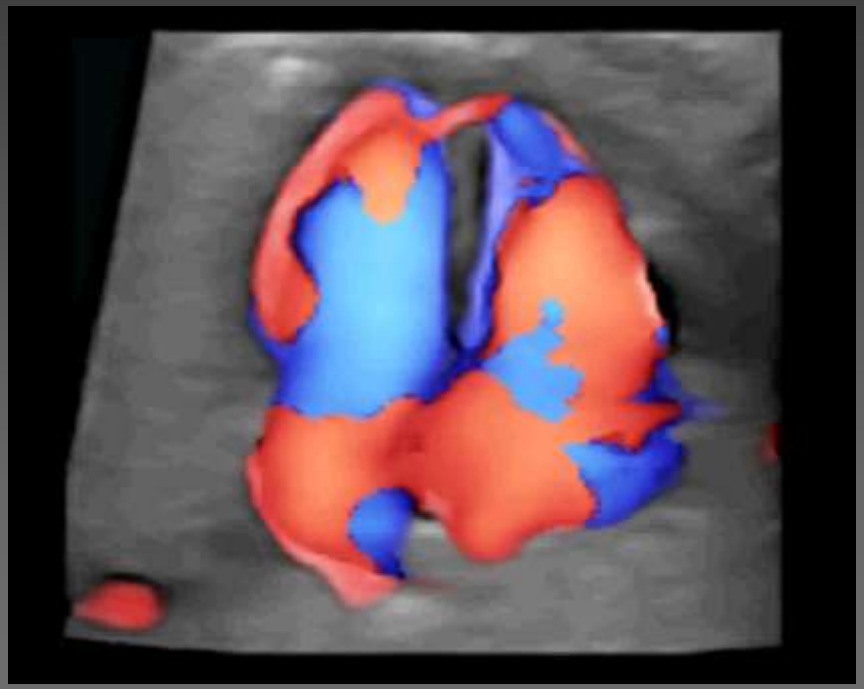
VSD or not VSD?

D.Paladini



Fetal Medicine & Surgery Unit
Gasllini Children's Hospital - Genoa

dariopaladini@ospedale-gaslini.ge.it

VSD – Issues to consider

- Is there a VSD or not?

- If there is:
  - ✓Associated anomalies?
  - ✓Karyotyping?
  - ✓Natural history?
  - ✓Prognosis?

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

Transverse 4-chamber:

90°

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

Apical 4-chamber:

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

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Tips & tricks in: Physics
Using an incorrect *insonation*

The False VSDs

- Inlet "dropout" VSD
- "Bad-alignment" VSD
- "Coronary" VSD

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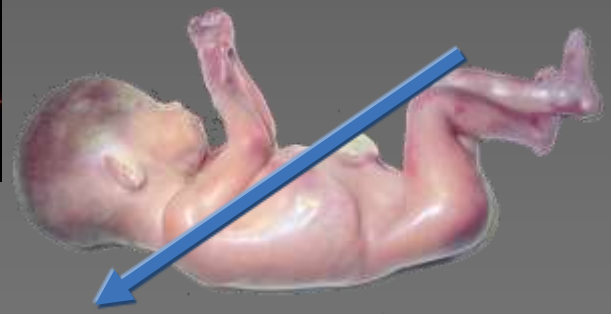
Tips & tricks in: Physics
Using the incorrect *insonation*

The False VSDs

- Inlet "dropout" VSD
- "Ill-alignment" VSD
- "coronary" VSD



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VSD – Issues to consider

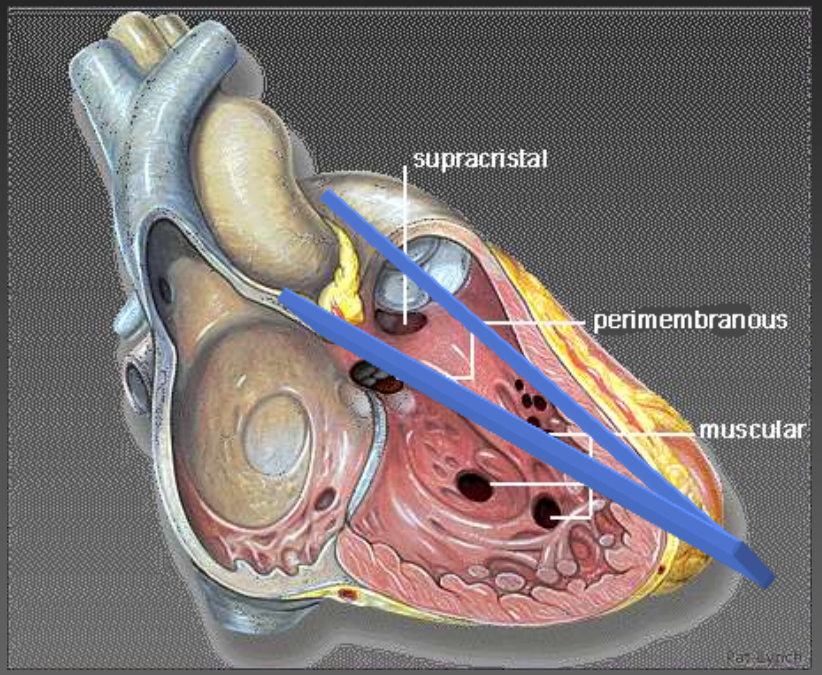
- Is there a VSD or not?
  - *Always use correct insonation angle & CD confirmation (with correct CD angle)*
- If there is:
  - ✓Associated anomalies?
  - ✓Karyotype?
  - ✓Natural history?
  - ✓Prognosis?

VSD - Epidemiology

- ✓ Most common CHD in post-natal life (35%)
- ✓ Their prenatal detection is limited by:
  - ✓ Only minor modification of the 4ch view
  - ✓ Absence of pressure gradient which, on the contrary, facilitates their detection in post-natal life
  - ✓ Small size

VSD – Anatomy & US detection

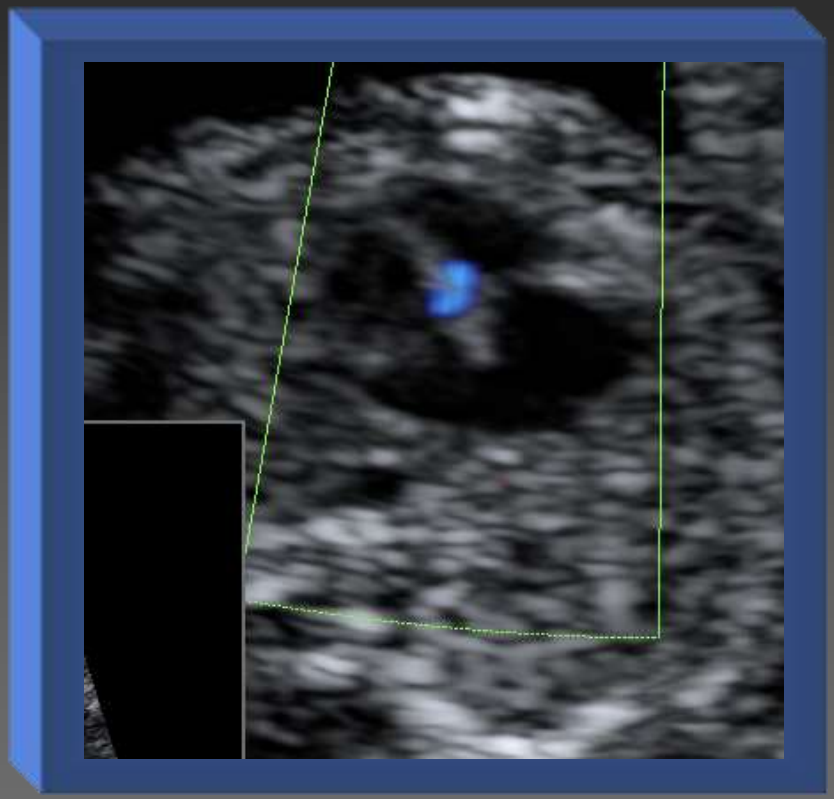
- ***Type***
  - Perim. inlet
  - Perim. outlet
  - Muscular*
  - Malalignment

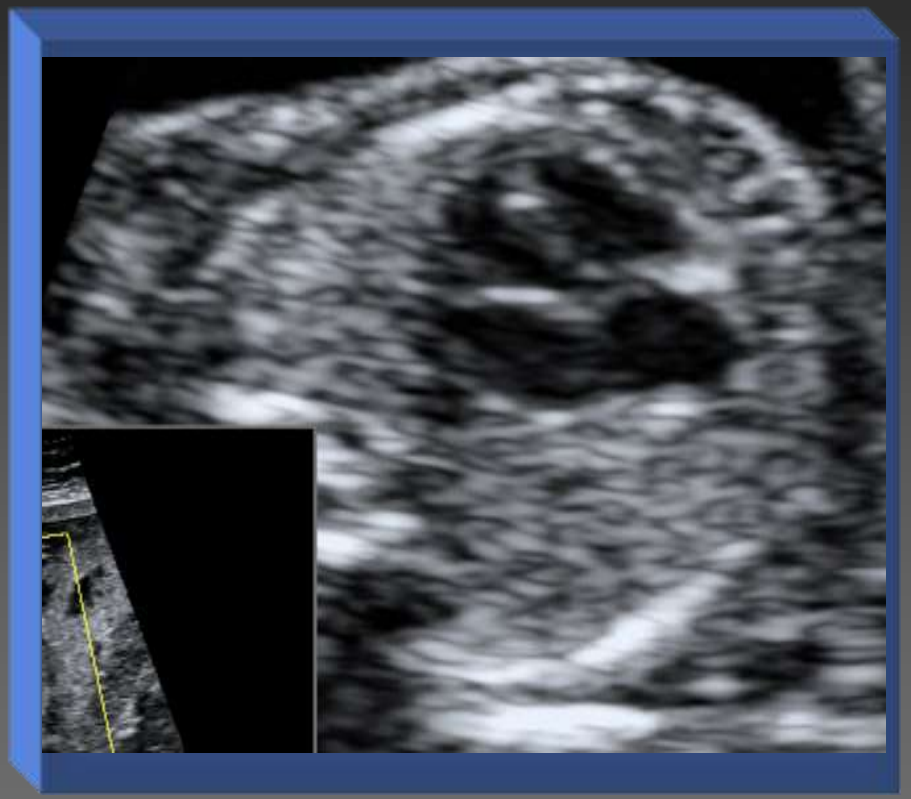


Different locations require different approaches & echo views

*: small muscular VSDs are frequently overlooked in utero

VSD **Inlet** – US detection (2T)





Associated with Down syndrome

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VSD **Inlet** – US detection (3T)

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VSD, **Muscular** – US detection

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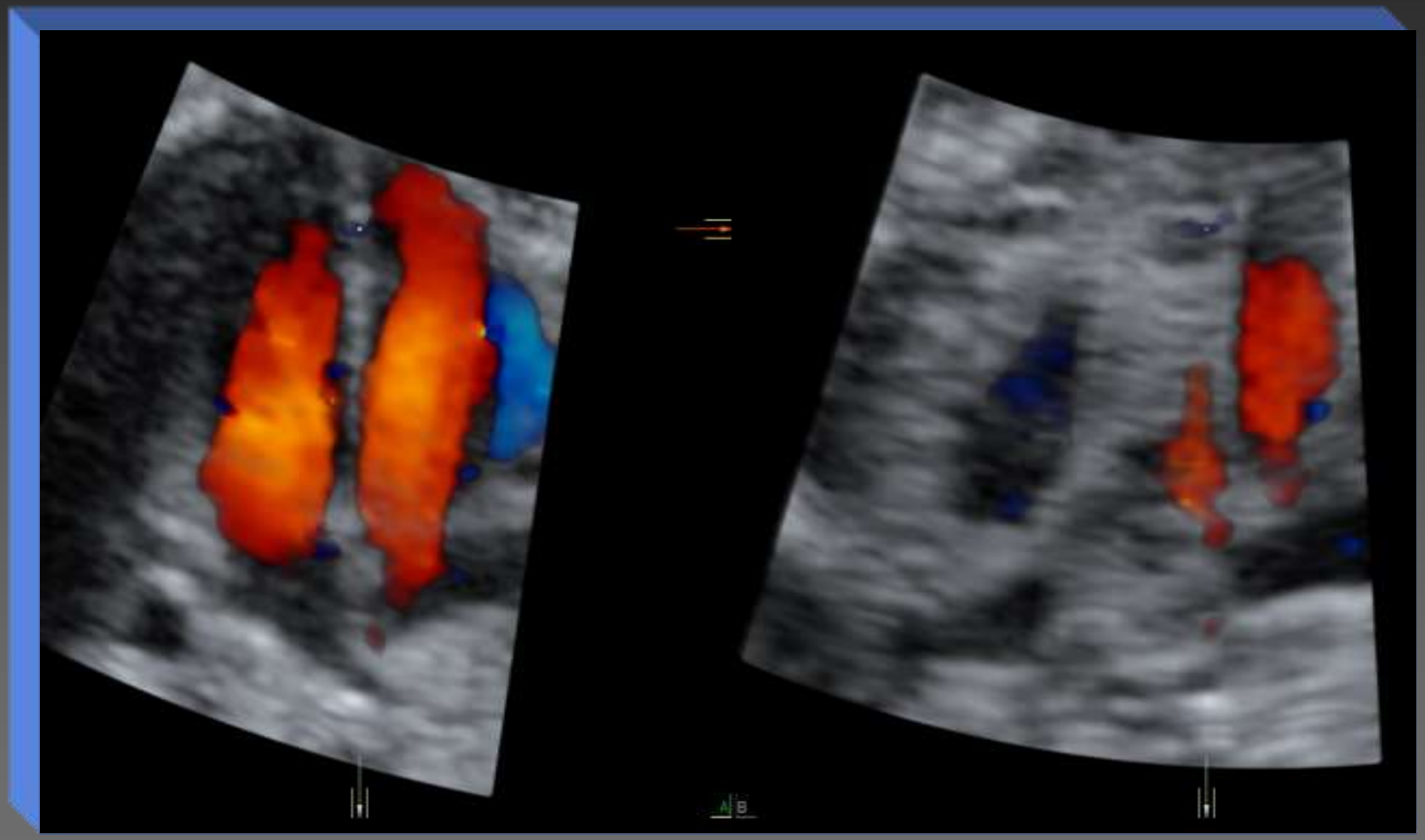
VSD, Muscular – US detection

VSD, Muscular – US detection



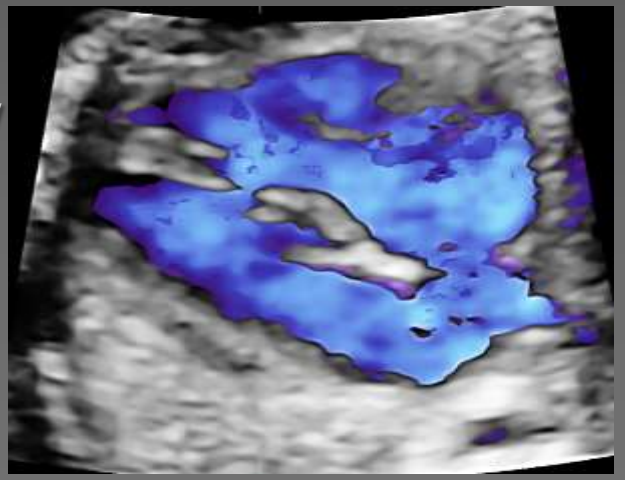
VSD, How to be sure…?

1. Midrange CD priority

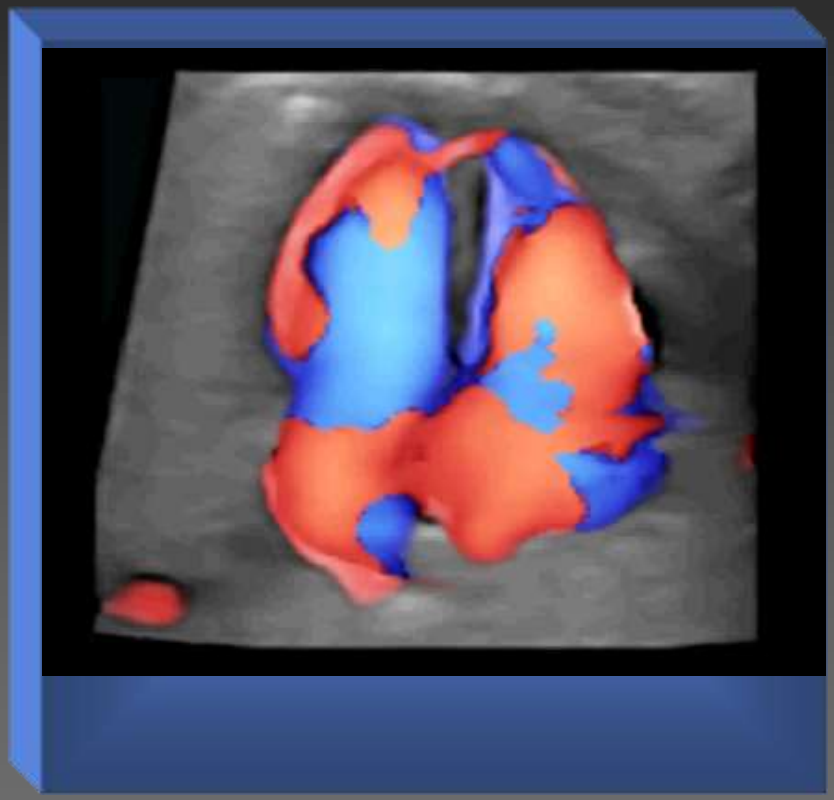
2. CD, transverse view

3. HD, transverse view, v.low priority

4. HD+VCI, v.low priority

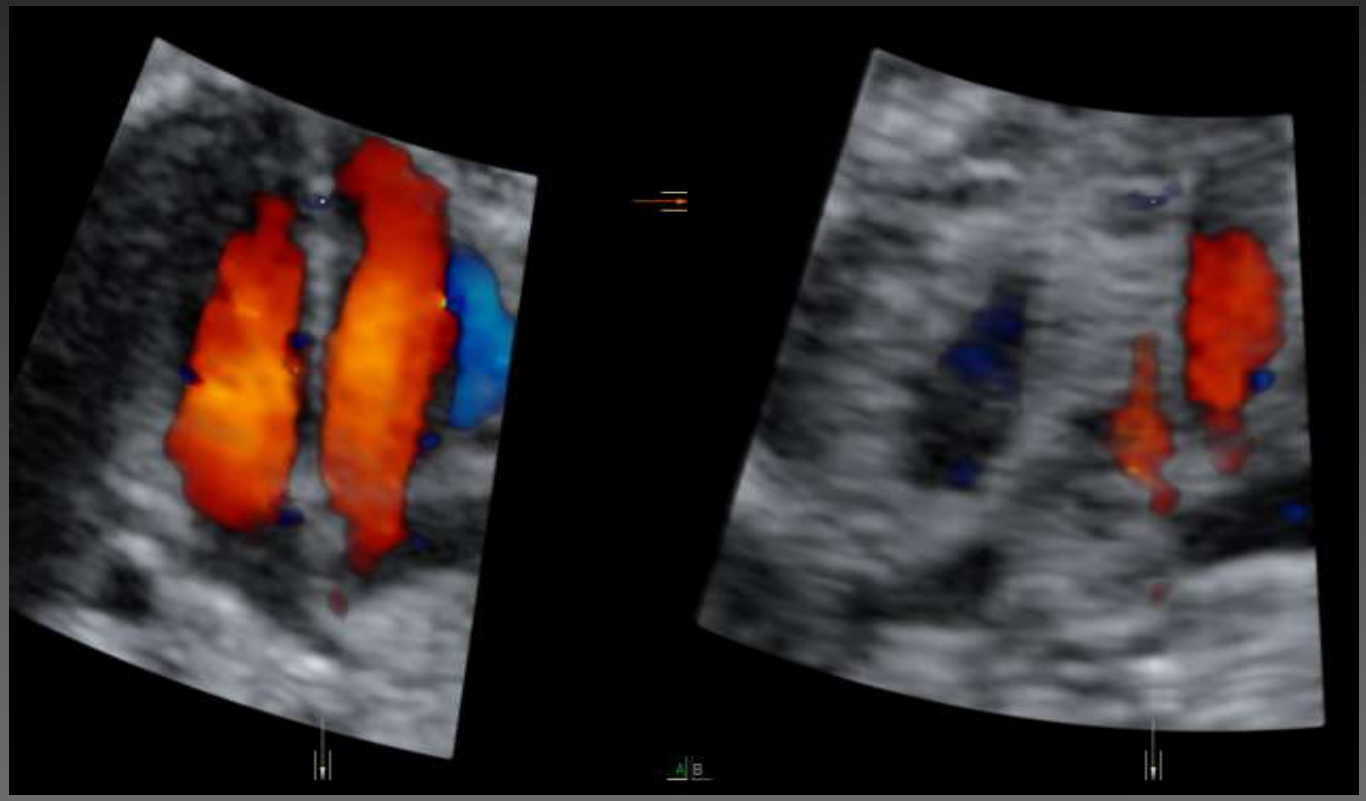


VSD, **Muscular** – US detection



- *Sometimes visible on CD only…luckily for the patients…*

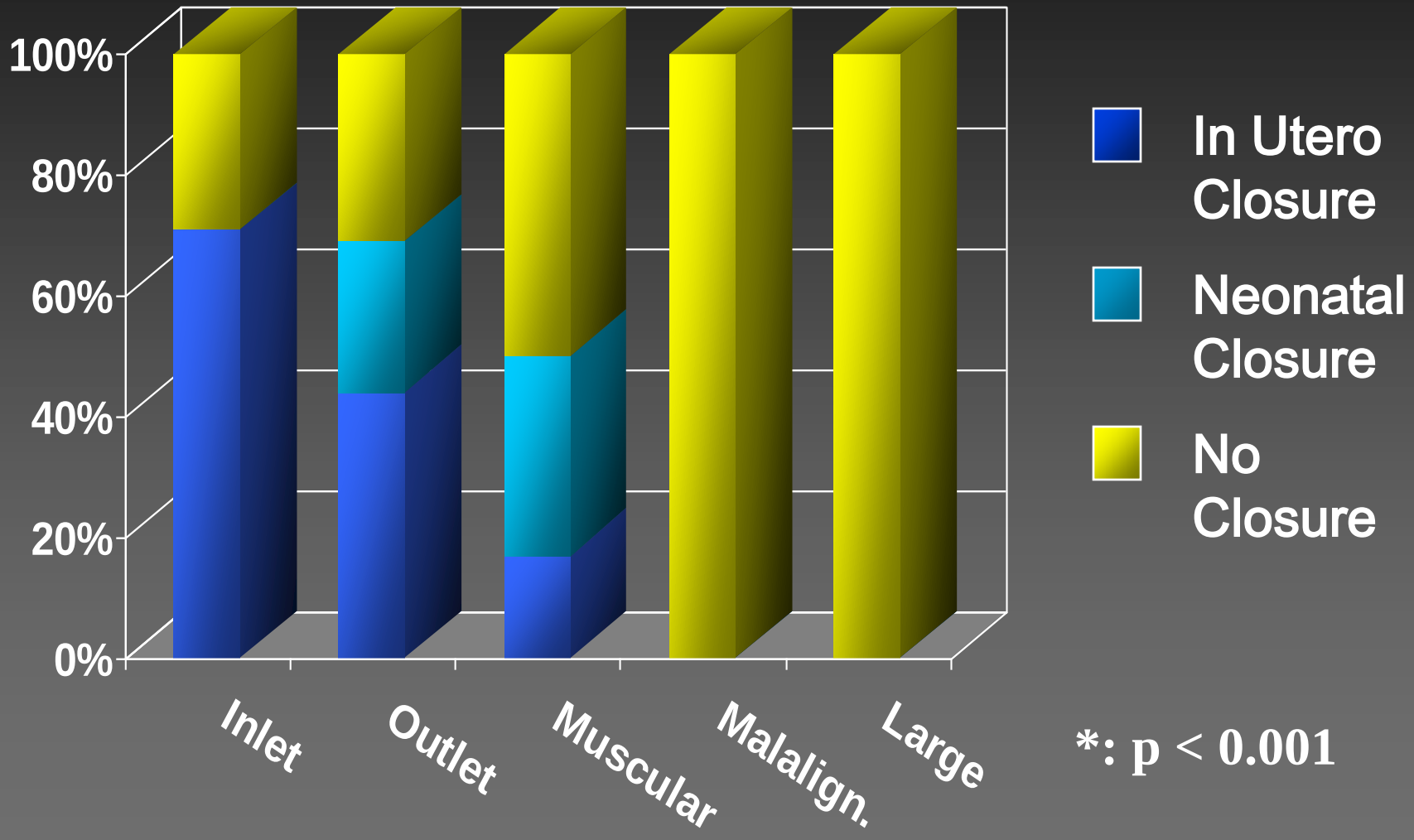
VSD, **Muscular** – US detection



- *STIC may help see 'oblique' VSDs*

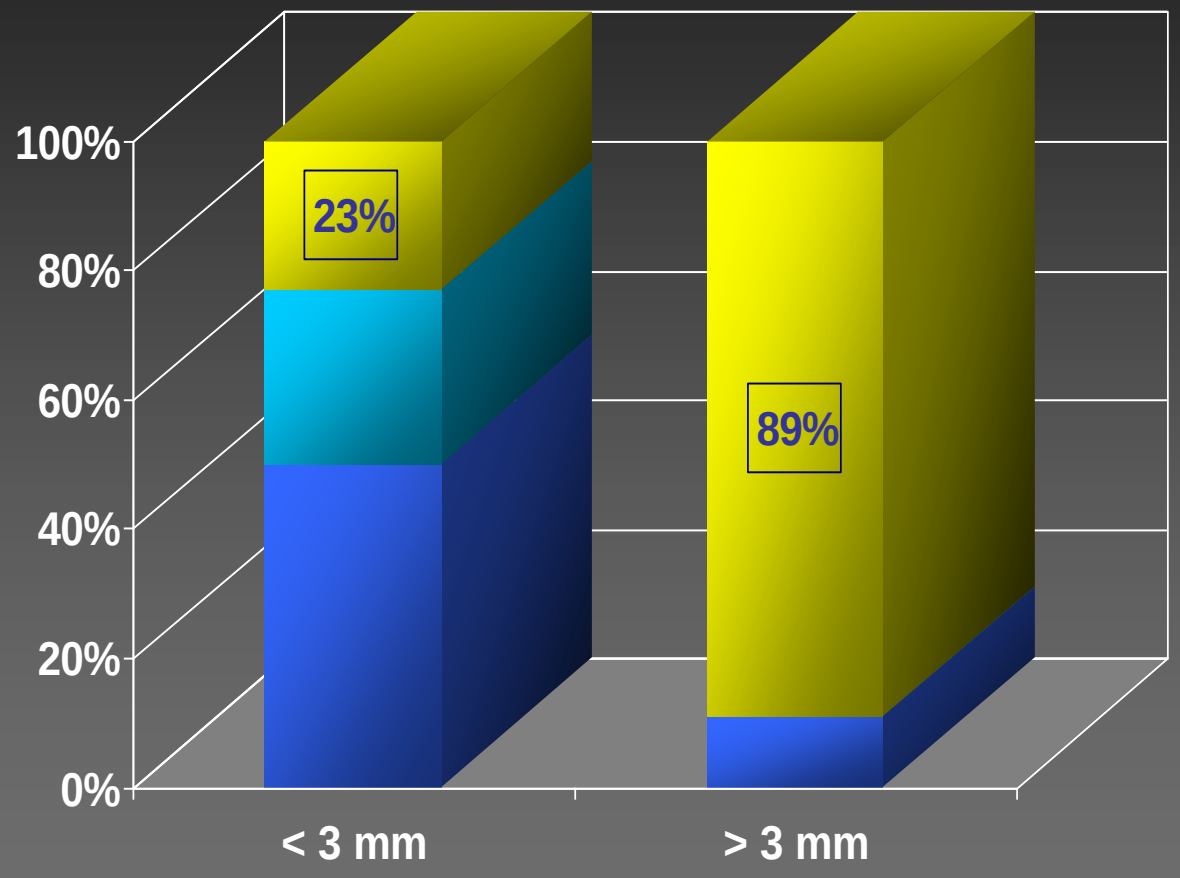
VSD, **Outlet** – US detection

VSD – Closure by site



Paladini D, et al. Characterization and natural history of ventricular septal defects in the fetus. *Ultrasound Obstet.Gynecol, 2000*

VSD – Closure by size



In Utero Closure

Neonatal Closure

No Closure

*: $p < 0.001$

Paladini D, et al. Characterization and natural history of ventricular septal defects in the fetus. *Ultrasound Obstet.Gynecol, 2000*

VSD – Issues to consider

- Is there a VSD or not?

Always use correct insonation angle & CD confirmation (with correct CD angle)

- If there is:
  - ✓Natural history?
  - ✓Prognosis?

Some VSDs may close in utero, too, depending upon their size and site (beware of FP!)

Chromosomal anomalies & VSD

Inlet VSD and Trisomy 21 (50%)	Malalign. VSD and Trisomy 18 (56%)	Outlet VSD & normal karyo. (88%)

Paladini D, et al. Characterization and natural history of ventricular septal defects in the fetus. *Ultrasound Obstet.Gynecol, 2000*

Fetal VSD & abnormal karyotype

Author	N. CASES	NL K	% NL K	T21	% TOT	% ABN.K	T18	% TOT	Other	% TOT
Axt-Fliedner et al. 2006	76	51	67,1	5	6,6	20,0	7	9,2	13	17,1
Paladini et al. 2000	62	33	53,2	12	19,4	41,4	13	21,0	4	6,5
Tennstedt et al. 1999	36	21	58,3	8	22,2	53,3	4	11,1	3	8,3
Paladini et al. 2002	75	41	54,7	14	18,7	41,2	16	21,3	4	5,3
Hafner et al. 1998	10	3	30,0	2	20,0	28,6	3	30,0	2	20,0
TOTAL	**259**	**149**	**57,5**	**41**	**15,8**	**37,3**	**43**	**16,6**	**26**	**10,0**
Postnatal BWIS	**1411**	**1300**	**92,1**							

Fetal VSD & abnormal karyotype
Confounding factors

- Most papers on VSD & karyo not accounting for previous NT screening
- "Isolated" vs "non-isolated" is questionable in some papers (eg, "*isolated*" VSD in trisomy 18?)
- VSD incidence in fetus depends on time of examination, for they can close in utero

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VSD – Issues to consider

- Is there a VSD or not?

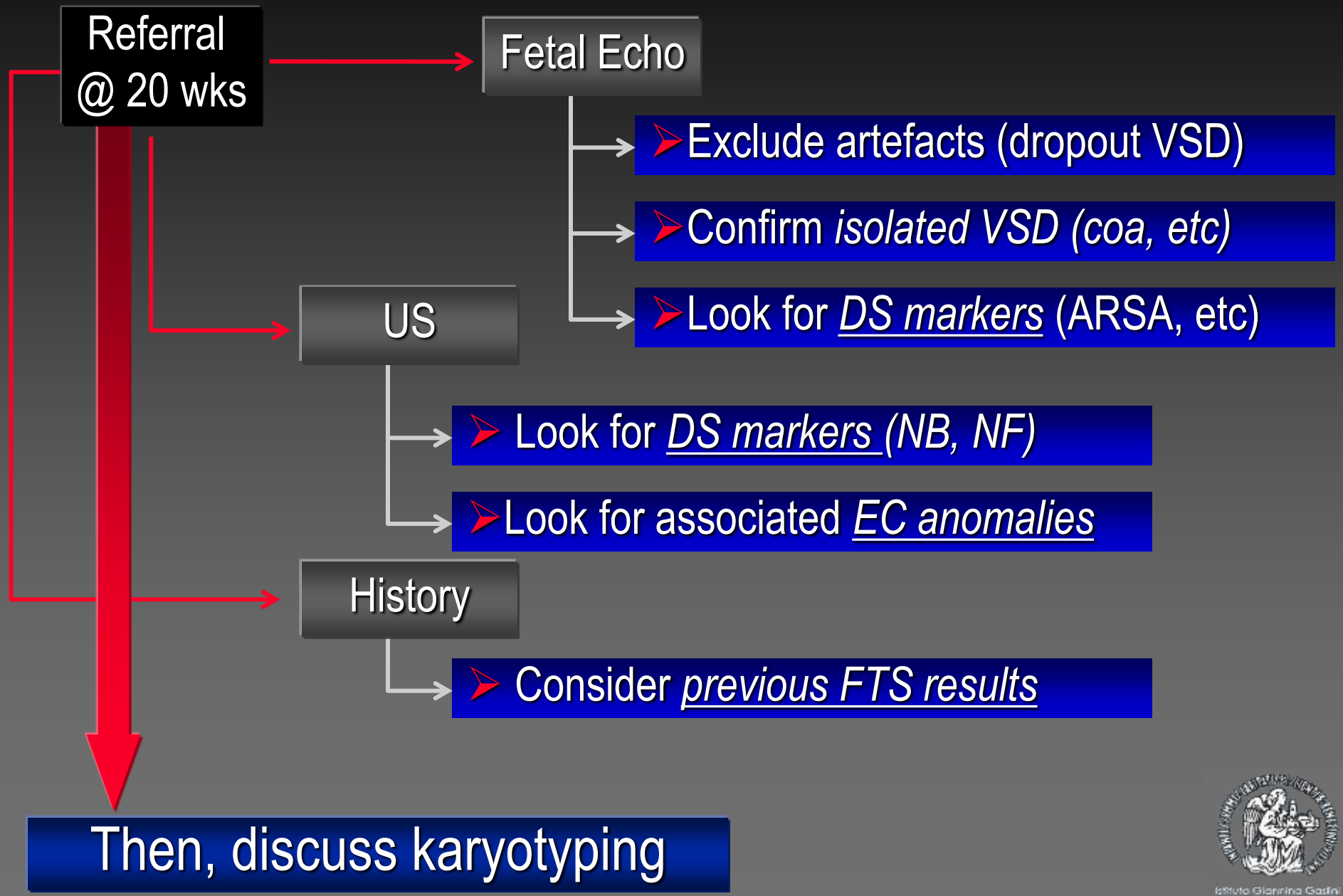
Always use correct insonation angle & CD confirmation (with correct CD angle)

- If there is:
  - ✓Natural history?

VSD can undergo spontaneous closure in utero, too

  - ✓Associated anomalies?
  - ✓Karyotype?

Isolated VSD – Management flowchart



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