

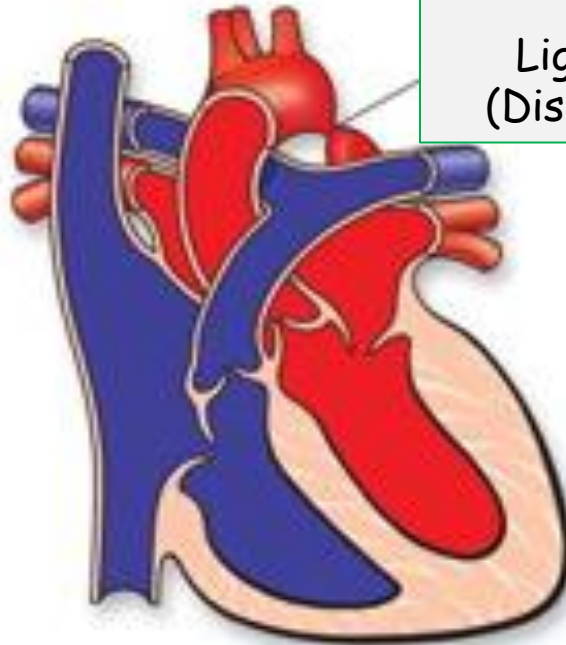


Diseases of the Aorta for
USMLE Step One

Part 2: Coarctation and Aortitis

Howard Sachs, MD
www.12DaysinMarch.com

Coarctation = Narrowing

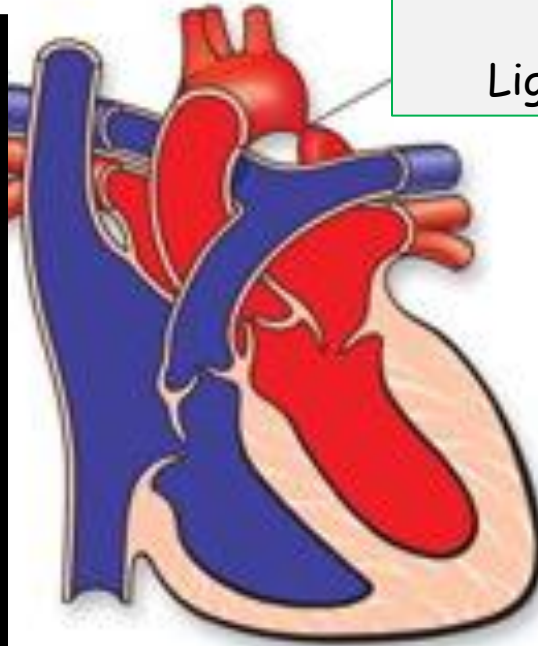


Location:
Ligamentum arteriosum
(Distal to Left Subclavian)

Coarctation = Narrowing

Adult

Infantile



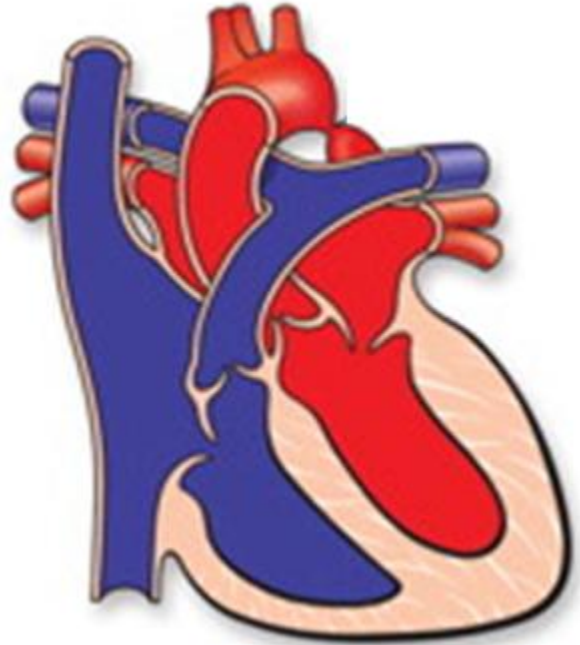
Location:
Ligamentum arteriosum

Coarctation = Narrowing

Infantile

Manifestations:

- HTN (upper extremities)
- Pulse discrepancy (upper/lower)

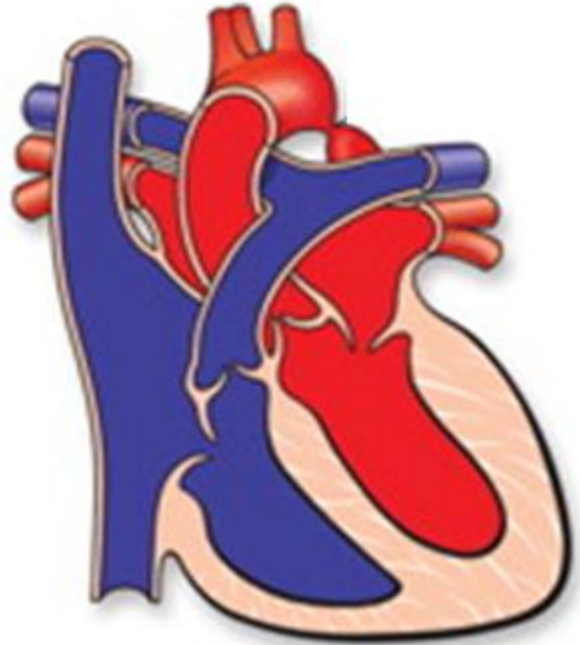


Coarctation = Narrowing

Infantile

Manifestations:

- HTN (upper extremities)
- Pulse discrepancy (upper/lower)
- CHF (↑↑ afterload; weeks 2-6)



Coarctation = Narrowing

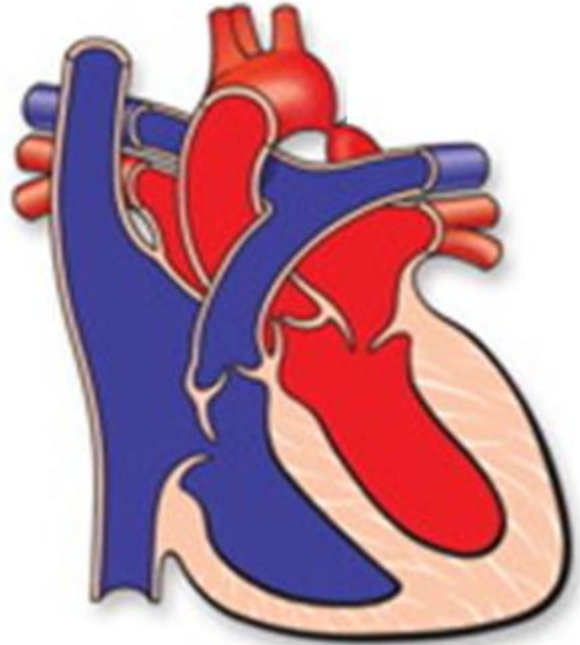
Infantile

Manifestations:

- HTN (upper extremities)
- Pulse discrepancy (upper/lower)
- CHF (↑↑ afterload; weeks 2-6)

Derivative:

Q. Why is the BP elevated?



Coarctation = Narrowing

Infantile

Manifestations:

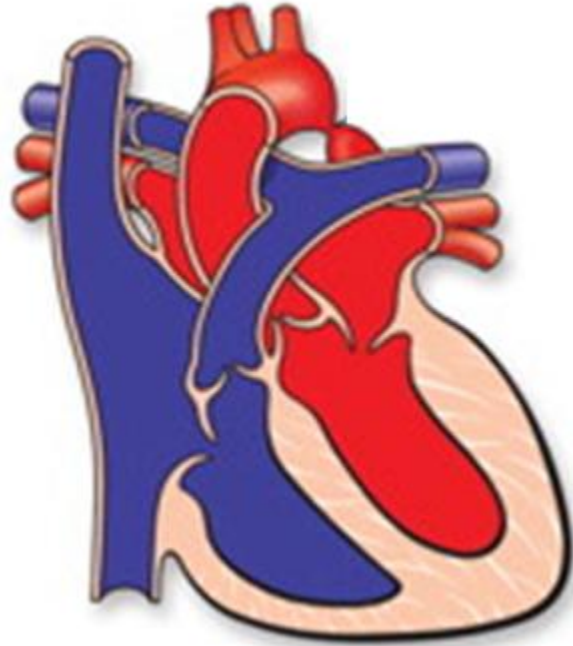
- HTN (upper extremities)
- Pulse discrepancy (upper/lower)
- CHF (↑↑ afterload; weeks 2-6)

Derivative:

Q. Why is the BP elevated?

A. **Activation of RAA**

- the kidneys are hypoperfused



Adult Coarctation



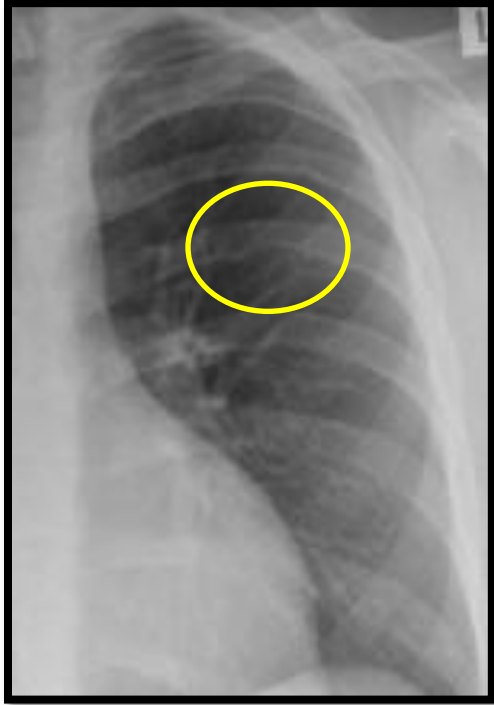
Adult coarctation is simply a kid with mild coarctation who grew up without a diagnosis

Adult Coarctation

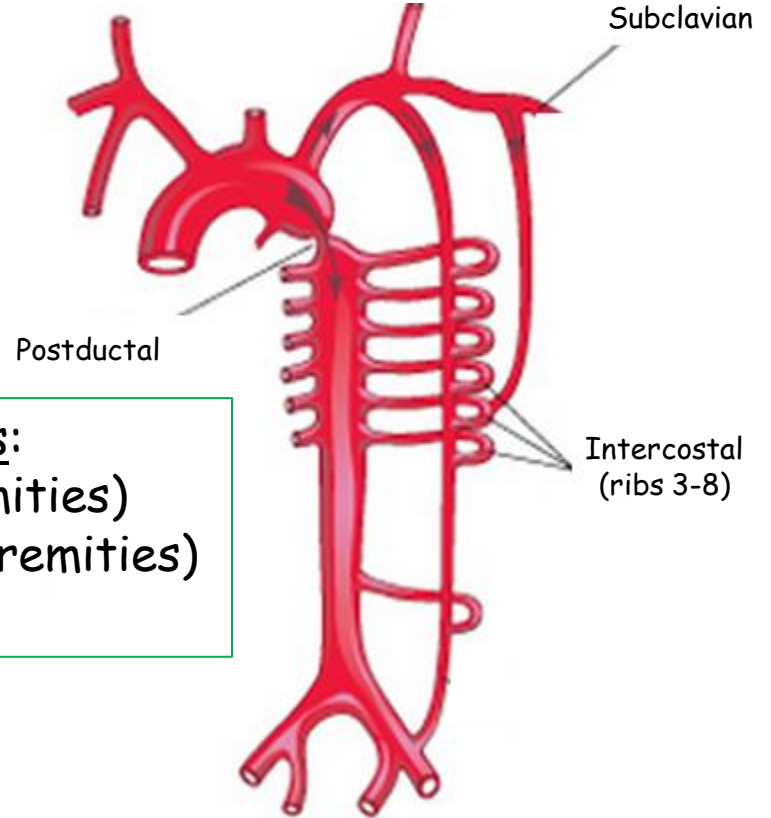


Manifestations:
HTN (upper extremities)
↓ Perfusion (lower extremities)

Adult Coarctation



Manifestations:
HTN (upper extremities)
↓ Perfusion (lower extremities)
Rib notching



Adult Coarctation

Manifestations:

- HTN (upper extremities)
- ↓ Perfusion (lower extremities)
- Rib notching

Derivatives:

- Mechanism of HTN (↑ RAA)
- **Disease Associations**
 - Berry Aneurysm



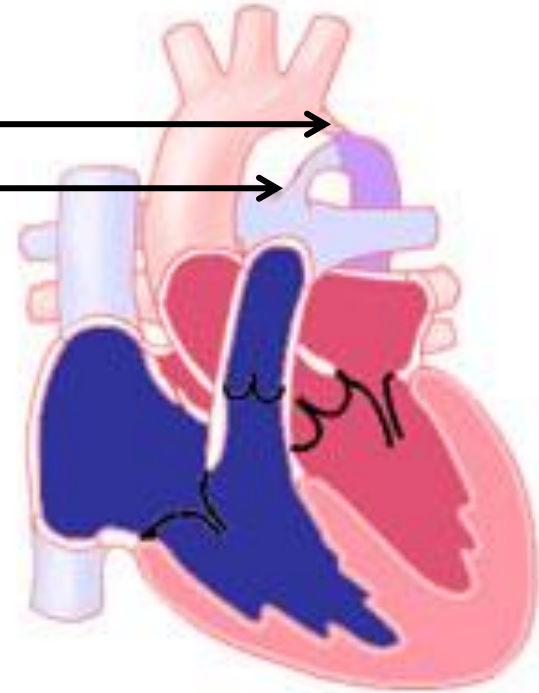
Intracranial
Aneurysm

Infantile

Preductal (Coarctation) with PDA

Coarctation (preductal)

PDA (distal to coarct)

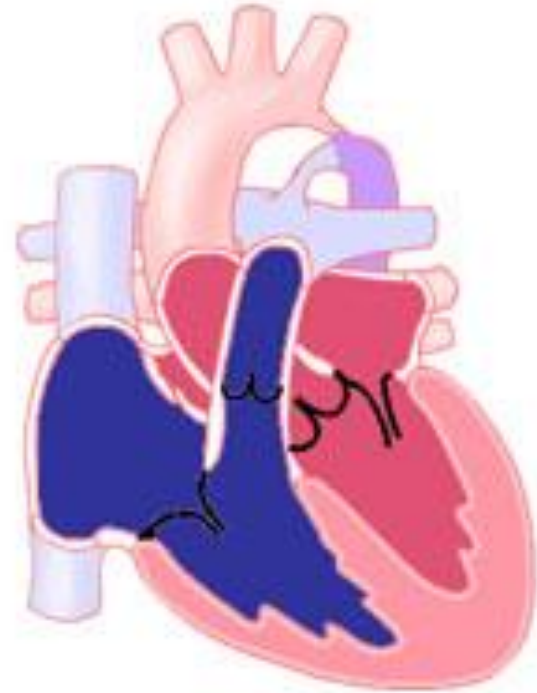


Infantile

Manifestations I:
Coarctation (as discussed)

HTN (upper extremity)
Pulse discrepancy

Preductal (Coarctation) with PDA

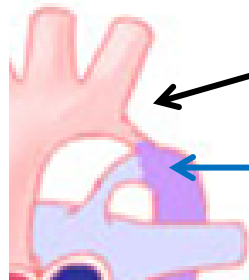
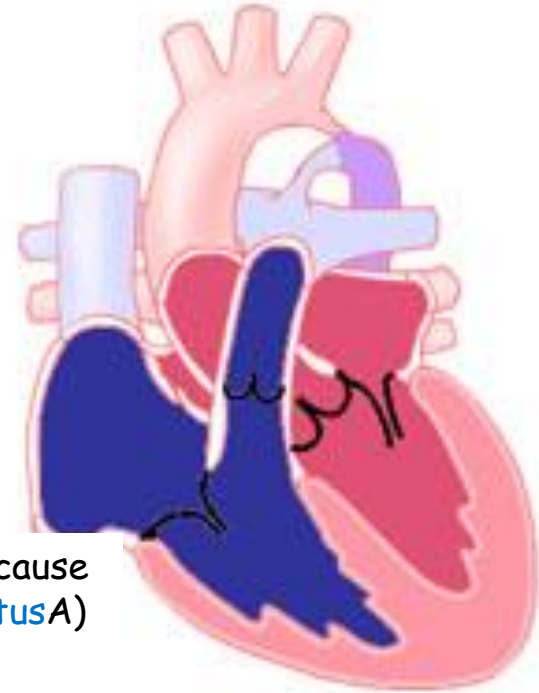


Infantile

Manifestations I:
Coarctation (as discussed)

Manifestations II:
PDA is added
Located beyond the stenosis
Crap, that sounds scary.

Preductal (Coarctation) with PDA



Coarctation (it is **Preductal** because it comes proximal to the **P**Ductus**A**)

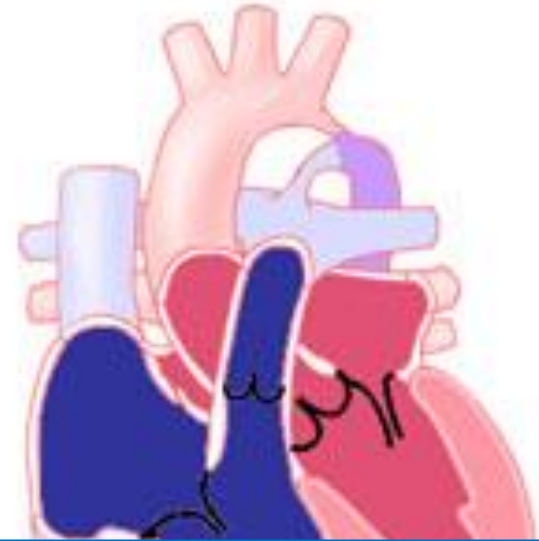
Patent **D**uctus **A**rteriosis

Infantile

Manifestations I:
Coarctation (as discussed)

Manifestations II:
PDA (machinery/continuous) murmur
The coarctation **facilitates R → L shunt**

Preductal (Coarctation) with PDA



Right-sided (deoxygenated)
blood enters the arterial
circulation bypassing (shunting)
pulmonary circulation

Infantile

Manifestations I:
Coarctation (as discussed)

Manifestations II:
PDA (machinery/continuous) murmur
The coarctation **facilitates R → L shunt**

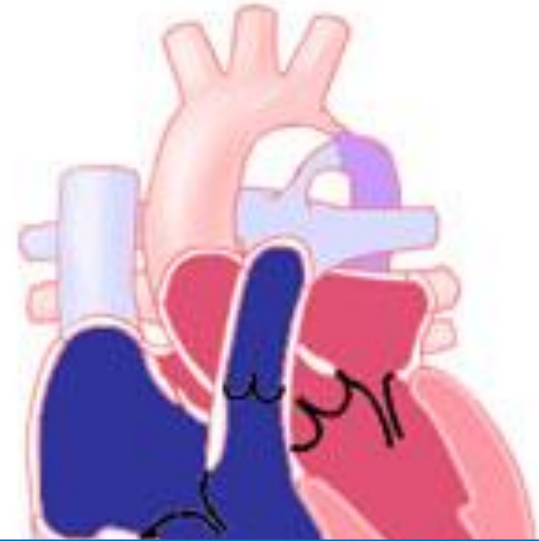
PA

DETOUR

Aorta

No lungs; No PV

Preductal (Coarctation) with PDA



Right-sided (deoxygenated) blood enters the arterial circulation bypassing (shunting) pulmonary circulation

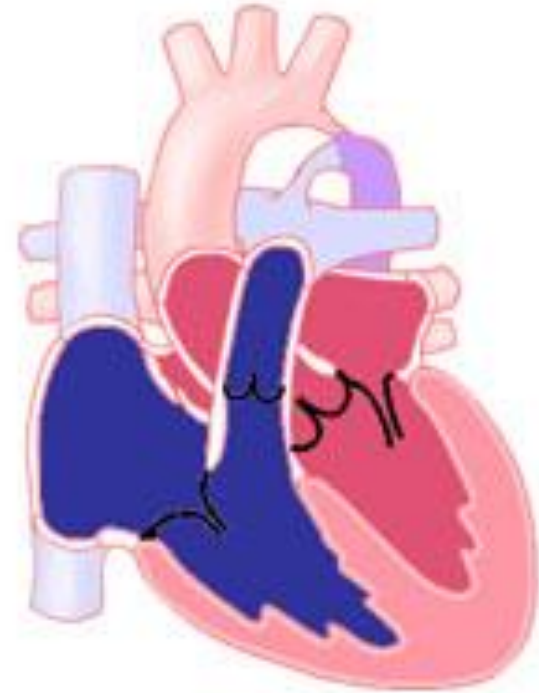
Infantile

Preductal (Coarctation) with PDA

Manifestations I:
Coarctation (as discussed)

Manifestations II:
PDA (machinery/continuous) murmur
The coarctation facilitates R → L shunt
Blue blood enters circulation beyond the
stenotic segment.

How is that clinically expressed?



Infantile

Manifestations II:

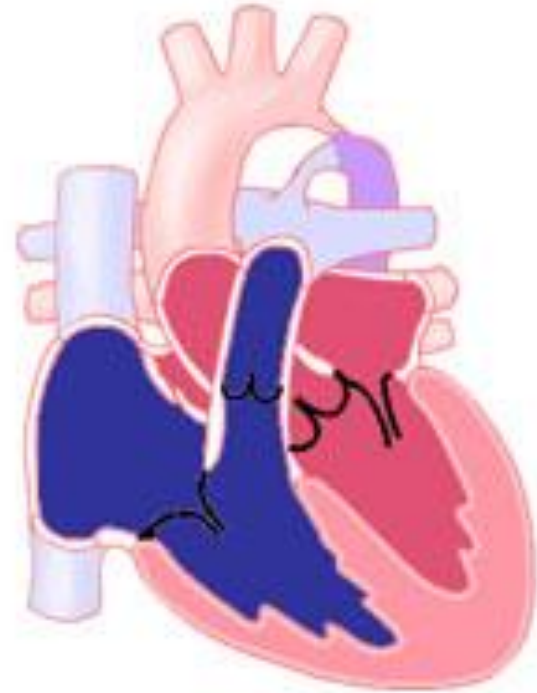
PDA (machinery; to and fro) murmur
The coarctation facilitates R → L shunt

Blue blood enters circulation beyond the stenotic segment.



Blue blood flows distally →
Blue feet (just like in the Smurfs!)

Preductal (Coarctation) with PDA



Infantile

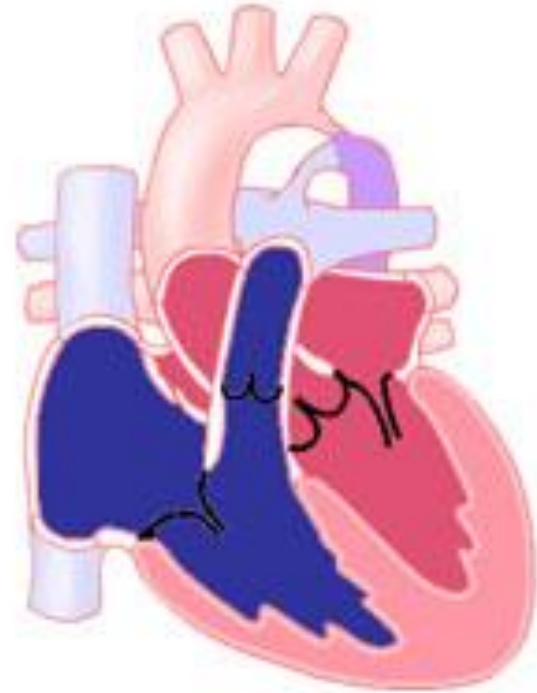
Manifestation I:
Coarctation (as discussed)

Manifestation II:
Differential Cyanosis



Deoxygenated blood enters circulation through PDA and causes lower extremity cyanosis

Preductal (Coarctation) with PDA

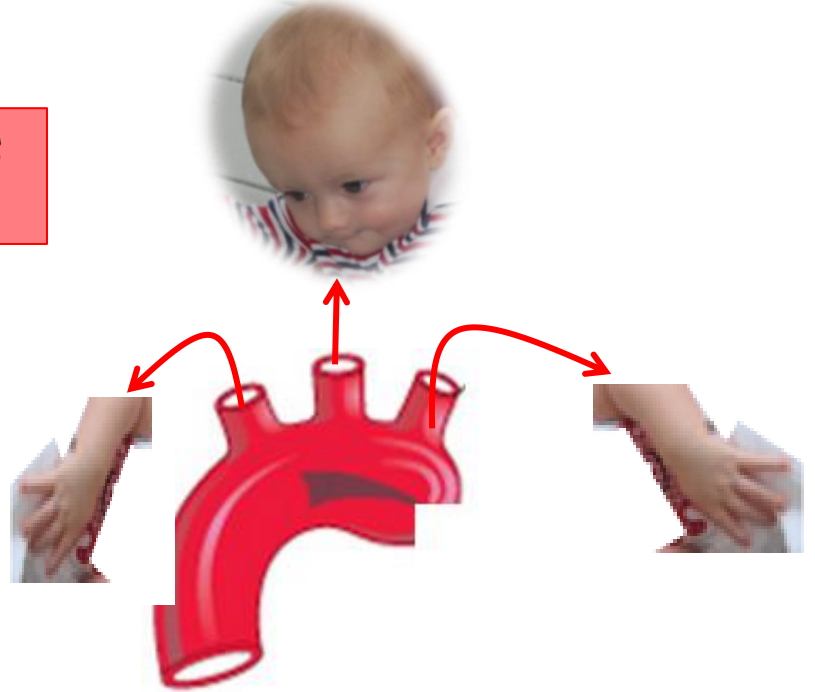


Infantile

Preductal (Coarctation) with PDA

Arterial circulation proximal to the stenosis is normal and well oxygenated

Manifestations II:
Differential Cyanosis



Preductal (Coarctation) with PDA

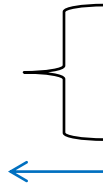
Hypertension
Normal pulse
Well oxygenated



Differential Cyanosis

Coarct

PDA



Low BP
Poor pulses
Deoxygenated



Infantile

Preductal (Coarctation) with PDA

Disease Associations:

Turner Syndrome - Coarctation and Congenital bicuspid



Short Stature, Broad Chest, Widely Spaced Nipples, Primary Amenorrhea, Arched Palate, Short 4th Metacarpal, Low set ears, Lacking Paternal X, Streak Ovaries/Dysgenesis



Aortic Coarctation (ligamentum arteriosum)

Infantile

Adult

HTN (upper extremity), pulse discrepancy (upper/lower)

Aortic Coarctation

Infantile

Adult

HTN (upper extremity), pulse discrepancy (upper/lower)

Severe

PDA (+)

Mild, Chronic

Aortic Coarctation

Infantile

Adult

HTN (upper extremity), pulse discrepancy (upper/lower)

Severe

PDA (+)

Mild, Chronic

CHF
Newborns



Aortic Coarctation

Infantile

Adult

HTN (upper extremity), pulse discrepancy (upper/lower)

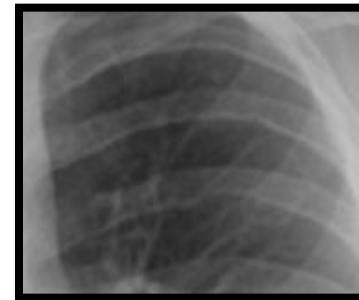
Severe

PDA (+)

Mild, Chronic

CHF
Newborns

Rib notching
(collateral circulation)



Aortic Coarctation

Infantile

Adult

HTN (upper extremity), pulse discrepancy (upper/lower)

Severe

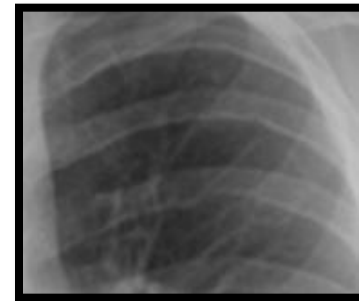
PDA (+)

Mild, Chronic

CHF
Newborns

Differential
Cyanosis

Rib notching
(collateral circulation)



Aortic Coarctation

Infantile

Adult

HTN (upper extremity), pulse discrepancy (upper/lower)

Severe

PDA (+)

Mild, Chronic

CHF
Newborns

Differential
Cyanosis

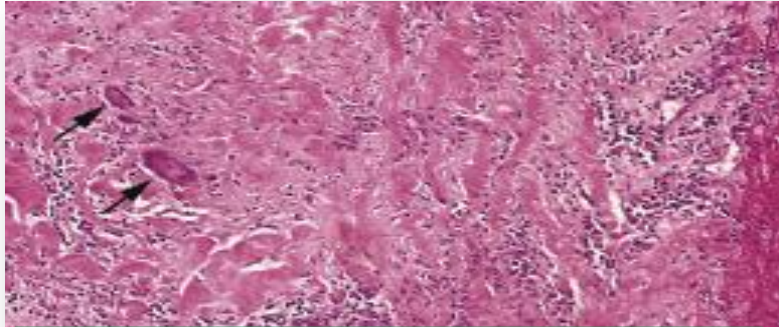
Rib notching
(collateral circulation)

Turner Syndrome

Berry Aneurysm

Aortitis (for USMLE Step One)

Inflammatory disorders



Large Vessel, Granulomatous

Takayasu syndrome

Young, Asian, Female

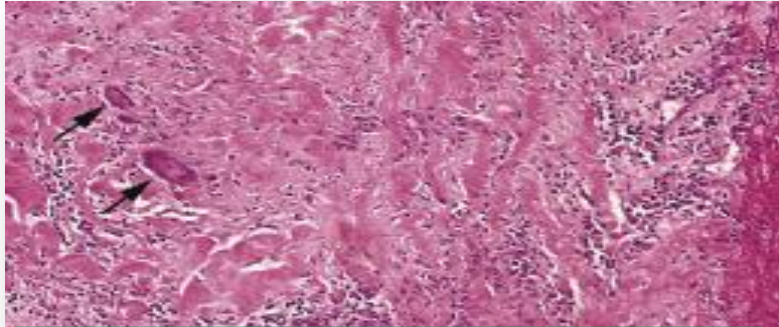
Pulse deficit or Aneurysmal Δ

Destruction/fibrosis of media

Aorta (& branch vessels)

Aortitis (for USMLE Step One)

Inflammatory disorders



Large Vessel, Granulomatous

Takayasu syndrome

Young, Asian, Female
Pulse deficit or Aneurysmal Δ
Destruction/fibrosis of media
Aorta (& branch vessels)

Other inflammatory disorders causing aortitis include:

GCA
Seronegative SpA
Sarcoidosis
SLE/RA
ANCA (+) Vasculitis
PAN

Aortitis will not be focus of inquiry

Aortitis

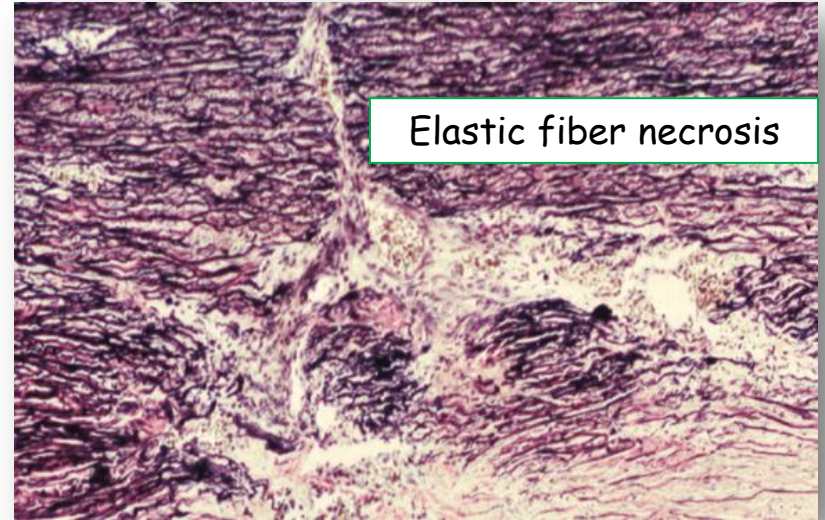
Infectious disorders

Tertiary Syphilis (late)

Obliterative Endarteritis (vaso vasorum)

Inflammatory (no spirochetes)

Present: aneurysmal dilation of aortic root with AI



Elastic fiber necrosis

Ischemic injury of the elastic lamina → weakening of vessel wall

Aortitis

Tertiary Syphilis (late)

Obliterative Endarteritis (vaso vasorum)

Inflammatory (no spirochetes)

Present: aneurysmal dilation of aortic root with AI



Saccular Aneurysm



'Tree bark'

Medial necrosis a/w
intimal (wrinkled) calcifications

Aortitis

Tertiary Syphilis (late)

Obliterative Endarteritis (vaso vasorum)

Inflammatory (no spirochetes)

Present: aneurysmal dilation of aortic root with AI



Saccular Aneurysm

Other infections are associated with aortitis:

Salmonella

TB

Staph aureus

They probably seed damaged areas (atherosclerosis) via the vaso vasorum



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