Murmur Evaluation and Referral

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WARD FAMILY HEART CENTER

Murmur

Accessory cardiac noise heard on auscultation

Blood flow through the heart

< 1% of murmurs = CHD

65-80% of school children have murmur at any given time

Most common reason for referral to Cardiology

Most murmurs are innocent (benign)

Murmur Incidence

Murmur onset at 24 hours of life: 8% pathologic

Murmur onset at 6 months of life: 14% pathologic

Murmur onset at 12 months of life: 2% pathologic

25% of children with CHD require surgery/cath intervention in first year of life

Gupta and May study- Clinical Pediatrics 2017 age 2-18

357 NEW MURMURS	116 KNOWN MURMURS
34 (9.5%) had no murmur at cardiology appointment	1 (0.9%) had no murmur at cardiology appointment
21 (5.8%) = cardiac pathology (none needed imminent intervention- 2 had eventual ASD closure)	12 (10.3%) =cardiac pathology (none needed intervention)

440/473 (93%) had no murmur or innocent murmur

Murmur Eval

1. History
    1. Birth
    2. Present
    3. Family
    4. Activity
2. Physical
    1. Weight/growth/development
    2. VS
    3. Exam

        Color, respiratory effort, auscultation, circulation (pulses)

History

Birth Hx

Maternal diabetes

Maternal infections (TORCH)

Multiple gestation

Prematurity

Maternal drug use

Fetal US/chromosomes

Family Hx

Cardiomyopathy/Transplant

Long QTS

Brugada

ARVD

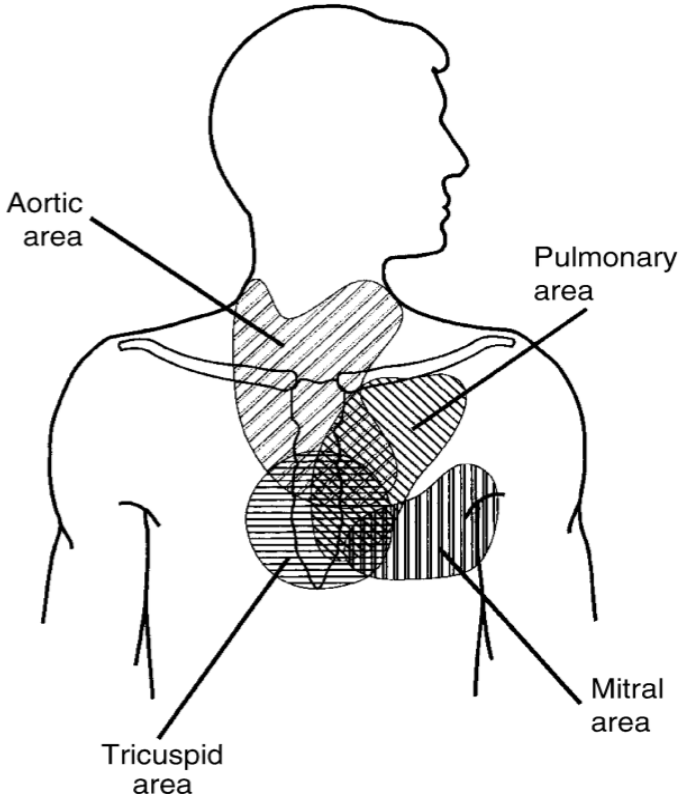
BCAV

Severe CHD

SIDS, sudden unexplained death < 50

NON CONCERNING	RED FLAGS
Gaining weight	VS- hypertension, wide pulse pressure, pulse/bp discrepancy
Normal development	Feeding issues- tires, sweats, labored breathing
Normal activity level	Dysmorphic, genetic anomaly
Family history non concerning	Can’t keep up with age matched peers
Frequent infections	
New isolated murmur after age one *unless there are red flags*	
New murmur with fever/illness	

Auscultation



Heart Sounds

S1 -closure of the atrioventricular (mitral and tricuspid) valves and best heard at the lower LSB

- Splitting of the first heart sound is so narrow that only a single sound is usually heard

S2 -closure of the aortic and pulmonic valves and best heard at the upper LSB, usually louder at the base

- Two audible components of S2 are variable with inspiration ("physiologic splitting") and single on expiration

Heart Sounds

S3 is a low-pitched sound heard in early diastole and follows S2

- May be normal in children
- Pathological S3, referred to as a ventricular gallop

S4 is known as the presystolic gallop

- Low-pitched sound heard in late diastole just before S1
- Produced by atrial contraction against a relatively stiffened ventricle caused by either ventricular hypertrophy or myocardial ischemia
- Rarely a normal finding

Grading Murmurs

Grade	Description
Grade I	**Very faint, not heard in all positions, no thrill**
Grade II	**Soft, heard in all positions, no thrill**
Grade III	**Moderately loud, no thrill**
Grade IV	**Loud and associated with a palpable thrill**
Grade V	**Very loud, with thrill, heard with the stethoscope partly off the chest**
Grade VI	**Loudest, with thrill, heard with the stethoscope entirely off the chest (just above the precordium, not touching the skin)**

7 S's

Systolic (occurs during and is limited to systole)

Small (limited to a small area)

Soft (low amplitude)

Short duration (not holosystolic)

Single (no associated clicks or gallops)

Sweet (not harsh sounding)

Sensitive (changes with child's position or with respiration)

Lefort study (2017)

194 children (2-18) referred for murmur

30 (15%) had pathologic murmurs (abn echo)

164 (85%) no CHD

100 (51%)had murmur supine but disappeared when standing up

- 2 had abn. echos and 1 needed intervention (ASD)

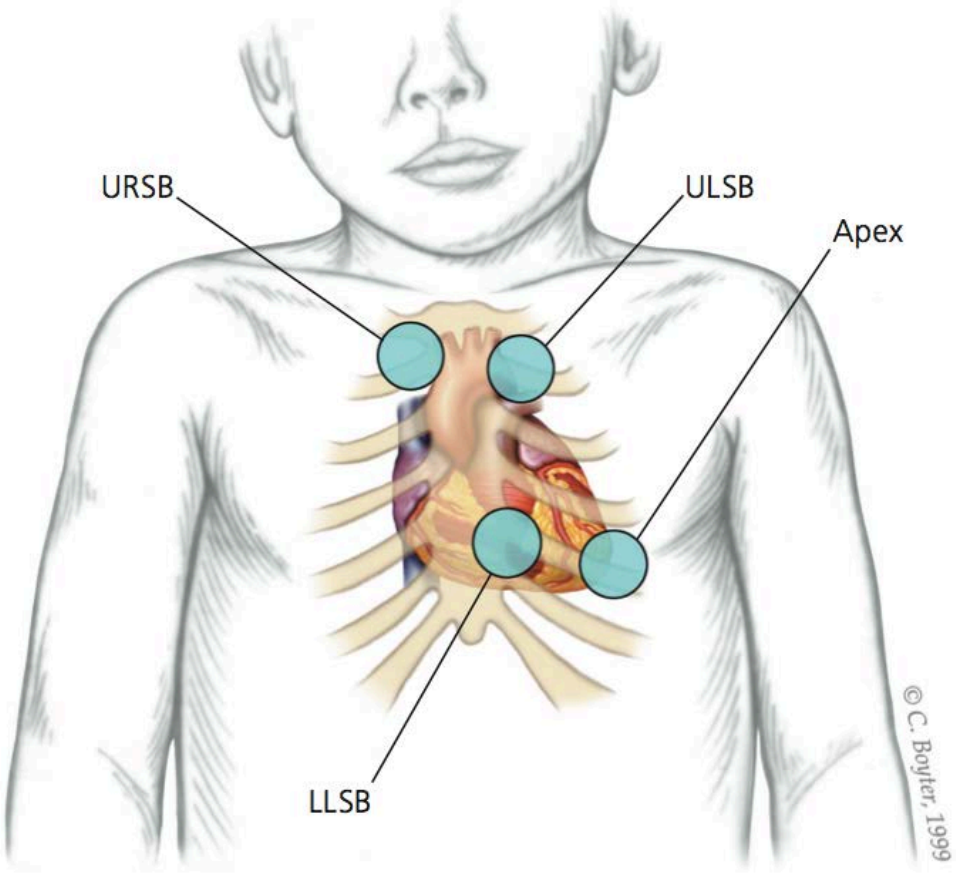
Types of Innocent Murmurs

Systolic murmurs

- Vibratory Still's murmur- age 3 and up
- Pulmonary flow murmur- infants, adolescents
- Peripheral pulmonary artery stenosis murmur- neonates
- Supraclavicular systolic murmur (carotid bruit)-school age

Continuous Murmur

- Venous hum (continuous)- school age


URSB
ULSB
Apex
LLSB
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Innocent murmurs

Vast majority of murmurs are innocent

- Early systolic ejection, short duration
- Low intensity (grade 2 or 1), without thrill, not associated with a click
- Vibrating (or musical) quality, normal intensity and splitting of heart sounds, non-radiating
- Varies with physiological maneuvers
- No relevant personal or family history
- No cardiovascular symptoms, no abnormalities on physical examination

Pathologic murmurs- refer

- Diastolic, pansystolic, late systolic or continuous murmur (except for venous hum)
- High intensity (grade III or above), thrill, long duration, click
- Audible throughout the chest region and radiating
- Fixed splitting or paradoxical S2 or no splitting
- Relevant personal or family history
- Symptoms, physical examination abnormalities suggesting heart disease

Info for parents (they are anxious)

Use innocent murmur handout from Cerner depart choices

Use a diagram and explain normal blood flow

- Pump/pipes
- Stream
- Hose

Quote statistics

Reassure them that their child is healthy

Case Studies

16 year old female presents with shortness of breath and decreased activity tolerance over the past 3 months. This has hampered her usual activities which is walking around school and participating in marching band. She is otherwise healthy. Medication= oral contraceptive. No mumur by PCP. Pulmonology eval is negative but in last follow up appointment a new murmur is heard. Do you refer to cardiology?

1.Yes
2.No
3. Maybe- if murmur continues on subsequent follow ups

4 year old male presents for well child check. A new 2/6 continuous murmur is heard when the child is sitting up on the left side supraclavicular area. The murmur disappears when the child is supine on the exam table. The patient is otherwise healthy. He is growing well and has no issues with activity tolerance. The rest of his exam is normal. He takes no medications. Do you refer to cardiology?

1. Yes
2. No

What is the most likely diagnosis?

1. Still's (vibratory) murmur
2. Pulmonary flow murmur
3. Venous hum
4. Patent ductus arteriosus

A 16 year old presents for his sports physical. He has complaints of chest pain after activity for the last 2 years. He denies other symptomatology. He has never had any issues playing football and he has never failed a physical. He would like to play college football in the future. You have never examined him before. He has a 2/6 systolic murmur and 3/6 diastolic murmur heard at the LLSB and RUSB. No one has ever told him that he has a murmur. The rest of his exam is normal. His blood pressure is 140/48 and rechecked 140/41. What are your next steps?

1. Restrict until seen by cardiology- request appointment within 1 week.
2. Send to ER
3. Obtain ECG

Palpitation eval and referral

RULE OUT ARRYTHMIA

Descriptions and Etiology

Racing

Beeping

Skipping a beat

Pounding out of my chest

Feel my heart beat in my chest

Hear my heart beat in my ear

Typically benign

- Anxiety
- Stress
- Fever
- Drugs
- Caffeine
- Anemia
- exercise

History

When (rest/exercise)

Description

How often (daily, weekly, monthly, once)

How long

Other symptoms- dizzy/syncope, dyspnea

Abrupt on and off

Ramp up and down

Measurements of pulse (count/tracker etc)

Diet history/fluid intake

Stressors- school/athletics/family/friends

Family history

? Other health issues- thyroid, anemia, prior CHD surgery

Tests

History is going to be most important

Exam will usually be normal but might hear ectopy

ECG- can see premature beats, preexcitation (delta wave), QTC measurement

Monitors- holter, chest plate, event, LINC

Keep a diary, teach how to take pulse

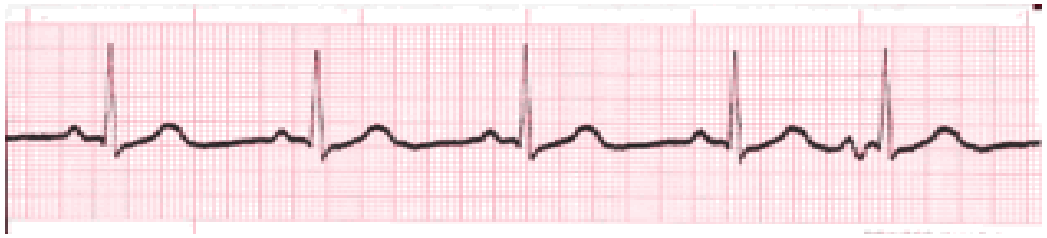
ECG

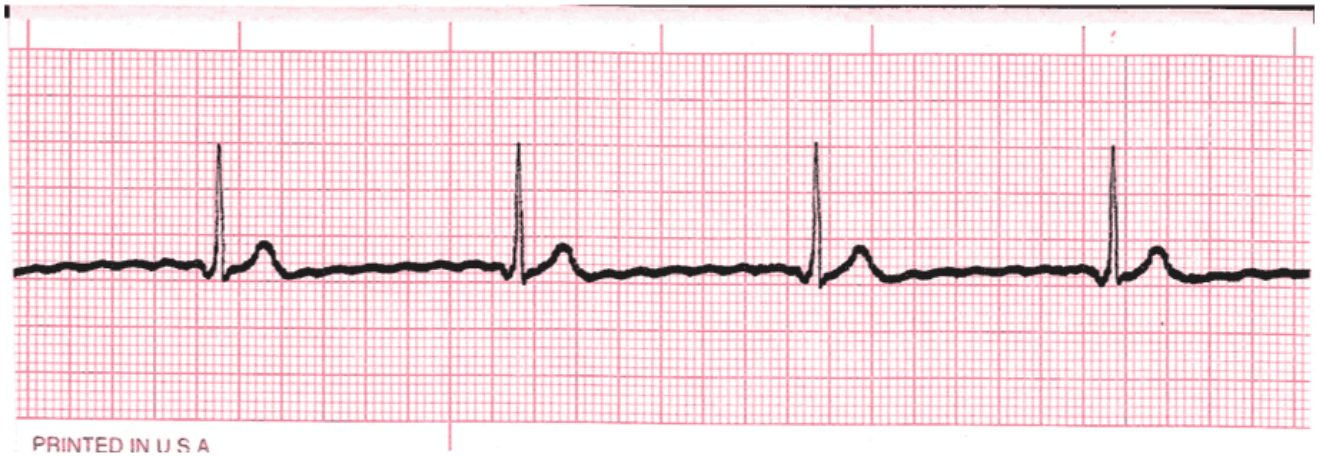
Non concerning

- PAC
- PVC- isolated, occasional
- Sinus arrythmia
- Wandering pacemaker
- Ectopic atrial rhythm
- Isolated escape beats
- Junctional rhythm (if rate is appropriate)
- Early repolarization
- Non specific ST changes

Concerning- refer

- Short pr
- Long pr
- Heart block
- Preexcitation- delta wave
- WPW pattern
- Long QTc
- SVT
- VT
- A fib and flutter

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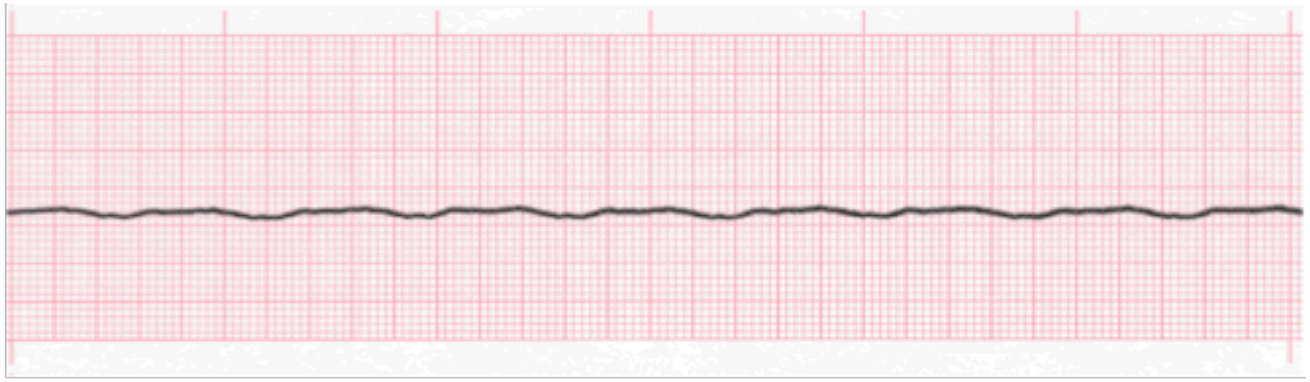

Less concerning

PREMATURE ATRIAL CONTRACTIONS

Idiopathic

Not usually felt

Originate from the atria or AV junction

Can be dx in fetal life- usually disappears in the first year

Benign

No treatment necessary

PREMATURE VENTRICULAR CONTRACTIONS

Usually idiopathic

Can increase with caffeine, stimulants, drugs, dehydration

Ok – if normal heart, isolated, 1 morphology, suppressed with exercise

Described as “heart skips then forceful beat”

No treatment if occasional

< 15% of all beats

Measure with holter

Tachycardias

SINUS TACHYCARDIA

Ramp up and ramp down

HR 100-200

Exercise, anxiety, fear

Benign

SUPRAVENTRICULAR TACHYCARDIA

Abrupt onset, abrupt off- HR fast to count- > 170 at rest (depends on age)

- Associated with syncope, exercise, CHD **refer**
- Have to catch episodes on a monitor (Ev. Rec)
- Vagal manuevers, beta blockers, ablation

Advice

Consume breakfast regularly

Increase fluid intake

Decrease/eliminate caffeine

Increase salt intake

Stress/anxiety management

Regular exercise

Reassurance

Cerner depart- palpitations handout

Refer

Associated with syncope

Caused by exercise*

> 2 episodes per month and /or lasts longer than 15 minutes

Concerns on ECG

Case study

- An 8 year old child presents to the ER for dizziness and headache. An ECG was obtained and reads: Normal sinus rhythm with premature supraventricular beat. Exam is otherwise normal and you do not hear irregularity upon auscultation. Headache resolved with ibuprofen. What is your next step?

1. Refer to cardiology for abnormal ECG
2. Restrict from recess and pe
3. Reassure the child and family that the ECG is normal.
4. Request that an electrophysiology (EP) provider see the patient in the ER.