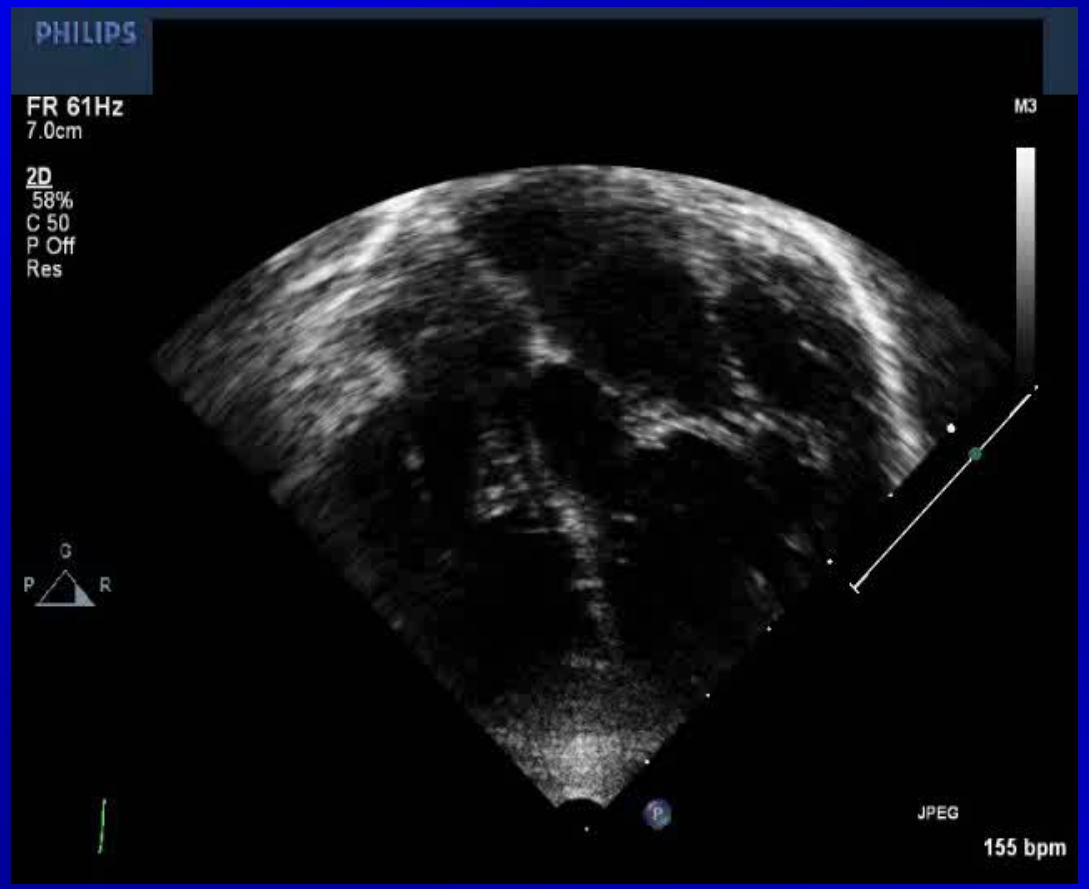
Q -VSD Type ? –

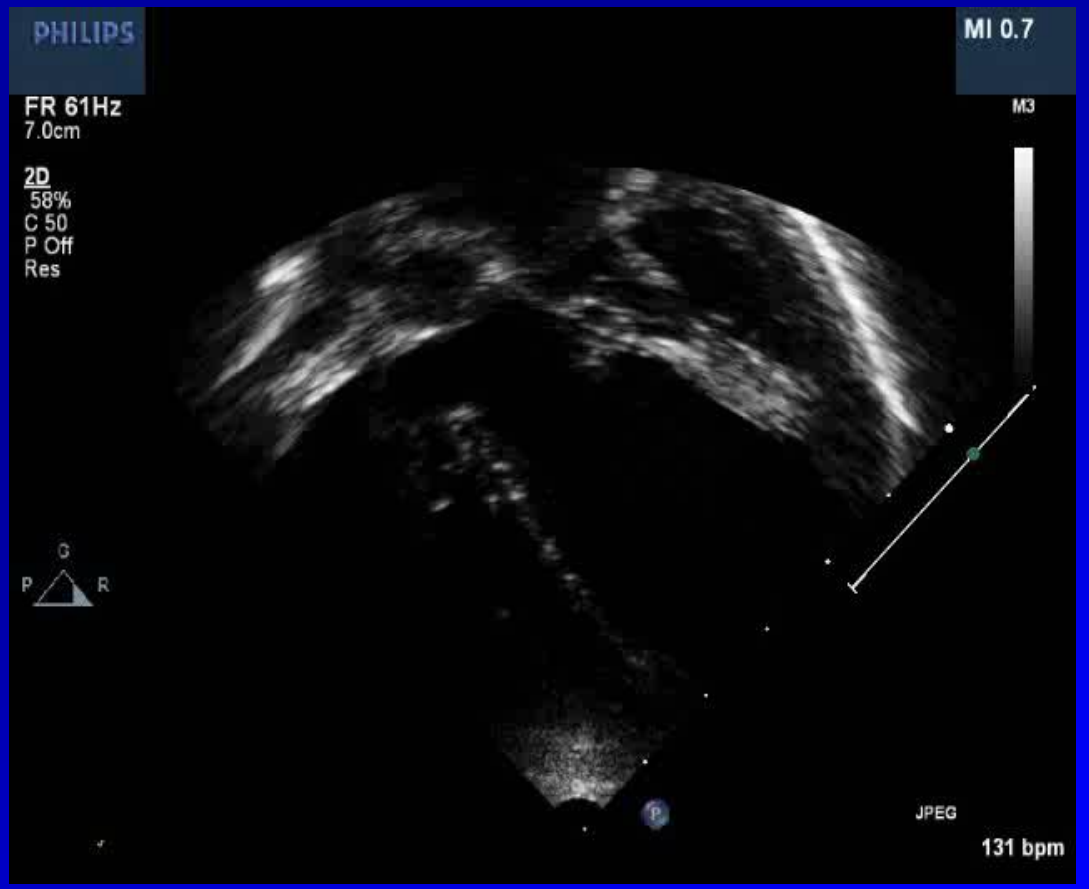
A Muscular ; B DCSA ;C VSD Peri- Memb. VSD

(Subcostal "RAO"/ Anterior Oblique view)

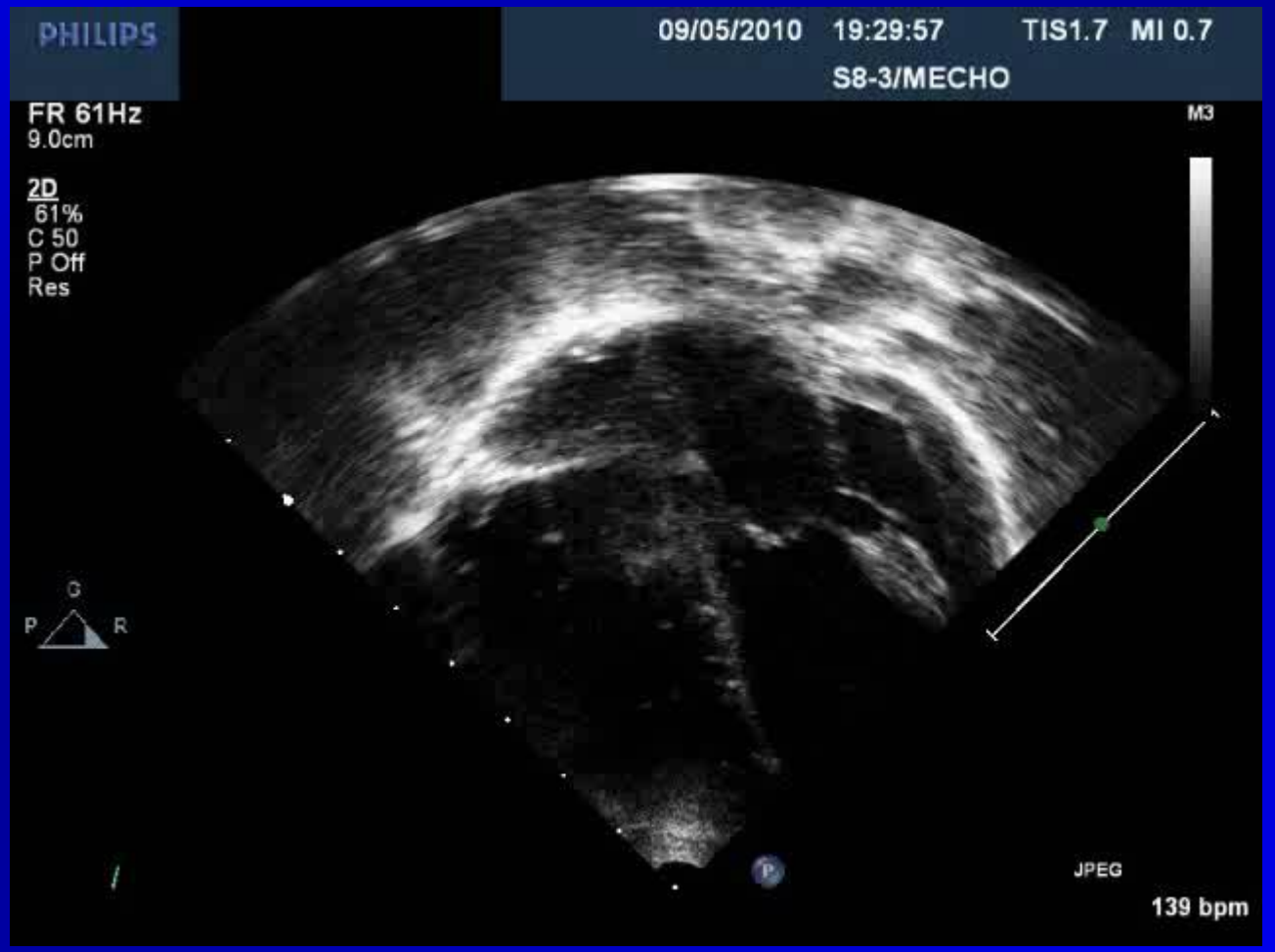


PM VSD type ? Why ? - How can we Intervene ?





Same VSD- patient has had a Device closure



Similar VSD Q1 What Intervention Done ?

Q2 Why Intervention is not at VSD margins?

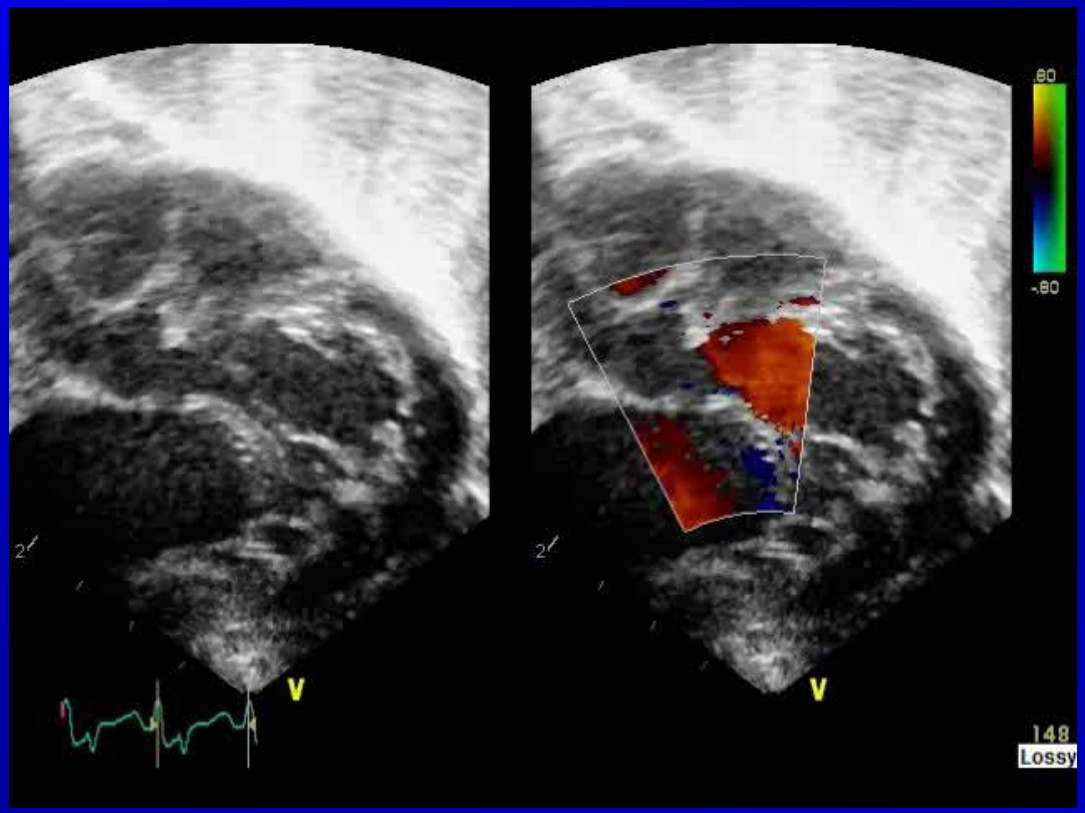
Device and surgery Comparison

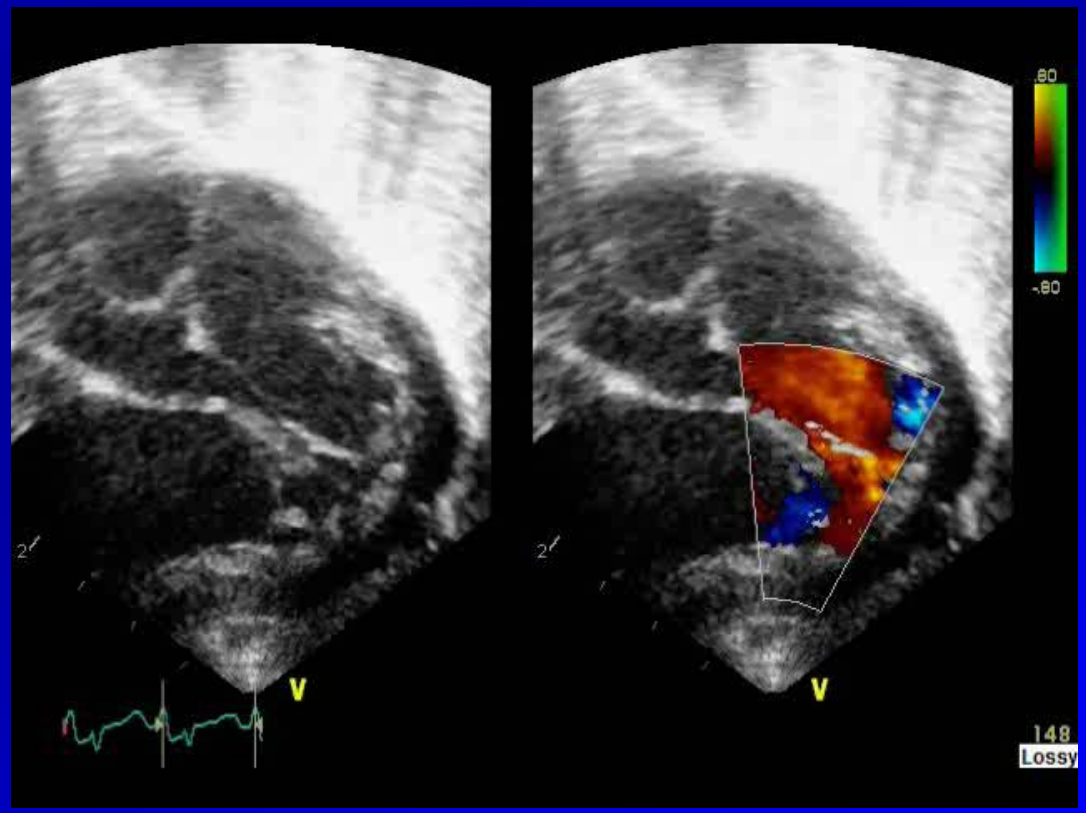
In both techniques Margins of VSD have been avoided as it contains Conduction tissue

What is VSD type- A Muscular ; B Peri- Memb (Subcostal view)

Q How many VSD's ; A- One ; B- Two Types VSD ?

Color Flow is very good at identifying VSD location
Flow not Turbulent as -A PHT ; B High RVp





Combined Large perimembranous and muscular Apical VSD

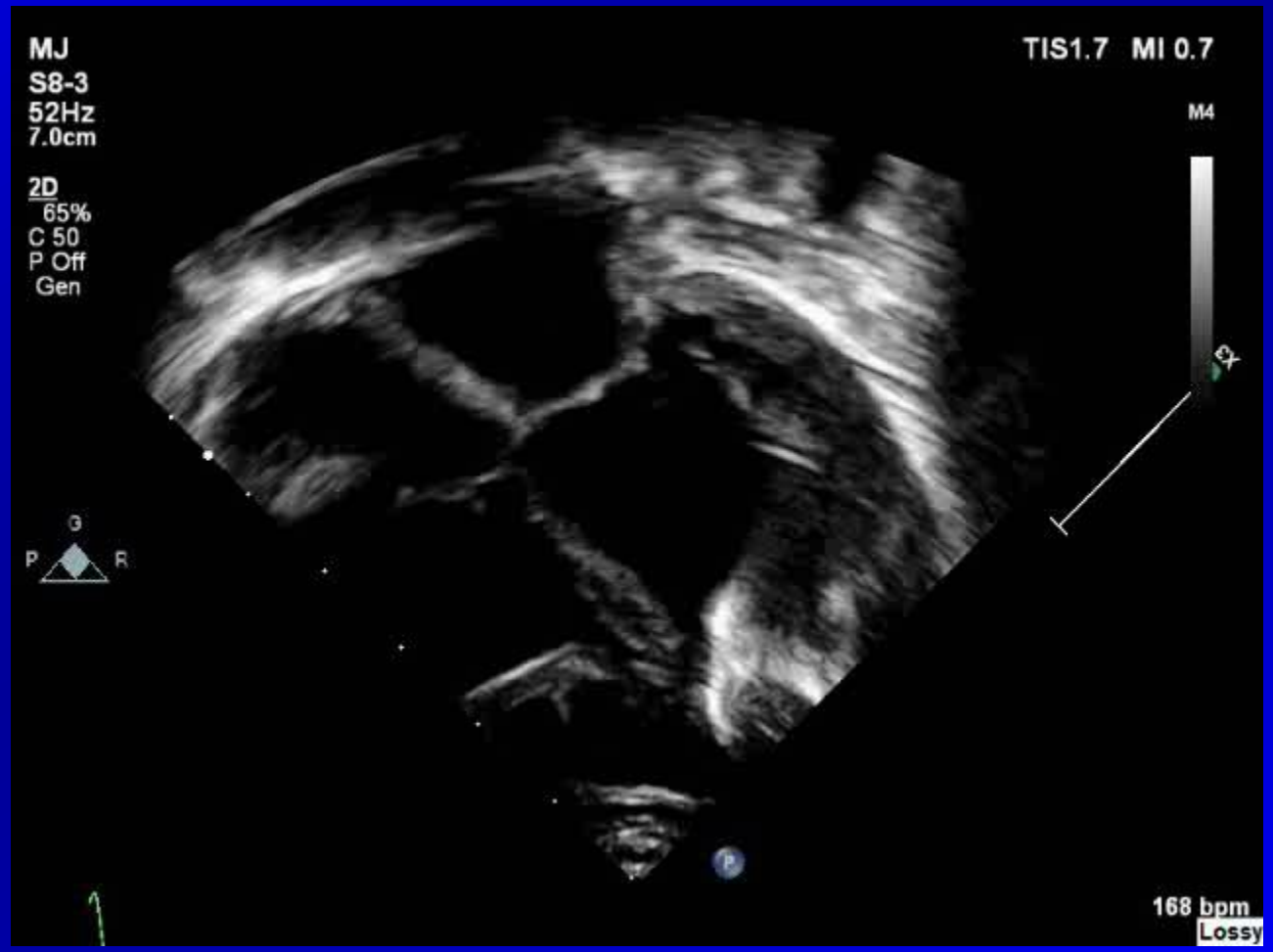
- Rare
- Can have Complex conduction pathway if gap between small .
- Surgically challenging

Mid Muscular / Apical VSD

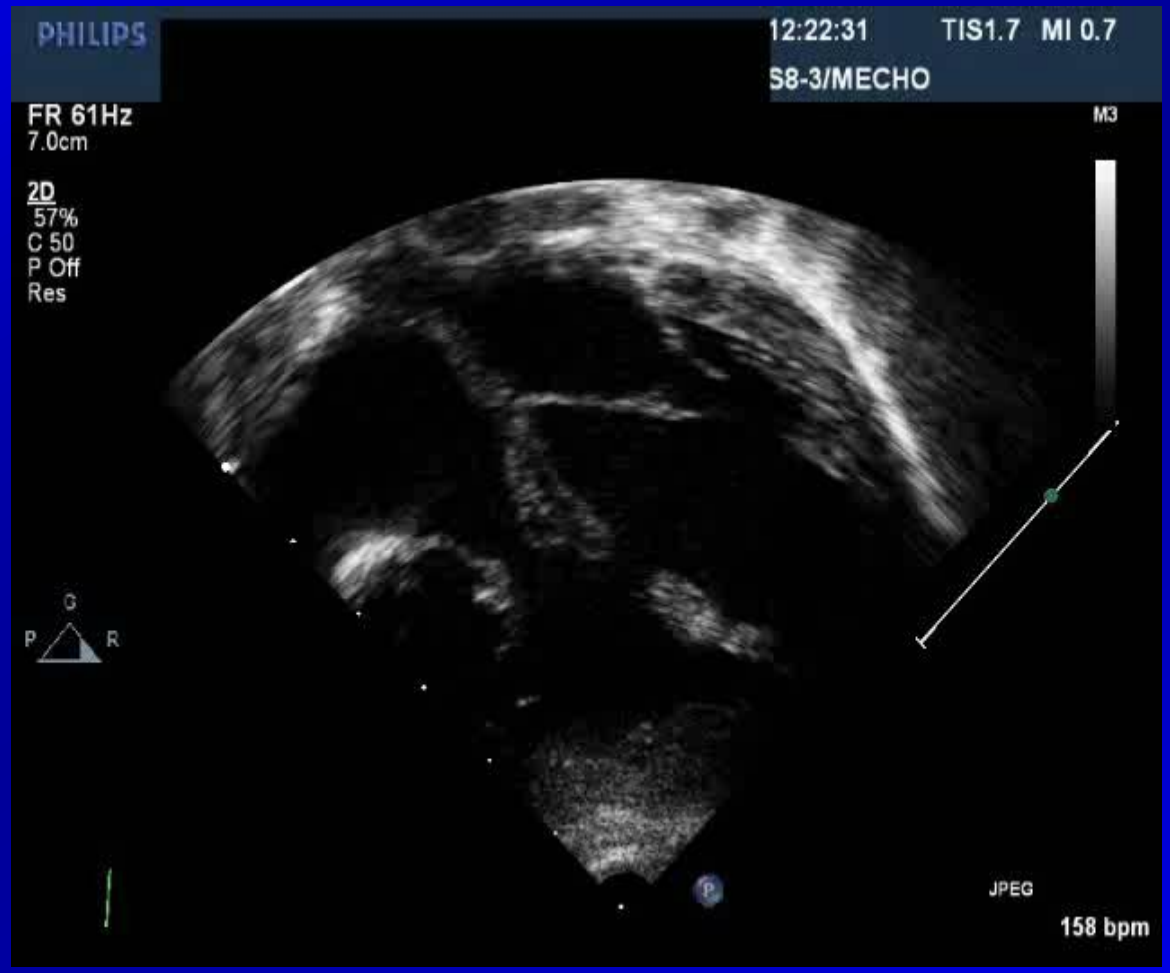
They Close spontaneously From RV aspect (muscle overgrowth)

How can we Close them ?

Apical VSD
Patient has had a VSD Device



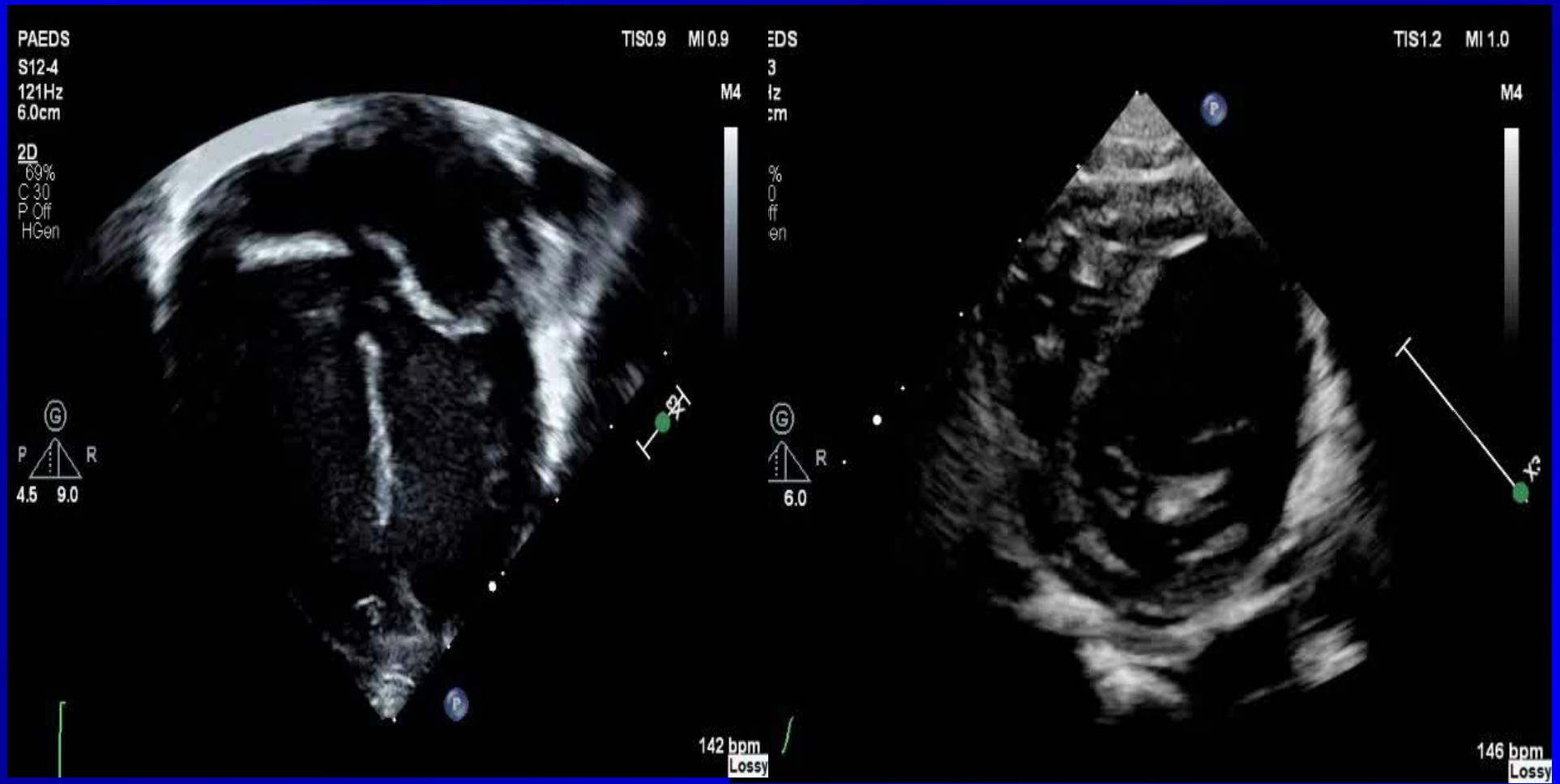
How Can We Intervene on This Patient with multiple VSD
Modern approach is Hybrid procedure



Same patient had Hybrid Approach (combined Surgeon and cardiologist in Theatre)

What is VSD position?

A Apical ;B Antero- Apical



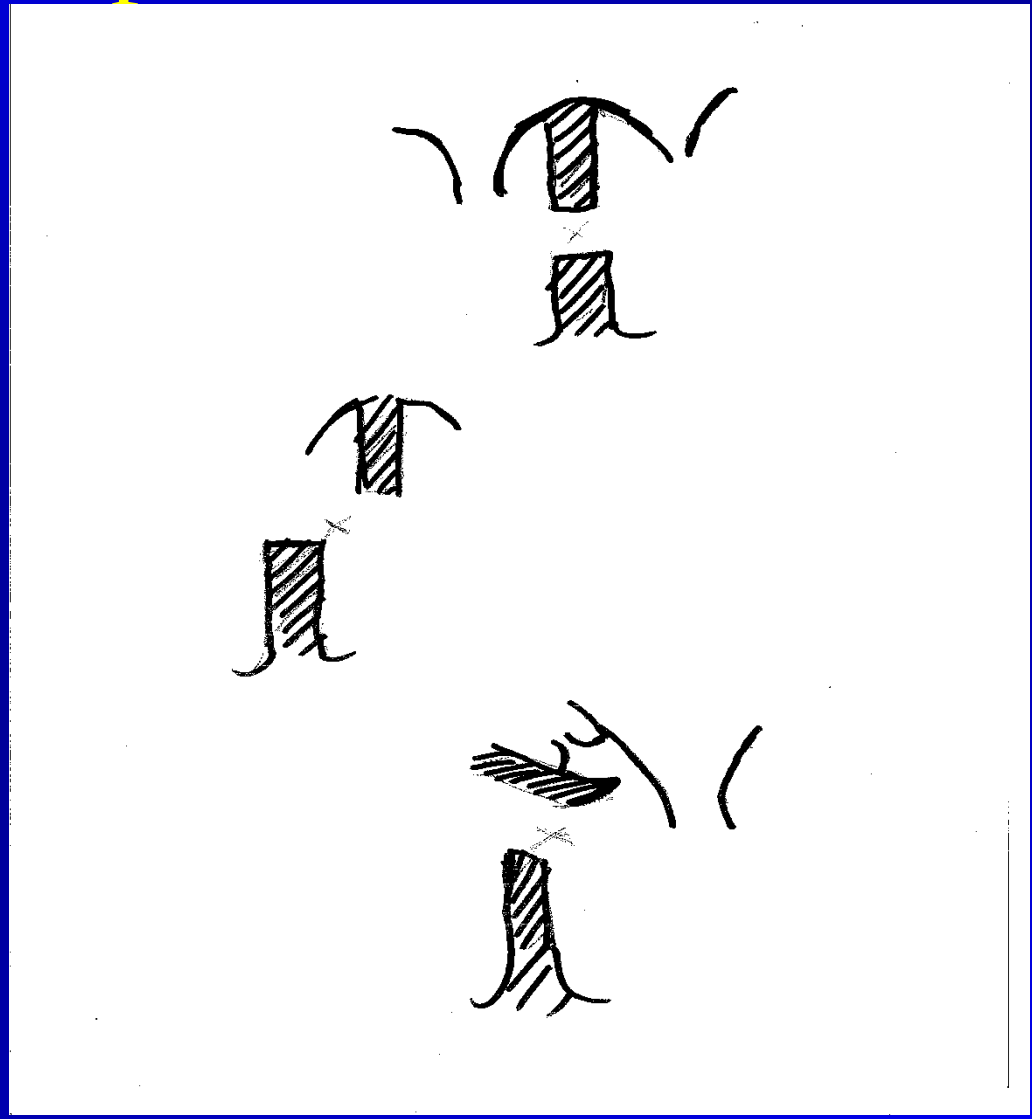
Same patient

Sweeps are important in VSD and other situations

Mal-alignment and Deviation

- The Bordering Walls of the VSD are not Truly aligned as in a simple VSD
- These Defects cannot close spontaneously
- Are usually part of a complex Morphological and Physiological situation.
- May not be amenable to repair.
- Deviation may mean an angled misalignment; Mal-alignment may mean parallell non alignment.

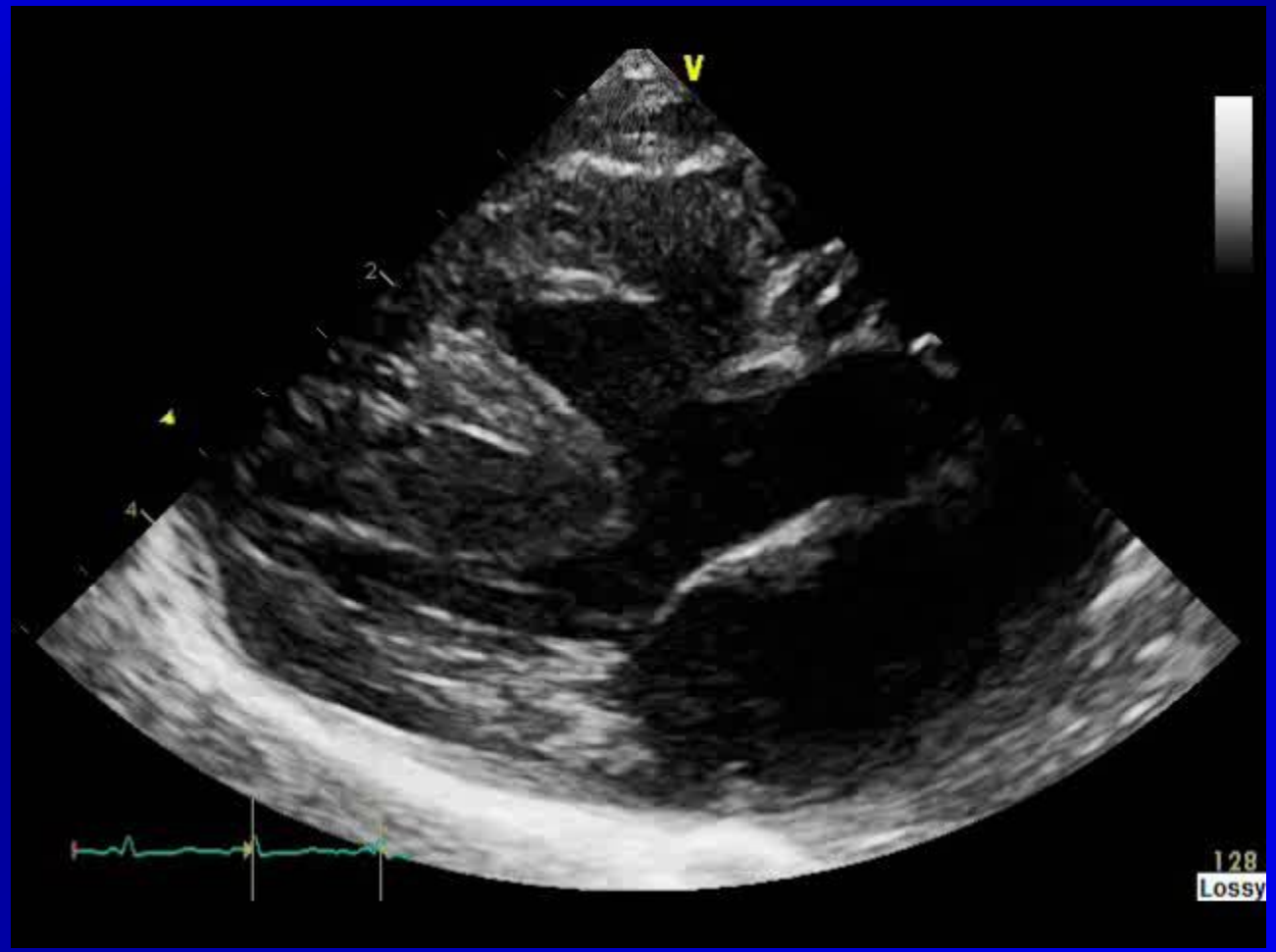
Mal-alignment and Deviation of Septal Borders of VSD.



Aortic Override – Q 1 What Type of VSD

A -Muscular B -Peri- Memb; C –Can't say

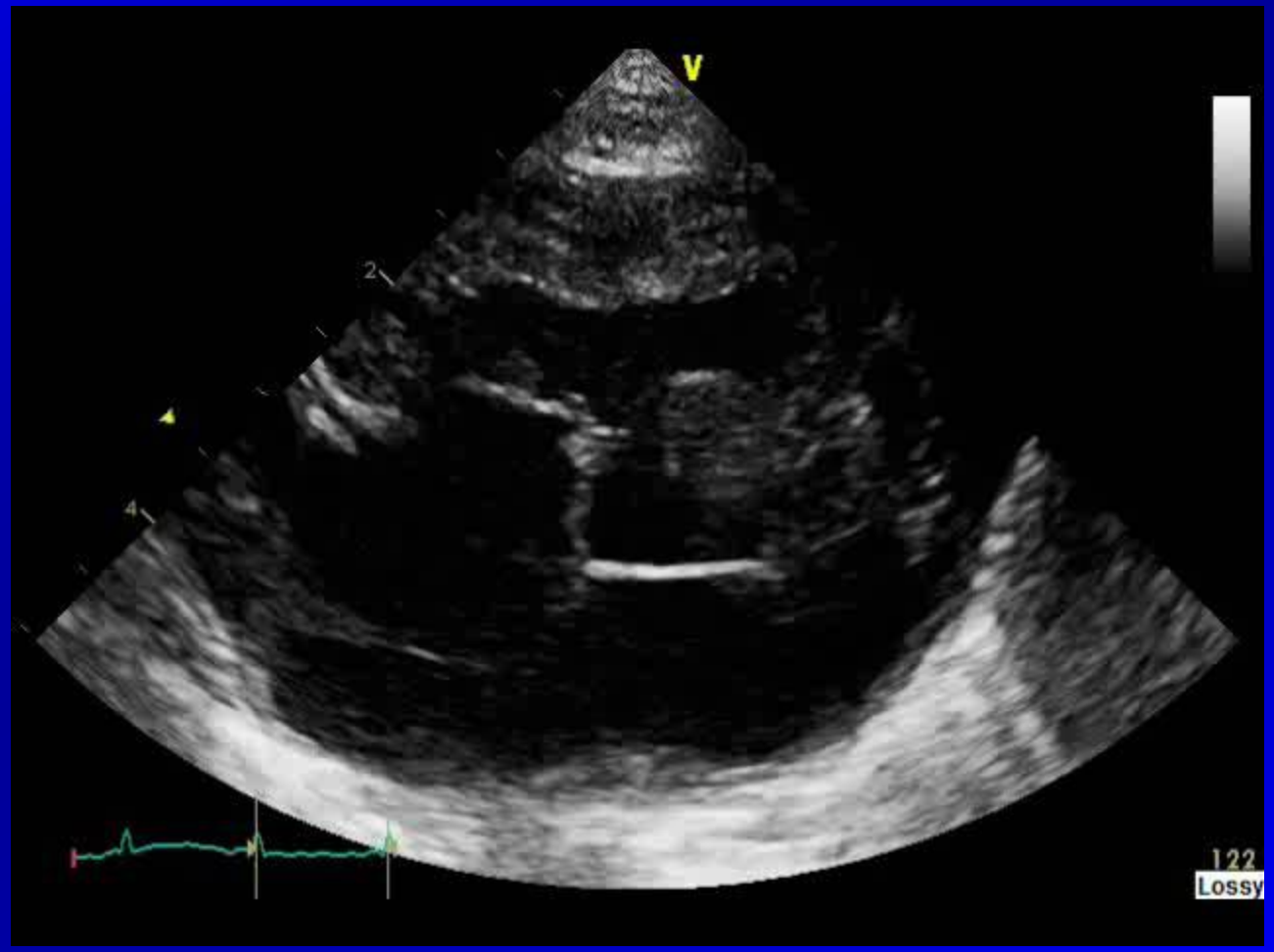
Q2 What is muscle bar above Parallel to septum in RV?



Same Aortic Override Patient

(Parasternal short axis- VSD Type?

Q Can we say type now ?

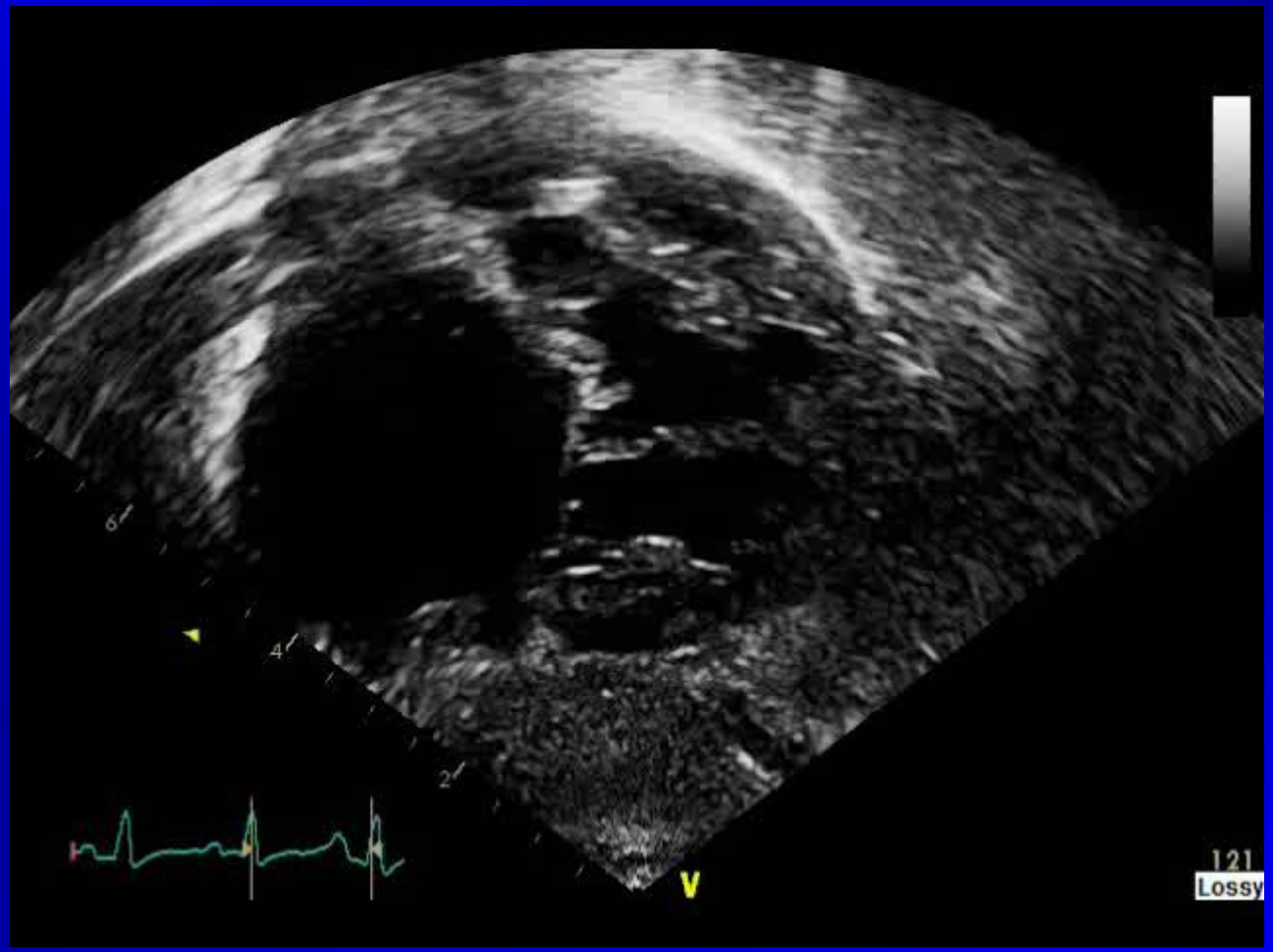


VSD typical of Truncus

Deviation-
Posterior Deviation of O/L septum ;

Posterior Deviation of Outlet Septum into LVOT (Anterior 4 chamber view)

Q What type of VSD ?- A -Peri- Memb ; B -Muscular ; C -DCSA



Is VSD Q1 A peri-Memb;BMuscular O/L

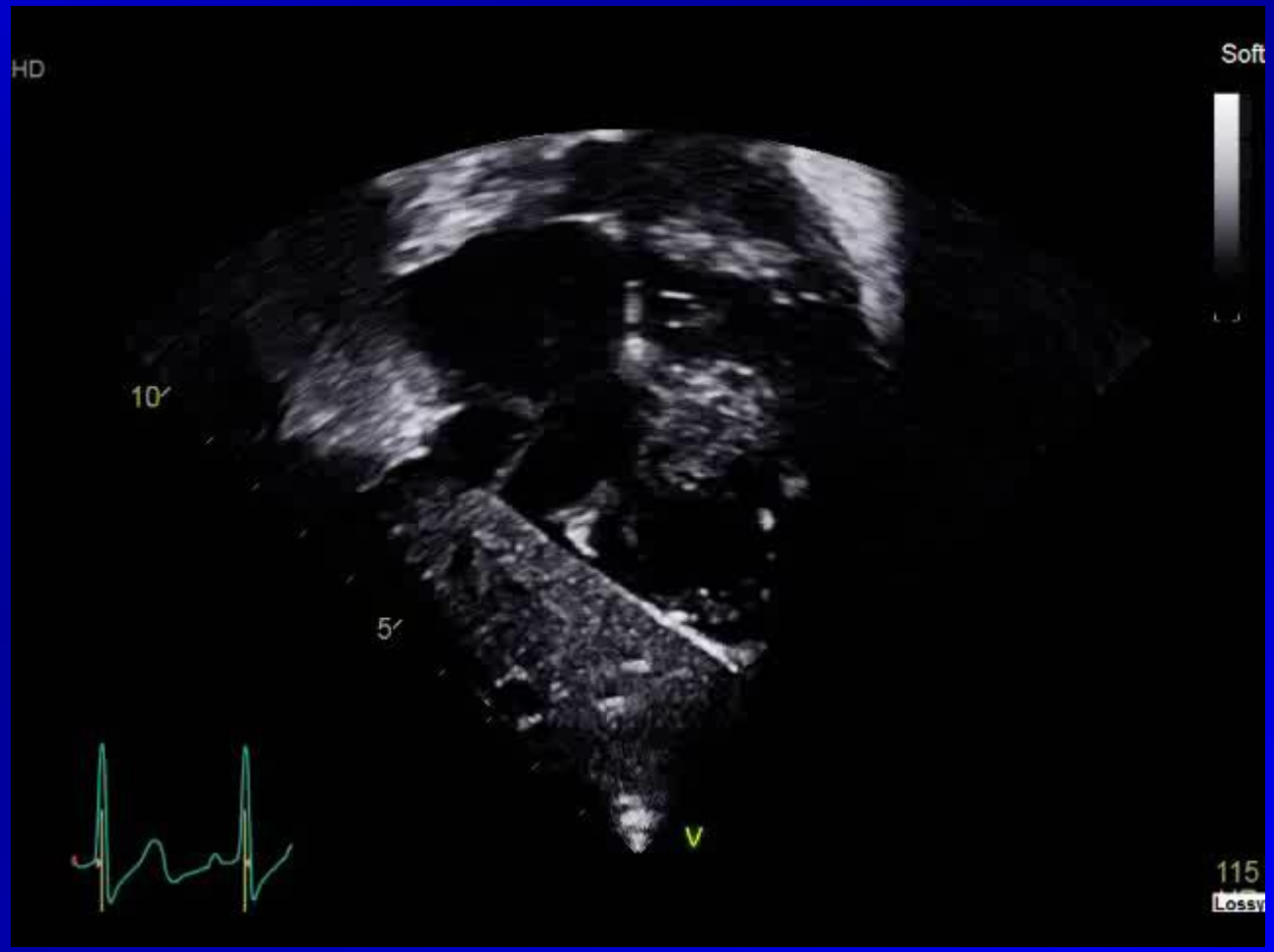
Q2 What is other important lesion ?

What Type VSD?

(Is it? A- Peri-Membranous ?; B Muscular ? ;
C DCSA ?) *(Sub costal "RAO" view)*

DCSA VSD POST OP –Patch closure

Has hallmarks of DCSA VSD
Note postero-Inferior Rim

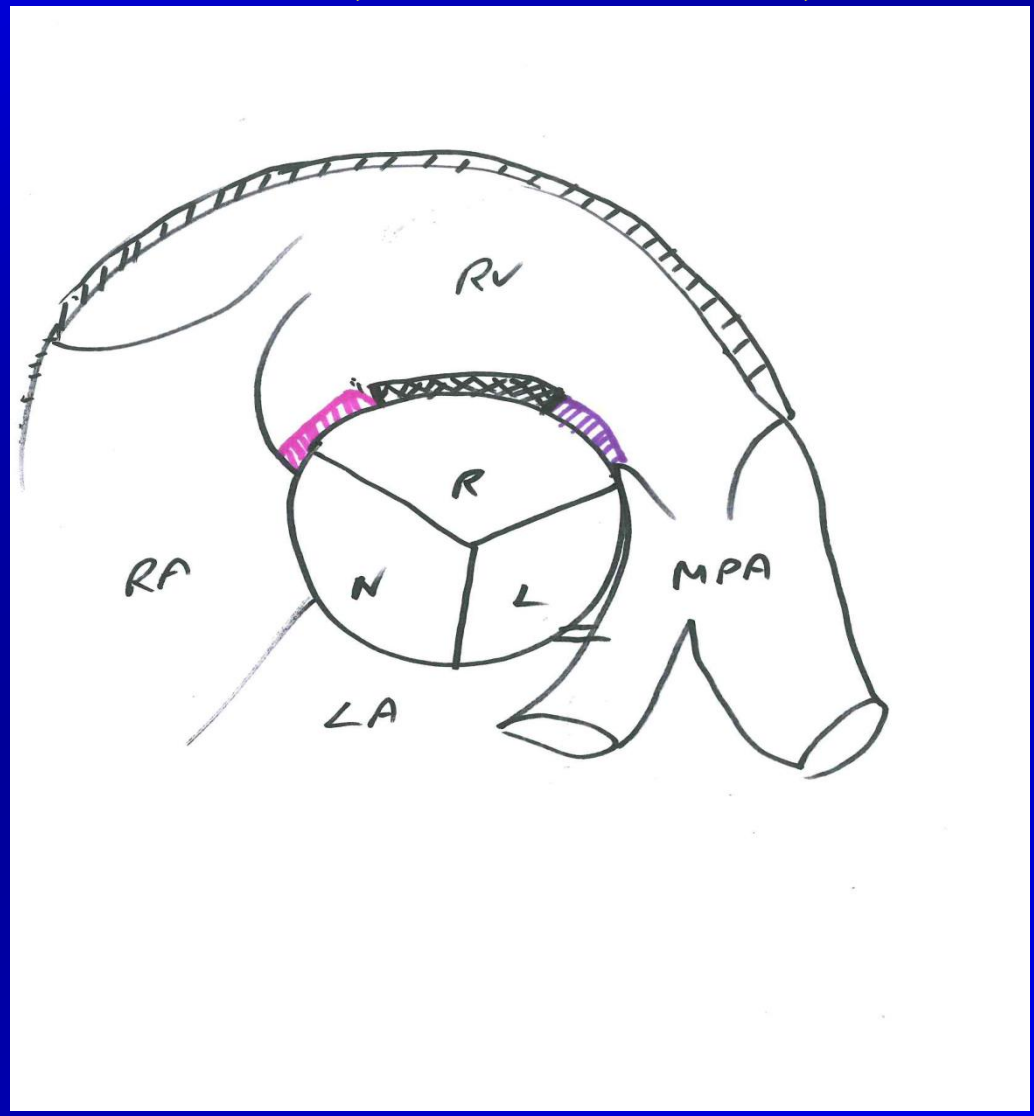


VSD WITH AORTIC VALVE PROPLAPSE

1. Can occur with Peri-membranous ; Muscular O/L or DCSA type VSD’s
2. Large VSD is closed by prolapsing leaflet
3 Can cause AR .

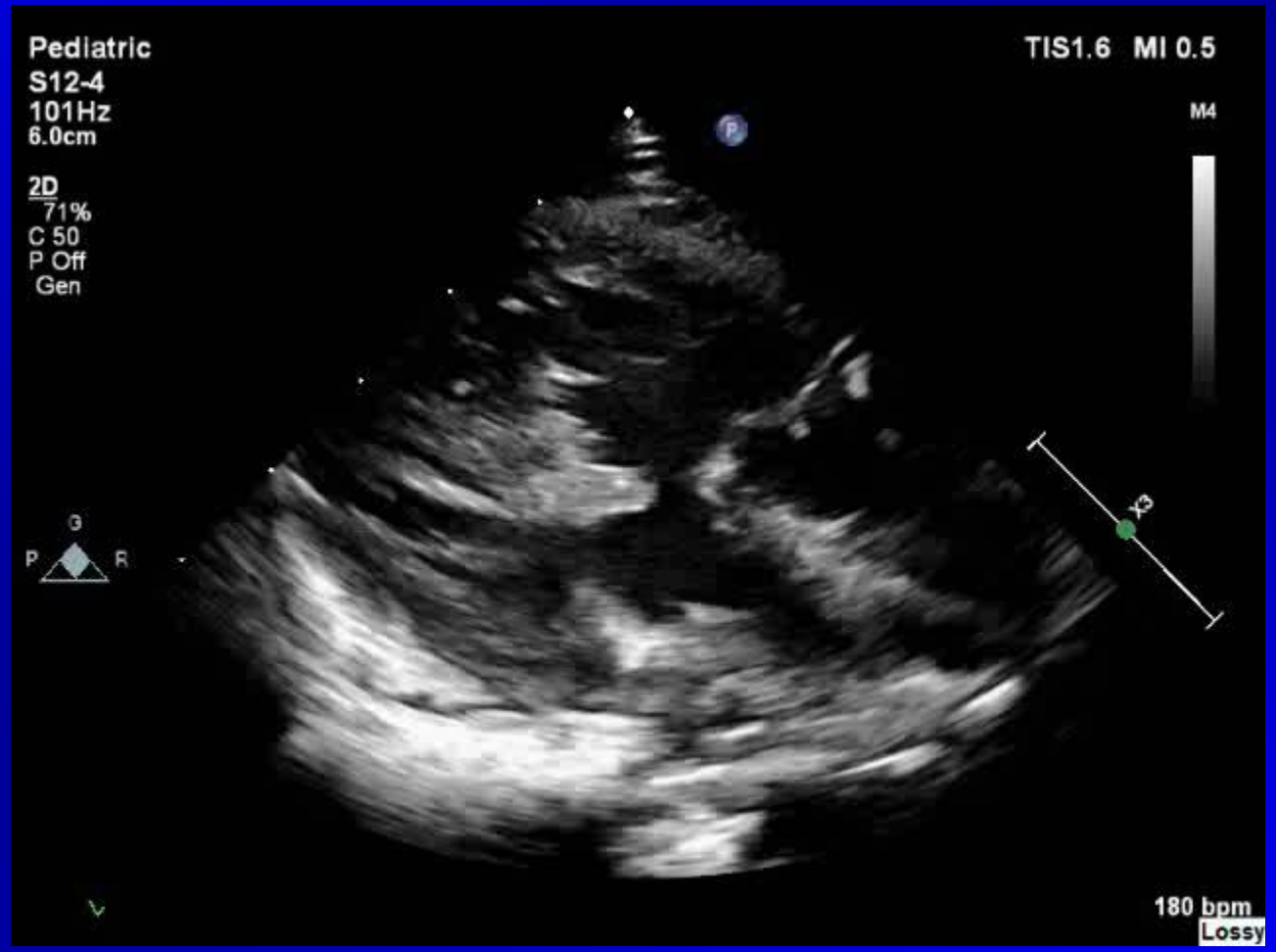
Aorta Short Axis- Zones of septum

Peri Memb ; Muscular ; DCSA



Q1 What Type VSD ? A Muscular B DCSA VSD

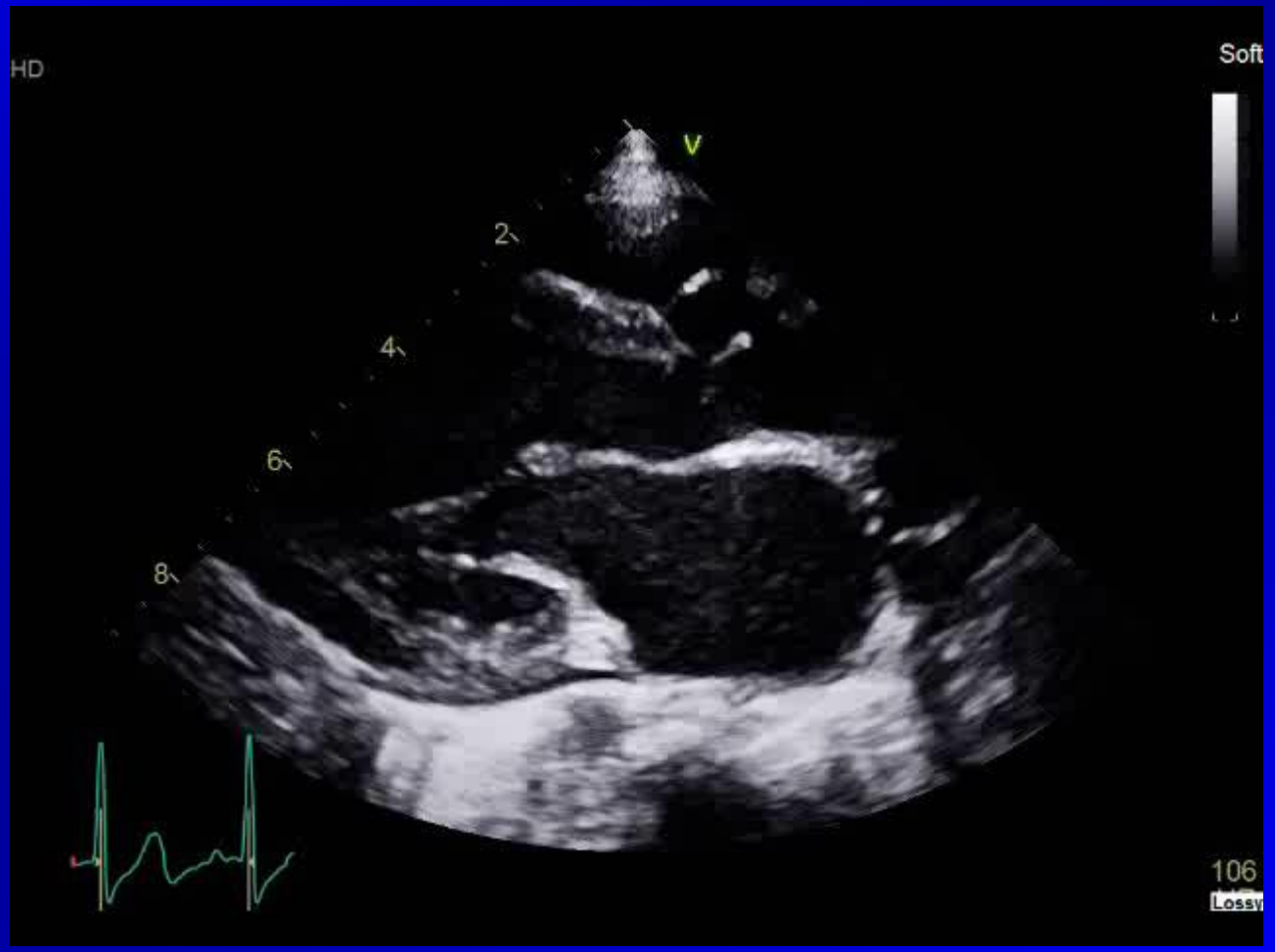
Q2 How Does It try to Close itself ?



VSD with Ao Valve Prolapse

AO V Prolapse

(Para- Sternal Long Axis)



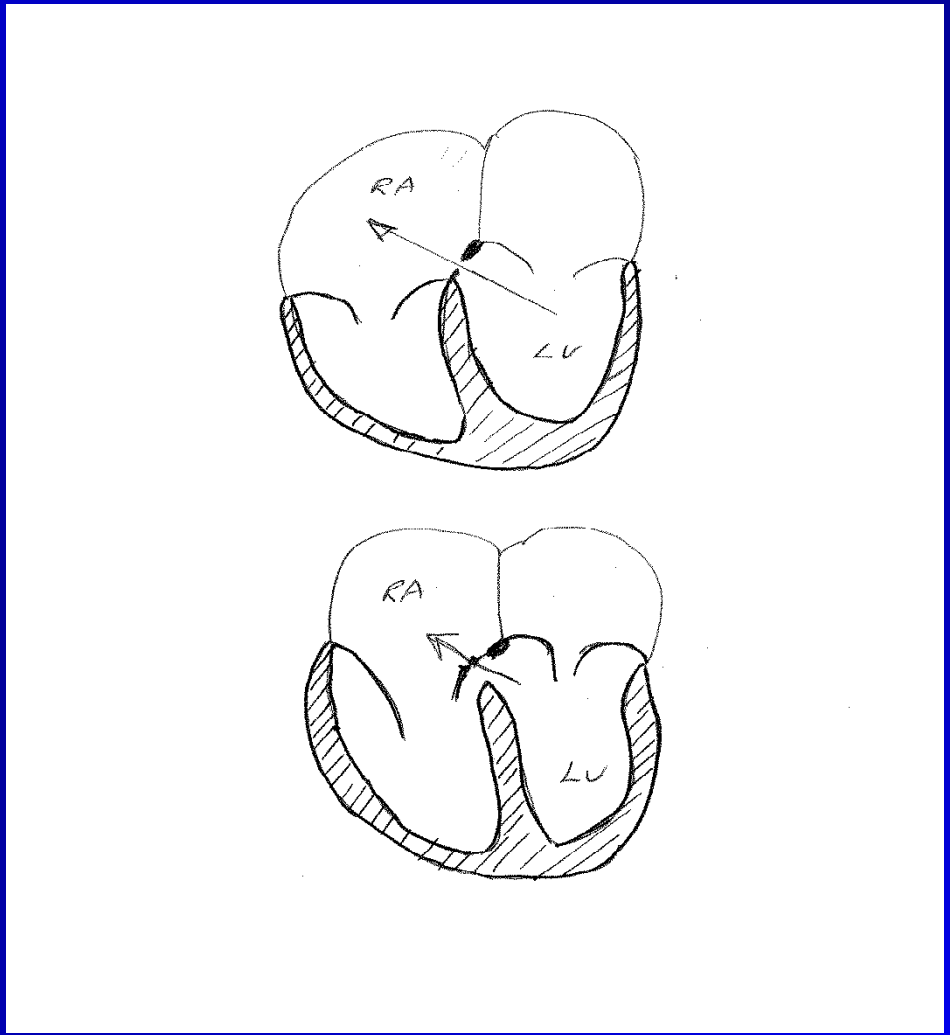
AoV Prolpase

Which Cusp prolapsed ? A -R Cusp; B- L Cusp)C Non Cororonary cusp

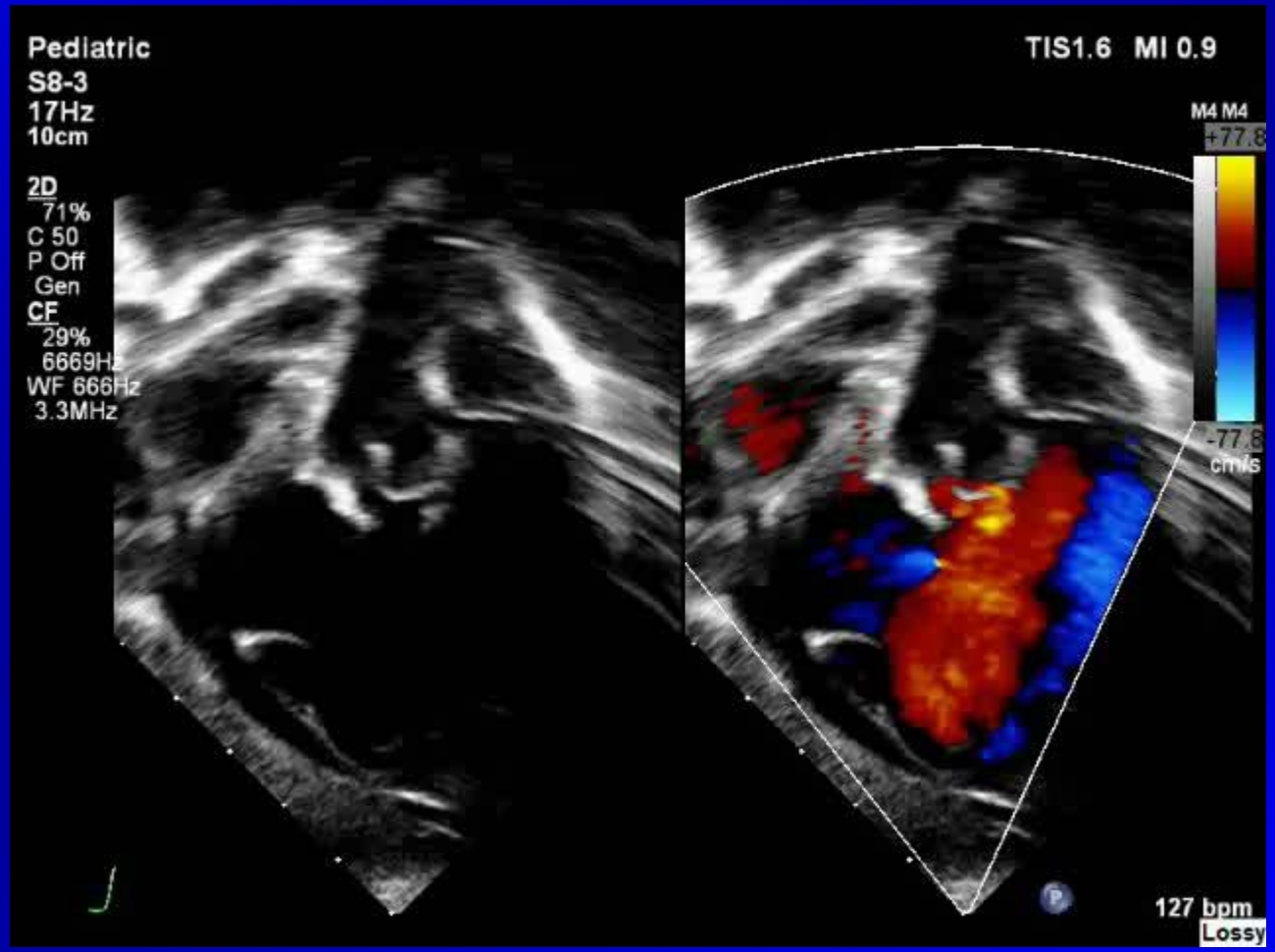
VSD ASSOCIATED WITH LV TO RA SHUNT

1. VSD HAS BEEN MOSTLY PARTIALLY BY TV APPOSITION
2. NOT A TRUE GERBODE DEFECT(Gerbode is a defect in membranous part of AV septum)
3. JET IS FROM LV TO RA THROUGH TV LEAFLET

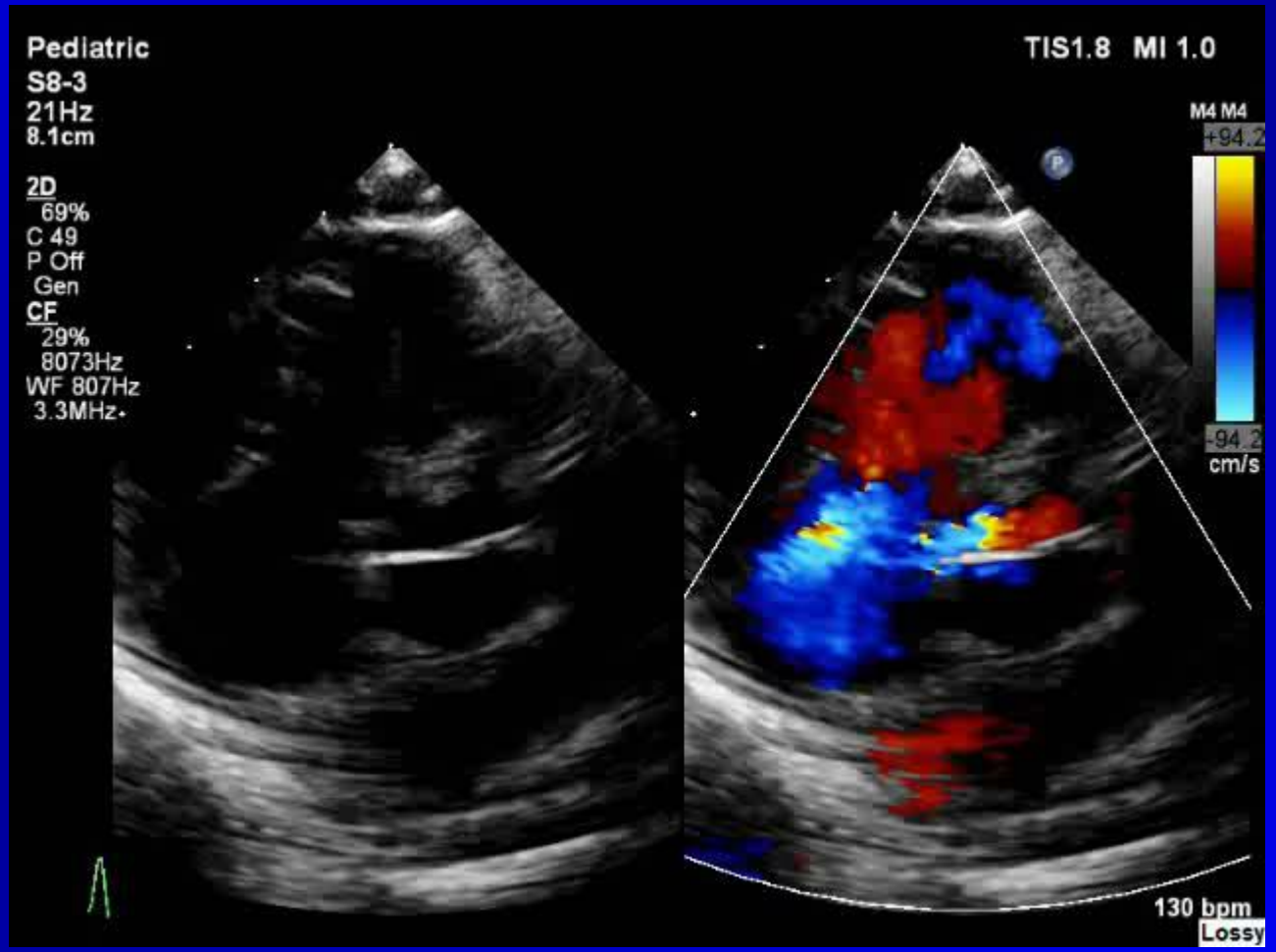
Gerbode defect compared to VSD with LV to RA shunt- Mechanism



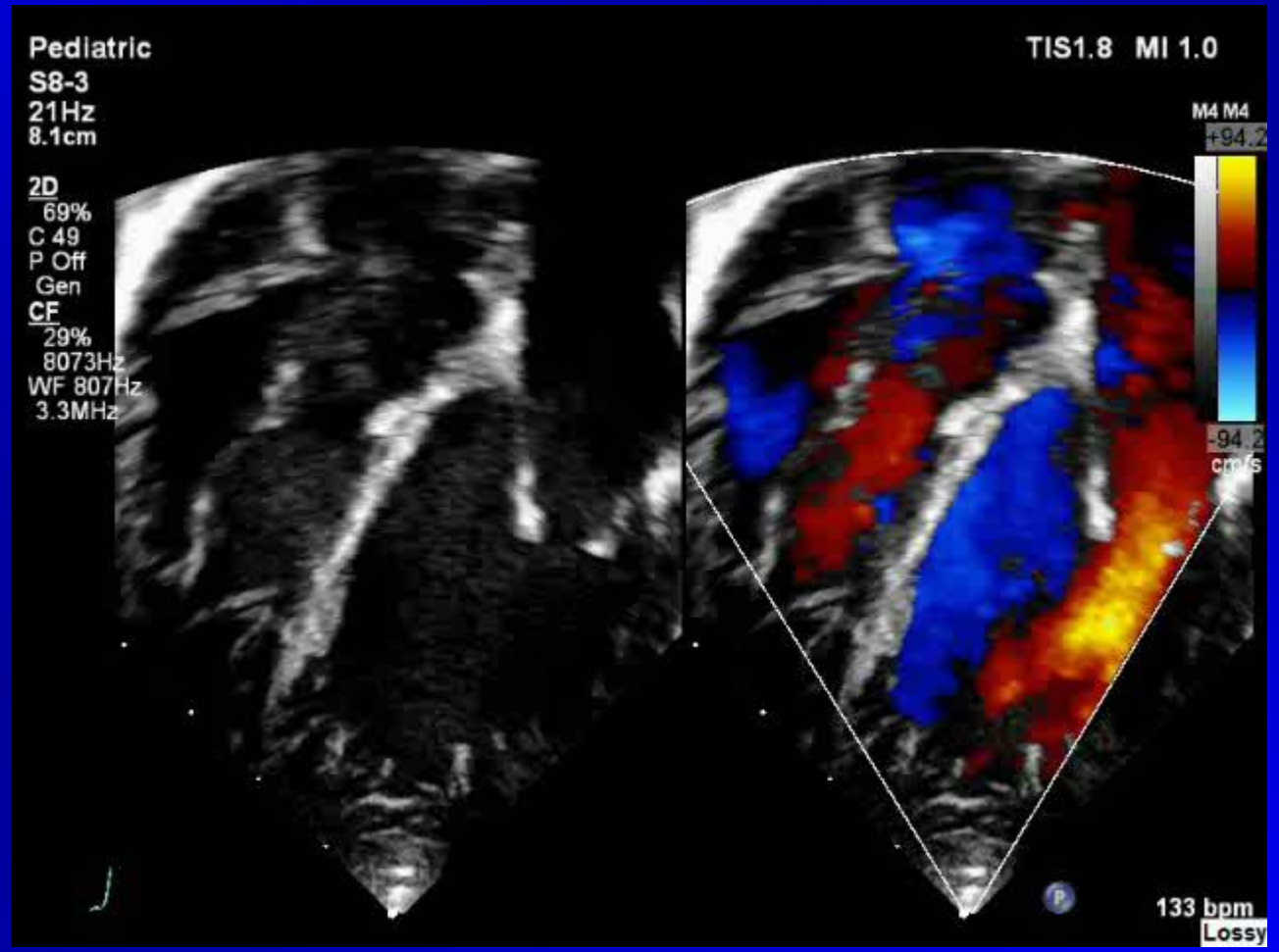
LV to Ra shunt (VSD setting sub costal)



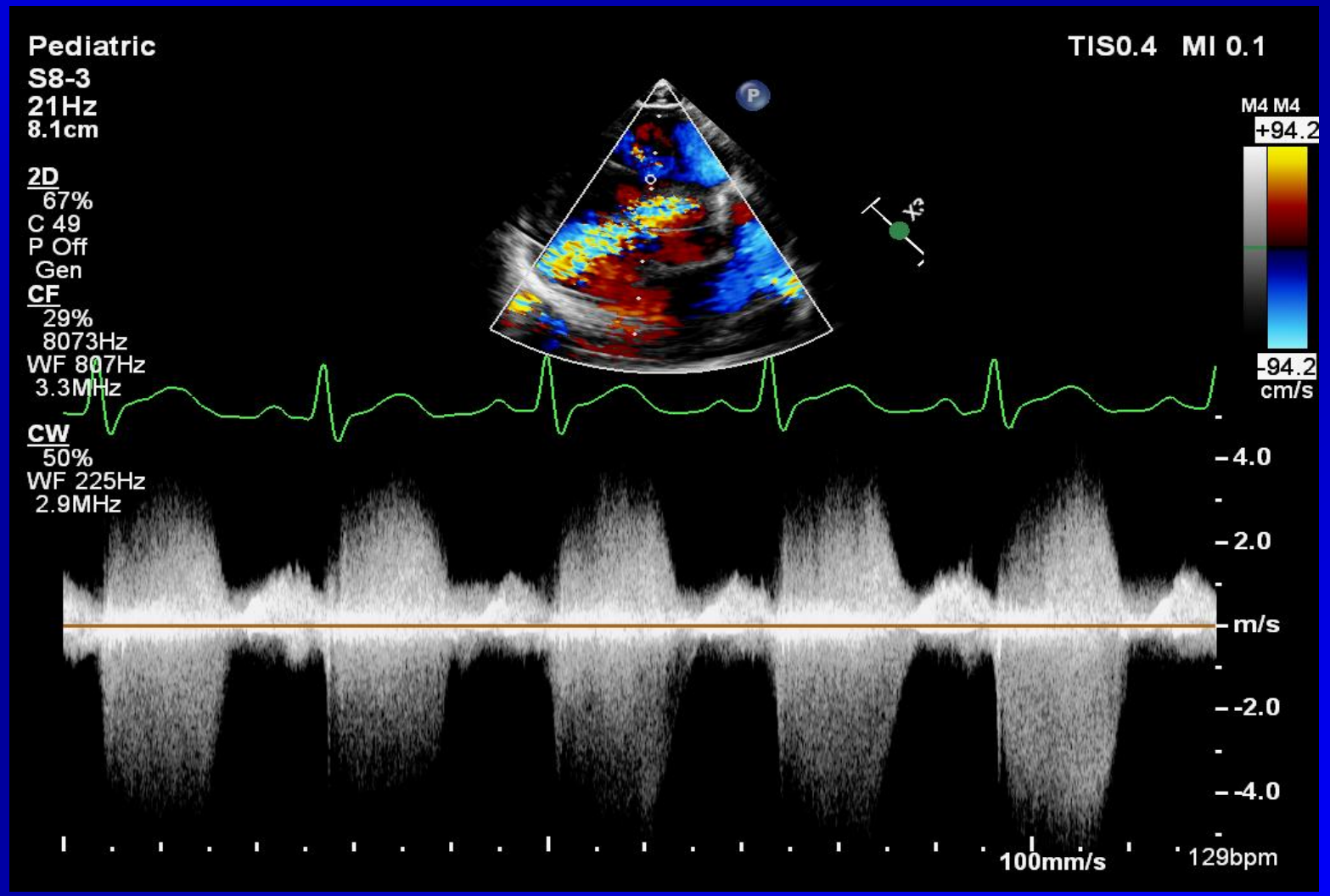
LV to RA Shunt
Parast. short- ax)



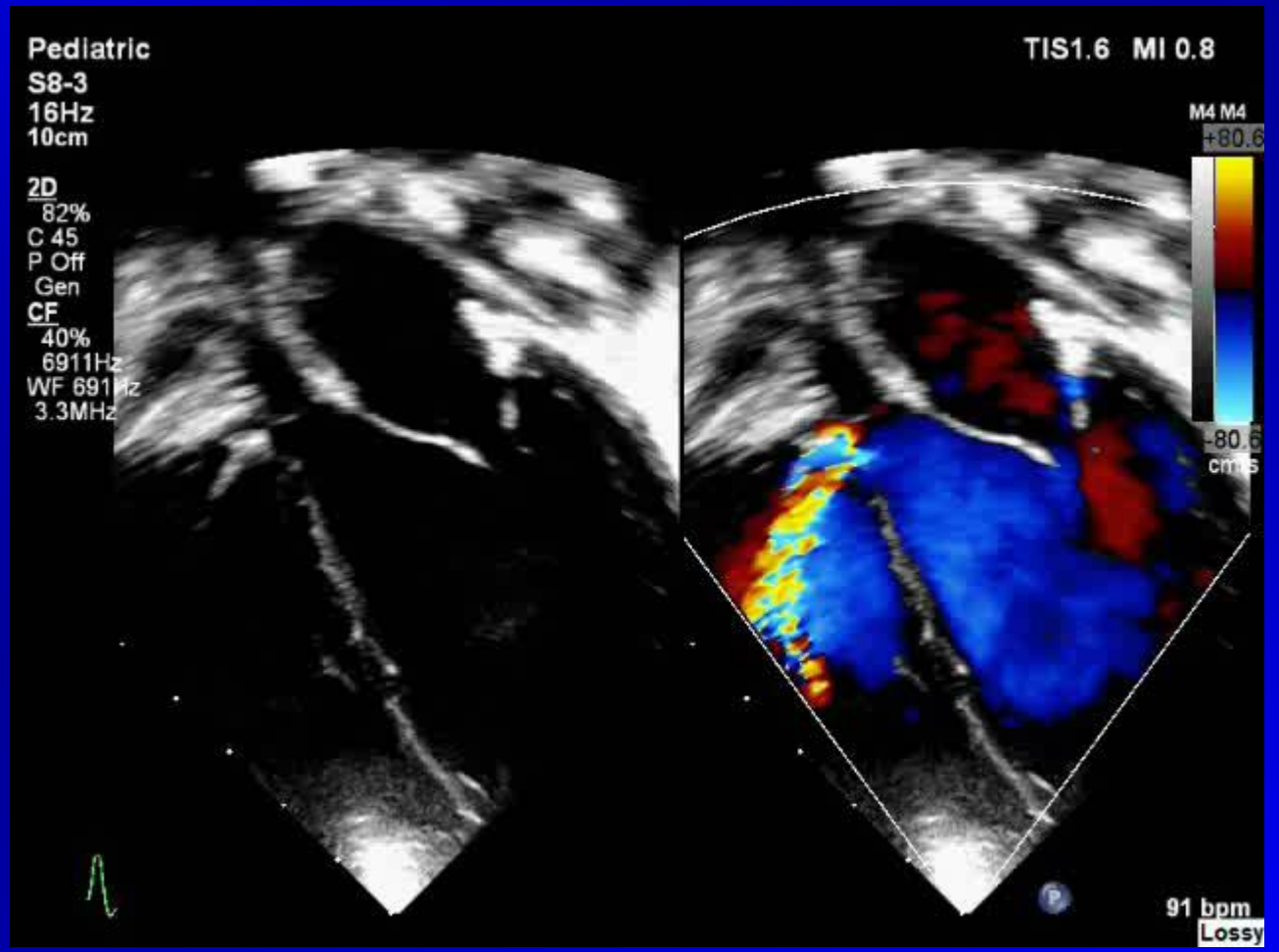
LV- RA shunt 4 chamber



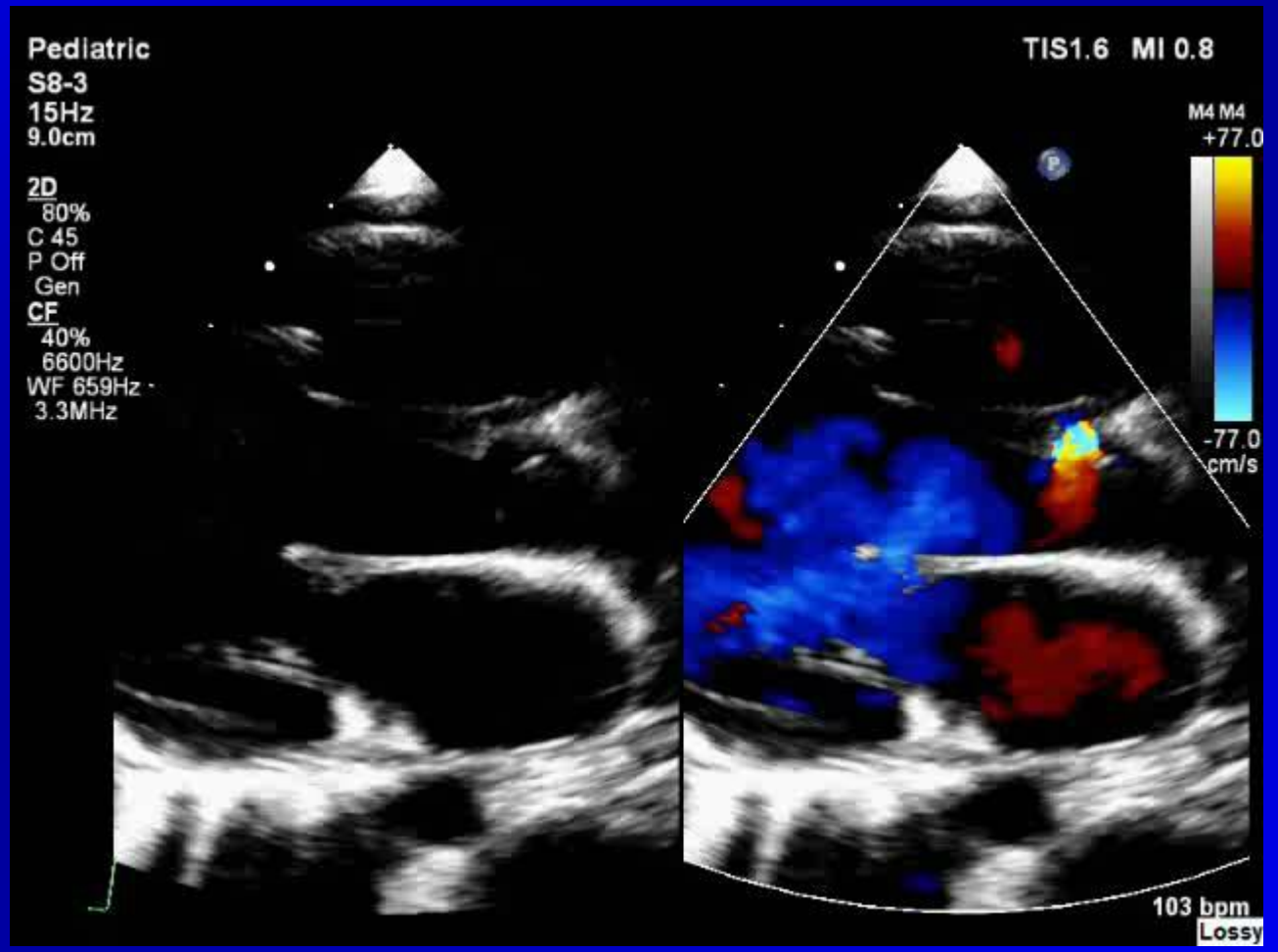
LV- RA shunt Doppler (P- Sax)



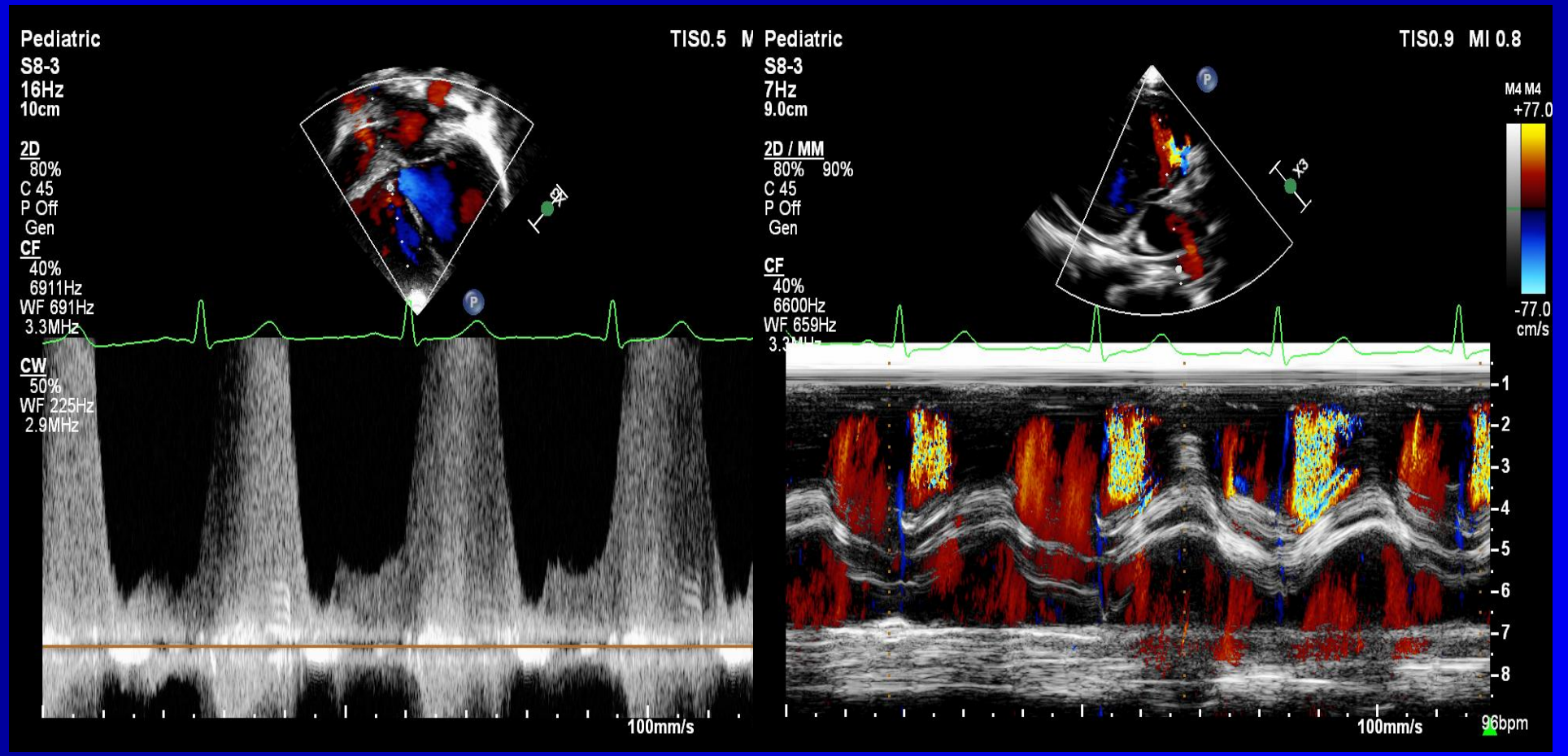
VSD'S CAN SHUNT BOTH IN SYSTOLE AND DIASTOLE



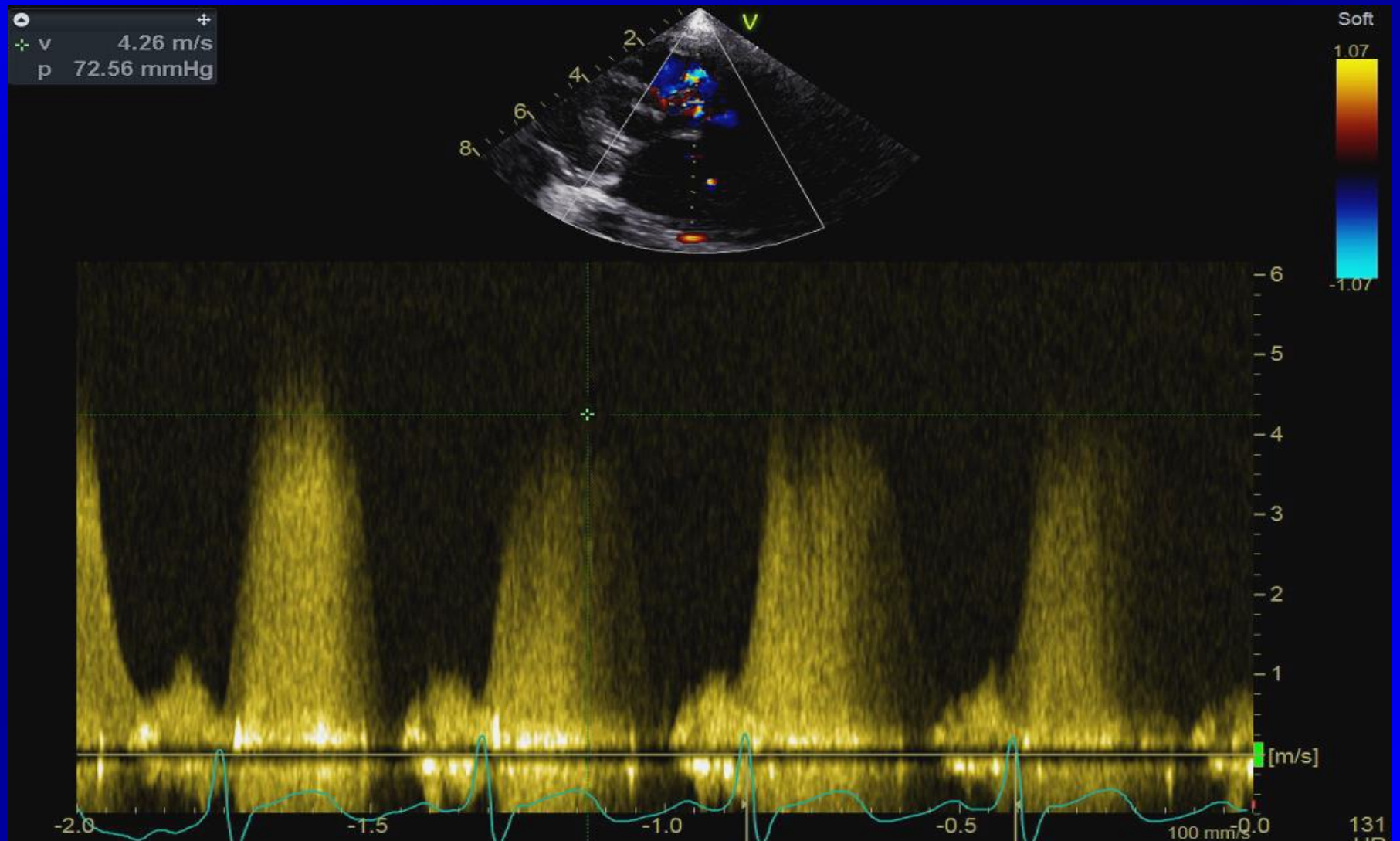
VSD sys and Dias shunt (L-Ax)



VSD with Sys. And Dias Shunt

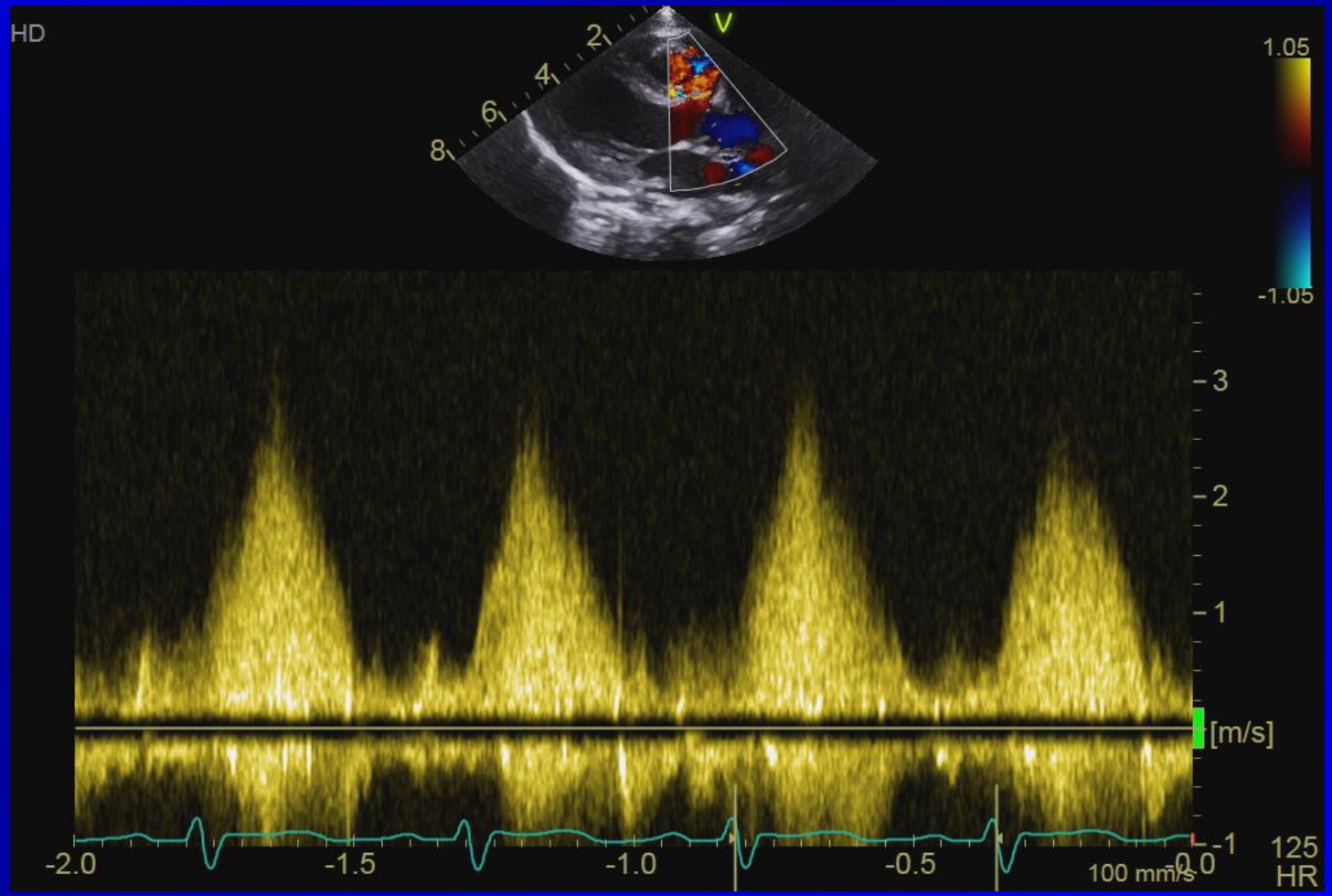


Doppler of VSD (Low RVp and Low PAp; High Velocity throughout systole VSD jet)



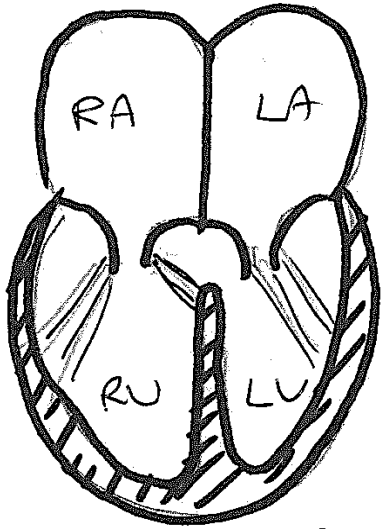
VSD Doppler with High RVp

(1 Shorter duration VSD; and 2 jet Velocity falls during systole)

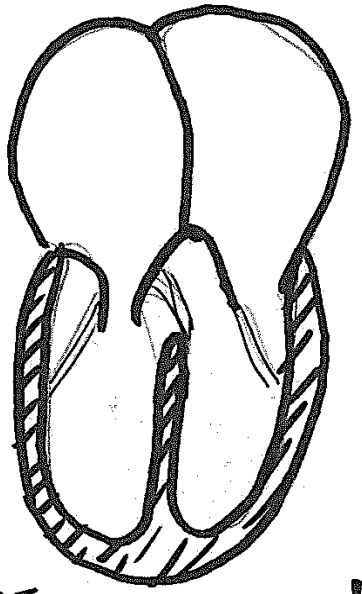


VSD with Override and/or Straddling valves

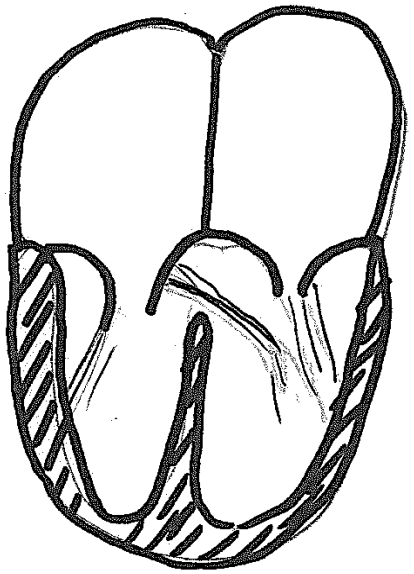
NORMAL



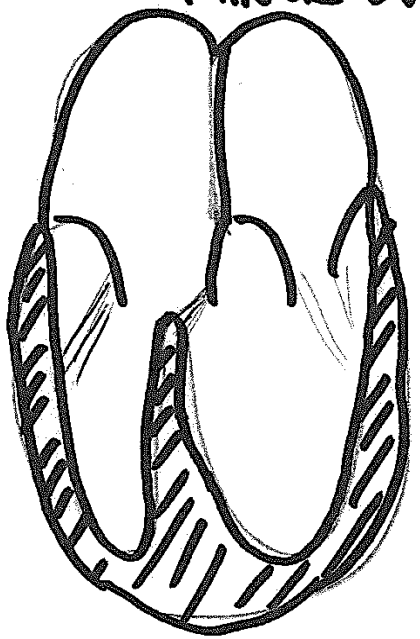
MINOR TV STRADDLING

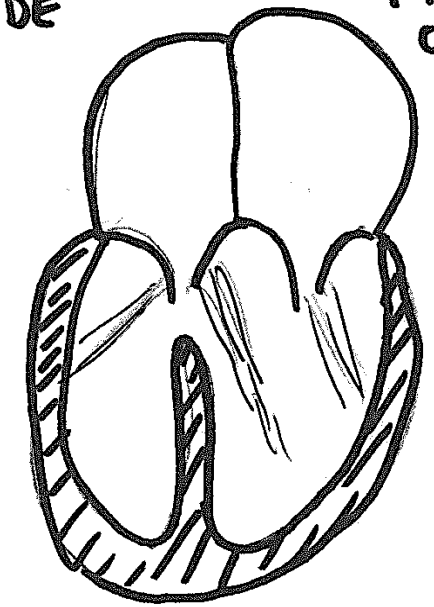


MAJOR STRADDLING TV

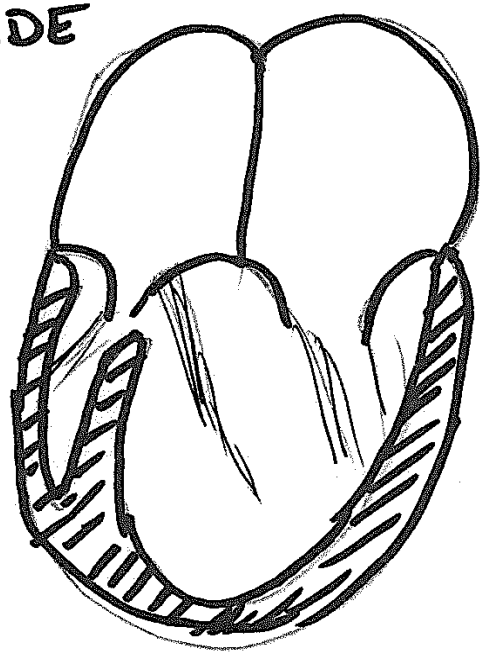


MINOR OVERRIDE TV





MAJOR OVERRIDE TV



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Override (Note Mal-alignment of Septa)

Noteable features of straddling valves

- Tricuspid valves Usually straddle through a posteriorly situated VSD (inlet VSD)

- Mitral valves always Usually through an anteriorly situated VSD (outlet)(Usually TGA)

- Straddling mitral valve can co-exist with straddling tricuspid valve (RARE)

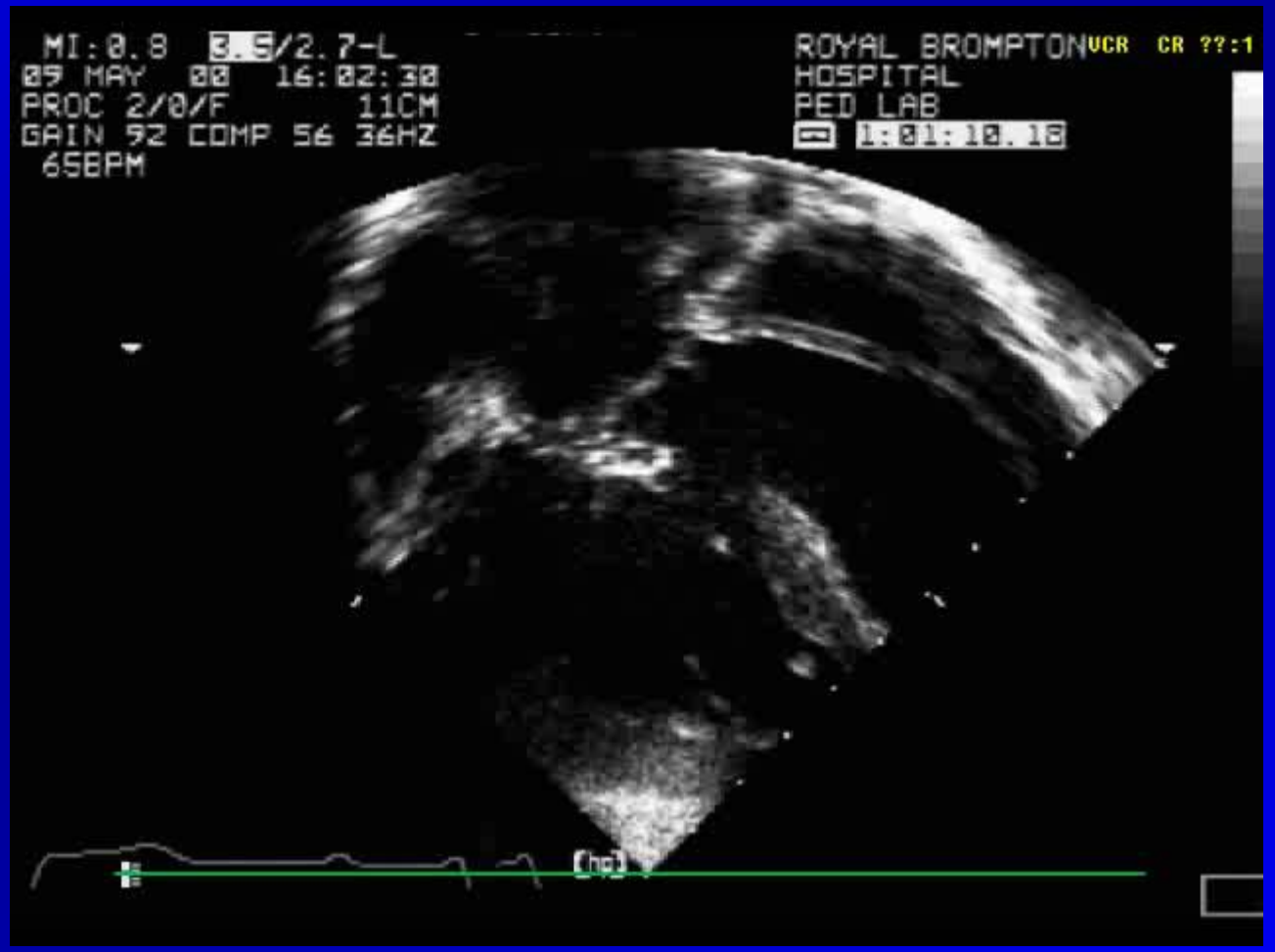
Why is straddling important ?

- Never a minor malformation (associated lesions always require surgical repair)
- Can complicate surgical repair
- May preclude biventricular repair

Surgical techniques to overcome straddling

- VSD with straddling TV can be repaired by minor surgical adjustment to patch
- Route VSD patch around tensor apparatus
- Leave a notch in VSD patch for the straddling cords (rarely done)
- Resite straddling cords (rarely done)
- Avoid intracardiac repair - palliate

TV is both Straddling and Overriding

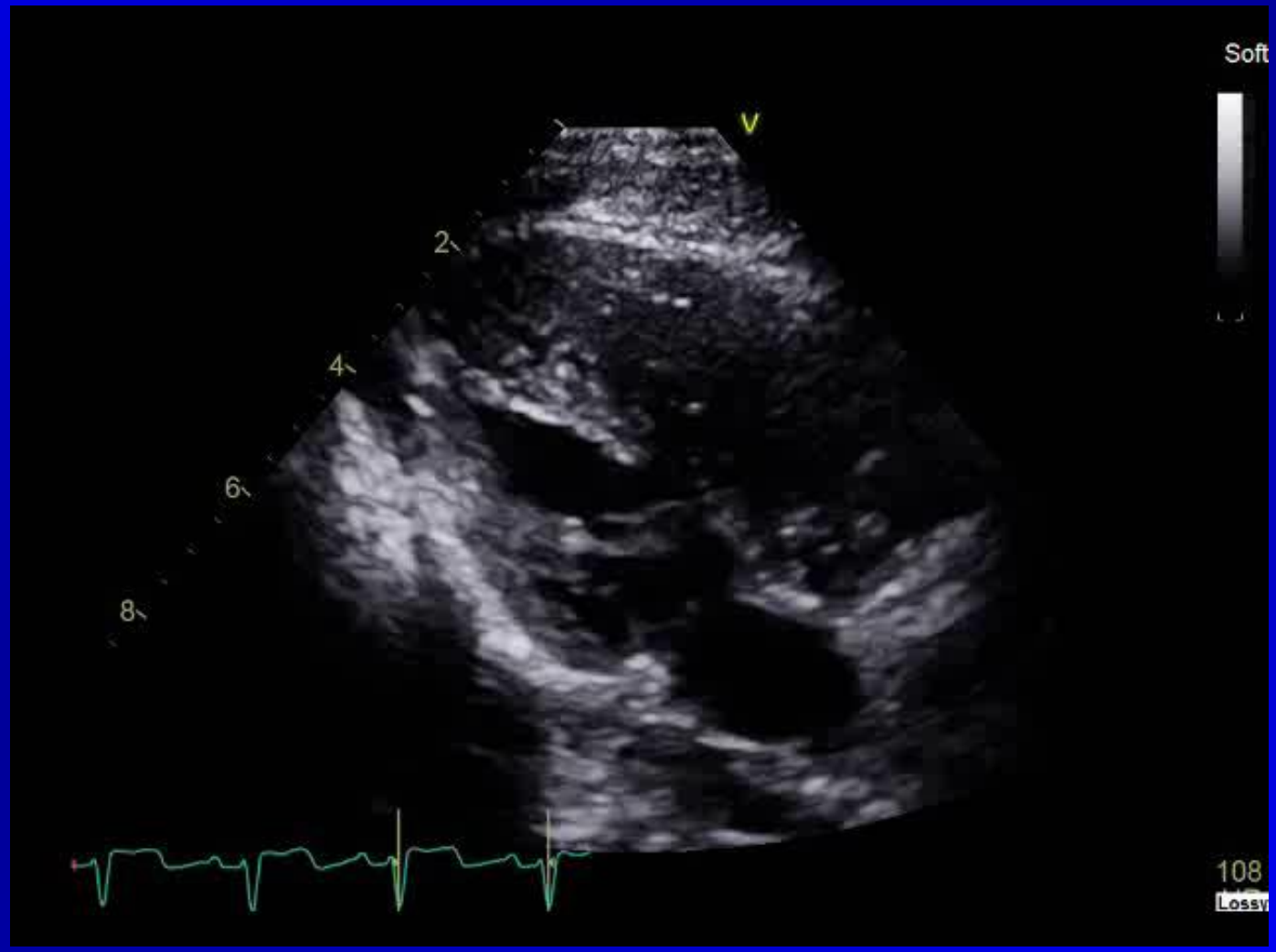


Large VSD with MV Stradlling

Q What is Large Muscular Shelf next to MV above RV

Large VSD Strad MV

(L- Ax view)



TV is Straddling thro'a Musc VSD

(Note VSD is Very Posterior towards "Crux")