Physical Findings in Congenital Heart Disease

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**Cases**

- **Case 1:** You see a 3 y/o M in your office for a well-child visit. He is meeting all his developmental milestones and is in the 50\textsuperscript{th} percentile for height and weight. You hear a 2/6 “vibratory” systolic murmur best heard at the lower left sternal border. Otherwise unremarkable exam.

- **Case 2:** You see a 1 y/o M in your office with h/o Trisomy 21. He has met all his 9-month-old milestones and is in the 15\textsuperscript{th} percentile for height and weight. On exam you note slanted eyes, flattened nose, low-set ears, and single palmar creases. You hear a 3/6 holosystolic, “harsh” murmur best heard at the LLSB.
Case 3: A girl is born at 36 weeks gestation to a 32 y/o with pregestational T2DM. Her Apgar scores are 2 and 2 at 1 and 5 minutes. She looks like this:
Evaluation and Management of Heart Murmurs in Children

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Heart murmurs are common in healthy infants, children, and adolescents. Although most are not pathologic, a murmur may be the sole manifestation of serious heart disease. Historical elements that suggest pathology include family history of sudden cardiac death or congenital heart disease, in utero exposure to certain medications or alcohol, maternal diabetes mellitus, history of rheumatic fever or Kawasaki disease, and certain genetic disorders. Physical examination should focus on vital signs; age-appropriate exercise capacity; respiratory or gastrointestinal manifestations of congestive heart failure; and a thorough cardiovascular examination, including features of the murmur, assessment of peripheral perfusion, and auscultation over the heart valves. Red flags that increase the likelihood of a pathologic murmur include a holosystolic or diastolic murmur, grade 3 or higher murmur, harsh quality, an abnormal S1, maximal murmur intensity at the upper left sternal border, a systolic click, or increased intensity when the patient stands. Electrocardiography and chest radiography rarely assist in the diagnosis. Referral to a pediatric cardiologist is recommended for patients with any other abnormal physical examination findings, a history of conditions that increase the likelihood of structural heart disease, symptoms suggesting underlying cardiac disease, or when a specific innocent murmur cannot be identified by the family physician. Echocardiography provides a definitive diagnosis and is recommended for evaluation of any potentially pathologic murmur, and for evaluation of neonatal heart murmurs because these are more likely to be manifestations of structural heart disease. (Am Fam Physician. 2011;84(7):793-800. Copyright © 2011 American Academy of Family Physicians.)
Constitutional Symptoms of CHD

- Failure to thrive
- Developmental delay
- Poor capacity for play
- Diaphoresis
- Fatigue
Respiratory Symptoms

- Dyspnea/tachypnea
- Chronic cough
- May present with asthma-like symptoms
Cardiovascular Symptoms

- Chest pain
- Palpitations
- Dizziness
- Syncope (HOCM)
- Cyanosis
Cyanosis

- **Central cyanosis** – around lips, tongue, core
  - Caused by: CHD, pneumonia/bronchiolitis, environmental exposure

- **Peripheral cyanosis** – in extremities
  - Can be caused by above or cold exposure, arteriovenous obstruction

- **Differential cyanosis** – in lower but not upper extremities
  - Caused by large PDA

- Look for clubbing!

- In anemic patients, cyanosis may be more subtle/nonexistent
Cyanotic CHD

- Tetralogy of Fallot
- Truncus arteriosus
- Tricuspid atresia
- Transposition of the great vessels
- TAPVR
Murmurs: Classification

- Timing – systole vs diastole
- Location
- Intensity – measured by Levine scale
  - Grade I – audible with careful listening for some time
  - Grade II – immediately audible but faint
  - Grade III – loud with no palpable thrill
  - Grade IV – loud with a palpable thrill
  - Grade V – audible with rim of stethoscope touching chest
  - Grade VI – audible with stethoscope off chest
- Pitch – bell vs diaphragm
- Radiation
- Quality
Murmurs: Is it normal?

- **Sensitive** – change with position/respiration
- **Short** (duration)
- **Single** – no clicks/gallops
- **Small** – nonradiating, limited to small area
- **Soft** – less than 3/6
- **Sweet** – not “harsh” sounding
- **Systolic**
Mystery murmur #1

- Still’s murmur
- Early systolic murmur, grade 1-3
- Heard best at LLSB
- Low/medium pitch with “musical” or “vibratory” quality
- Loudest when supine, decreases when standing up
- Caused by resonation of blood flow in the LV outflow tract
- DDx: VSD, HOCM
Venous hum

- Continuous murmur accentuated in diastole, can be grade 1-6
- Heard best just above right clavicle
- Peculiar “humming” or “annoying” quality
- Caused by vibration of walls of internal jugular veins
- Intensity/quality changes by placing finger on ipsilateral jugular vein
- DDx: PDA
Mystery murmur #2

- Pulmonary flow murmur
- Grade 2-3 early systolic crescendo-decrescendo
- Heard best at LUSB
- “Rough”, “dissonant” quality
- Loudest when supine, decreases when standing up
- Caused by high flow through normal pulmonic valve
- DDx: Aortic/pulmonic stenosis
Abnormal Cardiovascular Findings

- Capillary refill > 3 seconds
- Displaced PMI
- Precordial heaves/thrills
- Peripheral edema
- $S_3/S_4$
- Systolic ejection click
- Weak/absent peripheral pulses
  - If femoral – think coarctation
Other Abnormal Findings

▪ Ascites
▪ Hepatomegaly
▪ Rales
▪ Wheezing
▪ Dysmorphic features
Mystery murmur #3

- Atrial septal defect
- Grade 2-3 systolic ejection murmur with fixed split S2
- Crescendo-decrescendo with “harsh” quality
- Heard best at LUSB
- Murmur caused by high flow across pulmonic valve b/c L to R shunt
- DDx: physiologic split vs paradoxical split (HOCM)
Mystery murmur #4

- Patent ductus arteriosus
- Grade 1-5, continuous murmur
- Best heard at LUSB
- May crescendo in systole and decrescendo in diastole
- Thrill or hyperdynamic apical impulse may be present
- DDx: venous hum
Mystery murmur #5

- Ventricular septal defect
- Holosystolic murmur
- “Harsh” quality
- Best heard at LLSB
- Small defects are louder, however larger defects may have thrill
- Due to instantaneous pressure gradient during systole
- Associated with trisomies
- DDx: Still’s murmur
Some statistics

- Holosystolic murmur – OR = 54
- Grade 3/6 or higher – OR = 4.8
- Harsh quality – OR = 2.4
- Abnormal S2 – OR = 4.1
- Maximal intensity at LUSB – OR = 4.2
- Diastolic murmur – OR = 8.3
Conclusion

▪ Murmurs can be difficult to pick up in young kids
  – Relatively fast heartbeats
  – Cooperativity

▪ A murmur is “innocent” if all these are met:
  – No other abnormal physical findings
  – Negative RoS
  – No risk factors for structural heart disease
  – Auscultatory characteristics of an “innocent murmur”

▪ Otherwise, consider referral for an echo and/or cardiologist
Cases

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  - *Still’s murmur, no further workup needed*

- **Case 2:** You see a 1 y/o M in your office with h/o Trisomy 21. He has met all his 9-month-old milestones and is in the 15th percentile for height and weight. On exam you note slanted eyes, flattened nose, low-set ears, and single palmar creases. You hear a 3/6 holosystolic, “harsh” murmur best heard at the LLSB.
  - *VSD, consider referral for echo + cardiologist*
• **Case 3:** A girl is born at 36 weeks gestation to a 32 y/o with pregestational T2DM. Her Apgar scores are 2 and 2 at 1 and 5 minutes. She looks like this (cyanosis)
  - Cyanotic CHD, likely transposition of the great vessels
  - NICU + CXR + echo
  - PGE, corrective surgery