Chest Pain in the Pediatric Population Hot Topics

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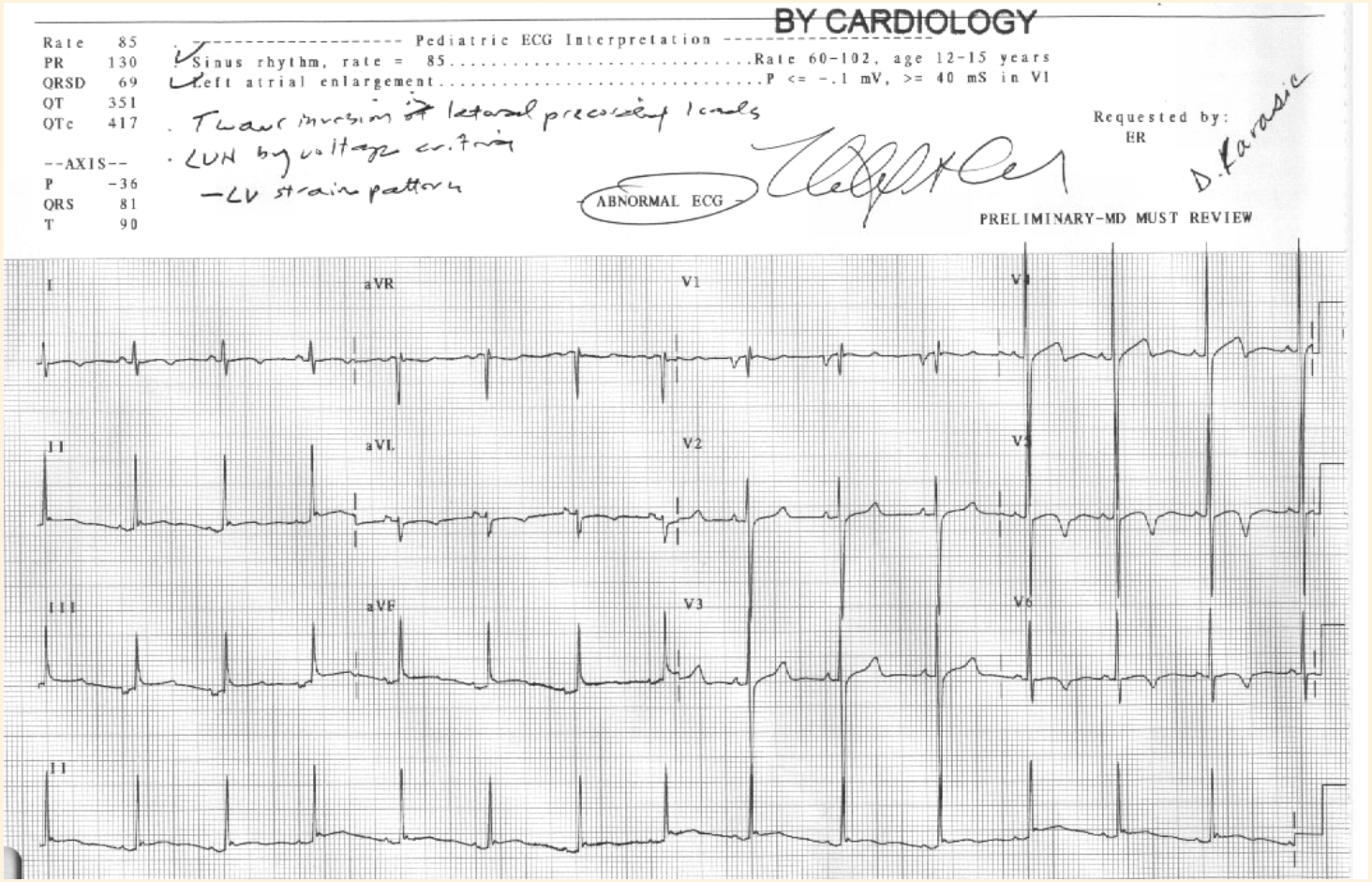
NEMOURS
CHILDREN'S HEALTH

A) 14 y/o with syncope/CP

- New onset syncope/chest pain
- Marfanoid features
- Loud P2
- ECG LVH with strain
- Echo aortic dissection, Blood in pericardium
- CT confirmed

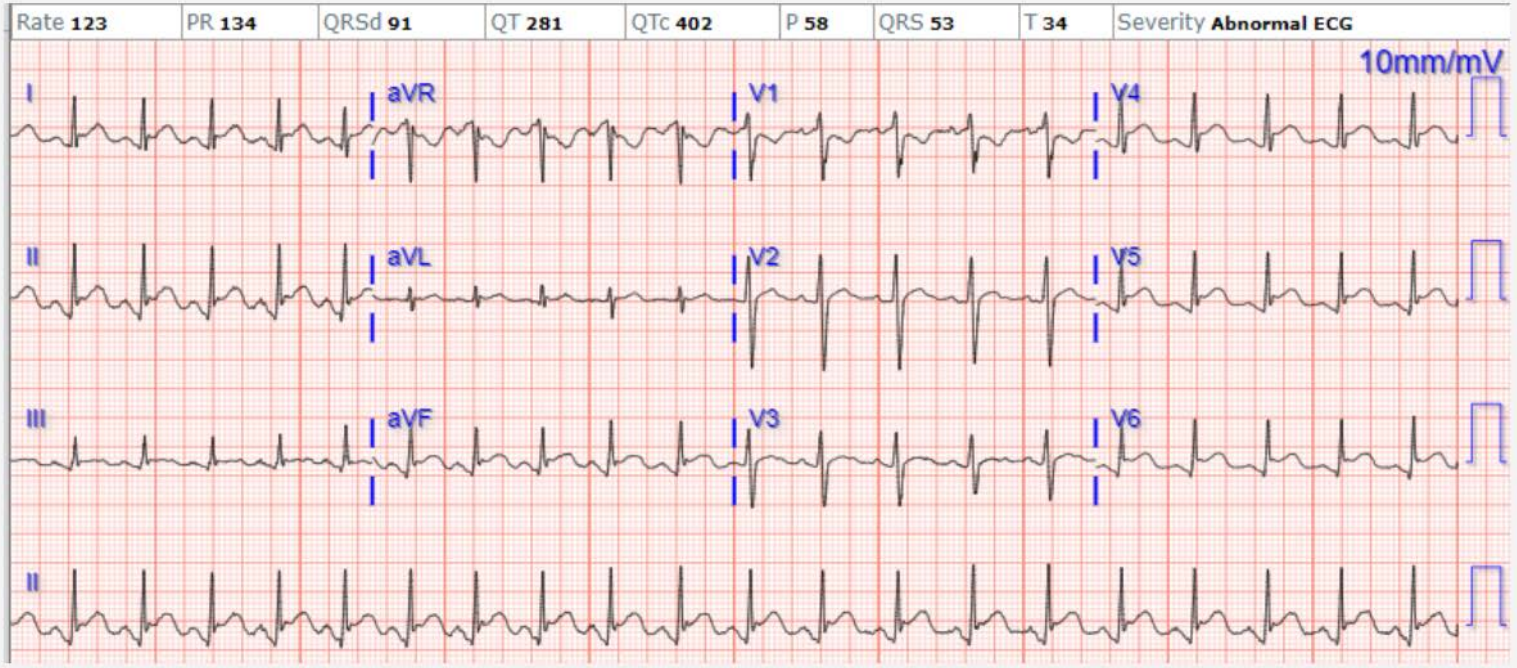
ECG of 14 y/o


BY CARDIOLOGY
Rate 85
PR 130
QRSD 69
QT 351
QTc 417
--AXIS--
P -36
QRS 81
T 90
Pediatric ECG Interpretation
Sinus rhythm, rate = 85
Rate 60-102, age 12-15 years
Left atrial enlargement
P <= -.1 mV, >= 40 mS in V1
T wave inversion in lateral precordial leads
LVH by voltage criteria
-LV strain pattern
ABNORMAL ECG
Requested by:
ER
D. Farasic
PRELIMINARY-MD MUST REVIEW
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

B) 14 y/o with CP with this ECG

History:

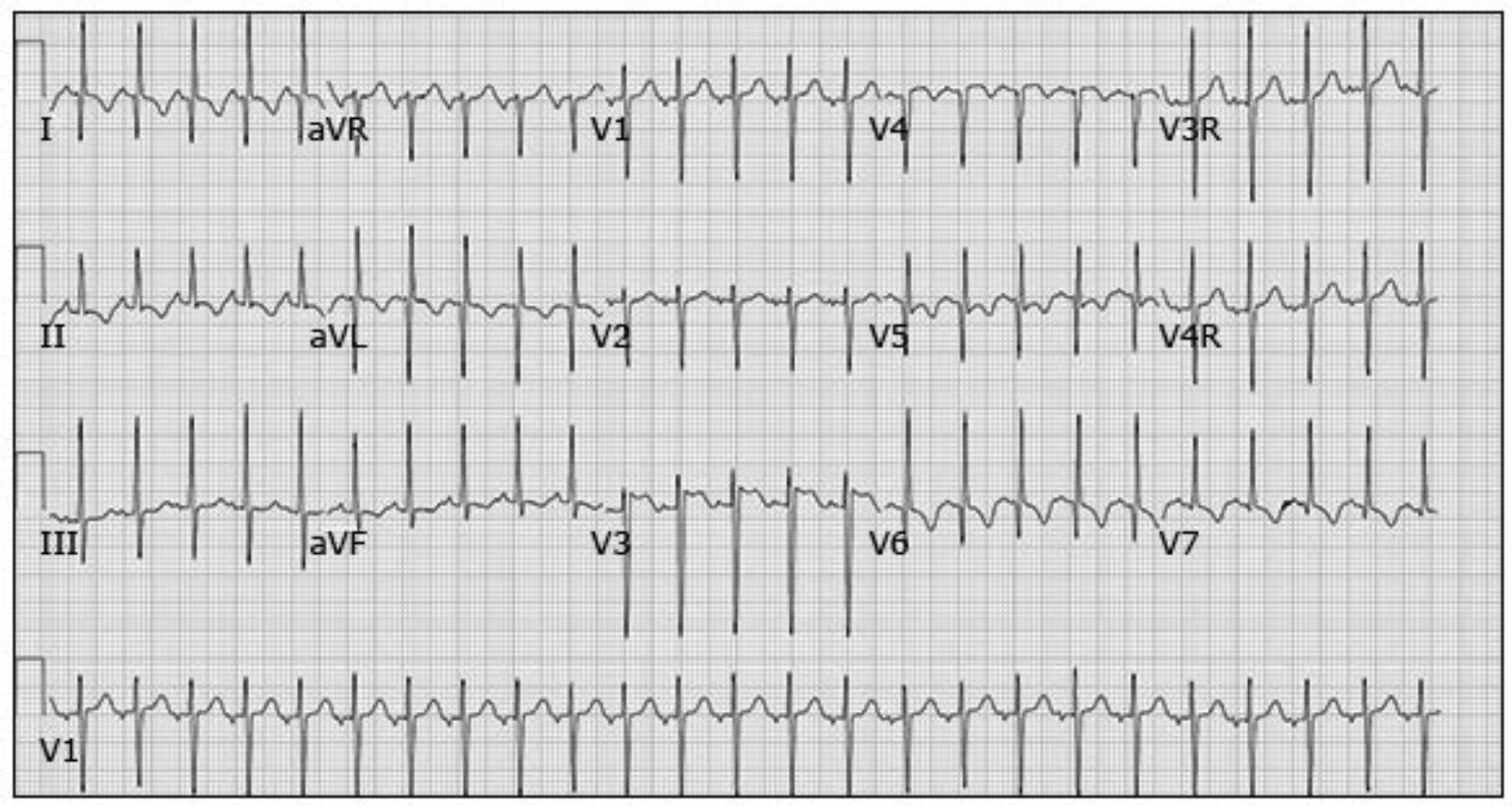
14 year old male with chest pain



14 y/o with CP answer

- Dx Sinus tachycardia
- PR depression
- Flat ST elevation in inferior/lateral leads
- R/o pericarditis
- Dx: MISC with elevated troponins

C) Infant with colic



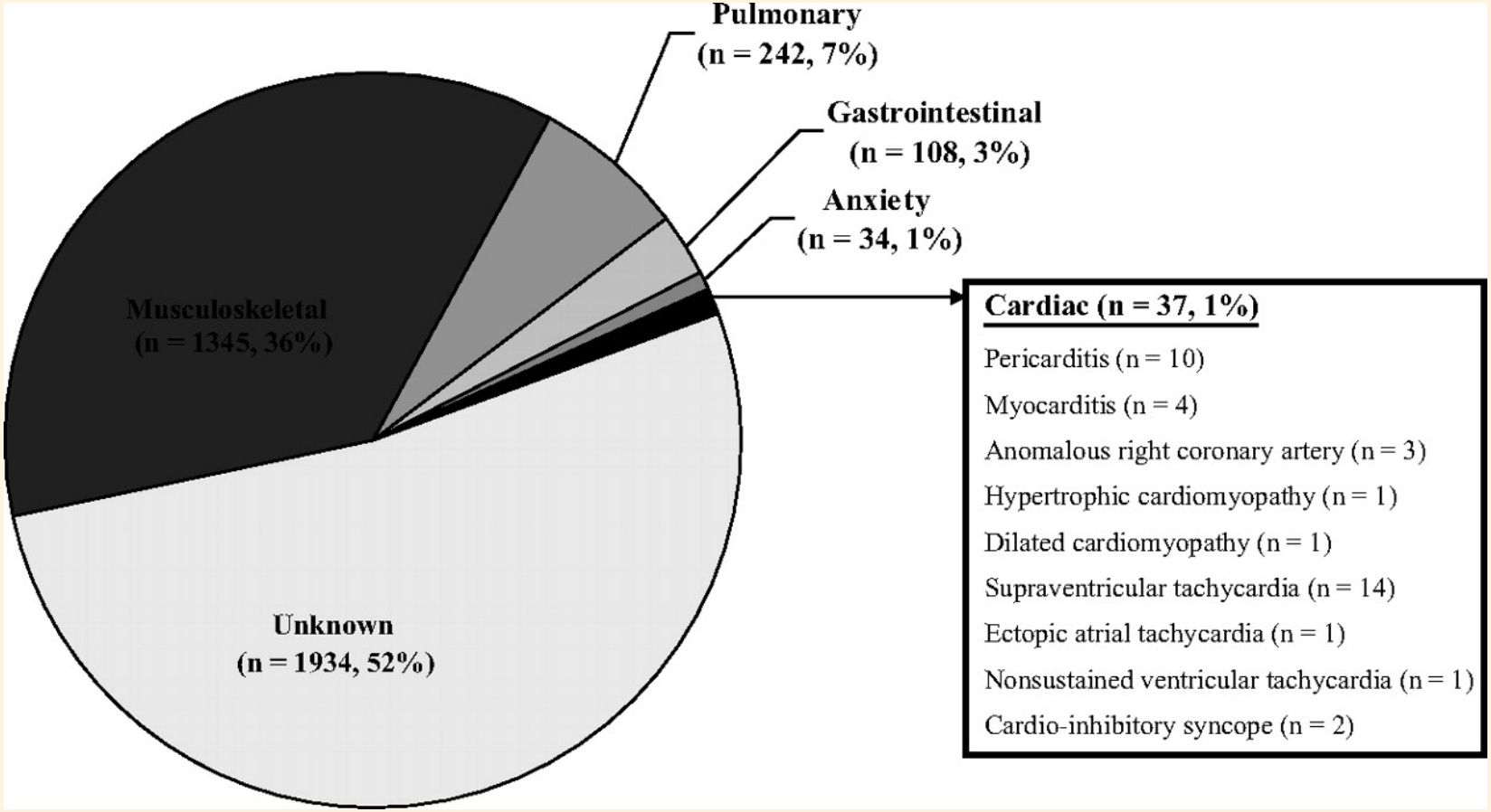
OBJECTIVES

- I. Know common causes of cardiac chest pain (non-cardiac/cardiac)
- II. History/Work up
- A) Primary MD B) Cardiologist
- III Know when to refer chest pain
- A) Emergent B) Elective

Summary (Saleeb et al 2011)

- Objective: Incidence of SUD after cardiology clinic (with CP)
- Methods: 10 years c/o CP in >6 y/o
- Searched National death index/SS
- Results: 3700 with CP (median age 13.4)
- 37 had cardiac cause (1%)
- 3663 (99%) non-cardiac cause
- None died of cardiac cause after discharge

Cardiac causes of chest pain



Susan F. Saleeb et al. Pediatrics 2011;128:e1062-e1068

PEDIATRICS®

Cardiac causes of CP (1%)

Cardiac (n = 37, 1%)

Pericarditis (n = 10)

Myocarditis (n = 4)

Anomalous right coronary artery (n = 3)

Hypertrophic cardiomyopathy (n = 1)

Dilated cardiomyopathy (n = 1)

Supraventricular tachycardia (n = 14)

Ectopic atrial tachycardia (n = 1)

Nonsustained ventricular tachycardia (n = 1)

Cardio-inhibitory syncope (n = 2)

OBJECTIVES

I. Know common causes of cardiac chest pain (non-cardiac/cardiac)

II. **Work up History and physical exam**

A) primary MD B) Cardiologist

III. Know when to refer chest pain

A) Emergent B) Elective

History

- Crushing exertional CP for <1 minute
- Burning CP after meals worse reclining
- Sharp CP worse with inspiration
- Something else…syncope, palpitations, fever, decrease pulse ox warrants referral

Summary (JACC 2020, Chen et al)

- Methods: 23,868 patients with AD in 2015
- Taiwan Natl Registry, Studied RR,
- Results: FHX of AD in first degree relatives associated with RR of 6.82 of AD
- Excluding Marfan, BCAV, RR 6.56*
- Patients with AD and Fhx, higher risk of later aortic surgery (than those with AD without Fhx)

Physical Exam

- Vital signs: supine and standing
- Brachial right arm blood pressure sitting
- Palpation of chest (Often forgotten but most helpful if find)
- Cardiovascular exam supine/standing, Diastolic murmur, BP difference
- Marfan syndrome stigmata, bifid uvula

Lab work up for chest pain

PRIMARY CARE MD

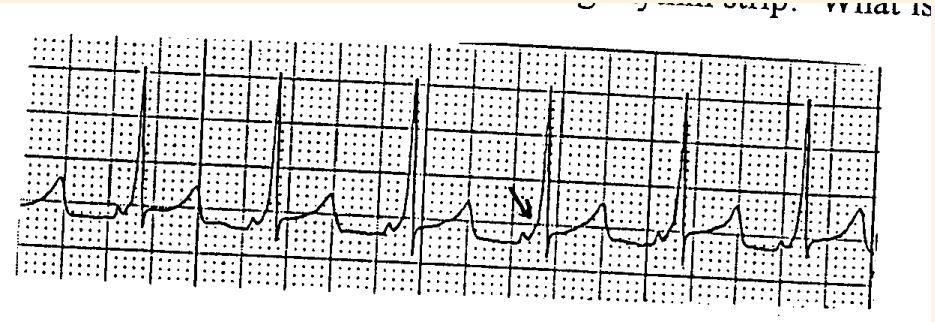
Pulse ox (decreased in pulm emboli)

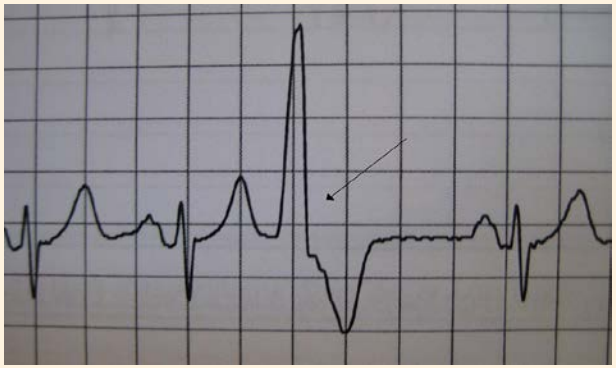
- ECG (r/o WPW, long QT, PVCs, Brugada, IHSS)
- Chest xray (r/o pneumonia, pnthx)
- Drug screen

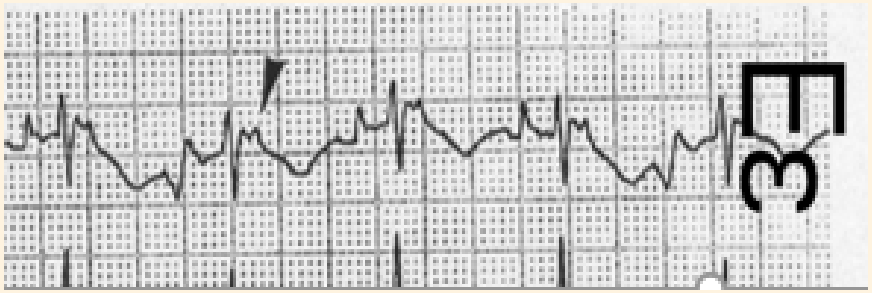
- Are valuable in CXR and ECG helpful in CP evaluation for primary MD?
- Yes per Swenson et al in 1997

6 ECG Red flags to know

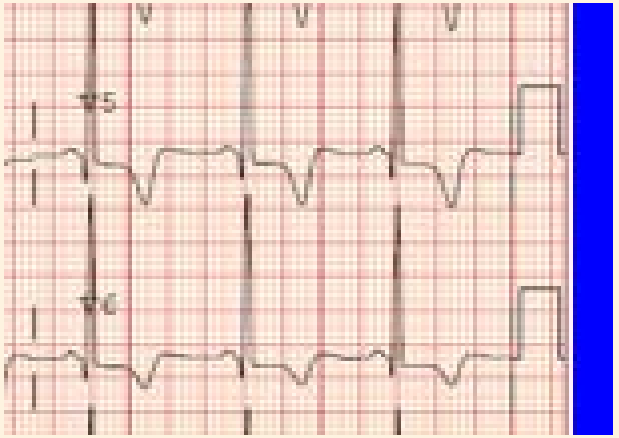
- 1. LVH with strain (HCM)
- 2. Epsilon wave (RV dysplasia)
- 3. Long QT interval
- 4. Delta wave (WPW)
- 5. RBBB with ST-T wave elevation (Brugada)
- 6. PVC (CPVT)








II


V
V
V
V5
V6

Lab work up for chest pain

SPECIALIST What are important findings to look for? Pulse ox (decreased in pulm emboli)

- ECG (see previous slide)
- Chest xray (r/o pneumonia, pnthx)
- Echo 1410 (38%) 11 positive relative to CP
- Holter/loop/event monitors (491 or 13.3%) 13 dx with arrhythmia 11/13 had palpitations
- EST NOT helpful for cardiac cause 769 (20.8%) and only 1 positive (false) resp dx was made

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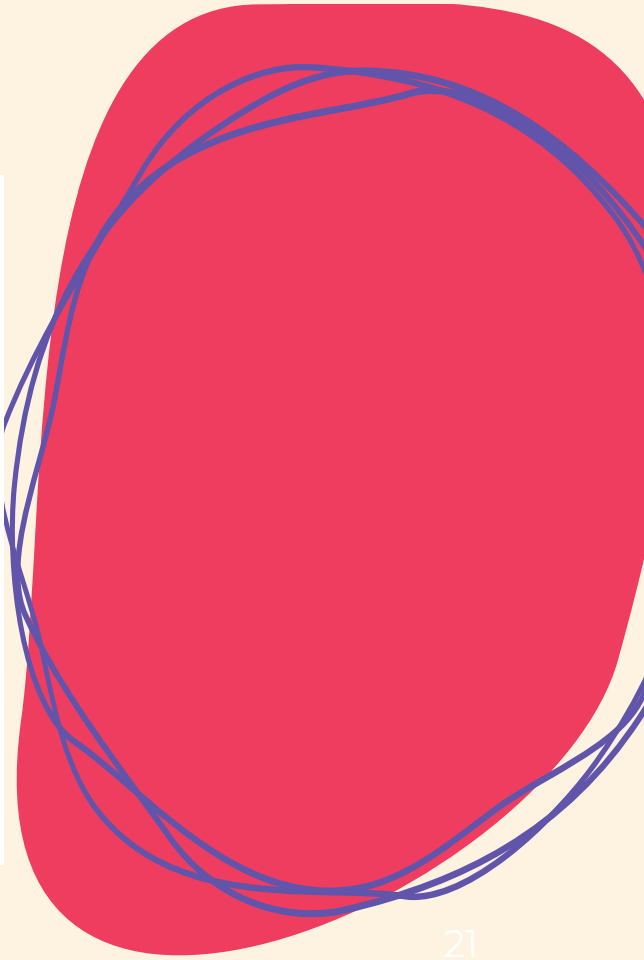
When to refer chest pain-need something else….

- 1. History-was exertional? Crushing?
- 2. Physical Exam-Marfanoid, distress
- 3. Lab tests: (Office) Pulse ox, ECG , CXR, Echo, Holter, Event monitor, Drug Screen
- 4. Positive FHx of CMp, Long QT SUD, Brugada, Aortic Dissection (AD)
- 5. High levels of anxiety in family

OBJECTIVES

- III. Emergent Referral
- A) Aortic dissection Marfan
- B) Chest pain after Covid
- C) Infant Colic from ALCAPA



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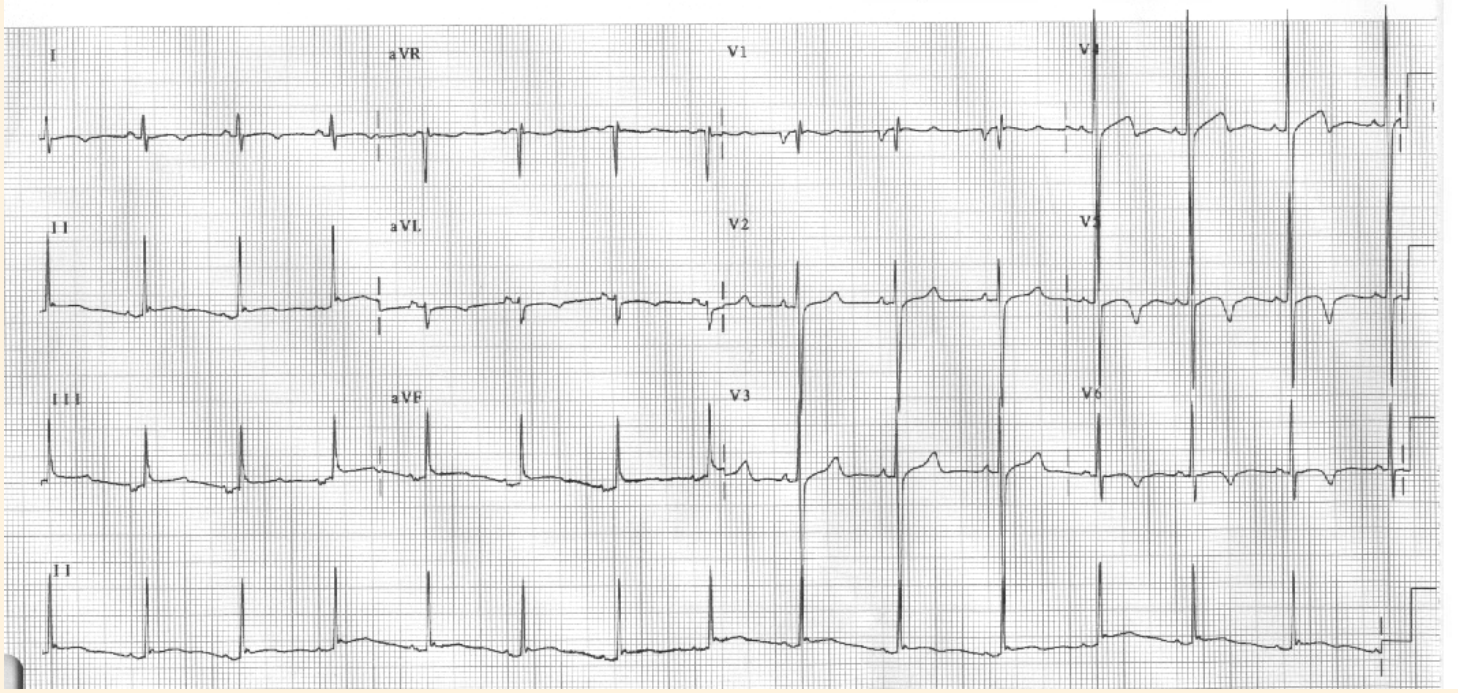
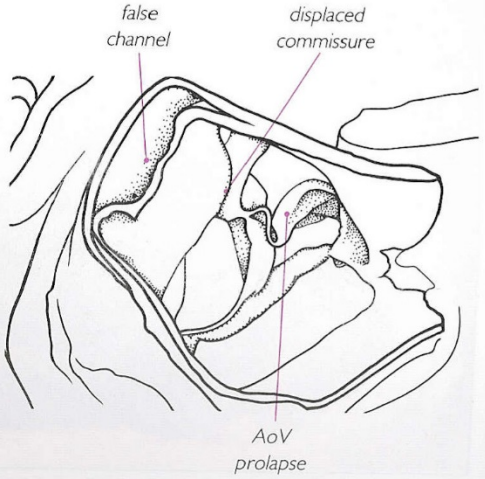


Aortic Dissection

Fig. 13.61 Aortic dissection; an intramural haematoma has displaced the commissure leading to prolapse of leaflets and valvar insufficiency.



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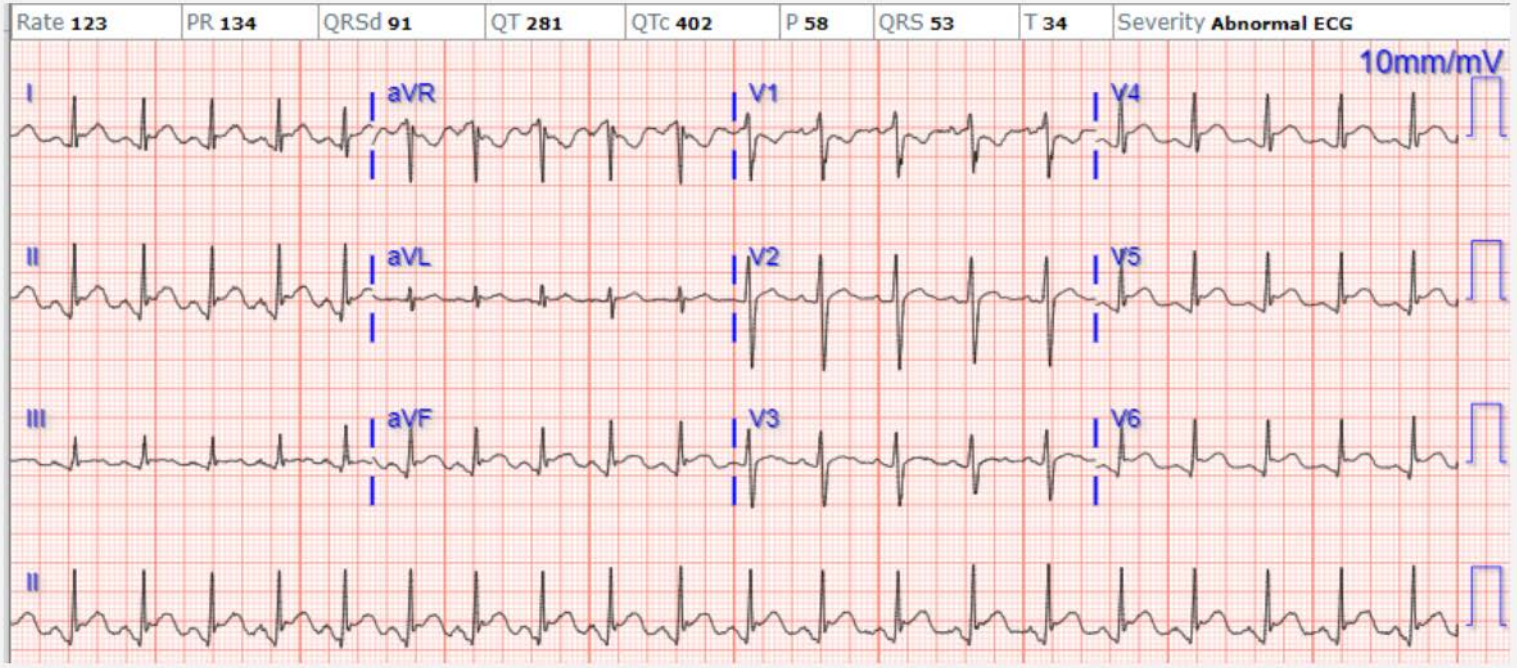

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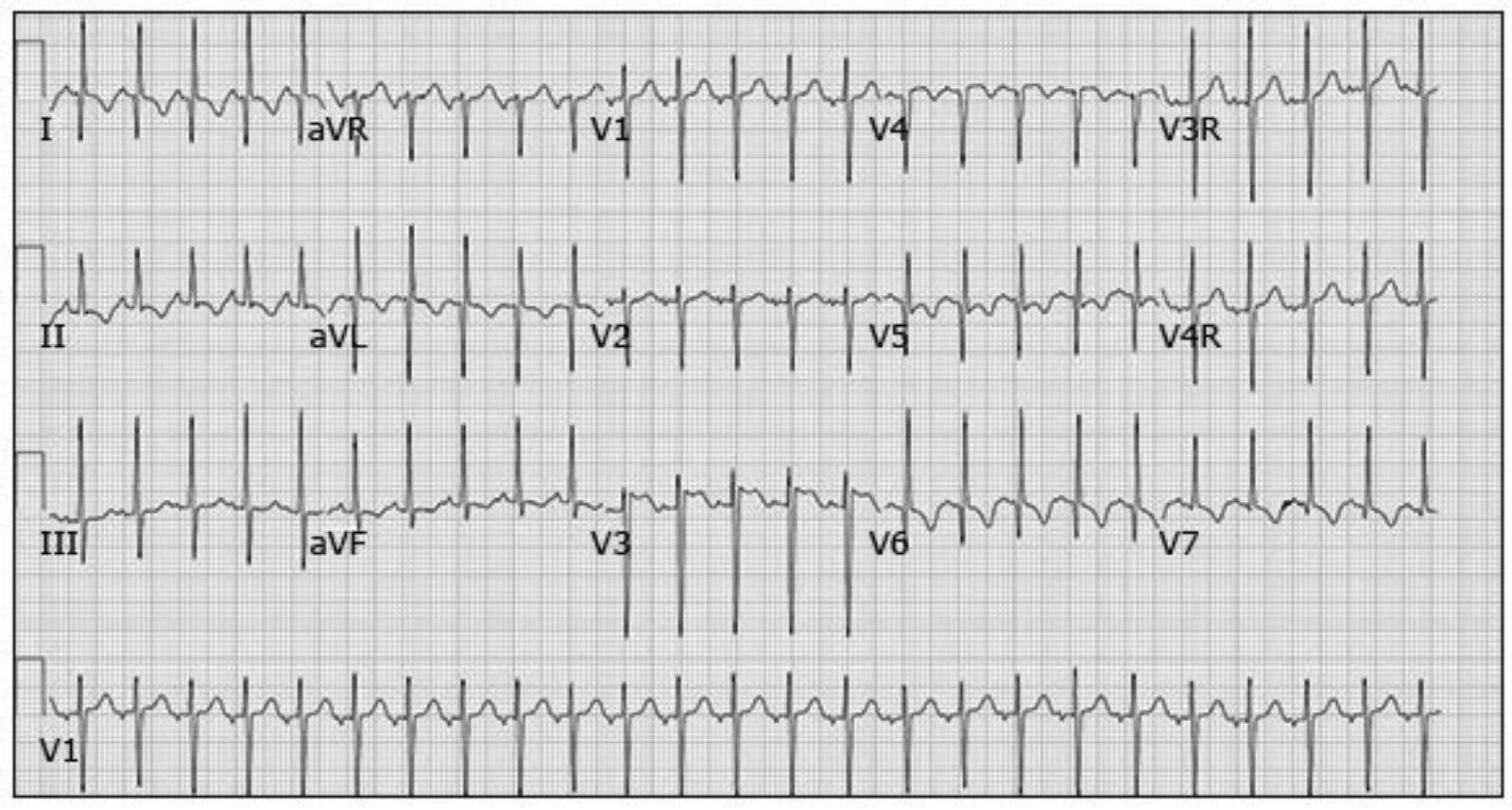

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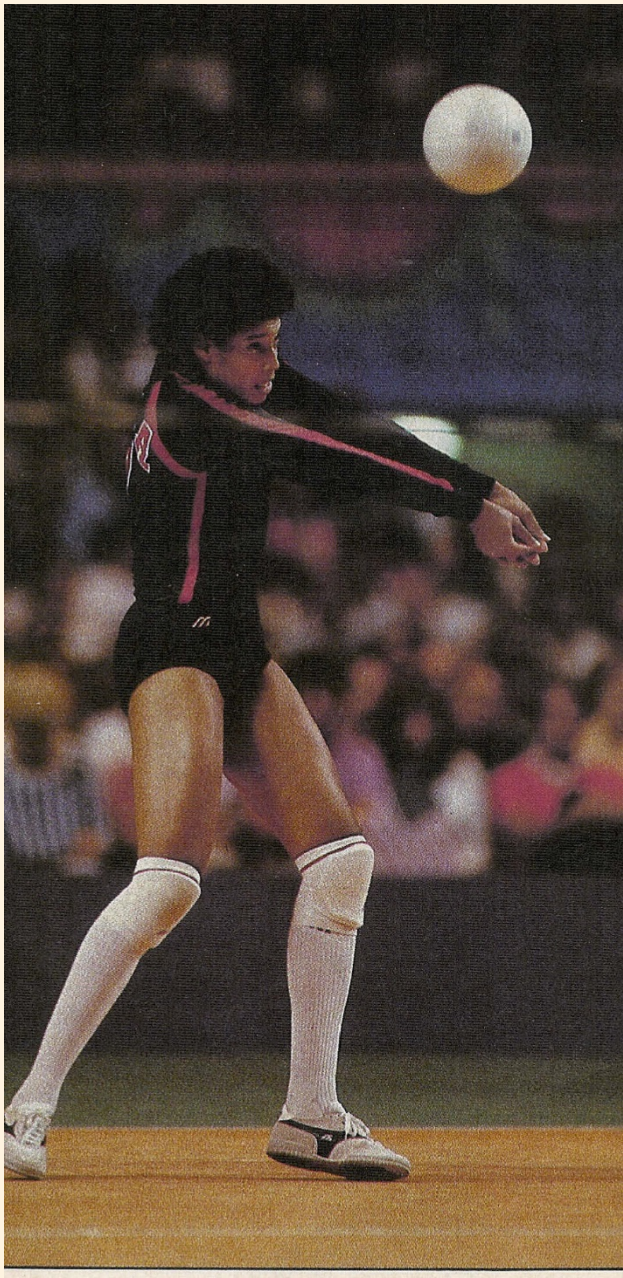
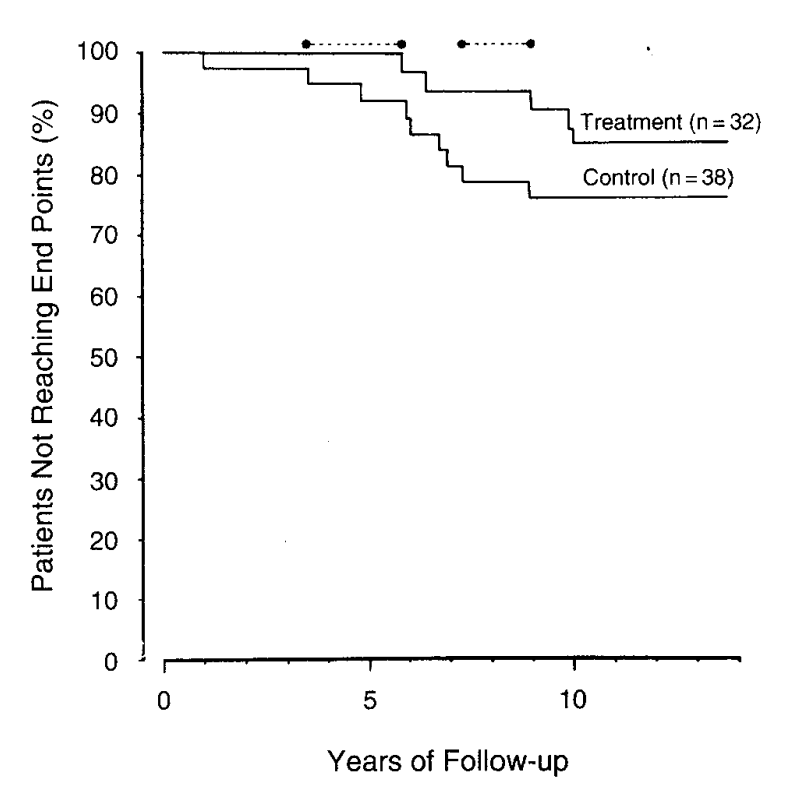
- Saleeb et al Pediatrics 2011 vol 128
- Selbst Evaluation of CP in children Peds in Review Vol 8#2 August 1986
- Swenson et al Pediatrics 1997 vol 99
- Park Pediatric Cardiology for Practitioners 4th edition, 2002, p 441
- Driscoll Ch 75 Chest pain in Children and Adolescents in Moss and Adams' Heart Disease in Infants, Children and Adolescents, 7th edition, 2008, p 1444

Marfan syndrome

- Flo Hyman story
- Tall stature, arachnodactyly
- Scoliosis
- Pes planus
- Wrist sign, thumb sign
- Ectopic lentis
- Treatment: beta blockade



Efficacy of Beta Blockers



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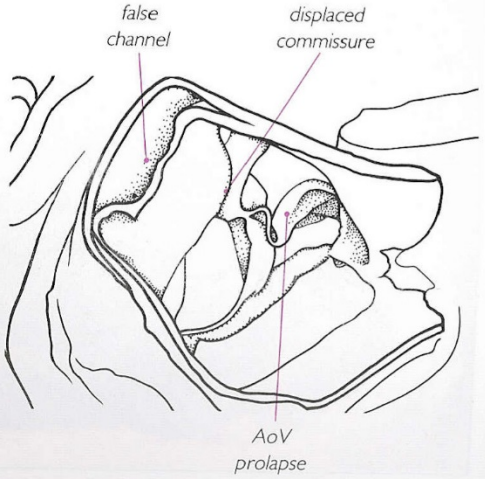
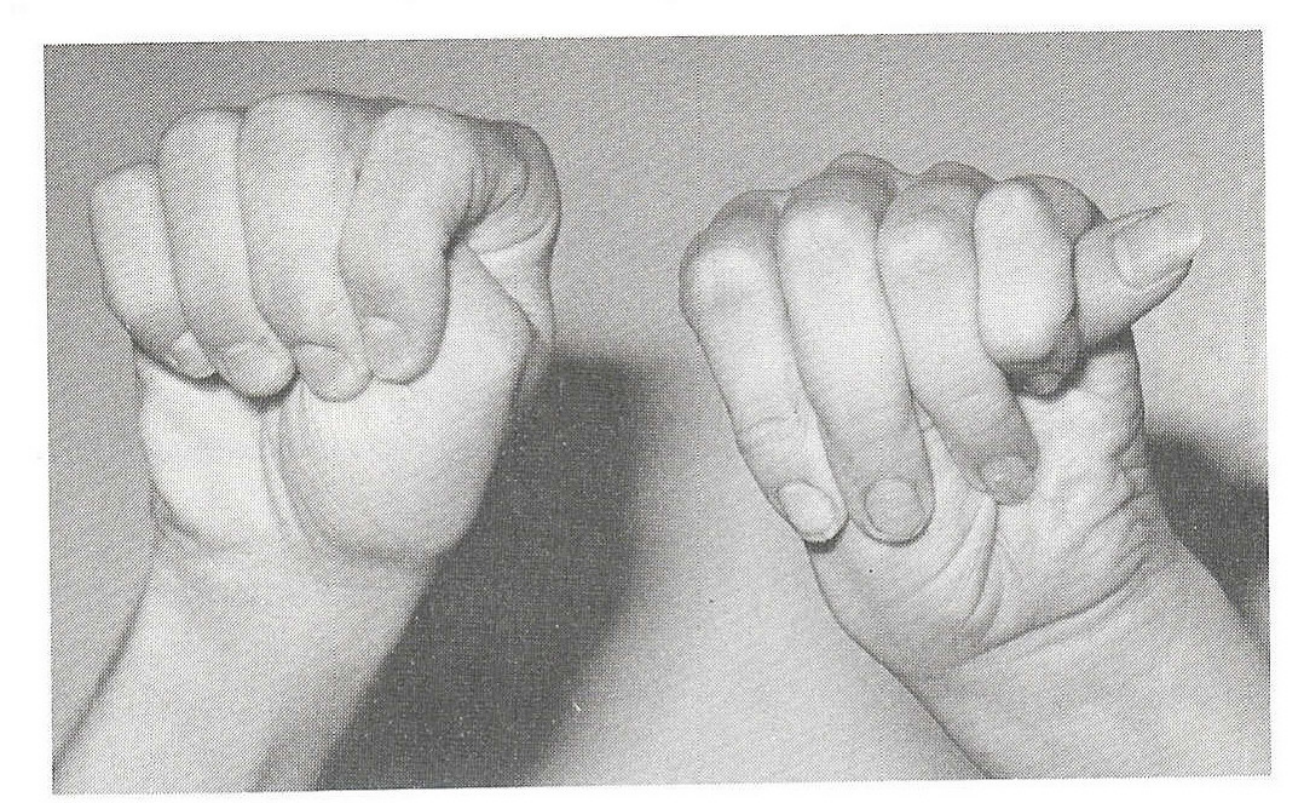


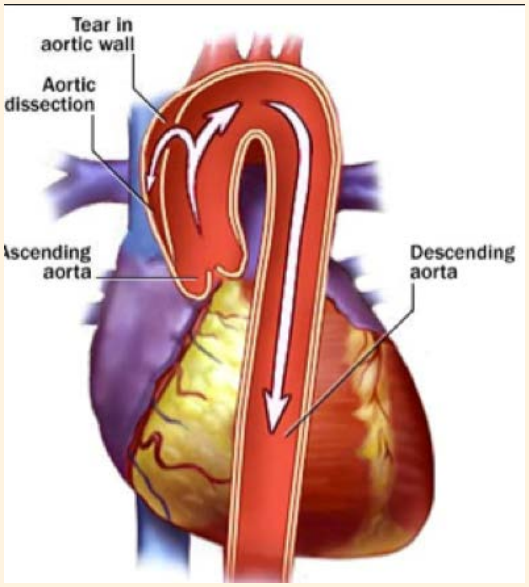
Thumb sign



Wrist Sign

The normal patient at left cannot overlap his thumb and little finger around his wrist because, unlike the patient with Marfan syndrome at right, his fingers are not long relative to his wrist.

Actor-Vincent Schiavelli



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Sources

- Cong Heart Dis Dec 12, 2017
- Med Clin N Am March 2010
- Curr Sports Med Rep March 2017
- J Am Heart Asso 2019
- Clinc J Sport Med 2005
- Pediat An 2015
- Clin Ped Phila 1996
- Ped Clin No Am 2020

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