

2025 SDMS Annual Conference

Fetal Arrhythmias

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Disclosure

I have no actual or potential conflict of interest in relation to this program/presentation

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Acknowledgement

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Fetal arrhythmias have long been a source of interest since we first had the ability to hear the fetal heart. Since they may be benign, posing no risk to the fetus, or extremely dangerous, potentially leading to fetal demise, the diagnosis of fetal arrhythmias is extremely important. This lecture will examine the various types of fetal arrhythmias, the strategies for the evaluation and diagnosis fetal arrhythmias, and the treatment and management options for fetuses diagnosed with arrhythmias.

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Objectives

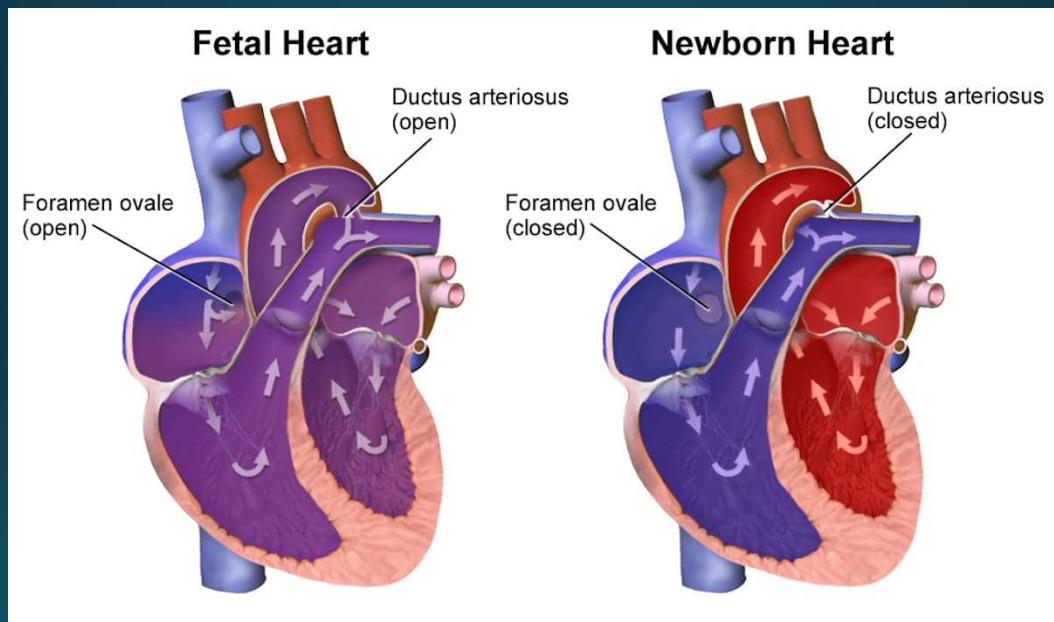
- Review the workings of the heart's electrical system
- Understand the various types of fetal arrhythmias
- Discuss the strategies for the evaluation and management of fetal arrhythmias

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The Fetal Heart

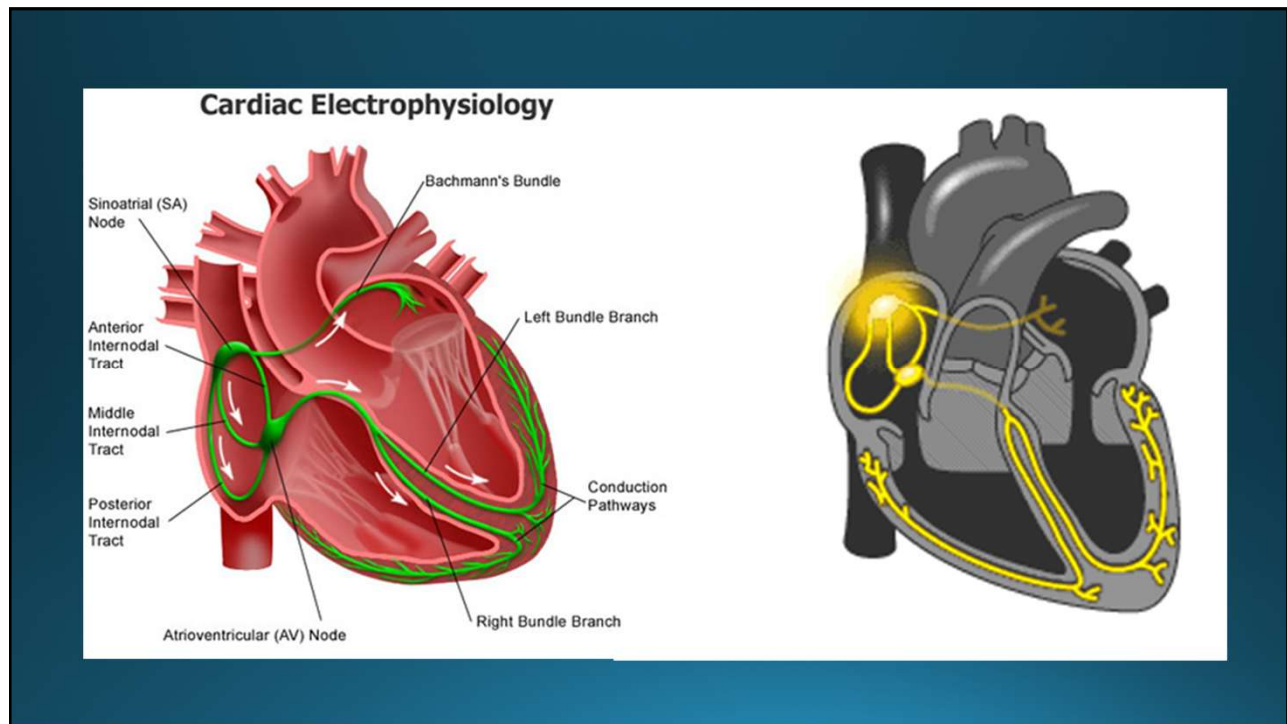
- Fetal circulation
- Electrical system

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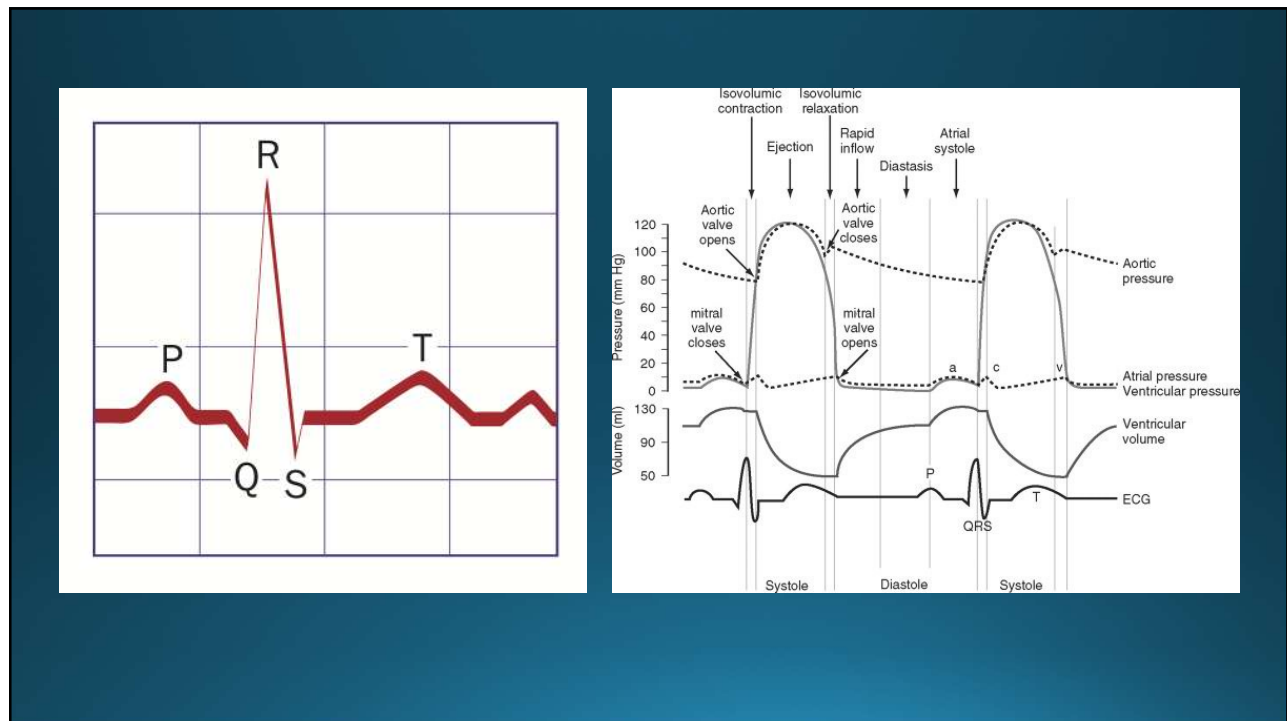


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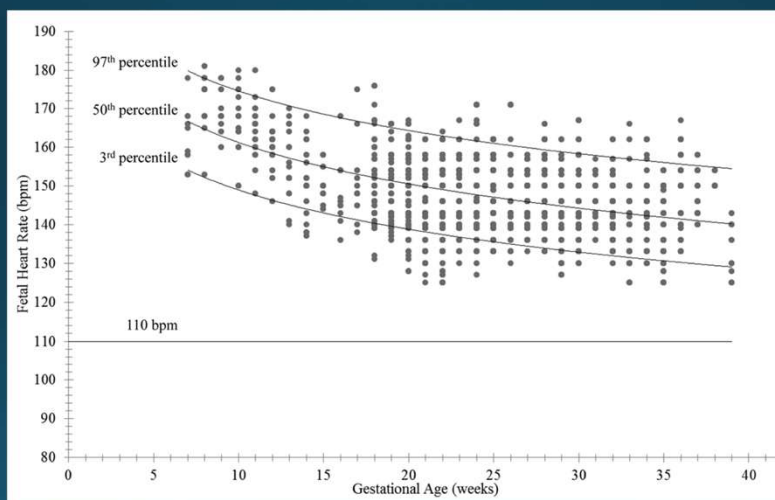
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Normal Fetal Heart Rate (FHR)

- Normal FHR 110-180 beats per minute (BPM)
- May vary 5-15 bpm beat-to-beat
- FHR gradually decreases with advancing gestational age

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Normal Fetal Heart Rate



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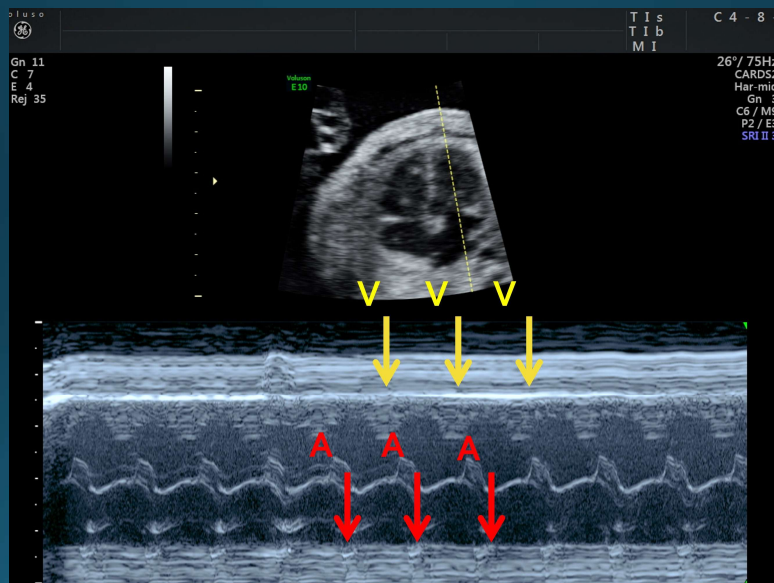
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Assessing Rate and Rhythm

- Ventricular Rate and Atrial Rate
- AV relationship – 1:1 / 2:1
- Rhythm – Regular / Irregular
- AV Interval normally less than <160 ms
- V-V Interval should not vary by more the 10 ms
- Use M-Mode, Pulsed Wave Doppler (PW), M-Mode + Color Doppler, or Tissue Doppler

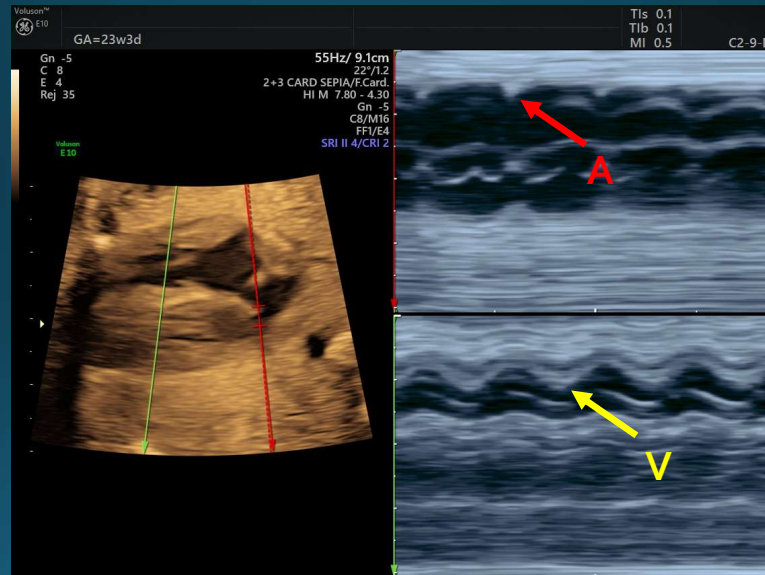
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M-Mode



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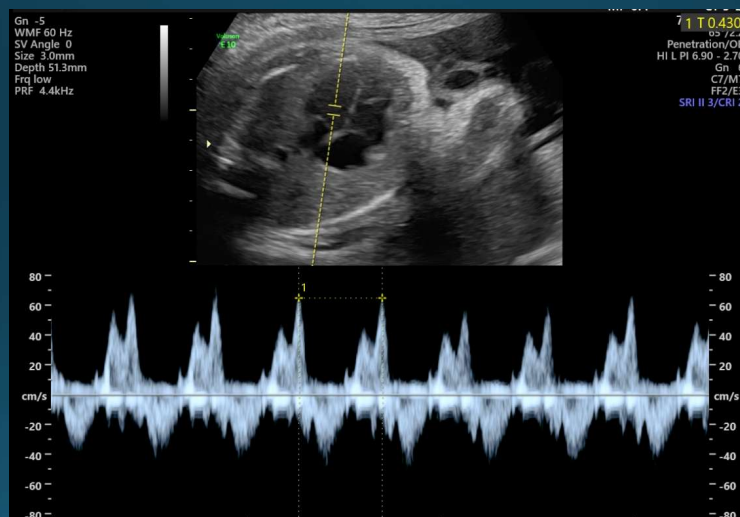
Anatomical M-Mode (AMM)



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Pulsed-wave Doppler

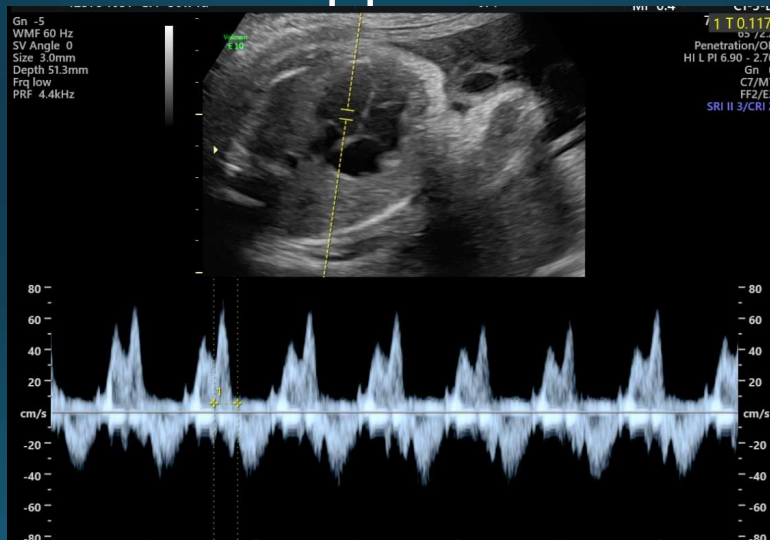
A-A



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Pulsed-wave Doppler

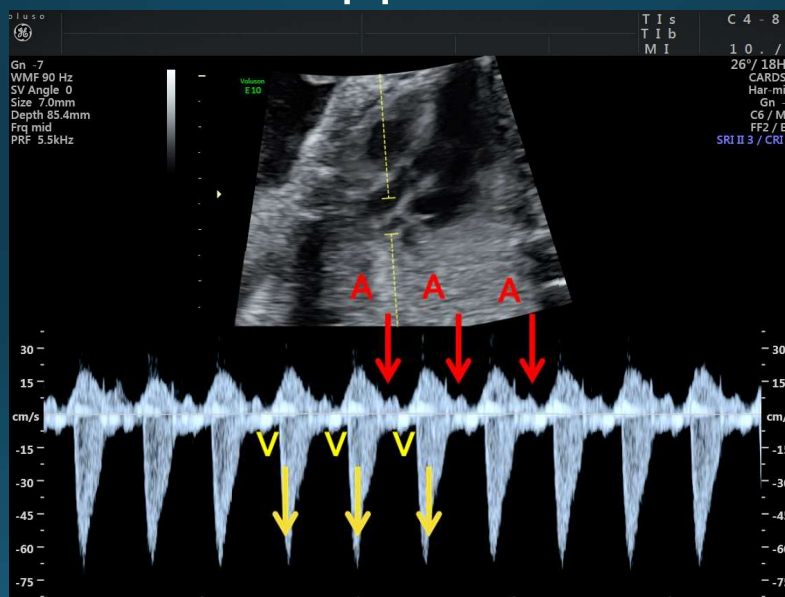
PR Interval



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Pulsed-wave Doppler

Ao/SVC

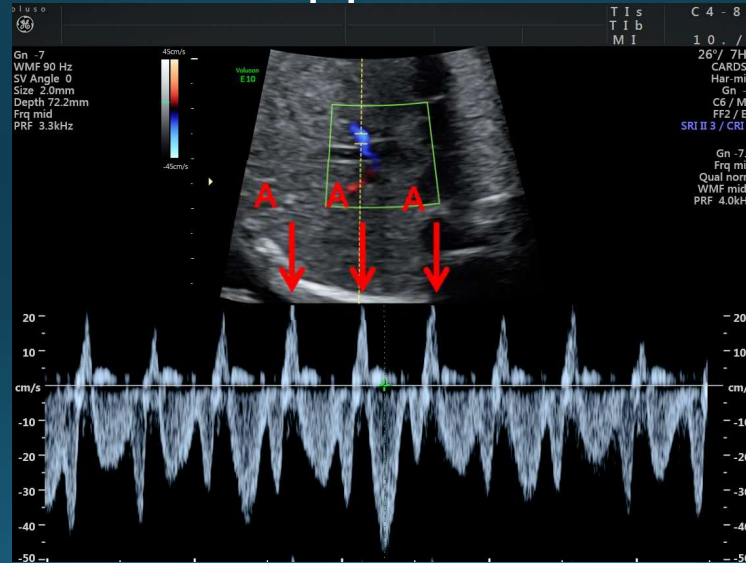


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Pulsed-wave Doppler

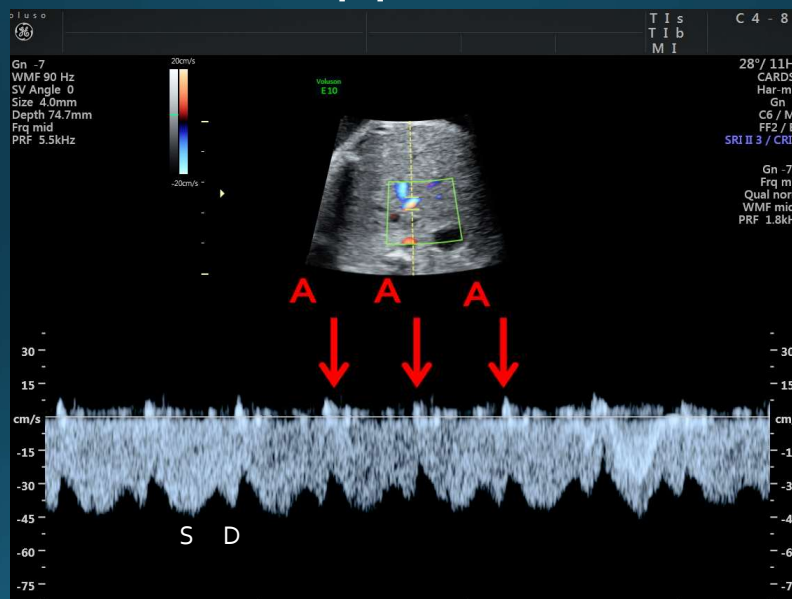
Hepatic
Veins



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Pulsed-wave Doppler

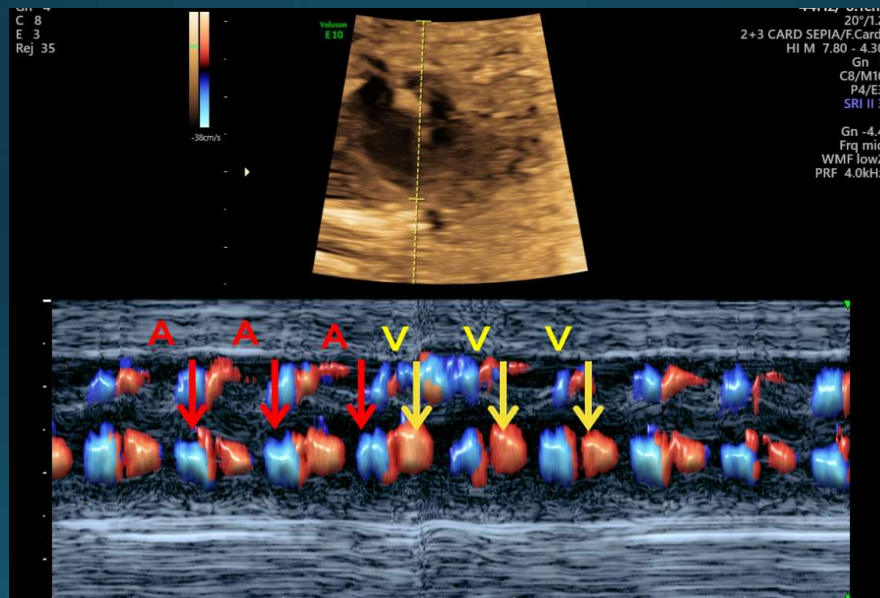
Ductus
Venosus



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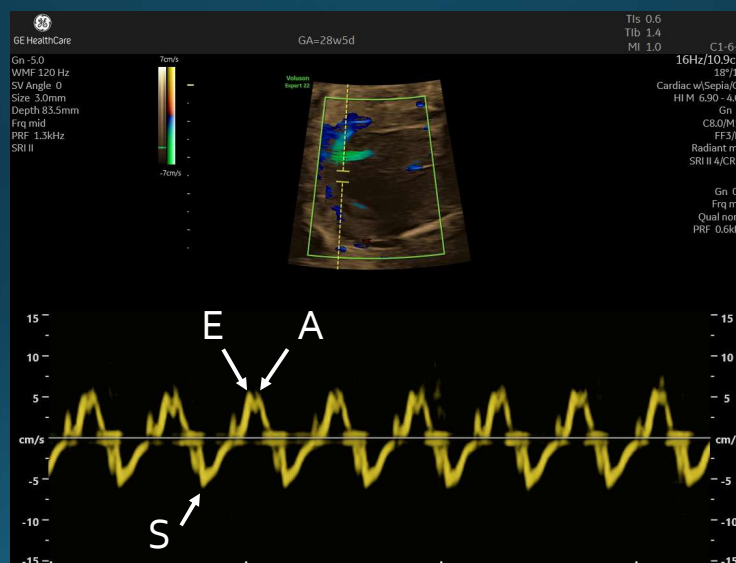
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M-Mode + Color Flow



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Tissue Doppler



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Fetal Arrhythmias

- Occur in 1-3% of pregnancies
- Most are benign
- 10% are significant
- A fetal echocardiogram performed to rule out structural abnormalities

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Fetal Arrhythmias

- Determine the A-V relationship
 - 1:1, 2:1
 - Atrial rate
 - Ventricular rate
 - A-V interval (normal 100-140 ms)
- Regular or irregular rhythm
- Fast or slow FHR

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Types of Arrhythmias

- Extra Systoles (Ectopy)
- Tachycardias
- Bradycardias

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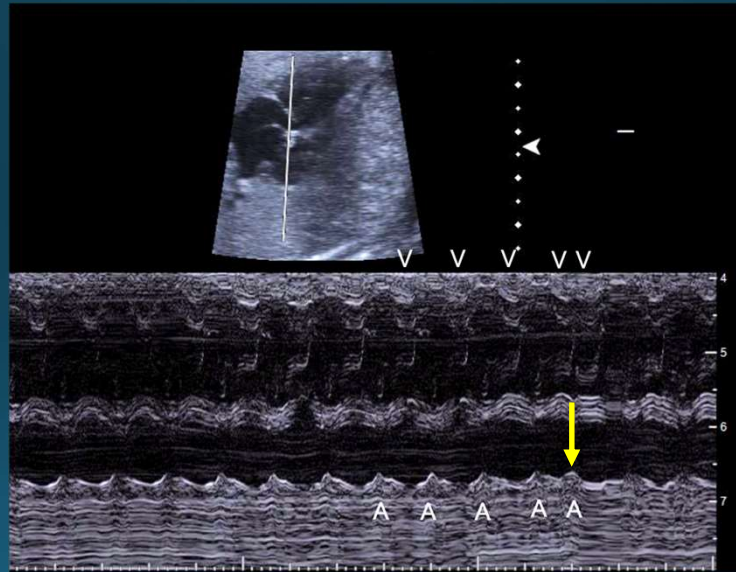
Extra Systoles (Ectopy)

- Premature Atrial Contraction (PAC)
 - Most common
 - Conducted or non-conducted
- Premature Ventricular Contraction (PVC)
 - Rare
- Blocked Atrial Bigeminy (BAB)
 - Slow rate
 - Regular rhythm
 - One regular atrial beat and one PAC
- AV block will have regularly spaced atrial beats

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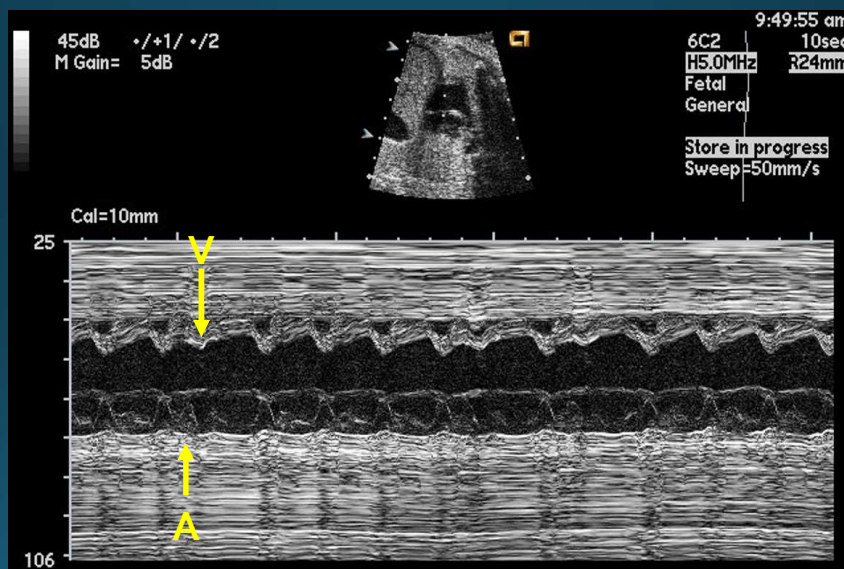
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Isolated PACs



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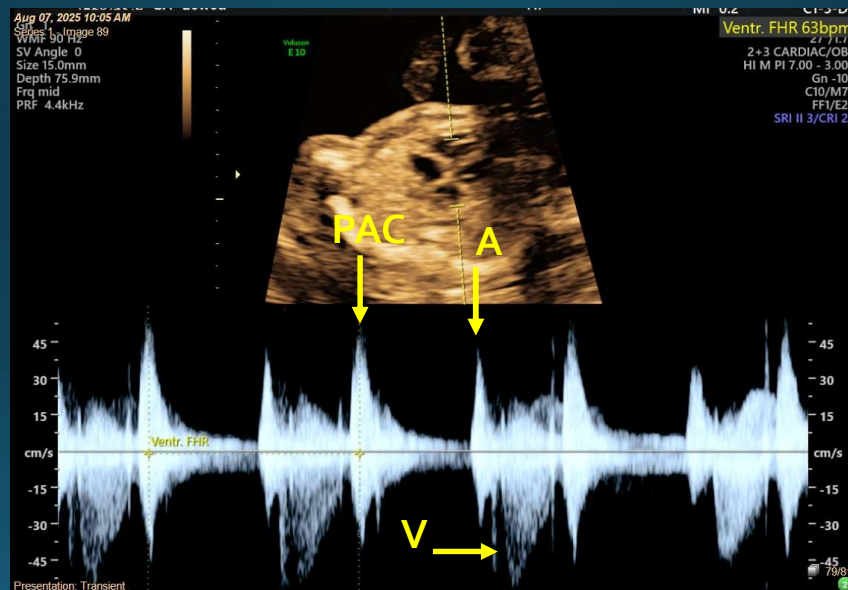
Conducted PACs



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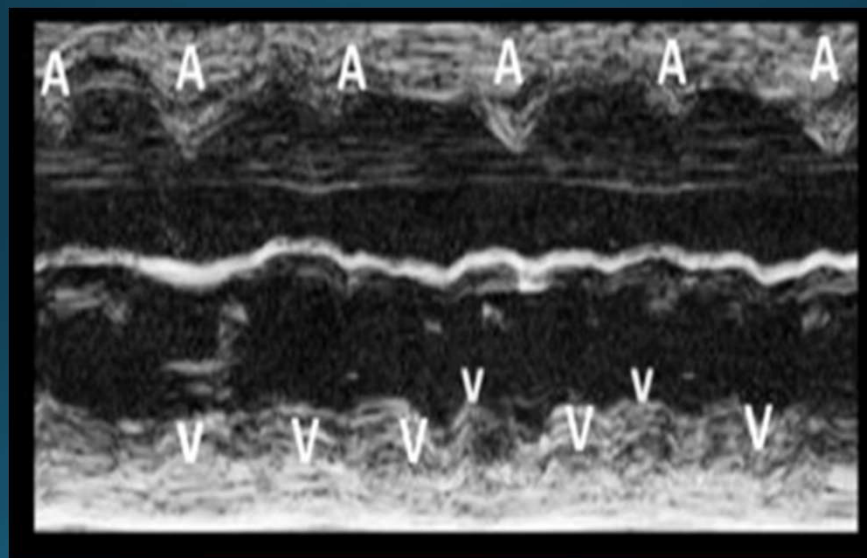
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Blocked PACs



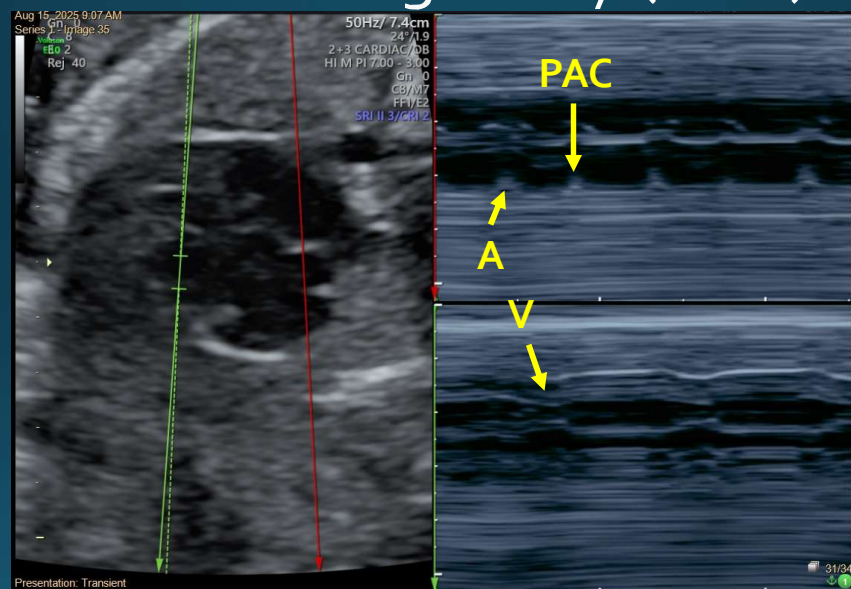
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PVCs



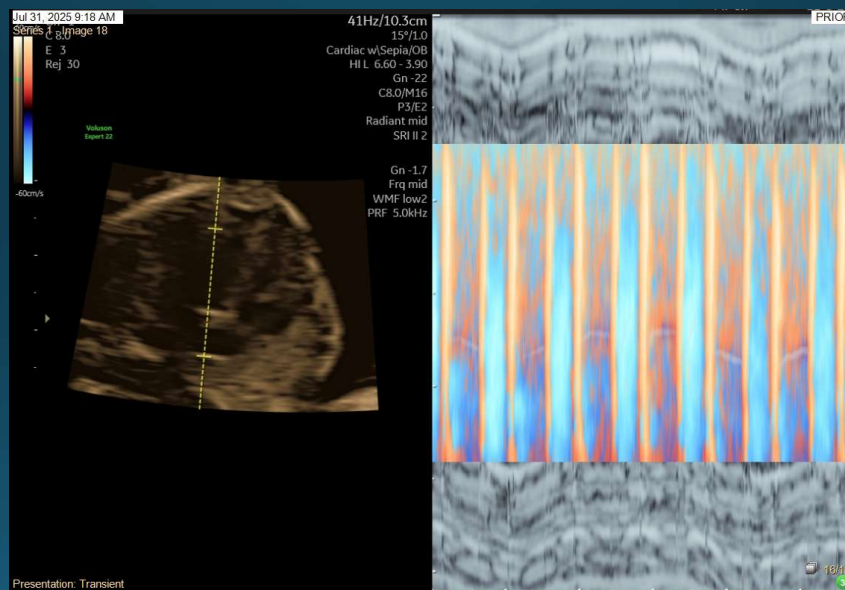
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Blocked Atrial Bigeminy (BAB)



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Blocked Atrial Bigeminy (BAB)



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Tachyarrhythmias

- Sinus Tachycardia
- Supraventriculars
- Atrial Flutter

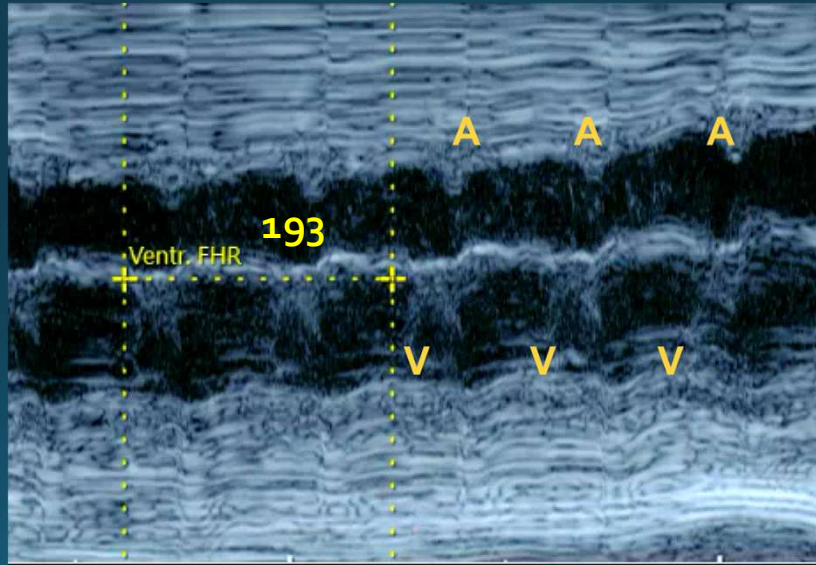
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Sinus Tachycardia

- 180 – 200 bpm
- 1:1 conduction
- Normal A-V interval
- Second and Third Trimester
 - Maternal fever
 - Infections
 - Maternal drug ingestions
 - Fetal distress

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Sinus Tachycardia



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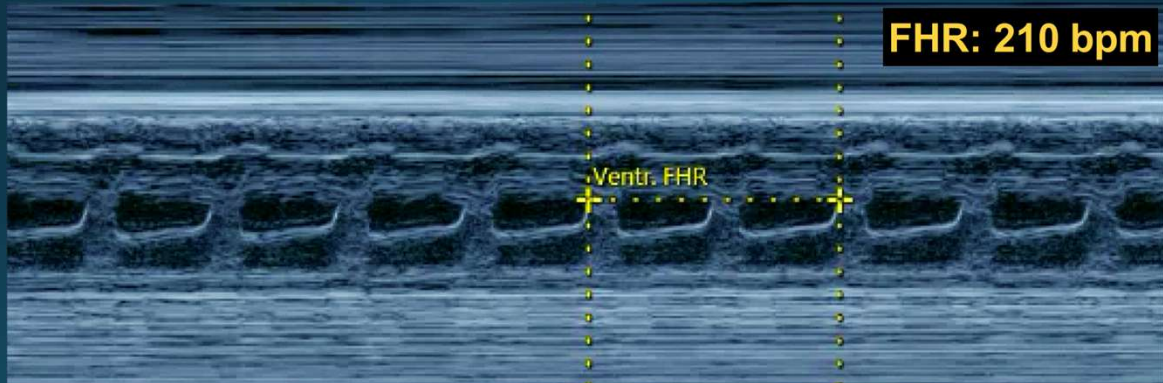
Supraventricular Tachycardia (SVT)

- > 180 to 300 beats per minute (BPM)
- 1:1 Conduction
- 66-90 % of cases
- Short V-A conduction
 - 230-300 bpm
 - 10% Associated with Wolff Parkinson White (WPW)
 - Atrioventricular reentrant tachycardia
- Long V-A conduction
 - 180-220 bpm
 - Sinus tachycardia, Permanent junctional reciprocating tachycardia (PJRT), or Ectopic atrial tachycardia (EAT)
- **All tachyarrhythmias can lead to hydrops and fetal demise if sustained**

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SVT



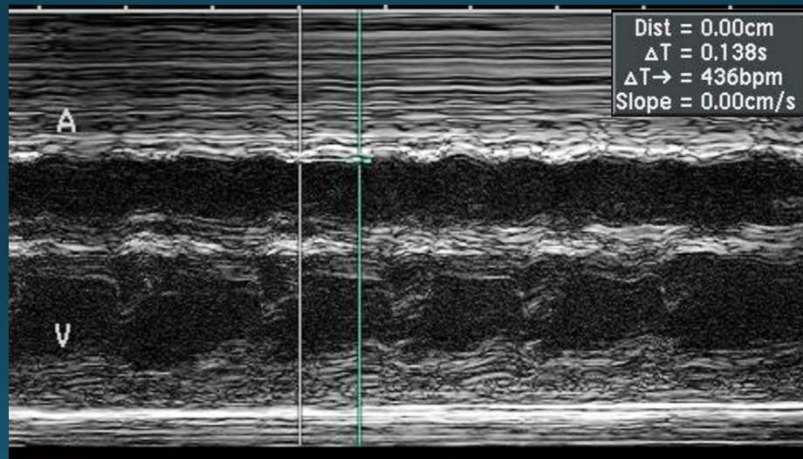
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Atrial Flutter

- Atrial rates 300-550 bpm
- Up to 30% of tachyarrhythmias
- Usually presents in the third trimester
- Structurally normal heart
- Variable A-V conduction
- Can lead to hydrops and fetal demise if sustained

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Atrial Flutter



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Bradyarrhythmias

- Heart rate less 110 BPM or less than 3rd percentile for gestational age (GA)
- Sinus bradycardia
- Blocked PACs
- 2nd or 3rd degree AV block

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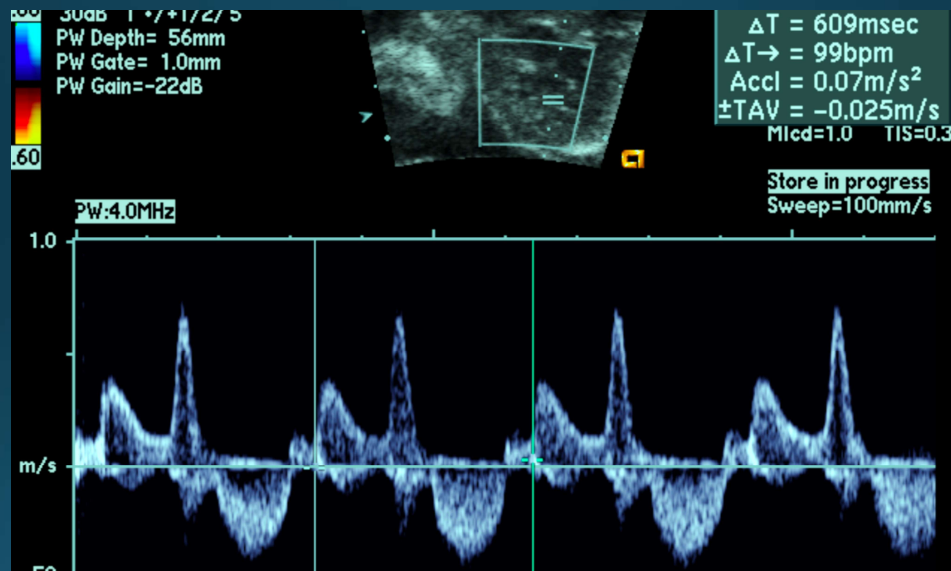
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Sinus bradycardia

- Most common
- 1:1 AV conduction
- Transient – vagal stimulation
- Prolonged – fetal distress, SA node dysfunction, hypothermia, long QT syndrome

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Sinus bradycardia



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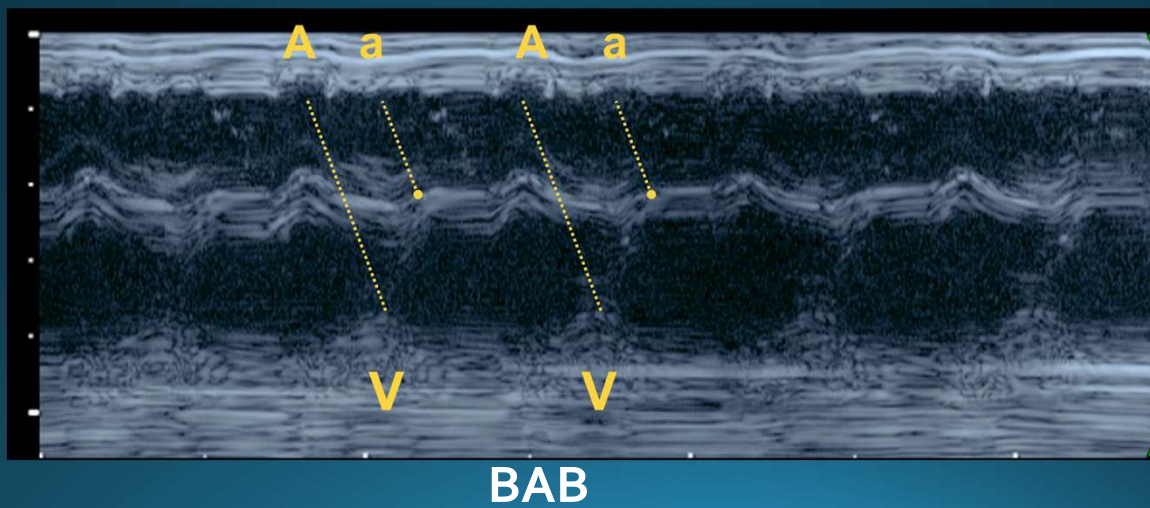
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Blocked PACs

- PAC does not conduct to the ventricle and does not produce a ventricular contraction
- Rhythm may be regular or irregular
- If every other atrial beat is a PAC, not conducted, with regular rhythm, it is blocked atrial bigeminy (BAB)

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Blocked PACs



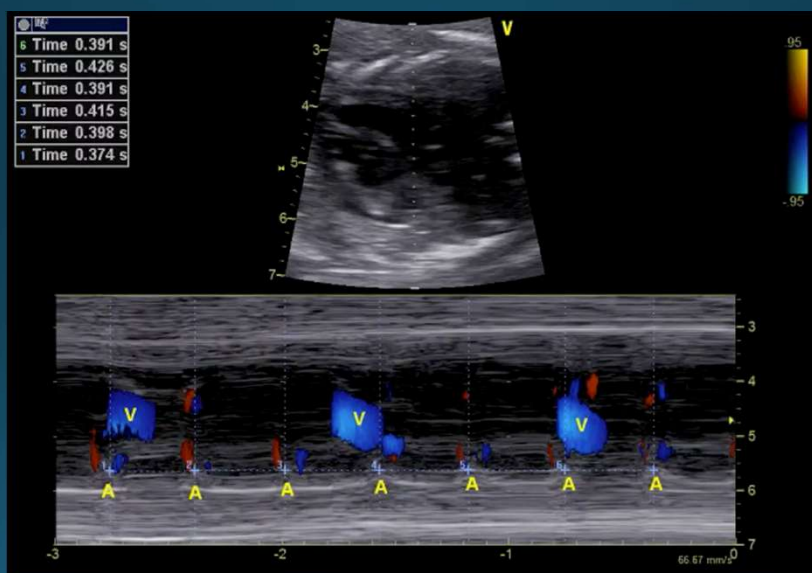
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Heart Block

- Rare, 1 in 14-20,00 pregnancies
- Complete lack of AV synchronization
- Atrial rate is greater than ventricular rate
- Structural heart abnormalities (30% of newborns)
 - Heterotaxy (left atrial isomerism)
 - Congenitally corrected transposition of the great arteries (cc-TGA)
 - Cardiac dysfunction and hydrops
- Maternal autoimmune disease
 - Anti-Ro/SSA antibodies
 - Inflammation and fibrosis
- Idiopathic

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Complete Heart Block



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Review

- Assess Rate
 - Normal – Bradycardia – Tachycardia
- Assess Rhythm
 - Regular – Irregular – Regular/Irregular
 - A – A, V – V, A – V
 - 1:1, <1:1, >1:1
 - Relationship of A – V
- Duration
 - Brief – Intermittent – Sustained – Incessant
- Structural/Physiologic Abnormalities
 - Effusion, heart size, valvular insufficiency, CHD, etc

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Questions

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