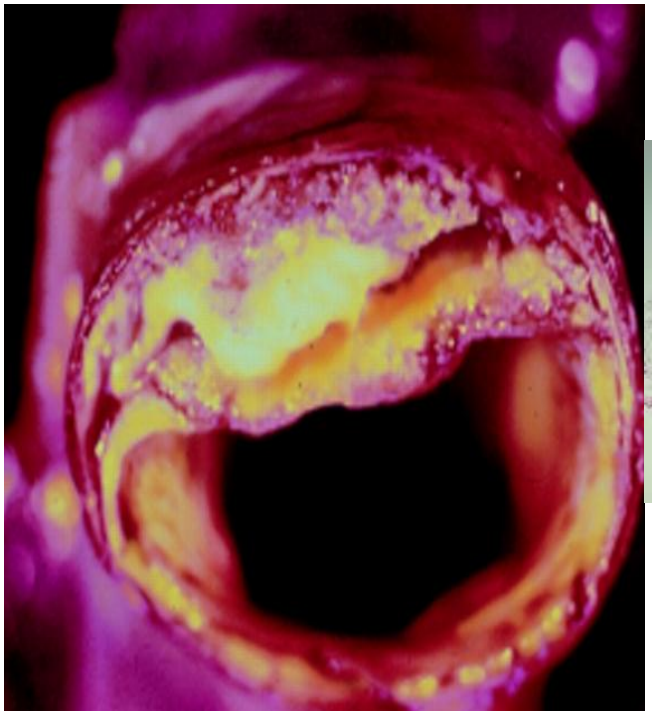
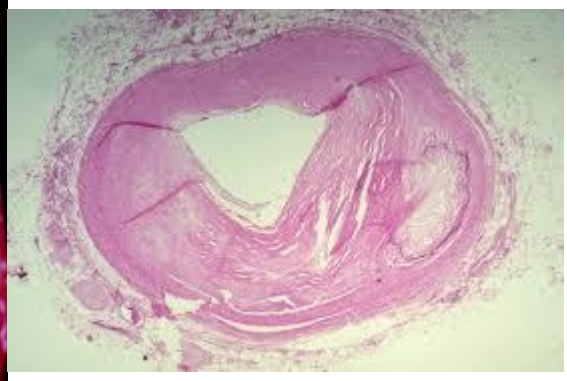




Second Lecture

Atherosclerosis

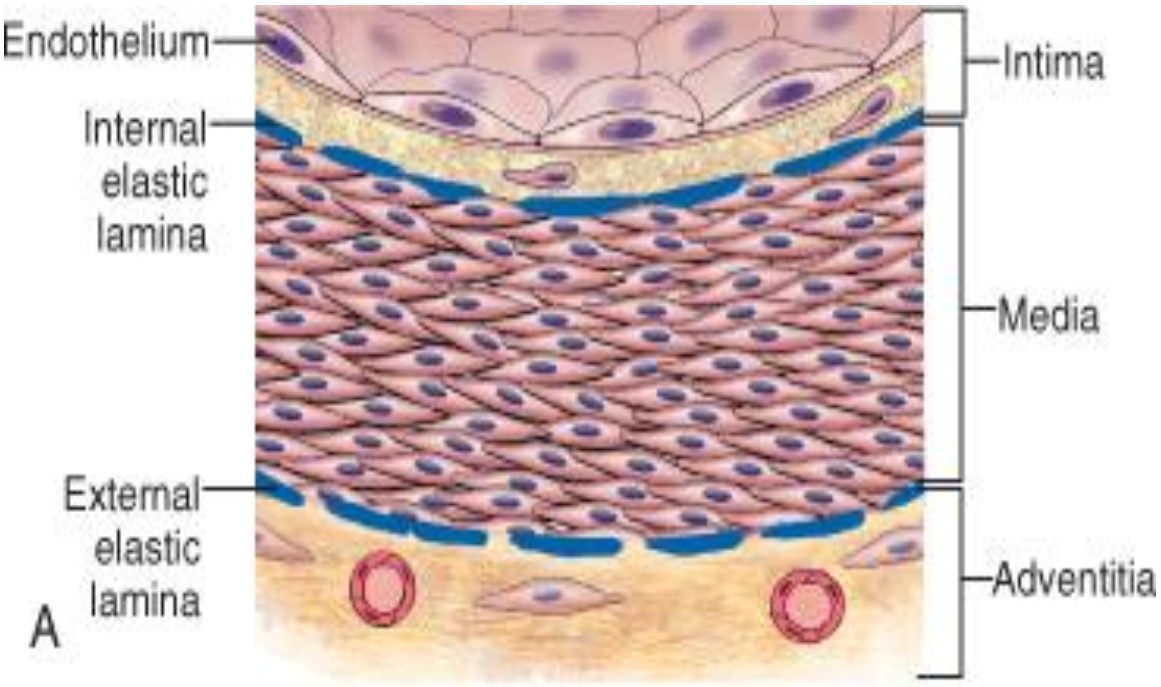
432 ***Pathology*** *Team*

Done By : ***Dana aldubaib , Amal AL Sinan***

*Reviewed By :****Ammar Alymani***

Cardio vascular Block

Vessel wall structure :



Normal Blood vessel : 3 layers

1) intima 2) media 3) adventitia

- Separated by External elastic lamina , Internal elastic lamina <u>(just in medium size vessel)</u>

- Atherosclerosis is a specific type of arteriosclerosis (thickening & hardening of arterial walls and loss of elasticity
- It is affecting primarily **<u>the intima</u>** of large and **medium-sized muscular arteries.** (most common)

Large sized vessels (ex, Aorta)

Medium sized vessels (Ex, carotid , coronary)

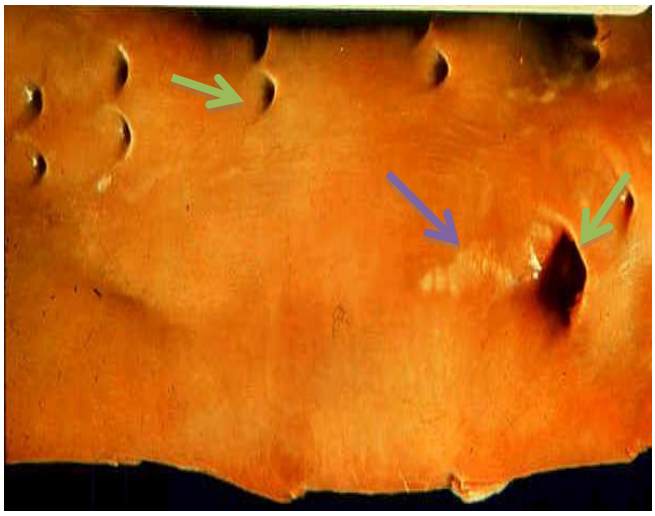
- Chronic inflammatory response in the walls of arteries.
- Slowly progressive.
- A build-up of fat (cholesterol) within the artery wall.

- Characterized by intimal lesions called: atheromas, atheromatous or fibrofatty plaques
- Atherosclerosis Common sites (large – medium size)

- Abdominal aorta
- Coronaries
- Popliteal artery
- The internal carotid arteries
- The vessels of the circle of Willis

Tributaries or branches are also a good place for atherosclerosis

Fatty streaks it's exist almost in every body but some people say that fatty streaks is an early stage for Atherosclerosis and some



Advance Atherosclerosis allot of massive Fatty streaks, ulceration and haemorrhage

Atherosclerosis Risk factors

Potentially controlled : can be changed by life style

Nonmodifiable : We can't do anything – can't be changed by life style

Major	Lesser, Uncertain, or Nonquantitated
Nonmodifiable	
Increasing age	Obesity
Male gender	Physical inactivity
Family history	Stress ("type A" personality)
Genetic abnormalities	Postmenopausal estrogen deficiency
	High carbohydrate intake
Potentially Controllable	
Hyperlipidemia	Alcohol
Hypertension	Lipoprotein Lp(a)
Cigarette smoking	Hardened (trans)unsaturated fat intake
Diabetes	*Chlamydia pneumoniae*

Hyperlipidemia : increase in cholesterol and hypertension is the most important

- patient non smoker , not diabetic don't have these risk factors but still develop atherosclerosis .. new study show 2 EXTRA factors

1) increase in c reactive protein
2) hemocysteine (type of protein)

Reminder:

LDL cholesterol : deliver cholesterol to peripheral tissues.

HDL, "good cholesterol": mobilizes cholesterol from developing and existing atheromas and transportsit to the liver for excretion in the bile

Cause Atherosclerosis

- - Current hypothesis: Response to Injury " hypertension will lead to injury in endothelium" Not completely understood

Pathogenesis of Atherosclerosis

Initiated by endothelial dysfunction
It's a major step in Atherosclerosis
Usually by
Hemodynamic disturbances
Hypercholesterolemia (increasing local production of reactive oxygen species)

Fibro-fatty plaque is the main lesion in intima, containing of :

1) Macrophages contain lipid
2) Extracellular matrix
3) Smooth muscle cells proliferation

Preclinical phase (non-symptomatic)

the Risk factors lead to injury (not clearly understood) → endothelial cell injury → adhesion to the monocyte and platelets → emigration → macrophages produced (Chronic inflammatory response)→ Migration of SMC from media to intima → Proliferation of Smooth Ms Cells in intima→ Excess production of Extra cellular Matrix by smooth muscle cells→ macrophages and smooth muscle engulf the fat(cholesterol LDL) → fome cells → Enhanced lipid accumulation and it become oxidized.

note the inflammation well not usually has neutrophils

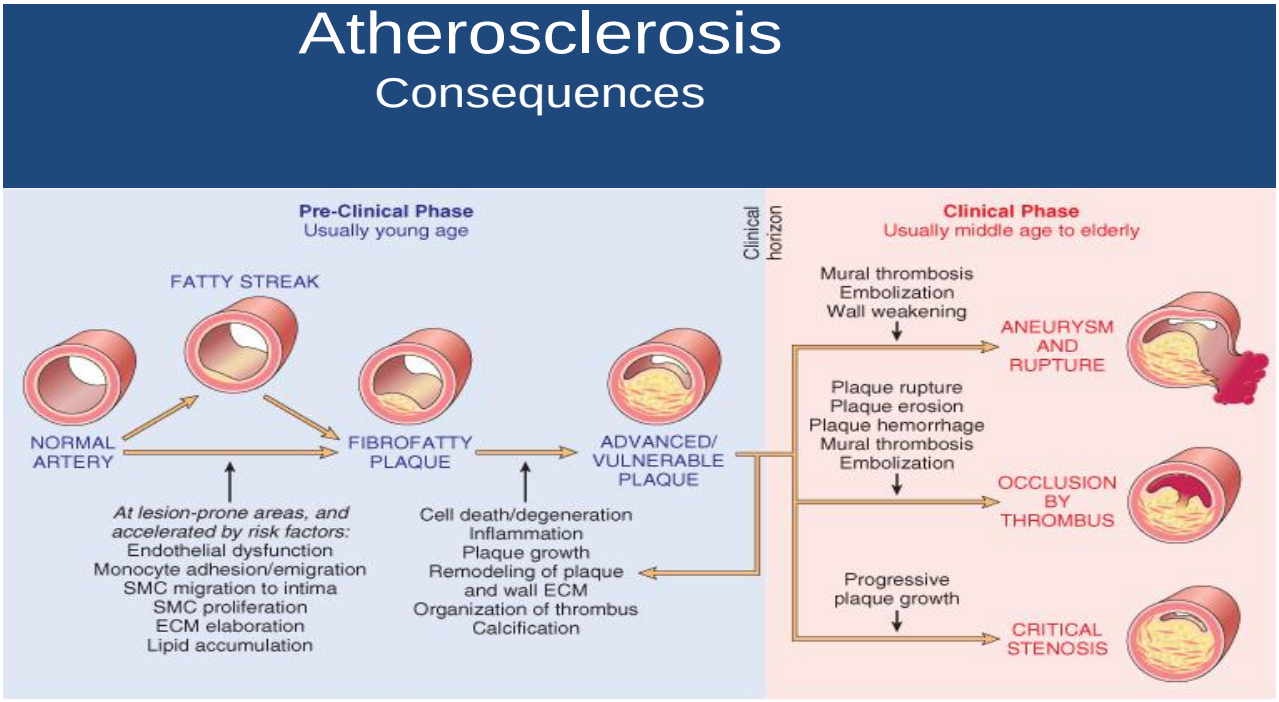
Fatty streack well become atheroma (collagen deposition → fibrosis layer (cap) with necrotic center and lymphocyte → new vascularisation → plaque

Clinical phase

Plaque → advanced vulnerable plaque →

1-critical stenosis 2-thrombos

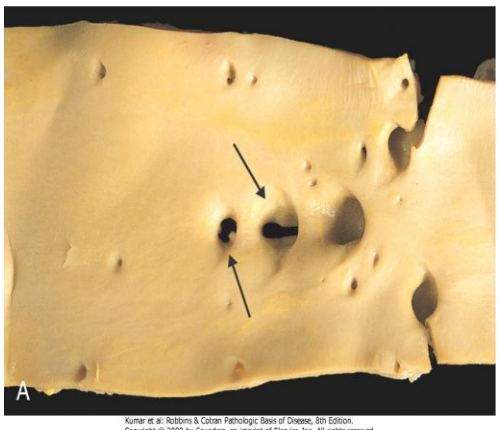
3-embolism 4-aneurism and rupture



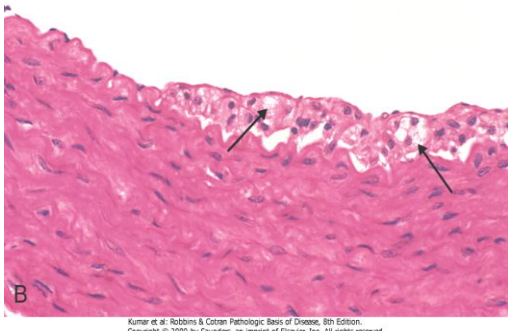
Microscopic picture

(Fatty streak, a collection of foamy macrophages in the intima.)

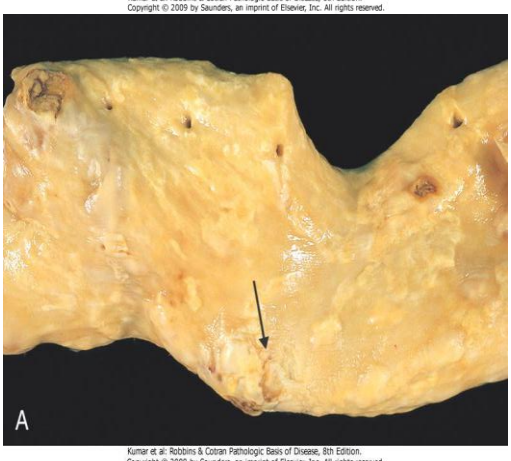
A, Aorta with fatty streaks (arrows), associated largely with the ostia of branch vessels.



B, Intimal, macrophage-derived foam cells
Fatty streaks can appear in the aortas of infants younger than 1 year and are present in virtually all children older than 10 years



Plaques vary from 0.3 to 1.5 cm in diameter but can coalesce to form larger masses



Coalesce: come together and form one mass or whole

normal artery → fatty streak → fibrofatty → plaque → advanced vulnerable plaque.

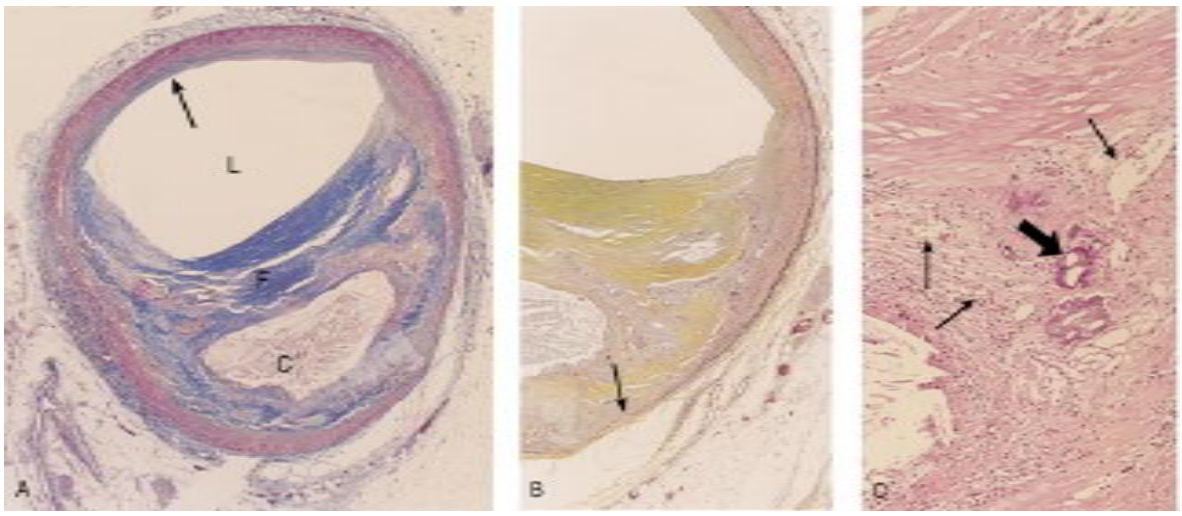
Atherosclerosis
Clinical Complications:

- Myocardial infarction (heart attack)

- Cerebral infarction (stroke)
- Aortic aneurysms
- Mesentric occlusion (infarction in the GIT)
- Peripheral vascular disease (gangrene of the legs)

Morphological changes that are seen on macro and microscopic levels in atherosclerosis

- Neovascularization (formation of new blood vessels)
- Calcification
- Hemorrhage
- Erosion → ulcer → fissure
- Thrombosis
- Medial thinning → Aneurysmal dilatation
- Cholesterol microemboli



Fibrous cap
Cholesterol clefts

Elastin membrane destroyed

- **Neovascularisation**
- **Calcification**
- **Inflam. cells**

Question:

1. How can you describe arteriosclerosis?

Hardening if the arteries

2. Where do the atheromas form?

In the intima

3. What are considered the 4 major factors?

Dyslipidemia, hypertension, smoking, and diabetes mellitus.

Case :

A 65-year-old man has sudden onset of severe abdominal pain. Physical examination reveals his temperature is 37 C, heart rate 110/minute, respirations 25/minute, and blood pressure 145/100 mmHg. He has diminished pulses in the lower extremities. There is a pulsatile abdominal mass. His serum creatine kinase is not elevated. He has had fasting blood glucose measurements in the range of 140 to 180 mg/dL for over 20 years. Which of the following conditions is he most likely to have?

- Superior mesenteric artery thrombosis
- Atherosclerotic aortic aneurysm
- Polyarteritis nodosa
- Septic embolization
- Monckeberg's medial calcific sclerosis

Correct answer. The aorta involved with an atherosclerotic aneurysm is markedly enlarged and filled with thrombus. Risk factors for atherosclerosis include both diabetes mellitus and hypertension. Atherosclerotic aortic aneurysms are typically located in the abdominal portion below the renal arteries.

You can find more cases about CVS

here
http://library.med.utah.edu/WebPath/EXAM/MULTORG/car1frm.html

Dr. Shesta suggested this website

Thank You