Listen Up!
An Audio Guide to Pediatric and Adult Heart Murmurs

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Case

• You are working at an urgent care centre when a 40 year old recent immigrant from Syria presents with breathlessness.

• You hear the following on cardiac auscultation:

  • What do you hear?
  • How can you describe what you hear so another practitioner will understand exactly what you mean?
  • What other important information will help you determine the significance of your auscultation?
<table>
<thead>
<tr>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic stenosis</td>
</tr>
<tr>
<td>Ejection click</td>
</tr>
<tr>
<td>Aortic insufficiency</td>
</tr>
<tr>
<td>Mixed aortic valve disease</td>
</tr>
</tbody>
</table>

I have no clue! (that's why I'm at this session)
Objectives

• In pediatric and adult patients:
  – To provide a general approach to cardiac auscultation
  – To review the most common pathologic and innocent heart murmurs

• To emphasize the importance of a thorough history and physical exam (in addition to murmur description) in determining underlying etiology for heart problems
Outline

• A little bit of physiology and hemodynamics (we promise not too much)
• Interactive pediatric and adult cases
  – https://pollev.com/michaelgratt679
  – Get your listening ears ready!
• Systolic murmurs (pathologic and innocent)
• Diastolic murmurs
• Continuous murmurs
• Some other stuff
Normal Heart Sounds
Normal First and Second Heart Sounds

Note: sounds are slowed to half speed, (30 bpm) for this example.
Splitting of 2\textsuperscript{nd} heart sound

**Physiological:**
- Venous return to right is increased in inspiration – causes delayed closure of the pulmonary valve.
- Simultaneously, return to left heart is reduced - premature closure of the aortic valve.
- Heart sounds are unsplit when the patient holds breath at end expiration.

**Fixed:**
- No alteration in splitting with respiration.
- In a patient with ASD – In expiration there is reduced pressure in the right atrium and increased pressure in the left atrium.
- Blood is shunted to the right and this delays closure of the pulmonary valve in the same way as would occur in inspiration.

**Paradoxical:**
- when there is delayed closure of the aortic valve (aortic stenosis or LBBB).
Physiological Splitting of the Second Sound

Diagram showing ECG and pressure waves in the heart chambers (LV, LA, RV, RA) and arterial vessels (Ao, PA, LV, LA) with labeled sound (A2, P2).
3rd Heart Sound

- Also known as a gallop rhythm.
- Occurs in early diastole (S1S2S3)
- Can be normal in young (<40 years of age) where it implies a supple ventricle that can easily fill rapidly.

- In older people it usually signifies disease (e.g.: LV dysfunction or mitral regurgitation) where it implies increased left atrial and left ventricular filling pressure
Third Heart Sounds: Causation

- **LV Dysfunction**: Relatively excessive inflow
- **Mitral Regurgitation**: Absolutely excessive inflow
- **Normal**: High cardiac output

ECG graph showing waves P, Q, R, S, and T.
Additional sounds - 4th Heart Sound and Ejection clicks

4th Heart Sound:
• Occurs during late diastole, (S4S1S2)
• In conditions of increased left ventricular stiffness such as HCM.
• Sound is generated by the atria contracting hard and creating turbulence against resistance.

Ejection Click:
• High pitched sound that occurs with the opening of the aortic or pulmonary valve.
• Heard just after the first heart sound. (S1 Click, S2)
Fourth Heart Sounds: Causation and Comparison

- **4th Heart Sound**: Hypertrophic Cardiomyopathy
- **Ejection Click**: Bicuspid Aortic Valve

ECG tracings with annotations 1, 2, 4.
The Problem

- Murmurs are common in adults and children\(^1\)
  - Congenital heart disease is rare.
  - Significant valvar pathology is (relatively) rare.
- Murmurs cause anxiety\(^2\)
  - Parent perception of murmurs = heart abnormality
- Vast majority of murmurs in children are innocent
  - Cardiac investigations/referral may be expensive and unnecessary
- The significance of pathologic murmurs varies from inconsequential to needing immediate intervention

\(^1\) Moss and Adams 2016
\(^2\) Bardsen et.al. 2015 BMC Pediatrics
What is a murmur?

• **Definition:**
  – “Whooshing” sounds heard in addition to the normal heart sounds
  – Auditory manifestation of turbulence in the cardiovascular system

• **Why turbulence?**
  – Increased pressure gradient
  – Increased flow
An Approach to Murmurs: The Language


- What are you listening for?
  - Timing and type*
  - Location and radiation
  - Quantity and quality
  - Maneuvers
  - Associated abnormalities
The Language of Murmurs

• Timing and type
  – Systolic
    • Systolic ejection (crescendo-decrescendo)
    • S1-coincident (‘Pansystolic’ ‘Holosystolic’)
  – Diastolic
    • Early
    • Mid
    • Late
  – Continuous
The Language of Murmurs

• Location and radiation
• Quantity (4+ → thrill)
• (Quality)
• Changes with maneuvers
• Associated abnormalities
  – On auscultation: S2, S3, S4, clicks
  – On cardiac exam: heaves, thrills, abnormal pulse
  – On general exam: FTT or wasted appearance, desaturation, abnormal BP
  – On investigations: ECG, CXR
Summary of Heart Sounds & Murmurs

**Sounds**
- Physiological Splitting
- Persistent Splitting
- Paradoxical Splitting
- Third Heart Sound
- Fourth Heart Sound
- Opening Snap
- Ejection Sound
- Midsystolic Click

**Murmurs**
- Early Diastolic (decrescendo)
- Early Diastolic (crescendo-decrescendo)
- Mid-diastolic
- Mid-diastolic / Presystolic
- Early systolic
- Holosystolic
- Midsystolic
- Late systolic
- Continuous

Expiration  Inspiration  Expiration  Inspiration

ECG  Carotid
Cases

• When auscultating the heart you should be actively listening for…
  – S1 (and only S1): intensity, splitting (not normally heard)
  – S2 (and only S2): intensity, splitting (should be physiologic)
  – Systole (and only systole): murmurs and extra heart sounds (i.e. clicks)
  – Diastole (and only diastole): murmurs and extra heart sounds (S3, S4, snaps)

• Understanding the hemodynamics of the heart (pressure and flow) will make auscultation a breeze!
  – Think about what valve is open during which phase and how that affects your differential diagnosis of murmurs/sounds
The Origin of Pathologic Murmurs

Relative Pressure

Aorta/ Pulmonary artery

MV/TV close

AoV/PV open

AoV/PV close

Atrium

Ventricle

ECG

Phonogram

1st

2nd

3rd

Systole

Diastole

Systole

1st

2nd
The Origin of Pathologic Murmurs

- **Systole:**
  - MV and TV close and remain closed
    - Closure → S1
    - Leaking → murmur
  - AoV and PV open and remain opened during forward flow out of the heart
    - (Opening sound → click)
    - If narrow or increased flow → murmur

- **Diastole:**
  - MV and TV open and remain opened during forward flow into the heart
    - (Opening sound → snap)
    - If narrow or increased flow → murmur
    - (early diastole → ++passive flow; end diastole → active flow)
  - AoV and PV closed and remain closed
    - Closure → S2 (on inspiration PV closure slightly delayed → split)
    - Leaking → murmur
Paediatric Case 1

• You and your resident see a 5 year old female, new to your clinic for a routine assessment and vaccination

• On auscultation you hear the following:

• Thoughts?
Paediatric Case 1

• You berate your resident for not performing a complete history and physical exam and then obtain the following information:
  – The patient is thriving with no cardiac symptoms, a normal activity level and no other medical problems
  – The vital signs are normal. Palpation of the precordium reveals a prominent impulse at the left sternal border. Pulses are normal. Respiratory and abdominal exam are normal.

• How does this information help you?
• What is your diagnosis?
Pediatric Case 1 - What is your diagnosis?

- Moderate VSD
- ASD
- Pulmonary stenosis
- Innocent murmur
- Tricuspid atresia
Pediatric Case 1 - ASD

- Communication between left and right atria (usually from defect within atrial septum)
- Usually asymptomatic in childhood, but symptoms of arrhythmia, CHF and pulmonary hypertension in adults
- Key findings: systolic ejection murmur at LUSB (increased pulmonary flow), fixed and widely split S2, RV heave
- Important to distinguish from pulmonary stenosis and pulmonary flow murmurs
Adult Case 1

80 Year old man with exertional chest pain
Adult Case 1

- What do you hear?
- How does the additional available clinical information help you?
<table>
<thead>
<tr>
<th>Adult Case 1 - What is your diagnosis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic murmur</td>
</tr>
<tr>
<td>Diastolic murmur</td>
</tr>
<tr>
<td>3rd heart sound</td>
</tr>
<tr>
<td>4th heart sound</td>
</tr>
<tr>
<td>Normal heart sounds with no murmurs</td>
</tr>
</tbody>
</table>
Integrating pulse with sounds and murmur

Additional info:
- Age
- Exertional chest pain
- Timing with carotid
- Louder in RICS than LICS

Findings:
- Murmur occurs w/ upstroke
- Murmur is systolic
- Sound is S2

Compare with normal:
- Normal peaks well before S2
- Carotid peak is delayed
**Hemodynamics and flow**

**Pressures:**
- LV-Ao pressure gradient throughout systole
  - murmur occurs w/ upstroke

**CW Doppler:**
- high velocity outflow
  - reaches peak of 5 m/sec
  - est. 100 mmHg gradient

**Severe AS:**
- LV pressure rises
  - increases LV-Ao gradient
- murmur peaks later
Paediatric Case 2

• 3 year old patient with fever and URTI symptoms.
• Mild bilateral wheezes but good air entry with normal respiratory rate and Oxygen saturations.
• You hear the following murmur at the left lower sternal border that was not there at his previous routine follow up:
• (The patient has been thriving and there are no obvious cardiac symptoms)
• The rest of the physical exam is normal. What is your diagnosis?
<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic stenosis</td>
</tr>
<tr>
<td>VSD</td>
</tr>
<tr>
<td>Still's murmure</td>
</tr>
<tr>
<td>HOCM</td>
</tr>
<tr>
<td>ASD</td>
</tr>
</tbody>
</table>
Paediatric Case 2 – Innocent Still’s Murmur

• Most common innocent murmur
• Classically 2-6 years (infancy to adolescence)
• Characteristic sound:
  – 1-3/6 systolic ejection murmur
  – Quality: vibratory, musical, twangy
  – Left lower sternal border (nipple line) – no radiation
  – Louder when supine
Paediatric Case 3

- A 13 year (tall and skinny) female is being evaluated in your clinic for presyncope. She has a history of some mild lightheadedness when standing from a sitting position. You suspect a vasovagal etiology and reassure the family, but also note the following murmur at the left upper sternal border:

- What other information will help you?
  - Risk factors for other illnesses including anemia; presence of intercurrent febrile illness
  - Body habitus – tall and thin
  - Easily palpable heart but no heaves or thrills
<table>
<thead>
<tr>
<th>Valvular pulmonary stenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innocent pulmonary flow murmur</td>
</tr>
<tr>
<td>Still’s murmur</td>
</tr>
<tr>
<td>ASD</td>
</tr>
<tr>
<td>VSD</td>
</tr>
</tbody>
</table>
Paediatric Case 3 – Innocent Pulmonary Flow Murmur

- Older children and adolescents
  - Thin children, pectus excavatum
  - Increased cardiac output (anemia, fever, dehydration)
- Timing: 1-2/6 soft (non-musical) systolic ejection murmur
- Upper sternal borders with minimal radiation
- Normally split S2, no clicks

- Differential diagnosis:
  - ASD (soft murmur but S2 has wide and fixed split, RV heave)
  - Valvar stenosis (harsher, associated ejection click)
Innocent Murmurs

• Common reason for referral to pediatric cardiology
• Common problem overall (80% of population)
• Many normal murmurs can be diagnosed after careful history and physical exam alone
• Many studies show that generalists can diagnose many innocent murmurs with reasonable accuracy

McCrindle et.al. 1996 Pediatr Adolesc Med
Innocent Murmurs

• Innocent murmurs characteristics
  – Systolic ejection murmurs (except one), never diastolic
  – Never >III/VI
  – Usually soft/musical/vibratory
  – Usually minimal radiation
  – Usually louder when supine or at times of increased cardiac output (fever, anemia, dehydration)
  – Usually no other findings on HPI, family history, remainder of cardiac exam
Innocent Murmurs

- Still's
- Pulmonary flow
- Venous hum
- PPAS
- Other innocent
- CHD
Adult Case 2

50 year old female visits you with recent onset breathlessness and fatigue
Adult Case 2

What is the murmur?
**Adult Case 2 - What is your diagnosis?**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic stenosis</td>
<td></td>
</tr>
<tr>
<td>Aortic regurgitation</td>
<td></td>
</tr>
<tr>
<td>Mitral stenosis</td>
<td></td>
</tr>
<tr>
<td>Mitral regurgitation</td>
<td></td>
</tr>
</tbody>
</table>
Adult Case 2
Acute aortic regurgitation

Examination:
- Bounding (Corrigan's) pulse
- Harsh midsystolic murmur
- Abbreviated early diastolic murmur initiated by a loud S2

Inspection of nailbed
- Blanching & blushing of nailbed
- Quincke’s pulse
Adult Case 3

40 year old man with murmur not noted incidentally
Adult Case 3

Q: What do you hear?
<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic stenosis</td>
</tr>
<tr>
<td>Aortic regurgitation</td>
</tr>
<tr>
<td>Mitral stenosis</td>
</tr>
<tr>
<td>Mitral regurgitation</td>
</tr>
<tr>
<td>Mixed aortic valve disease (AS and AR)</td>
</tr>
<tr>
<td>Mixed mitral valve disease (MS and MR)</td>
</tr>
</tbody>
</table>
Chronic Aortic Regurgitation

Inspection:
- Bounding (Corrigan’s) pulse
- Head bobbing (Musset’s sign)
- compare with normal carotid

Auscultation:
- “To-fro” murmur
  - Midsystolic murmur
  - Early diastolic murmur
- 2RICS
  - “TO-fro”
- 3LICS
  - “To-FRO”

Slow decrescendo suggests milder or better tolerated
Pediatric Case 4

- A 2 month old is being seen for their routine assessment and immunizations. You note some mild URTI symptoms including a runny nose and mild subcostal retractions. You hear the following at the left lower sternal border:

- Other important information (part of a family doctor’s cardiac assessment…)
  - Length 60 cm (50-85th percentile); weight 4.6 cm (3-15th percentile)
  - Prominent precordial impulse
  - Normal femoral pulses
### Pediatric Case 4 - What is your diagnosis?

<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valvar pulmonary stenosis</td>
</tr>
<tr>
<td>PDA</td>
</tr>
<tr>
<td>Still’s murmur</td>
</tr>
<tr>
<td>ASD</td>
</tr>
<tr>
<td>VSD</td>
</tr>
</tbody>
</table>
Case 4 – VSD
The Origin of Murmurs – VSDs

Relative Pressure

Aorta

LV

LA

RV

ECG

Phonogram

1st

2nd

3rd

1st

2nd

Systole

Diastole

Systole
VSDs

- Variable presentation mainly based on size of defect
- **Small**
  - Asymptomatic
  - Pansystolic murmur (abbreviated pansystolic murmur)
  - Only need intervention if associated anatomic abnormalities
- **Medium**
  - May have congestive symptoms (CHF): failure to thrive, respiratory symptoms
  - Pansystolic murmur +/- hepatomegaly, dynamic precordial impulse, increased work of breathing
  - May need intervention if symptomatic or high pulmonary pressures
- **Large**
  - Congestive symptoms
  - Systolic ejection murmur + hepatomegaly, dynamic precordial impulse, increased work of breathing
  - Will need intervention for symptoms and to prevent pulmonary hypertension unless VSD becomes smaller
Pansystolic versus Systolic Ejection Murmurs

- Systolic ejection murmur (crescendo-decrescendo)
- ‘Pansystolic’ / ‘Holosystolic’ (S1-coincident murmurs)
Systolic murmurs

• Pansystolic (S1-coincident murmurs)
  – Flat
  – ALWAYS start WITH S1
  – Usually end with S2 (may end prior to S2)
  – MR, TR, VSD

• Systolic ejection murmur
  – Crescendo – decrescendo
  – ALWAYS start AFTER S1 (when AoV and PV open)
  – May end prior to or with S2
  – Flow leaving heart (AoV/PV stenosis, arterial stenosis, increased flow, INNOCENT murmurs)
Adult Case 4

59 Year old man with recent fevers and is now breathless.
Adult Case 4

- Q: What is the lesion
## Adult Case 4 - What is your diagnosis?

<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic stenosis</td>
</tr>
<tr>
<td>Aortic regurgitation</td>
</tr>
<tr>
<td>Mitral regurgitation</td>
</tr>
<tr>
<td>VSD</td>
</tr>
</tbody>
</table>
Acute MR

Clinical Clue:
• Fever - ? IE
• Breathless ? AR / MR?

Inspection:
• rocking stethoscope by LV

Auscultation:
• Early systolic murmur begins with sharp S1
• Isolated, clear S2
• S3 rumble
• Gallop rhythm
Hemodynamics of Acute and Chronic

**Normal:**
- S1, S2, no murmurs

**Mitral valve prolapse:**
- Midsystolic click, possible late systolic murmur of MR

**Acute MR:**
- Here, from chordal rupture
- Loud S1, initiates explosive systolic murmur
- S3 with mid-diastolic murmur

**Compensation:**
- Increased compliance of LA, LV
- Blowing holosystolic murmur
- Mid-diastolic rumble
Pediatric Case 5

• You see a 6 year old male for assessment for ADHD. You auscultate the heart while he is sitting on the exam table and hear the following at the right upper sternal border:

• You go to listen to the heart again when supine and cannot hear the murmur…
Pediatric Case 5 - What is your diagnosis?

- Venous hum
- Still’s murmur
- Aortic stenosis
- PDA

Static from your computer (or a loud air conditioner in the background)
The Innocent Murmurs – Venous Hum

- Turbulent flow in superficial neck vein
- 2nd most common heart murmur
- Usually older toddler and above (when more upright)
- Characteristic, easily identifiable sound:
  - 1-3/6 low-frequency continuous murmur
  - Right upper sternal border/right supraclavicular area
  - Disappears when supine
  - Disappears when jugular vein occluded (by examiner or with head rotation to contralateral shoulder)
Pediatric Case 6

• You see an 8 month ex-25 week infant in your clinic for concerns about development

• Incidentally you hear the following:
Pediatric Case 6 - What is your diagnosis?

Venous hum

Coarctation of the aorta

Aortic stenosis and aortic insufficiency

ASD

Patent ductus arteriosus
Patent Ductus Arteriosus (PDA)

- Connection between aorta and main pulmonary artery leading to:
  - Left to right shunting
  - CHF if large
- Especially common in premature infants
- Classically causes a continuous murmur in the left chest and back
The Origin of Murmurs – PDA

- Aorta
- LA
- LV
- ECG
- Phonogram
  - 1st
  - 2nd
  - 3rd
  - 1st
  - 2nd
  - Systole
  - Diastole
  - Systole
Adult Case 5

• A 25 year old female presents to the local emergency department with chest pain and ST elevation

• You hear the following:

• You obtain a little bit more history and find that the pain is sharp and pleuritic and the patient cannot sleep at night due to the pain

• What is your diagnosis?
<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pericardial friction rub</td>
</tr>
<tr>
<td>Mixed aortic valve disease</td>
</tr>
<tr>
<td>VSD</td>
</tr>
<tr>
<td>Mitral regurgitation</td>
</tr>
<tr>
<td>Innocent murmur</td>
</tr>
</tbody>
</table>
Pericardial friction rub

• Not truly a murmur
  – Sound of inflammation and ‘friction’ between the two layers of pericardium
    • ‘Cat scratching’
• Wide differential
  – Infectious (usually viral)
  – Other infections, autoimmune, malignant, radiation…
General thoughts from a pediatric cardiologist…

• Most murmurs in childhood are innocent
  – Older patients are less likely to have critical heart disease even when the murmur is pathologic

• Most innocent murmurs (especially venous hums and Still’s murmurs) can be diagnosed by family doctors, nurse practitioners and generalists
  – A focused cardiac auscultation and complete cardiac exam are essential in accurate diagnosis
  – Diagnosing innocent murmurs in very young patients is hard (even for cardiologists)
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Benign/Physiologic</th>
<th>Pathologic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing/Type</td>
<td><strong>Systolic ejection murmur</strong> (continuous if venous hum)</td>
<td><strong>Systolic ejection murmur</strong> S1-coincident (pansystolic) <strong>Diastolic</strong> (early, mid, late) <strong>Continuous</strong></td>
</tr>
<tr>
<td>Quantity</td>
<td>1-3 (never a thrill)</td>
<td>1-4,5,6</td>
</tr>
<tr>
<td>Quality</td>
<td>Soft, musical, vibratory, blowing</td>
<td>Harsh (soft, blowing), rarely musical</td>
</tr>
<tr>
<td>Location/Radiation</td>
<td>Specific to murmur</td>
<td>Variable</td>
</tr>
<tr>
<td>Maneuvers</td>
<td>Louder supine (exception: venous hum)</td>
<td>Variable</td>
</tr>
<tr>
<td>Triggers</td>
<td>High cardiac output state</td>
<td></td>
</tr>
</tbody>
</table>
| Associated abnormalities | Normal cardiac history  
Normal saturations, BP  
+/- fever, tachycardia, pallor  
Otherwise normal cardiac exam  
Normal cardiac tests (if done) | +/- cardiac symptoms or family hx  
+/- desaturations, 4 limb BP gradient  
+/- dysmorphisms, FTT  
Cardiac: Hyperdynamic precordium, heaves/thrills, abnormal/extra heart sounds, other pathologic murmurs |
# Murmurs by age

<table>
<thead>
<tr>
<th>Age</th>
<th>Pathologic</th>
<th>Benign/Physiologic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>Pathologic regurgitation or stenosis</td>
<td>Tricuspid regurgitation</td>
</tr>
<tr>
<td></td>
<td>Critical obstructive lesions</td>
<td></td>
</tr>
<tr>
<td>0-2 days</td>
<td>+ Coarctation</td>
<td>Closing PDA, Tricuspid regurgitation</td>
</tr>
<tr>
<td>2 days – 6 months</td>
<td>+ High pressure shunts (VSD, PDA)</td>
<td>Peripheral pulmonary artery stenosis (PPAS), Still’s-like murmur</td>
</tr>
<tr>
<td>6 months – 2 years</td>
<td>+ ASD</td>
<td>Still’s-like murmur</td>
</tr>
<tr>
<td>2 years – 6 years</td>
<td>Significant pathology less likely ASDs, small VSDs/PDAs, mild valve disease, BAV</td>
<td>Classic Still’s murmur, aortic and pulmonary flow murmurs, venous hum</td>
</tr>
<tr>
<td>6 years – 8+ years</td>
<td>Significant pathology less likely ASDs, small VSDs/PDAs, mild valve disease, BAV</td>
<td>Aortic and pulmonary flow murmurs, venous hum</td>
</tr>
<tr>
<td>Post-pubertal,</td>
<td></td>
<td>Mammary souffle</td>
</tr>
<tr>
<td>pregnant females</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Murmur Auscultated

- Hemodynamic instability?
- Central cyanosis?
- Absent femoral pulses?

No

- Abnormal cardiac history?
- Pathologic sounding?*
- Abnormal cardiac exam?
- Other cardiac risk factors (syndrome, teratogens)

No/Unsure

Patient age <2 months?

Yes

Refer to pediatric cardiology

Patient age 2-12 months: FTT? Murmur persists >6 months?

Yes

Refer to pediatric cardiology

* See previous slide on innocent versus pathologic murmurs (if unclear but not worried consider general pediatrics referral)

Note: ECG/CXR unlikely to change management
- Is it continuous?
- Can you stop the murmur (jugular compression/head turning?)
- Is S2 normal (physiologic and not widely split)?
- Is there a click?
- Does it radiate to the axilla or back?
- Does it change with position?
- Is it a systolic ejection murmur?
- Is it musical?
- Are there femoral pulses?
- Is there a click?
- Does it radiate to the neck?
- Does it change with position?
General thoughts from an adult cardiologist…

• Clinical examination is useful and it is possible to determine the valvular lesion and severity of many cardiac lesions clinically.

• Other factors (fever, medications and other illnesses) can impact on cardiac examination findings and alter heart sounds.
Back to the opening case

• You are working at an urgent care centre when a 40 year old recent immigrant from Syria presents with breathlessness.

• You hear the following on cardiac auscultation:
  • What do you hear?
  • How can you describe what you hear so another practitioner will understand exactly what you mean?
  • What other important will help you determine the significance of your auscultation?

Answer:

• Loud systolic murmur, absent 2\textsuperscript{nd} heart sound (implying severe AS)
• Diastolic murmur - long decrescendo of AR (implying less severe)
We made it…

• Hopefully we have:
  – Provided an approach to cardiac auscultation
    • Active listening
    • Remembering the cardiac cycle
    • Importance of additional testing
  – Provided guidance regarding distinguishing innocent from pathologic heart murmurs
  – Provided guidance on managing heart murmurs in an outpatient setting
  – Practiced auscultation of various innocent and pathologic heart murmurs
Questions?