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Syncope in Children and Adolescents: Evaluation, Treatment, When to Refer

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- None.
- I have not had a financial relationship with an ineligible company.

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Welcome to Heart Month

- Congenital heart defects are the most common birth defects
- Affect ~1%, approximately 40,000, newborns per year
- 1 in 4 babies with CHD will have critical CHD with most requiring surgery/procedure within the first year
- In 2011, US Dept of HHS added Critical Congenital Heart Disease pulse oximetry screen to Recommended Uniform Screening Panel
- More adults living with CHDs than children

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Centers for Disease Control and Prevention. *Congenital Heart Defects (CHDs)*. https://www.cdc.gov/ncbddd/heartdefects/data.html

Learning Objectives

- To understand causes of syncope in children and teens
- To recognize cardiac etiologies for syncope
- To identify when to refer to cardiology

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Syncope Guidelines

Circulation
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American Heart Association.

ACC/AHA/HRS GUIDELINE

2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society

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Syncope Definition

- Abrupt, transient, complete loss of consciousness, associated with the inability to maintain postural tone, with rapid and spontaneous recovery
- The presumed mechanism is cerebral hypoperfusion
- Loss of consciousness is always complete
- Absence of clinical features of other non-syncope causes of loss of consciousness, such as seizure, antecedent head trauma, or apparent loss of consciousness

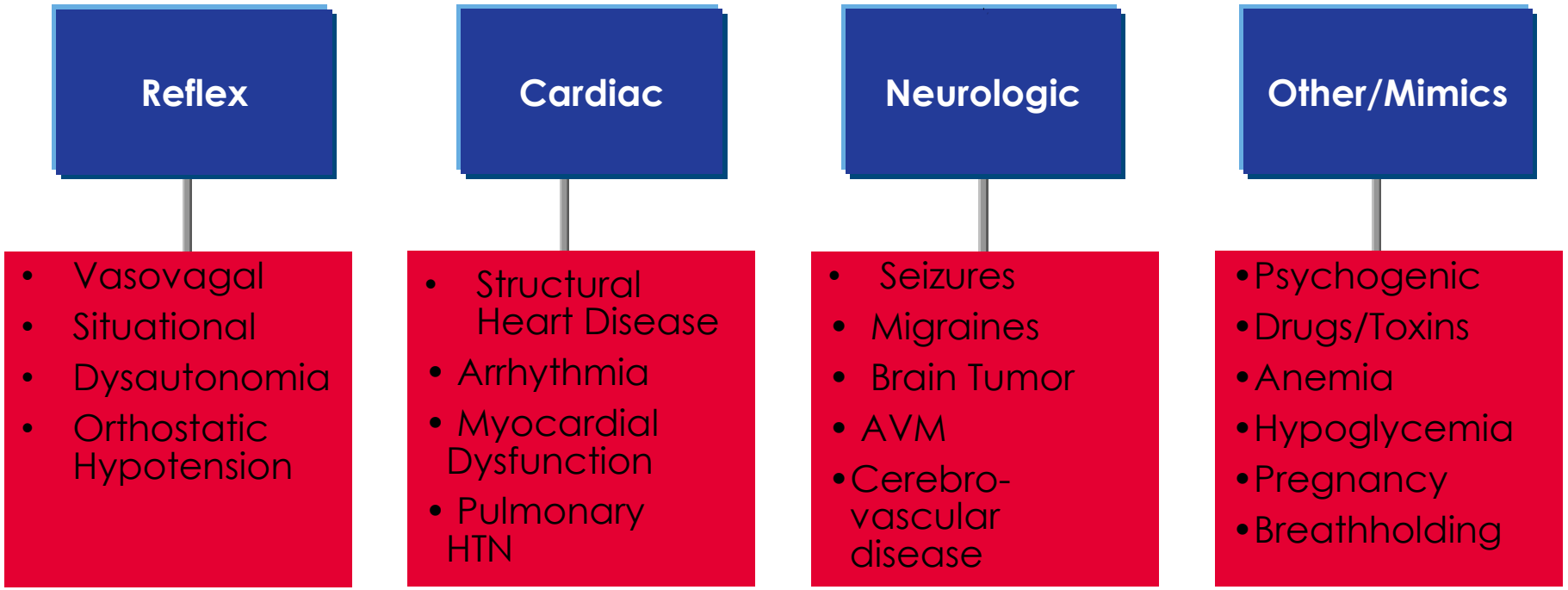
Orthostatic Intolerance

- A syndrome of symptoms including frequent, recurrent, or persistent lightheadedness, palpitations, tremulousness, generalized weakness, blurred vision, exercise intolerance, and fatigue upon standing
- Can occur with or without orthostatic tachycardia, orthostatic hypotension, or syncope
- Orthostatic tachycardia: sustained increase in HR ≥40 bpm (individuals 12-19 years) with standing
- Orthostatic hypotension: drop in systolic BP of ≥20 mmHg or diastolic BP of ≥10 mmHg within 3 min of standing

Incidence of Syncope

- By 18 years, 30-50% of children will have ≥1 syncopal episode
- Accounts for 3% of all pediatric ED visits
- Females > males
- Adolescent years most common
- Neurally mediated syncope: 75%
- Unexplained syncope: 8-15%
- Cardiac syncope: 1.5-6%

Etiologies of Syncope



History

- Prognosis
  - Neurally mediated vs. cardiac
- Diagnosis
  - Situation, prodromal symptoms, patient's self report, bystander observations, post-event symptoms
  - Time relationship to meals and physical activity
- Family history
  - 1st and 2nd degree relatives with history of syncope, sudden or unexplained death or accident, heritable arrhythmia, pacemaker, defibrillator, or cardiomyopathy

Physical Exam

- Vital signs
  - Baseline HR and BP
  - Orthostatic BP and HR (supine, sitting, standing, standing x 3min)

- Exam
  - Cardiac
    - Heart rate and rhythm
    - Murmurs, rubs, gallops

- Neurological
  - Focal defects or additional neuro concerns

ECG

- Widely available, inexpensive
    - Prospective adult studies did not conclude that ECG findings significantly affected subsequent management
    - In adults, prognostic value of abnormal ECG in patients with syncope has been questioned
- Rate
- Rhythm
- **QTc**
- **Ectopy**
- **WPW pattern**
- **Brugada pattern**
- LVH with T wave abnormality
- ST/T wave abnormality

Reflex syncope

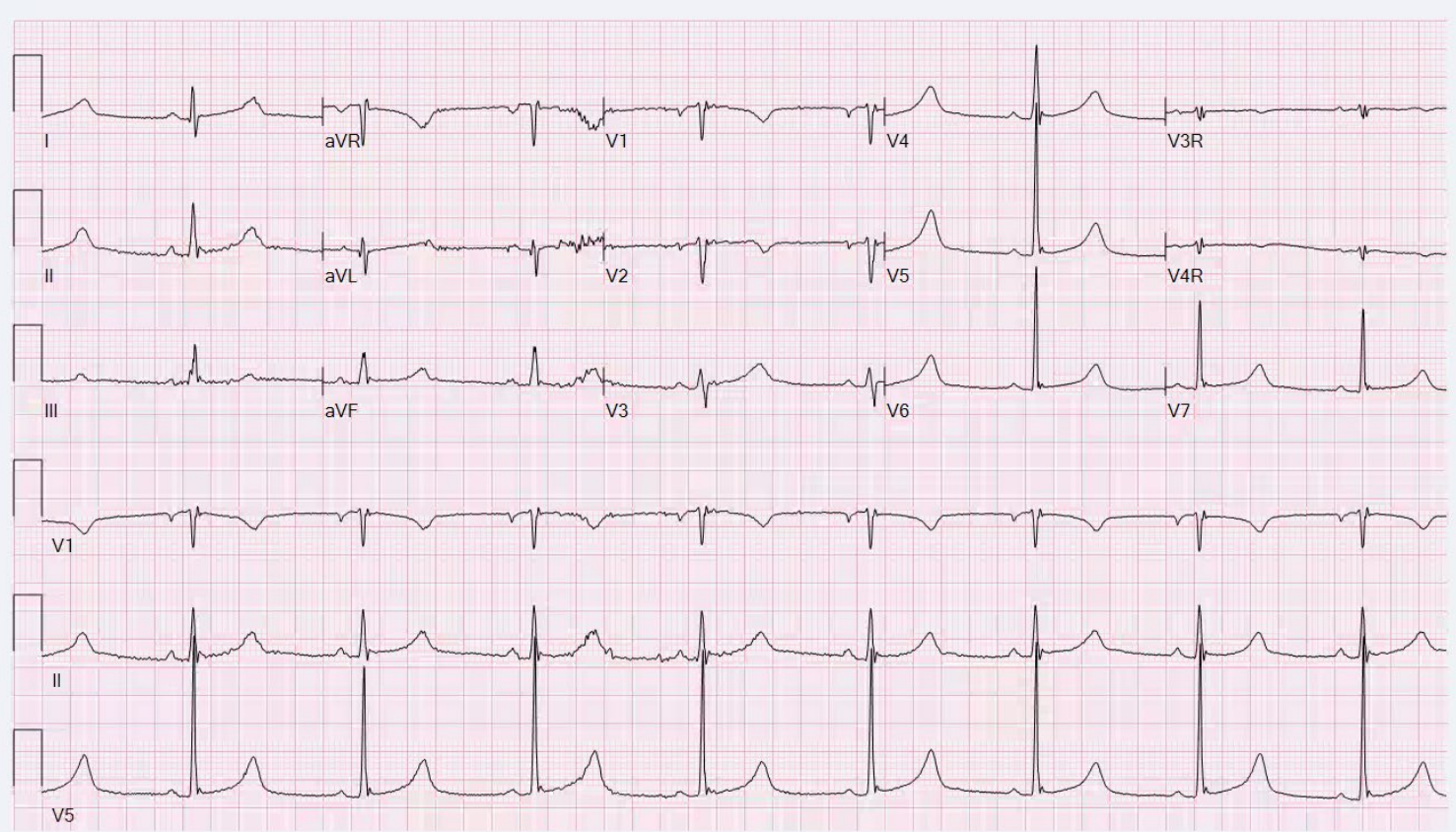
- Neurally mediated aka neurocardiogenic syncope
- Vasovagal syncope
  - Most common form of reflex syncope
  - May occur with upright posture or with exposure to emotional stress, pain, or medical settings
  - Often preceded by identifiable trigger and by a prodrome (warmth, nausea, pallor)
  - Dx made by history, physical, eyewitness observation
- Situational syncope
  - Coughing, laughing, swallowing, micturition, defecation, hair brushing (females), haircut (males)

Differential diagnosis

- Cardiac causes of loss of consciousness:
  - Caused by bradycardia or tachyarrhythmia
  - Hypotension due to low cardiac output, blood flow obstruction, or vasodilation

- Non-cardiac causes:
  - Reflex syncope, orthostatic syncope, volume depletion, dehydration, blood loss, seizure

Long QT syndrome



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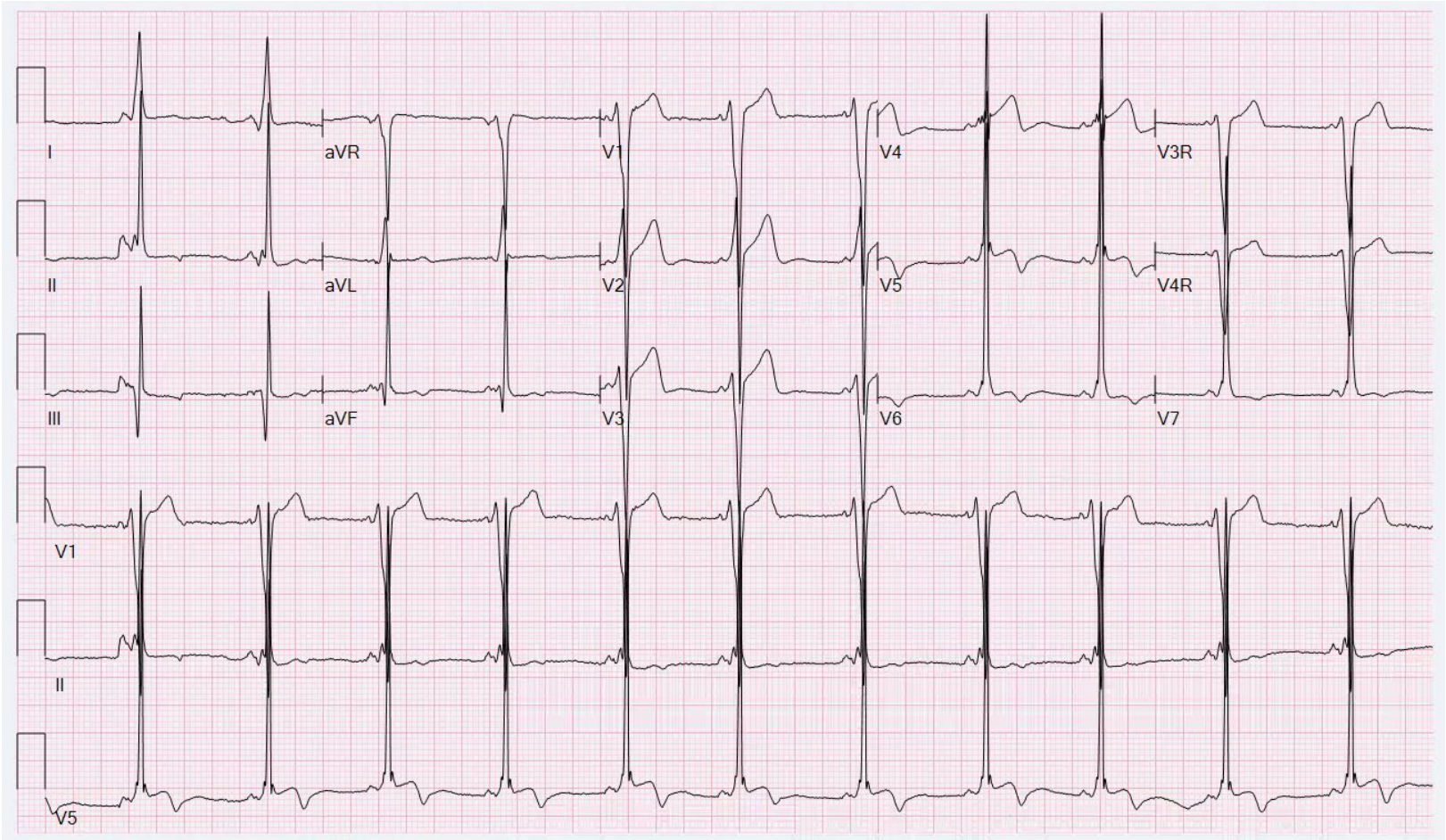
Wolff-Parkinson-White Syndrome



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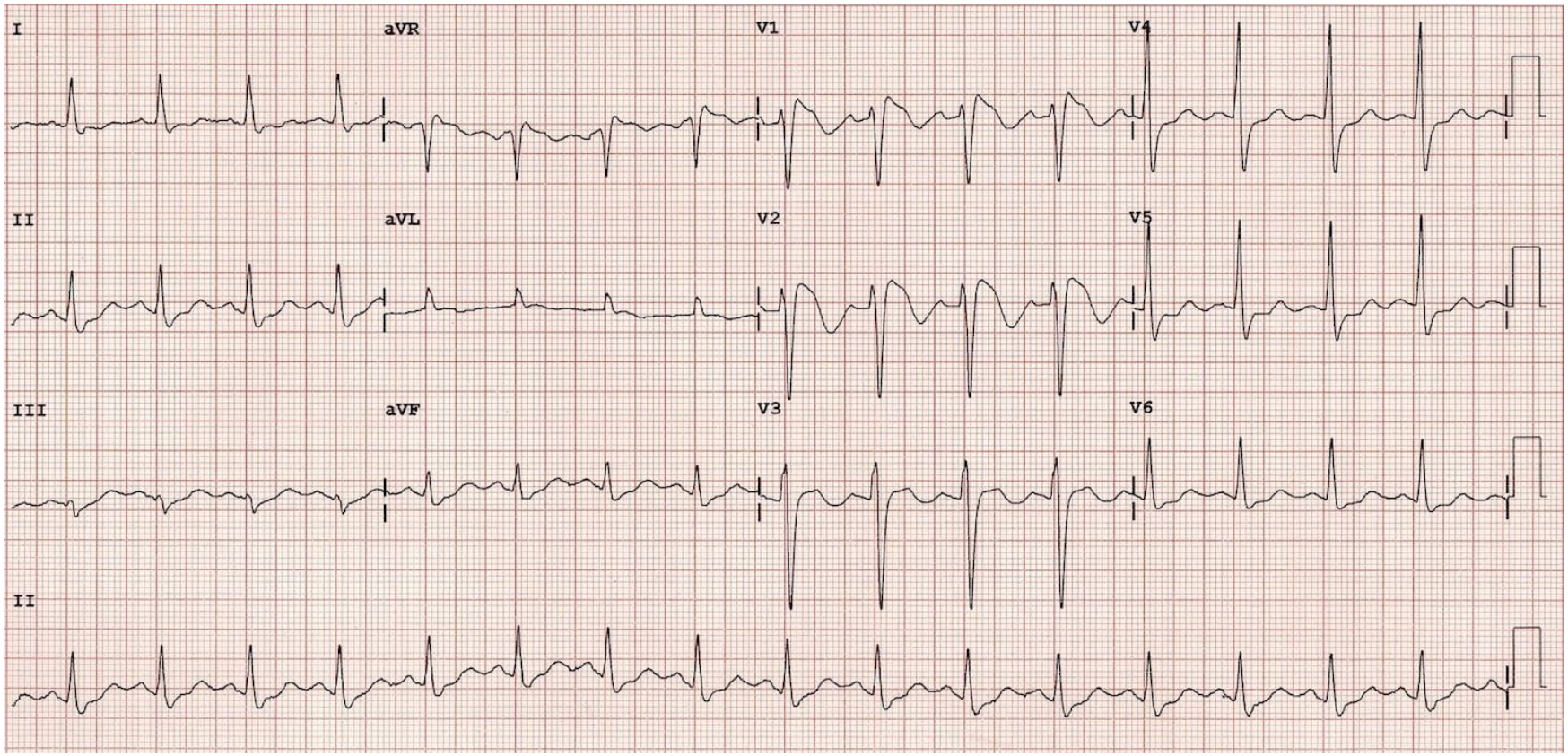
Brugada syndrome



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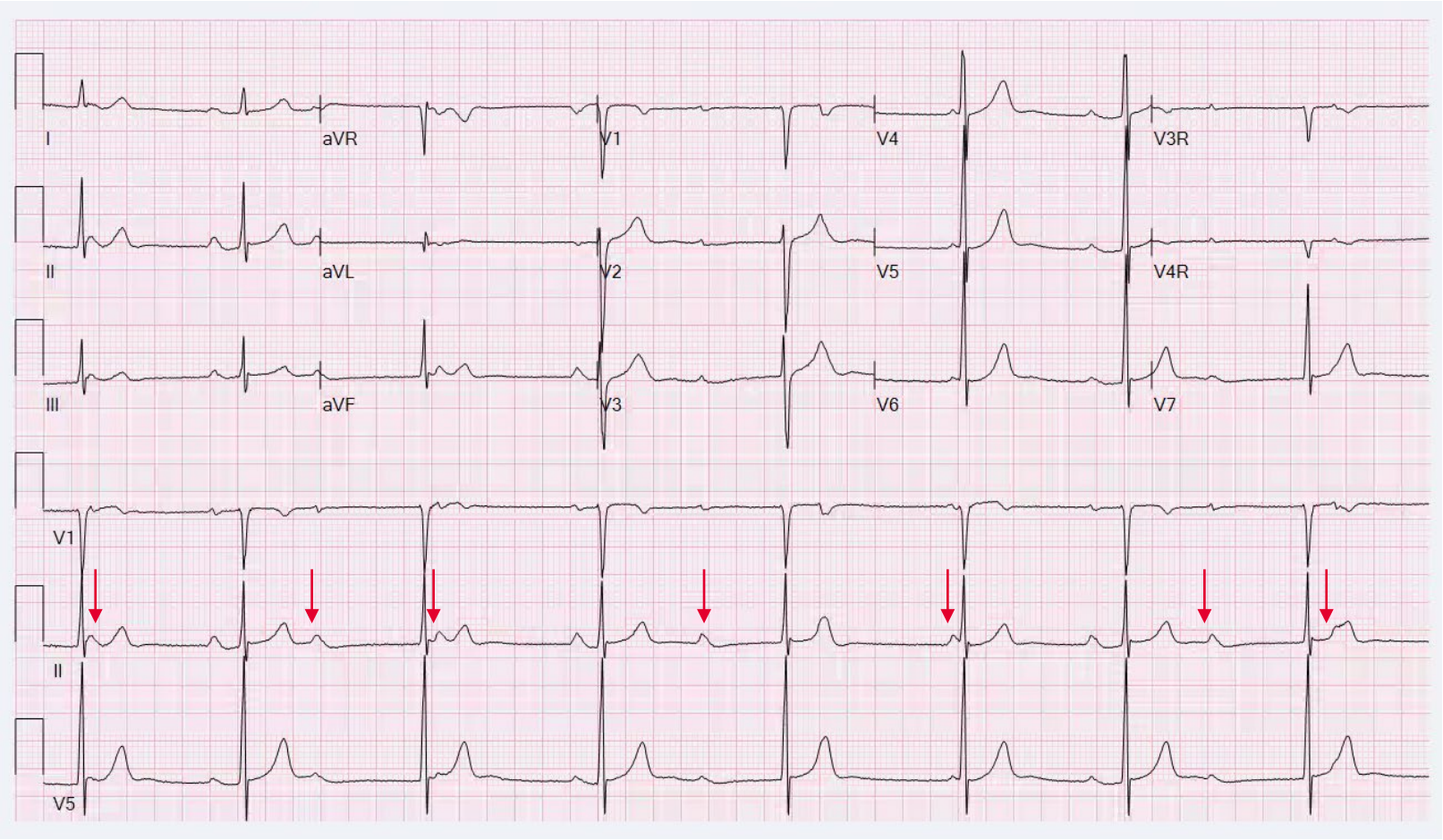
Bradycardia

- Symptomatic sinus bradycardia
- Sinus pauses
- High grade AV block (i.e. 2nd degree AV block or 3rd degree complete heart block)

Bradycardia



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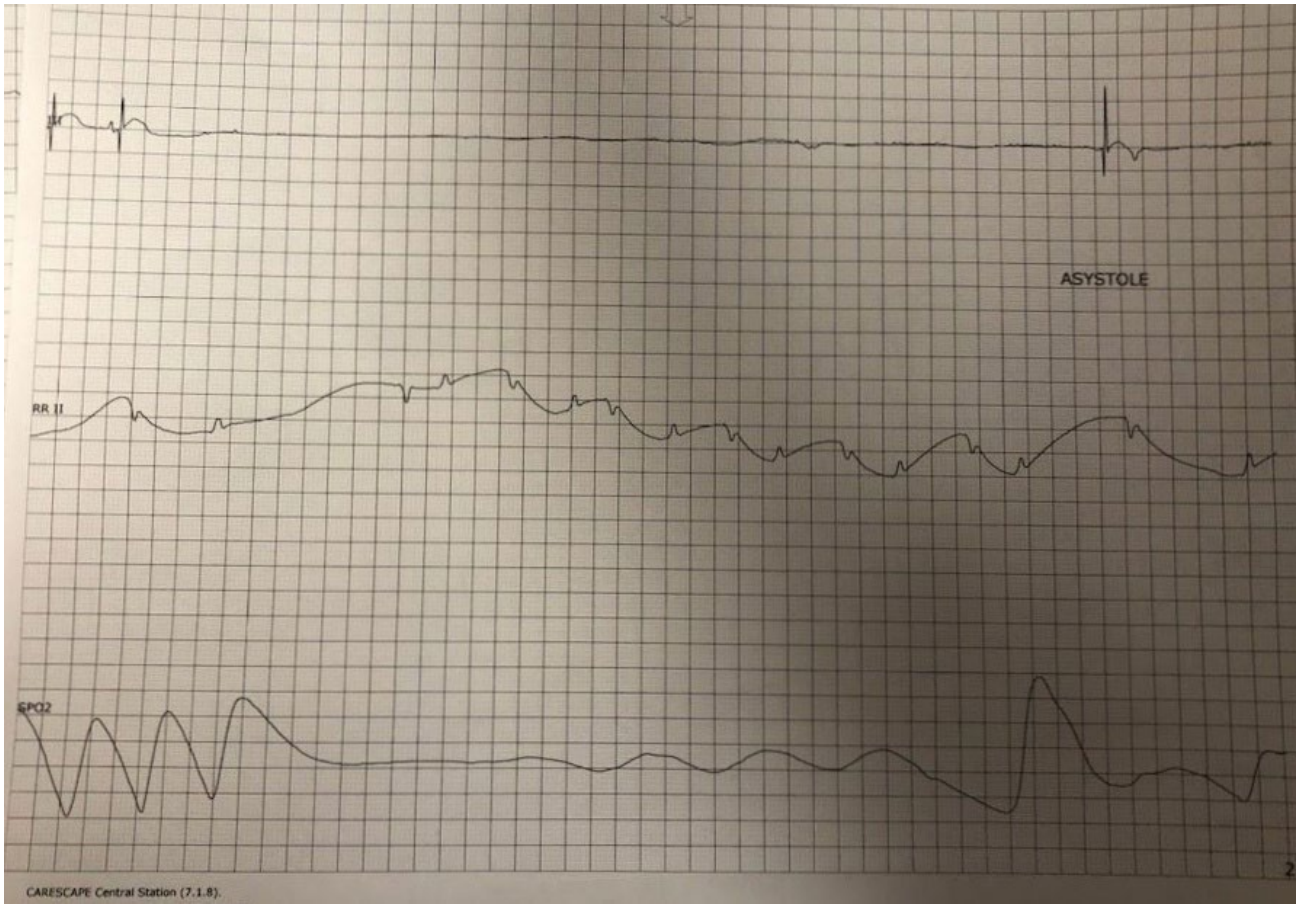
Sinus Pauses



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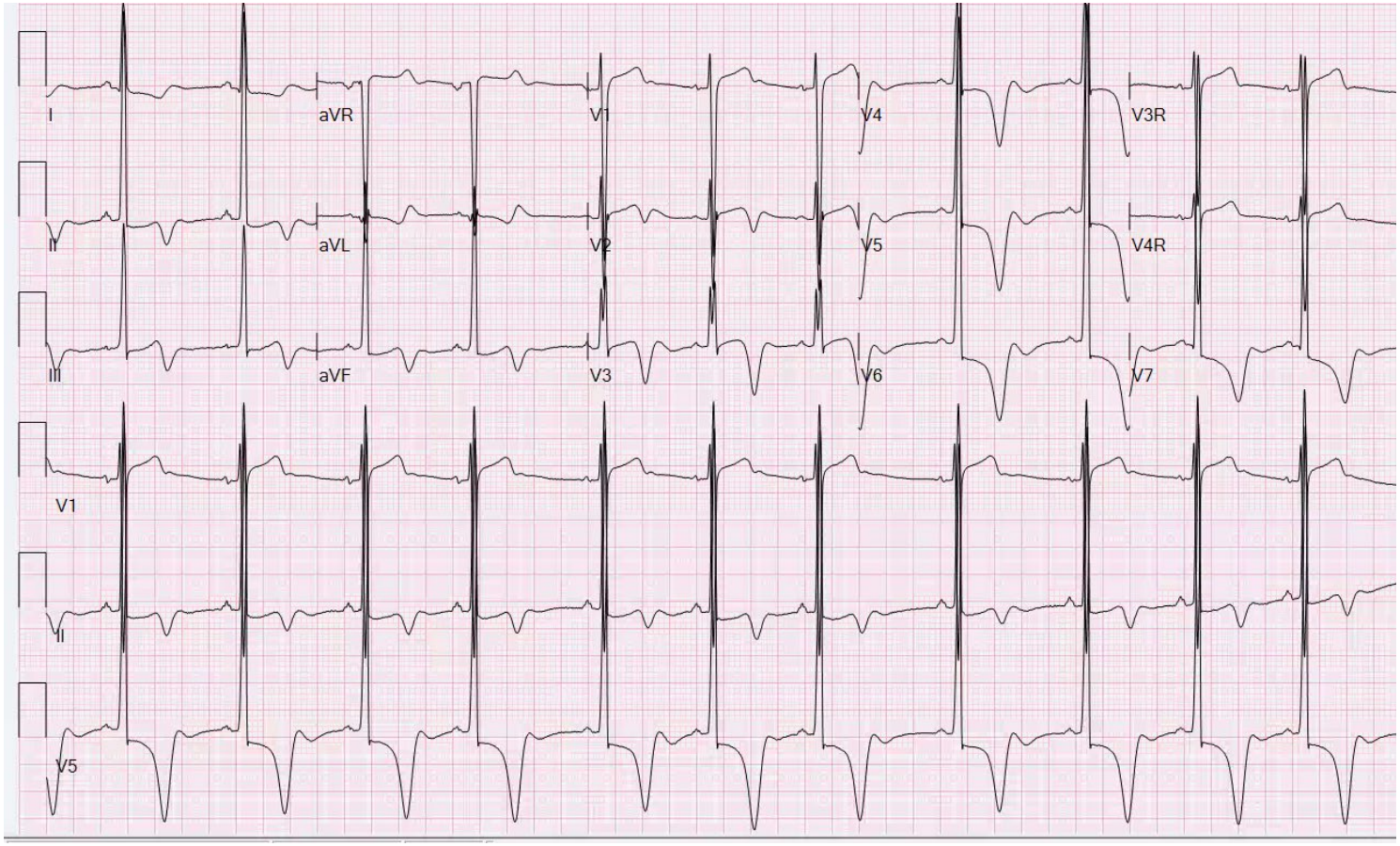
Hypertrophic Cardiomyopathy



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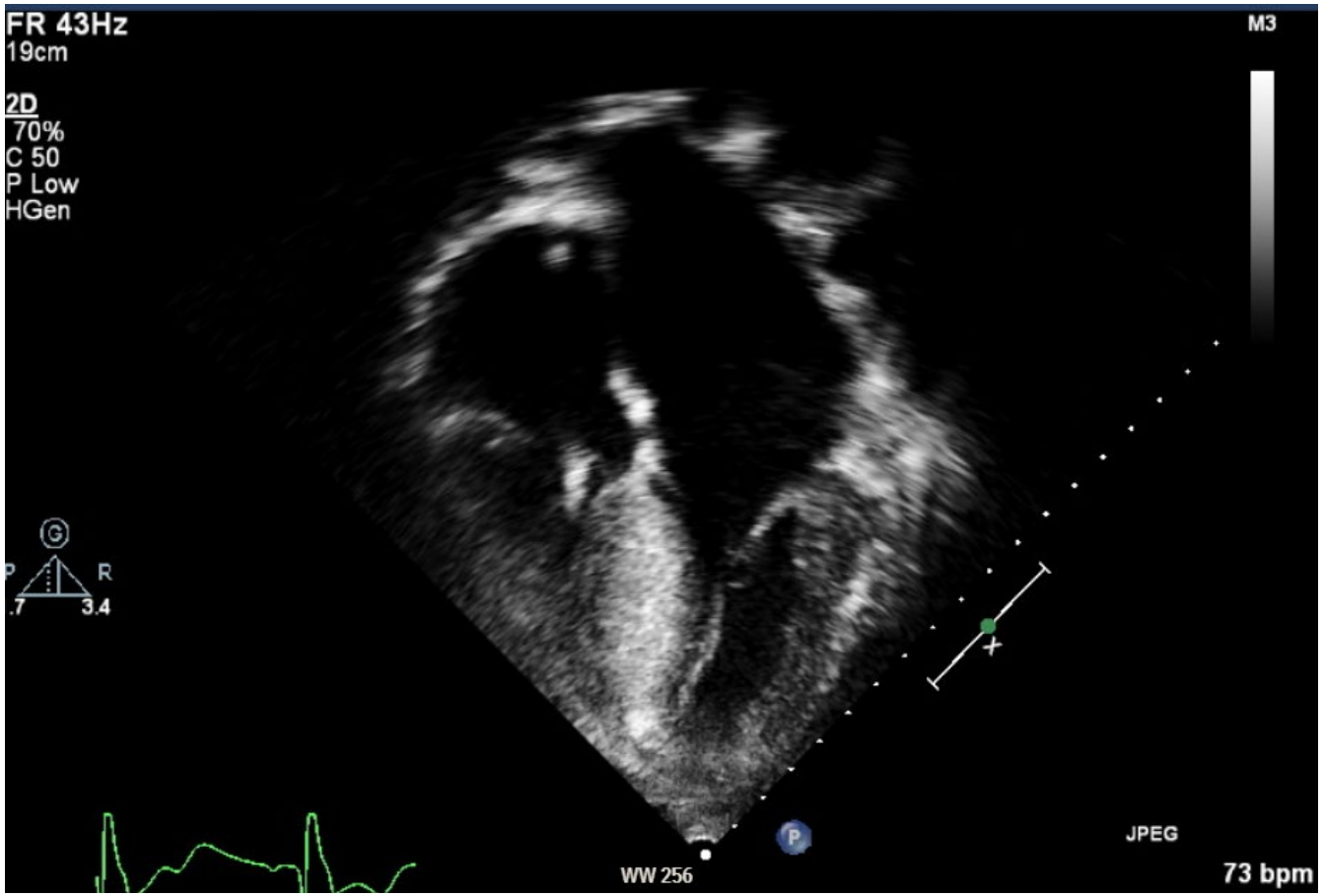
Hypertrophic Cardiomyopathy



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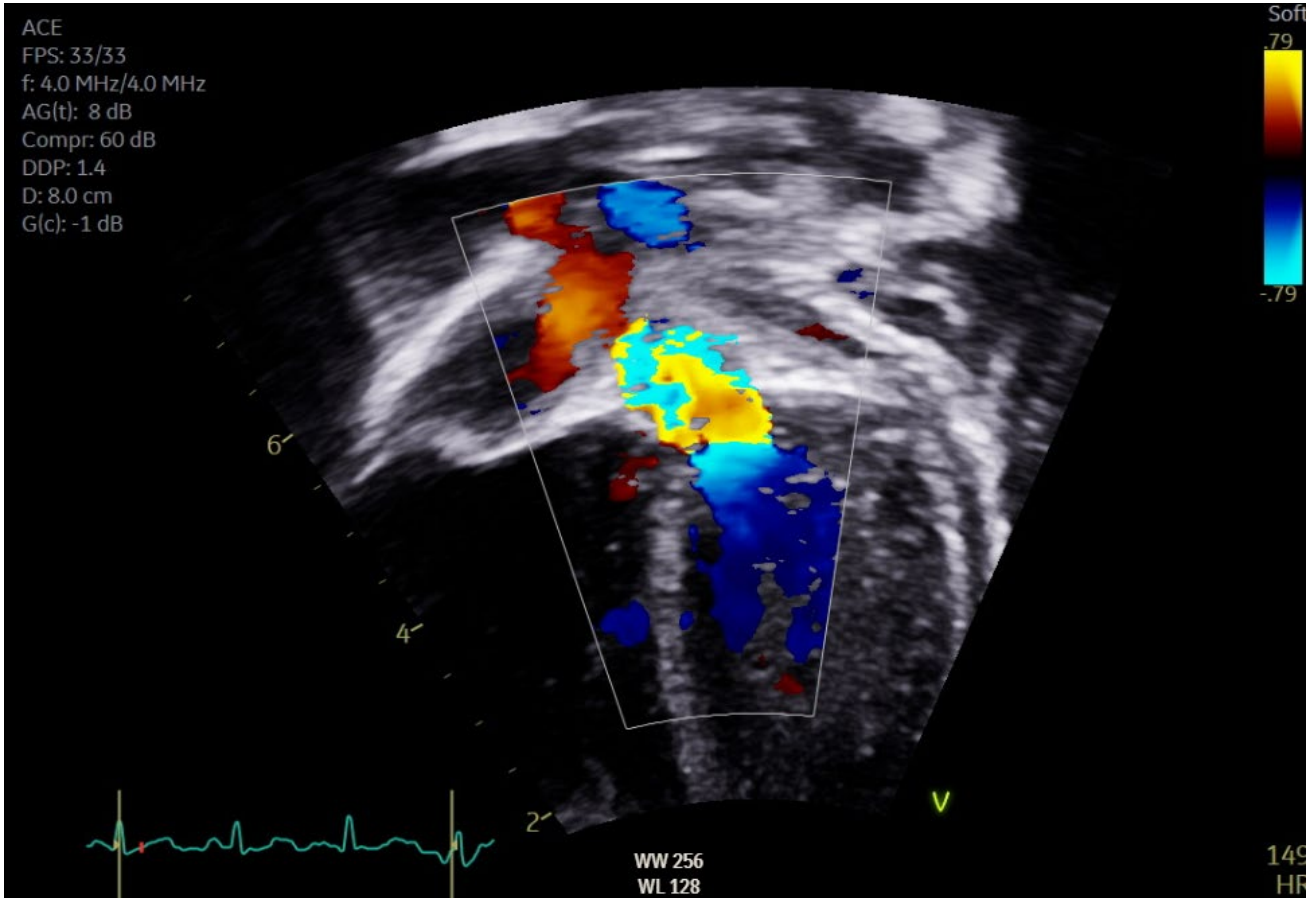
Aortic Stenosis



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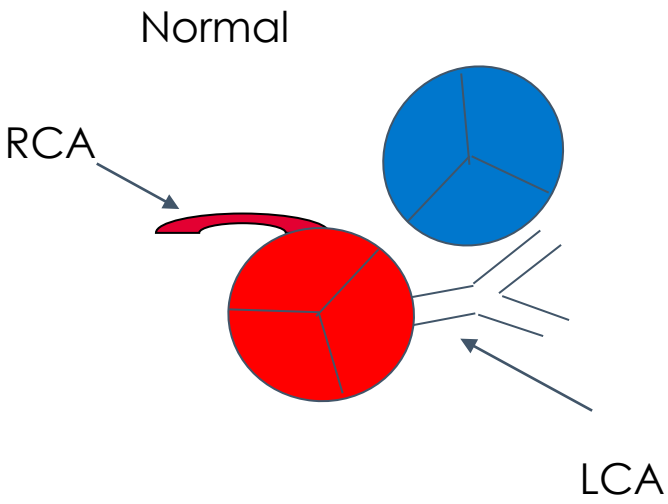
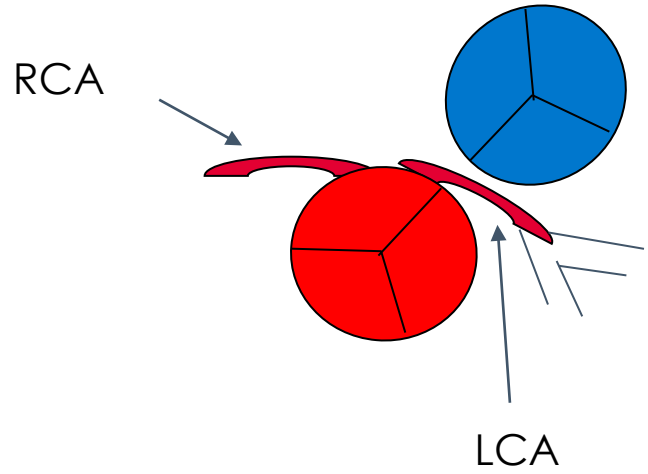
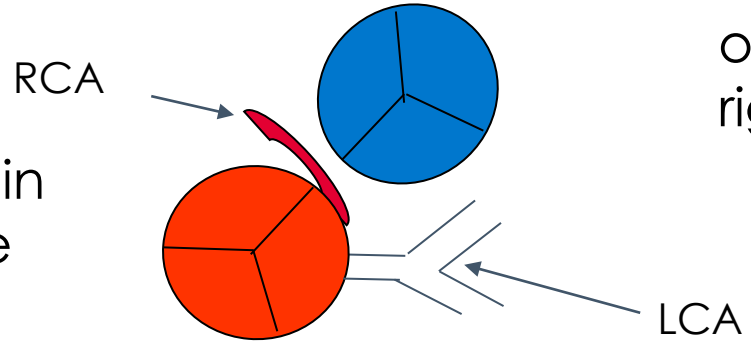
Coronary Artery Anomalies

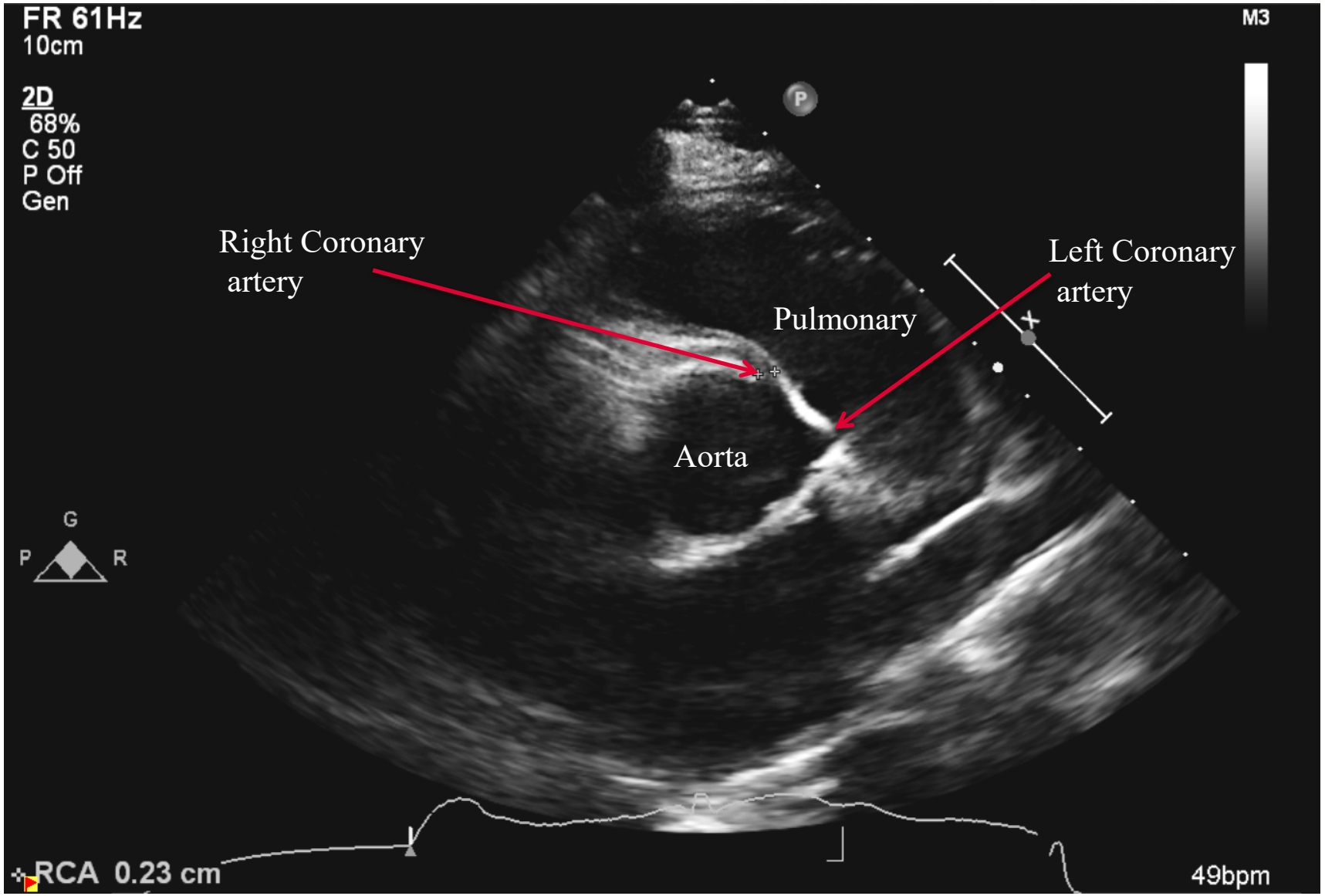




Anomalous origin of LCA from the right sinus



Anomalous origin of RCA from the left sinus



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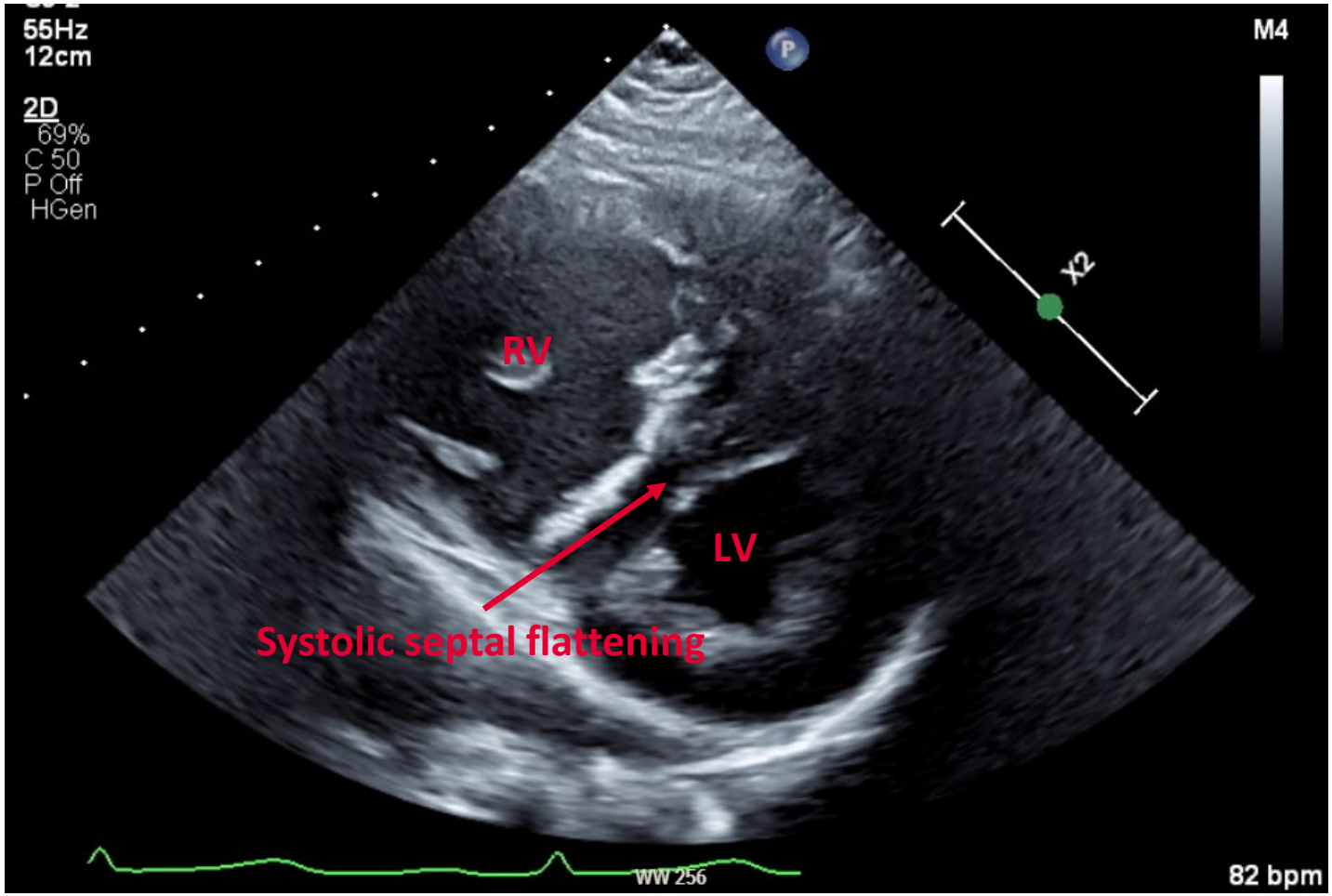
Pulmonary hypertension



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Associated Conditions

- Anemia – Iron deficiency
- Vitamin B12 deficiency
- Bedrest - Deconditioning
- Side effect of Medications – diuretics, vasodilators
- Dehydration, skipped meals, weight loss
- Endocrinologic Abnormalities
    - Hyperthyroidism
    - Adrenal insufficiency
    - Hypoparthyroidism
    - Hypoaldosteronism
- Diabetes Mellitus
- Rheumatologic Disease - Sjögren's syndrome, SLE
- Mitochondrial Disease

Non-Pharmacologic Treatment of Vasovagal Syncope

- Increase fluid intake
  - 64+ oz water per day
  - Clear urine
  - Avoid caffeine (diuretic)

- Increase salt intake
  - At least 3-4g/day
  - Increase dietary salt (i.e. pickles, olives, salted nuts, salted pretzels)
  - Add electrolytes to water (i.e. electrolyte powders, sports drinks)
  - Consider salt tablets 1-2x per day

Non-Pharmacologic Treatment of Vasovagal Syncope

- May be as useful or more so than pharmacologic Rx
- Avoid exacerbating factors:
    - Medications – Vasodilator or Sympathomimetic drugs
    - Dehydration, skipped meals
    - Menstrual cycle
    - Sudden changes in posture – arise slowly and in stages
    - Supine, seated and then standing
    - Inactivity and /or prolonged recumbency
    - Avoid prolonged standing and walking in hot weather
    - High temperatures, hot tubs, long/hot showers
- Sleep hygiene
- Exercise
    - Aerobic exercise with leg muscle strengthening regimen

Red flags → When to refer

- Age
- Absence of prodromal symptoms
- Preceding palpitations seconds prior to syncope
- Exertional syncope
  - Mid-exertion
- Chest pain preceding syncopal event
- Family history of SCD in first/second degree relative
- Abnormal physical exam
- Abnormal ECG

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Questions or comments?

Please feel free to reach out:
dfinkels@childrensnational.org

Thank You!