Everything You Always Wanted to Know About Fetal Arrhythmias, in 40 Minutes

Fetal Arrhythmias

What is clinically important?
Tachycardia (>200)
Fixed bradycardia (<~100)
Irregular ???

Distribution - 1977-96

<table>
<thead>
<tr>
<th>Arrhythmia</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated extrasystoles</td>
<td>1213</td>
</tr>
<tr>
<td>Supraventricular tachycardia</td>
<td>69</td>
</tr>
<tr>
<td>Atrial flutter</td>
<td>21</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>4</td>
</tr>
<tr>
<td>Sinus tachycardia</td>
<td>8</td>
</tr>
<tr>
<td>Junctional tachycardia</td>
<td>2</td>
</tr>
<tr>
<td>Ventricular tachycardia</td>
<td>6</td>
</tr>
<tr>
<td>Second degree AV block</td>
<td>10</td>
</tr>
<tr>
<td>Sinus bradycardia</td>
<td>2</td>
</tr>
<tr>
<td>Complete heart block</td>
<td>39</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1378</td>
</tr>
</tbody>
</table>

PACs

Clinical question:

How often do irregular fetal heart rates signal:
• significant fetal arrhythmias
• neonatal arrhythmias
• other fetal cardiac problems
Irregular FHR:
Referral for arrhythmia

Total referrals for arrhythmia: 595  
Arrhythmia on exam: 255 (42.9%)  
NSR on exam: 330 (55.5%)  
Other arrhythmias: 10 (1.7%)  

CHD in 2/614 (0.3%, 95% CI 0-0.7%)  
• SVT & overriding aorta  
• 2º heart block & corrected TGA  
Small VSD’s found in 2 additional neonates
Irregular FHR: Significant Arrhythmias

- Supraventricular tachycardia: 5
- Atrial flutter: 2
- Ventricular tachycardia: 1
- CHD & significant arrhythmia: 2
- Total: 10

Irregular FHR: Pediatric Follow-up

- Significant postnatal arrhythmia: 5
- WPW: 3
  - Postnatal day 1: 2
  - Age 4 years: 1
- Chaotic atrial rhythm: 1
- Frequent PVC’s: 1

All had extrasystoles on prenatal scan

Irregular FHR: Proper Management

Current standard:
- Fetal echocardiogram
- Weekly auscultation

Alternative:
- Single fetal monitor session 30-60 minutes
- Problem: 23.2% present < 24 weeks
- No follow-up if no arrhythmia found
- Continue auscultation for those with PAC’s

SVT
Fetal SVT

- Be sure of diagnosis
- Re-entrant
- Atrial flutter

- Talk to your local cardiologist/electrophysiologist

- Be careful with meds:
  - anything that can stop an arrhythmia can CAUSE one too!
  - Multiple drug interactions
  - Observation often best Rx
Heart block
Heart block

- Half structural heart disease
  - Complex lesions
  - AV Septal defects
  - Corrected transposition
  - Heterotaxias (asplenia, polysplenia)
- Half immunologic
  - Anti-SSA/Ro, SSB/La
  - Structural anomalies rare
  - ? Treatments in future

Complete Heart block

- Frequent association with hydrops
- Complete heart block + structural heart disease + hydrops = deadly
- Complete heart block & hydrops with immunologic cause may be treatable

Time of Detection of CHB (N= 264)

- Ventricular rate can increase with β- mimetics
- AV contraction sequence is critical
- Myocarditis also present

Risk CHB with anti-Ro/La?

- Prospective study 118 pregnancies/100 women
- All anti-Ro
- CCHB 2% first pregnancies
  - (95% CI 0.2-7%)
- CCHB 0/18 second pregnancies

Brucato Arthritis Rheum 2001;44:1832-5

Complete Heart Block

Neonatal Lupus Registry
- Subsequent pregnancies in 49
- CHB recurred in 16%
- Neonatal lupus rash in 6%

Buyon J Am Coll Cardiol 1998;31:1658-66
CHB Rx steroids

• First reported 1995 (Yale)
• Other case reports
• Review Neonatal Lupus Registry
  – No difference progression with steroids
  – Possible benefit resolution effusions
  – ? Rx started too late to benefit

Saleeb Arthritis Rheum 1999;42:2335-45

CHB Early Diagnosis

• Measurement mechanical PR interval
  – Mitral “a” wave = EKG P wave
  – Ventricular systole = QRS complex
  – Time interval onset a wave to systole
• Normal 110-140 msec 2nd & 3rd ∆
• ? ability to identify 1° heart block by prolonged PR interval

Glickstein Am J Cardiol 2000;86:236-9

Results

• Complete heart block in 3, all <23 weeks
• TOP 2 for NIH, both after dex
  – Both had normal echo <2 wk earlier
  – Both had TR at prior echo
  – Atrial densities in 1
• 3rd alive at 1 year, with pacemaker

Echo Dense Left Atrium

3° Heart Block Cases
Results

1º heart block in 3:
• 2 detected @ 18-22 weeks
  – Resolved with 3-7 days of dex
  – Both normal EKG at birth
• 1 normal PR through 30 wk
  – Born @ 32 wk
  – 1º degree block on EKG
  – Still present @ 3 years

Summary

• 1º heart block may be reversible with dex
• High recurrence rate substantiated
• Advanced block & cardiomyopathy can occur within 1 week of a normal mechanical PR interval
• Tricuspid regurgitation and atrial echodensities may be important markers of impending conduction system injury
• 3º block not reversible despite immediate intervention
Conclusions
• Even weekly evaluation of mechanical PR interval alone may not be sufficient
• We are unable to conclude whether 1° block is a necessary step along a path to complete block
• Needed: A reliable marker of early disease and/or a safe and economical method of prophylaxis

Speculation
• Weekly echo from 17 - 23 weeks
• If either:
  – Atrial echodensity
  – Tricuspid regurgitation
  – Prolonged mechanical PR interval
• Offer maternal dexamethasone

CHB in Labor
External Tracing

CHB in Labor
Internal Scalp Electrode