Colour Doppler: how to best use it

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CD – How to best use it

- Optimal set-up by application
- Optimal planning (before you switch on CD)...
- Applications (objectives)
  - faciltate anatomy evaluation (**obesity**)
  - Detect high velocities (**stenotic/insufficient valves**)
  - Detect abnormal shunts (**VSDs, fistulae**)
  - Functional cardiac evaluation (**high cardiac output conditions: TTTS, S-C teratoma, etc**)

Tips & tricks in: Set-Up
Switching from *OB* to *FE*

Tips & tricks in: Physics
Using the correct *line* of *insonation*

Transverse 4-chamber

90°

Apical 4-chamber

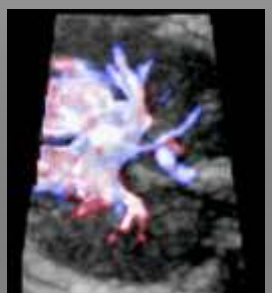
- Inter-atrial septum + FOV
- Inter-ventricular septum
- Free myocardial walls
- Chamber diameters
- Chordae tendinae

- Atrial/ventricular lengths
- A-V valves
- Free myocardial walls

Tips & tricks in: Physics
Using the correct *line* of *insonation*

Transverse approach

- LVOT
- RVOT
- Pulm.venous & FOV flow



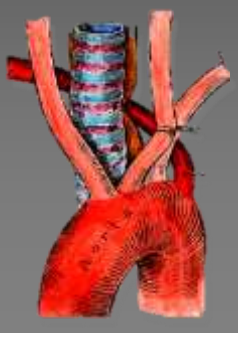
0°

Apical approach

- A-V inflow
- LVOT
- RVOT

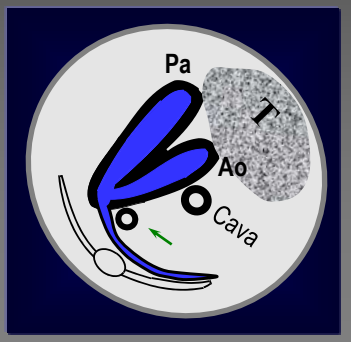
ARSA – Definition

- ✓ Right subclavian artery departing as 4° vessel from aortic arch
- ✓ Coursing behind the trachea
- ✓ Reaching the right shoulder



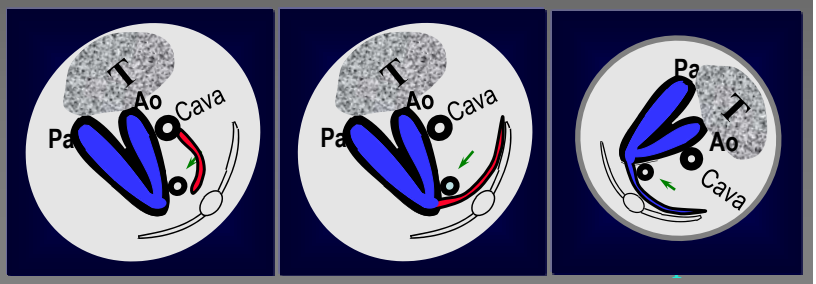
ARSA – How to look for it

1. Three-vessel view
2. At least 30° angle with expected course of ARSA
3. Reduce PRF to ~20 cm/sec
4. Or, use Power Doppler
5. Departing from the "V"
6. Coursing behind the trachea
7. Towards the right shoulder



ARSA – How to look for it

- Three-vessel view
  - Fetus lying on right side ➔ *ARSA blue*
  - Fetus lying on left side ➔ *ARSA red*
  - Do not be misled by azygos-SVC connection



ARSA – How to look for it

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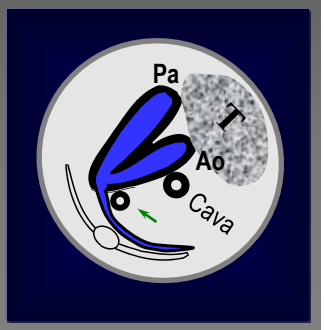
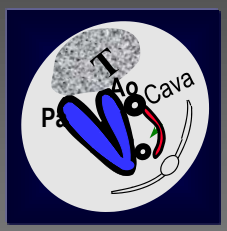
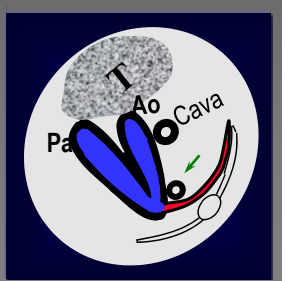


ARSA – How to look for it

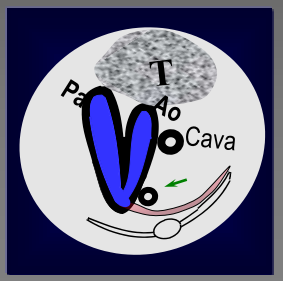
- Three-vessel view
  - Fetus lying on left side ➔ *ARSA red*





ARSA – How **NOT** to look for it

- Three-vessel view
  - Fetus lying with spine posterior
  - ARSA at 90° with insonation beam
    - NO flow detected at CD!



Tips & tricks in Physics
How to change the line of insonation

To change line of insonation

Either roll the patient

..or slide the transducer sideways

Set-Up – CD, PRF & aliasing

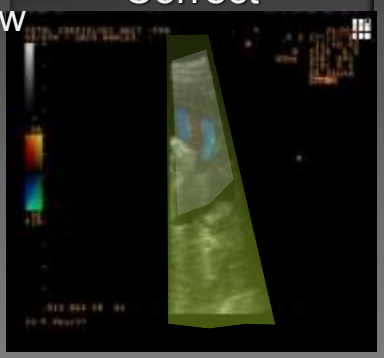
- PRF (Pulse Repetition Frequency):

Set-Up – CD & Frame Rate

- Always try to keep a high Frame Rate:
  - Narrow 2D window
  - Small Color ROI
  - Reduce CD lines

Wrong

Correct

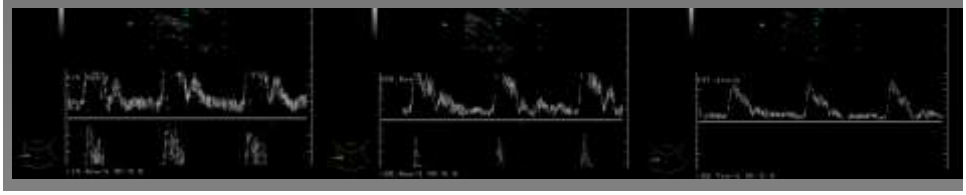


1. Width 2D sector
2. Width color box (ROI)
3. Insonation Angle

Set-Up – CD, PRF & aliasing

To accomodate high velocity color/spectral Doppler signals, it is required to increase the PRF

If the velocity is higher than the Nyquist limit, then the *Aliasing effect appears*

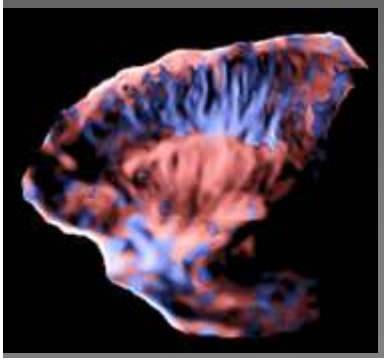


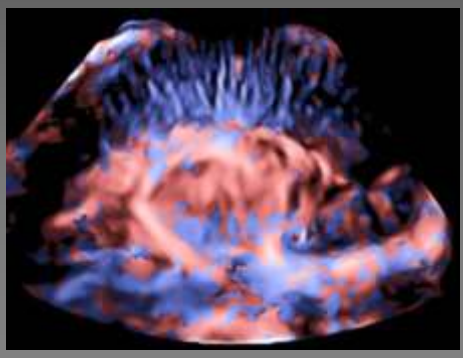
Set-Up – CD, PRF & aliasing

- Low PRF
- High PRF

Brain vasculature:
Very low PRF & Bidirectional Power Doppler

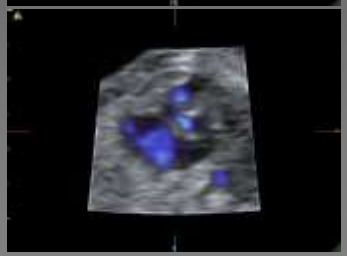
Normal medullary circulation @ 28 wks

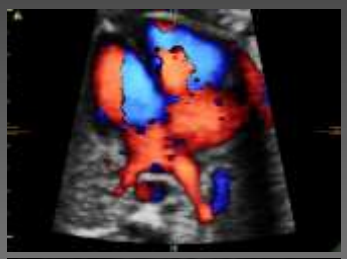




Why is it important to plan ahead?

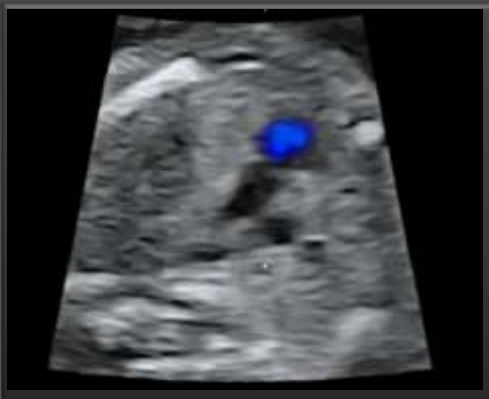
- VSD? CD priority **LOW**
- Pulm.Veins? CD priority **HIGH**

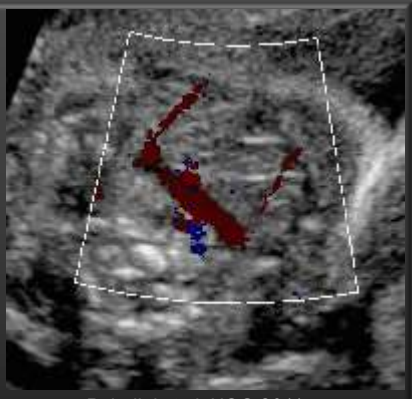




Why is it important to plan ahead?

- Arches? CD priority **HIGH** PRF **HIGH**
- Thymus? CD priority **HIGH** PRF **LOW**





Paladini et al, UOG 2011

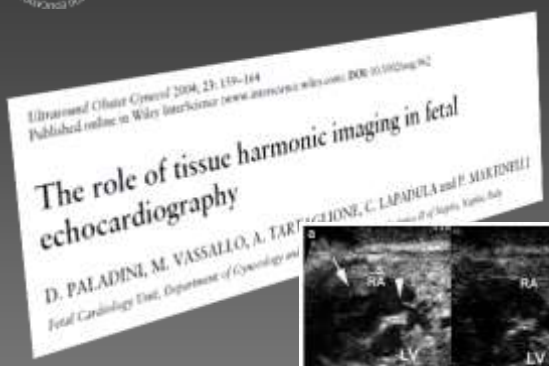
Objectives. 1
Support anatomic evaluation...

...in the century of obesity!

...What to do...

...if there is a foggy enviroment...

1. Use Tissue Harmonic Imaging

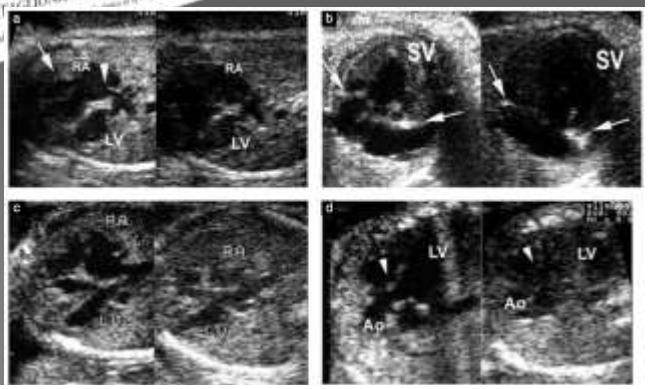


Ultrasound Obstet Gynecol 2004; 23: 159–164
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/uog.962

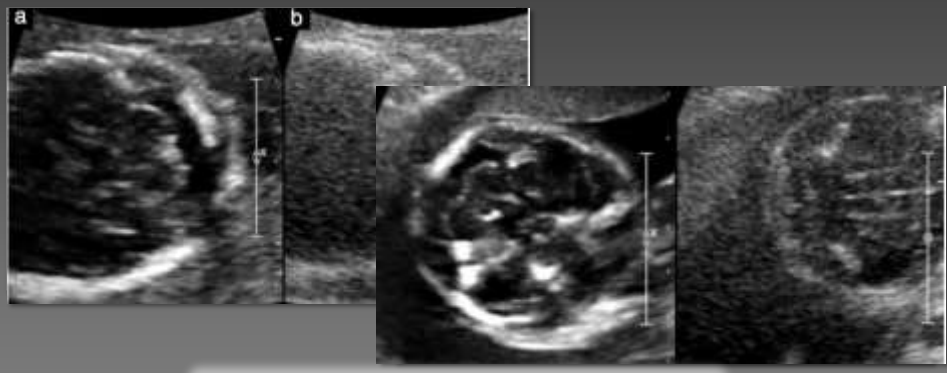
The role of tissue harmonic imaging in fetal echocardiography

D. PALADINI, M. VASSALLO, A. TARTAGLIONE, C. LAPADULA and P. MARTINELLI

Fetal Cardiology Unit, Department of Gynecology and



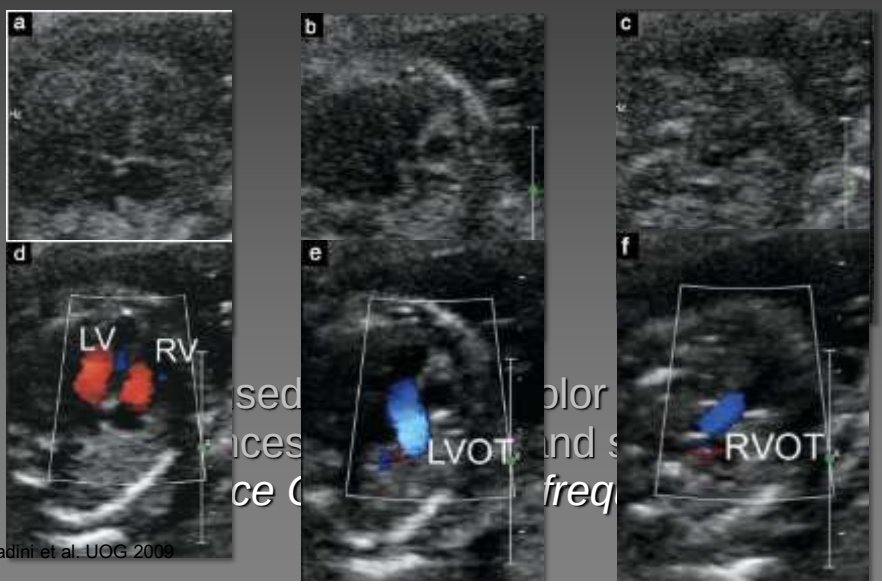
2. Use Contrast Harmonic, Crossbeam, SRI



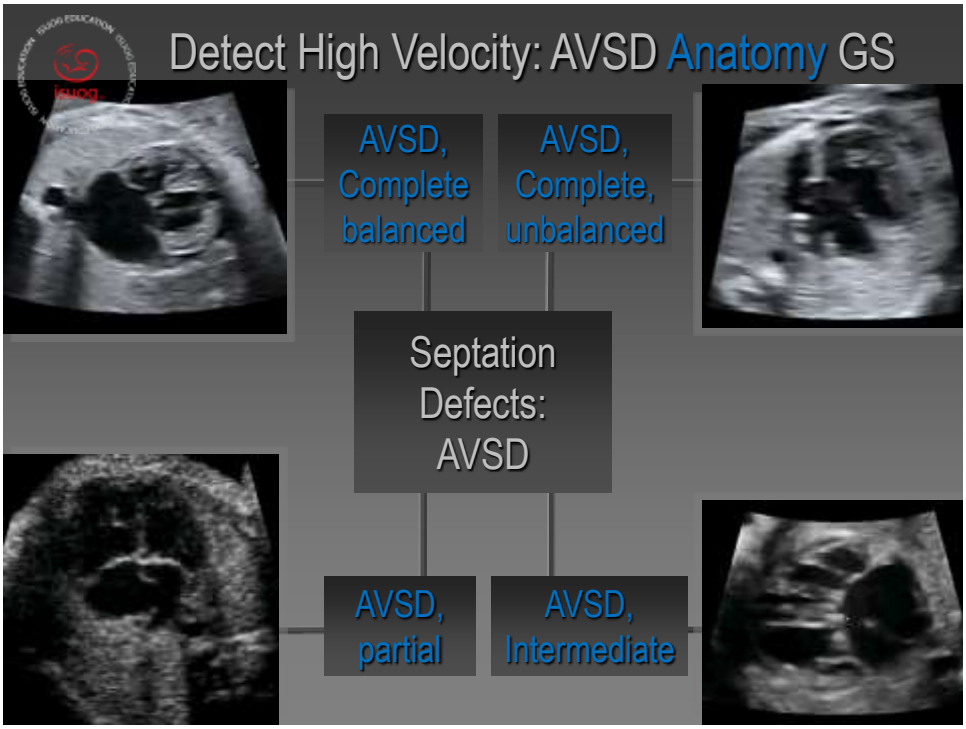
Sonography in obese and overweight pregnant women: clinical, medicolegal and technical issues

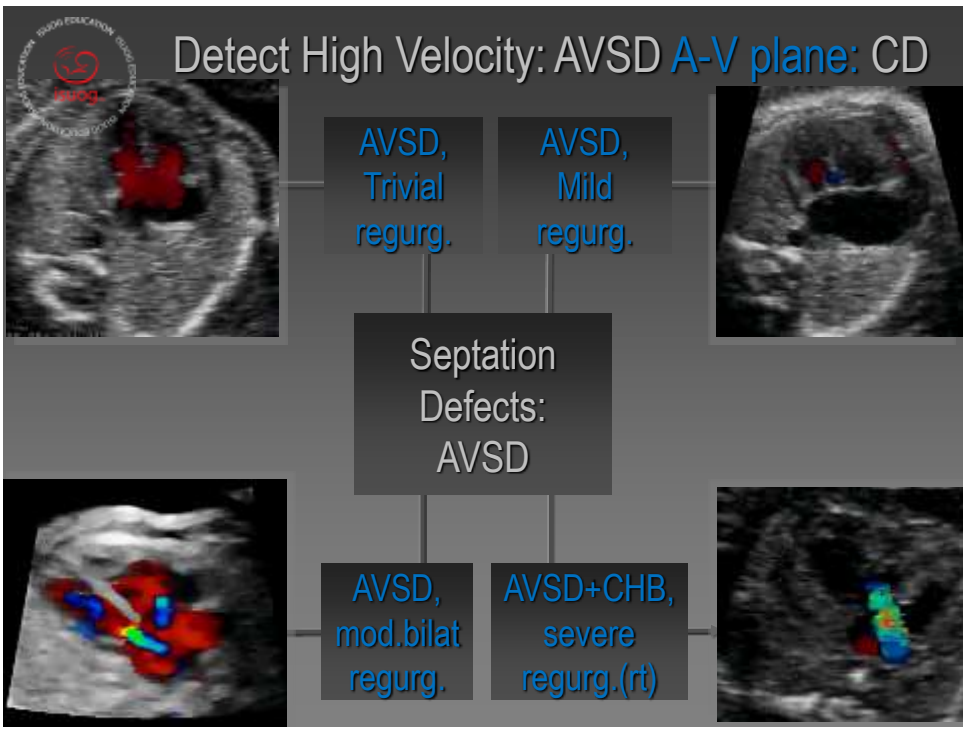
D. PALADINI

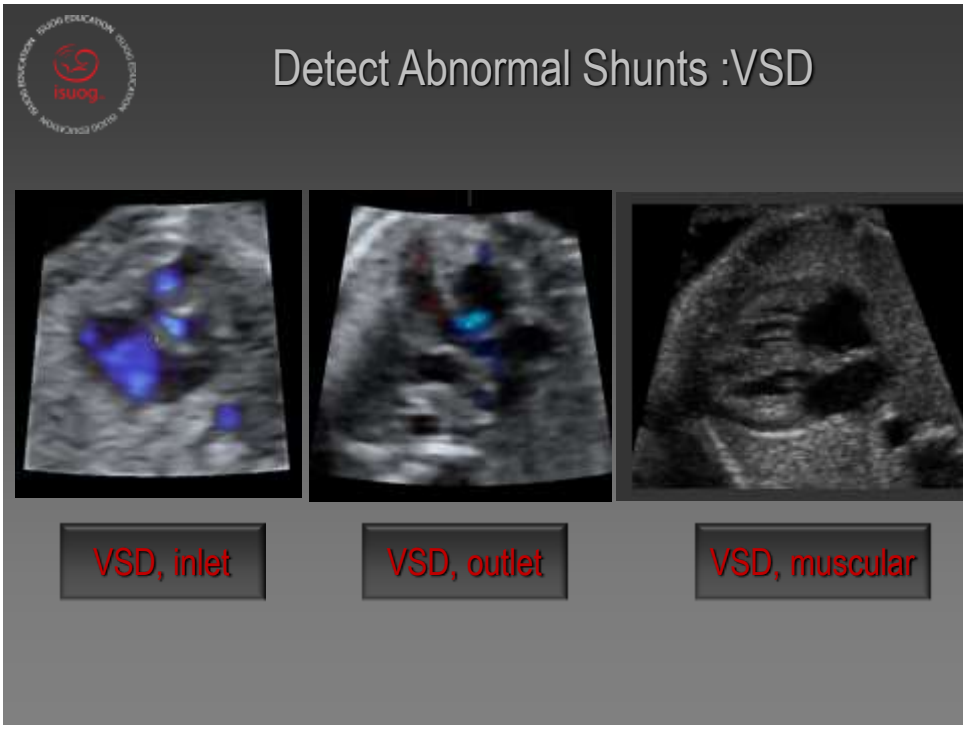
3. Use Color Doppler «support»

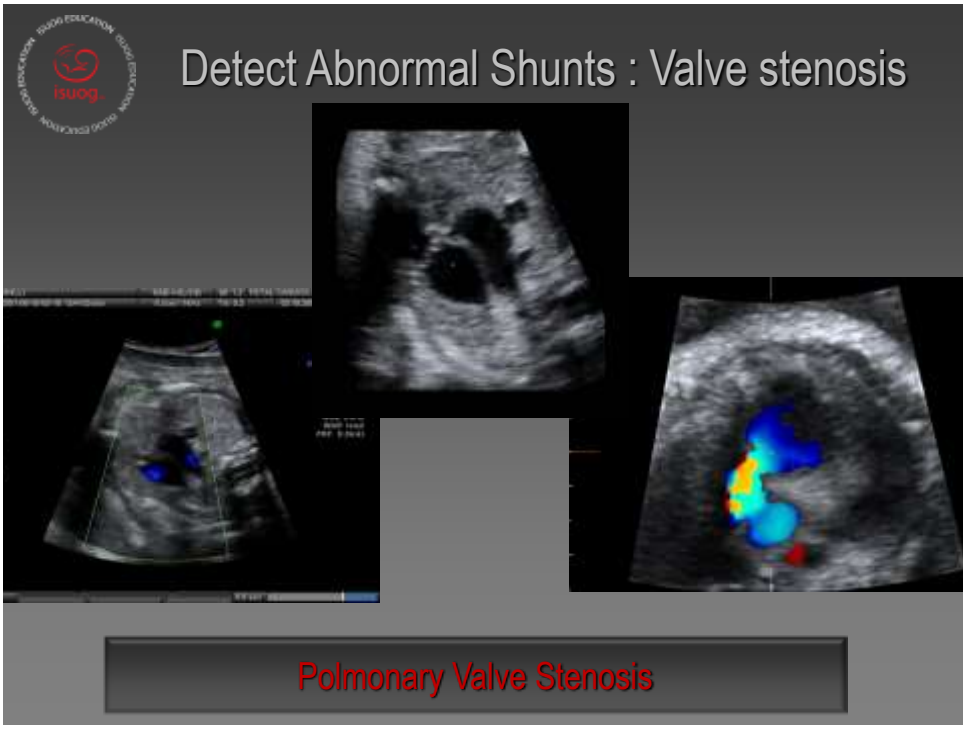


Paladini et al. UOG 2009

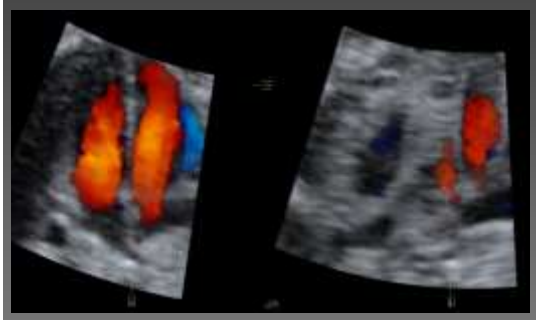

Detect High Velocity: AVSD Anatomy GS
AVSD, Complete balanced
AVSD, Complete, unbalanced
Septation Defects: AVSD
AVSD, partial
AVSD, Intermediate


Detect High Velocity: AVSD A-V plane: CD
AVSD, Trivial regurg.
AVSD, Mild regurg.
Septation Defects: AVSD
AVSD, mod.bilat regurg.
AVSD+CHB, severe regurg.(rt)

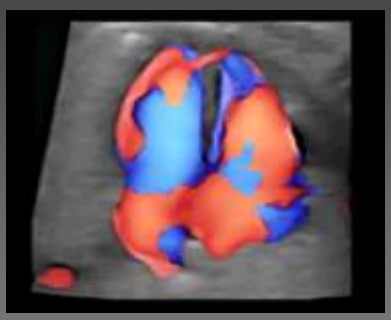

Detect Abnormal Shunts :VSD
VSD, inlet
VSD, outlet
VSD, muscular


Detect Abnormal Shunts : Valve stenosis
Polmonary Valve Stenosis

Detect Abnormal Shunts :VSD (STIC)



VSD, apical (VCI + MPI)



VSD, apical (VCI)

Detect Abnormal Shunts :fistulae & MAPCAS

HLH
+
MV reg
or fistula

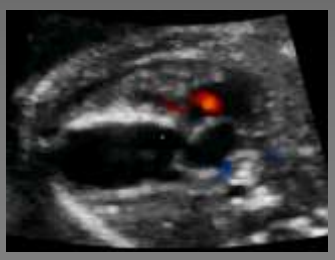
Paladini D, et al. HLH associated with left
veni
fistu
Ulti

PAVSD
+
MAPCAs

Detect Abnormal Shunts : reversed flow

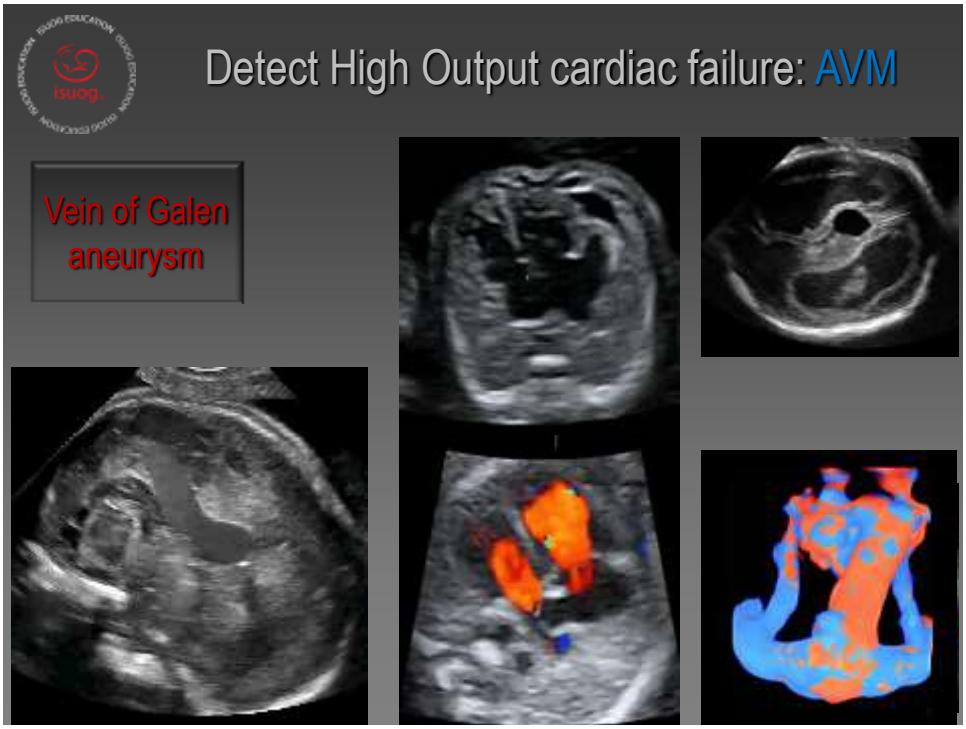
HLH
+ FOV &
Ao Arch
Rev.Flow

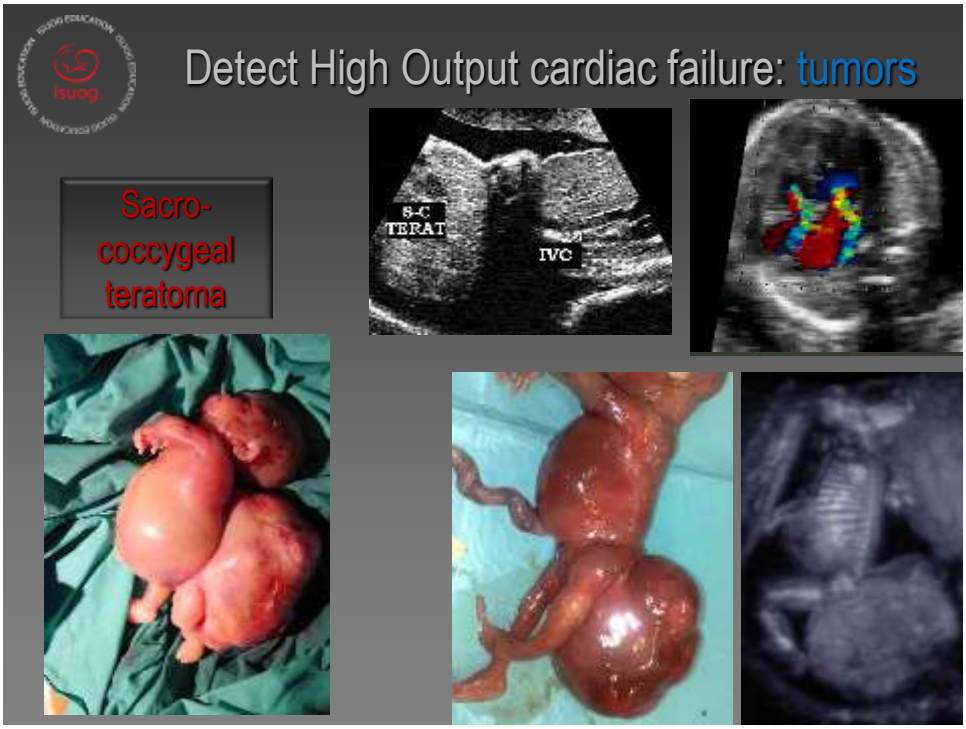
Critical
Aortic
Stenosis
+
FOV RF



Detect High Output cardiac failure: TTTS

TTTS
&
CMP in
recipient


Detect High Output cardiac failure: AVM
Vein of Galen aneurysm


Detect High Output cardiac failure: tumors
Sacro-coccygeal teratoma
S-C TERAT
IVC

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  - Detect abnormal shunts (VSDs, fistulae)
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