



MEDICINE
KING SAUD UNIVERSITY



PATHOLOGY
TEAM 436

PATHOLOGY PRACTICAL

CARDIOVASCULAR BLOCK



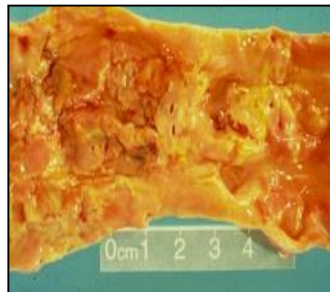
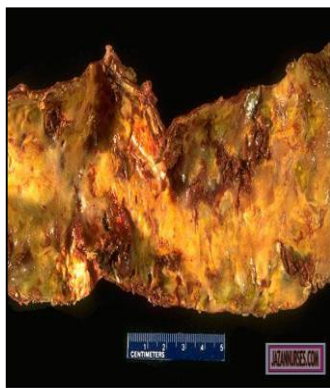
#Case1 ATHEROMA OF THE AORTA

*An **atheroma** is an accumulation and swelling in artery walls made up of (mostly) macrophage cells, or debris, and containing lipids (cholesterol and fatty acids), calcium and a variable amount of fibrous connective tissue.

*The four major risk factors are :

- hyperlipidemia
- hypertension
- cigarette smoking
- diabetes

#Gross :

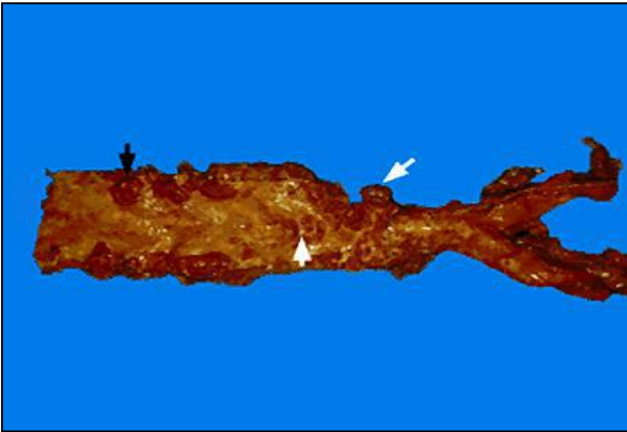


- extensive ulceration in the plaques
- formation of overlying mural thrombus.
- fissured-appearing endothelial surface .
- raised plaque-like structures from the surface.
- Red clot material adherent to the plaques in multiple areas.
- These clots consist of platelets held together by fibrin strands.
- raised yellow plaques and the fissures in between the plaques.
- Dystrophic calcification



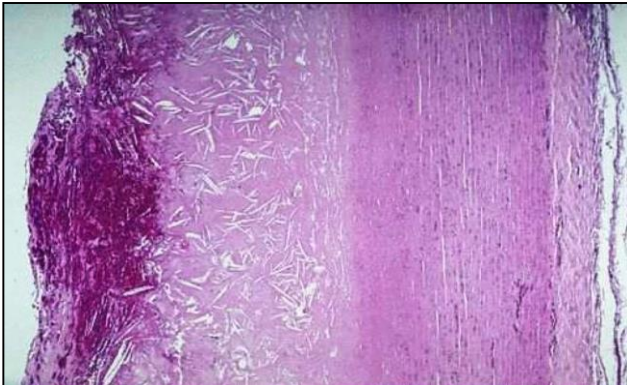
- 1/aorta with mild atherosclerosis: scattered lipid plaques .
- 2/aorta with moderate atherosclerosis: many more larger plaques .
- 3/aorta with severe atherosclerosis: extensive ulceration in the plaques .

*Inner surface of aorta and bifurcation, opened lengthwise along the posterior midline.

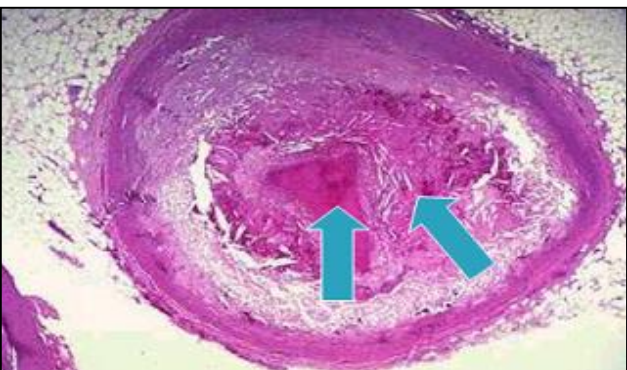


- irregular variegated lining due to diffuse disease
- black arrow: red thrombi .
- white arrows : ostia of celiac and superior mesenteric arteries and right renal artery .
- deceptive narrower caliber of abdominal aorta below celiac artery due to rigidity of calcified atheroma.

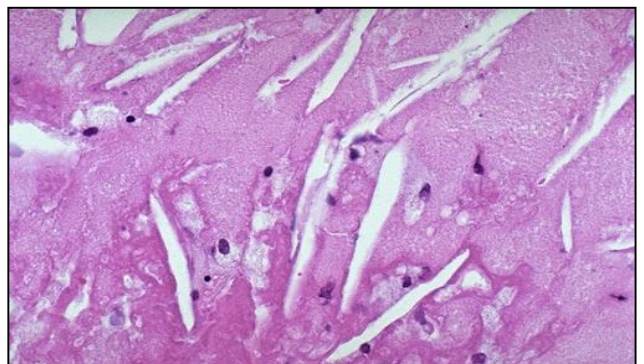
#Microscopic :



- atheromatous emboli are rare.
- large overlying atheroma the left.
- The far left shows ulceration and hemorrhage.
- Cholesterol clefts are numerous.



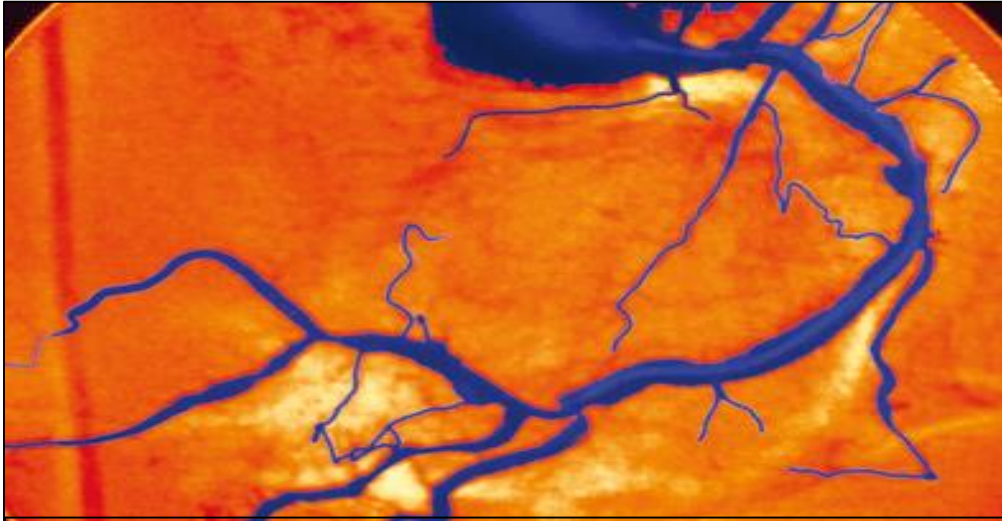
- cholesterol clefts.
- foam cells .
- **Arrows : Aortic Atheroma with Thrombosis**



- cholesterol clefts.
- foam cells .
- **Arrows : Aortic Atheroma with Thrombosis**

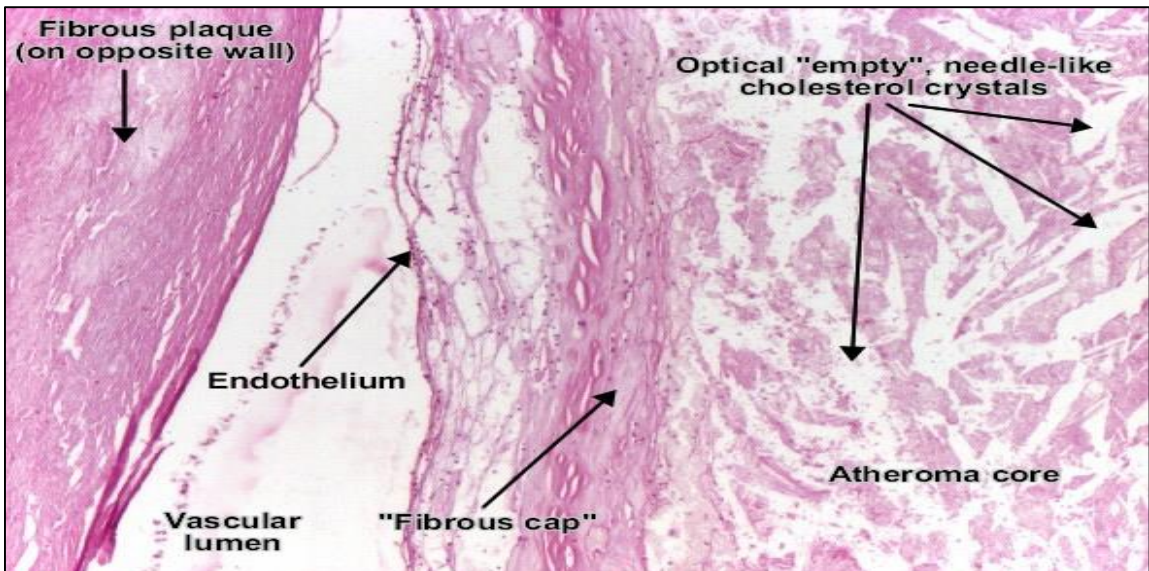
#Case2
CORONARY ATHEROSCLEROSIS

#Gross :



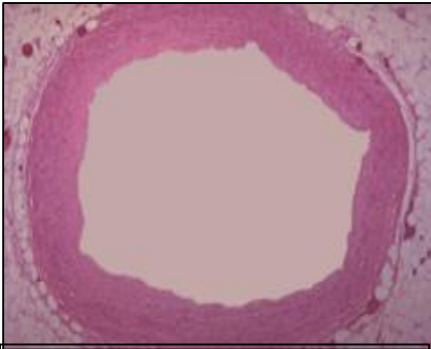
Coronary atherosclerosis. Coloured angiogram (X- ray) showing atherosclerosis in a coronary artery. The atherosclerosis is seen as the pinching in the blue- coloured artery at bottom center.

#Microscopic :

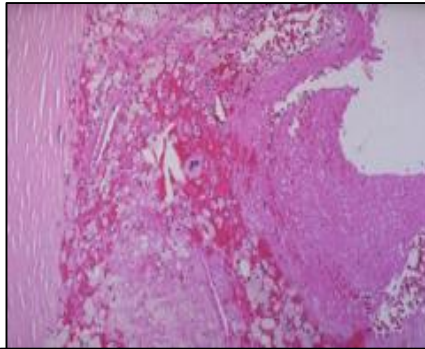


Coronary artery with atherosclerosis (fibro-lipid or fibro-fatty plaque). The **atheromatous fibro-fatty plaque** is characterized by the accumulation of lipids in the intima of the arteries, narrowing the lumen. Beneath the endothelium it has a "fibrous cap" covering the atheromatous "core" of the plaque, which consists in cholesterol crystals, cholesterol esters, fibrin, macrophages and smooth muscle cells, proteoglycans, collagen, elastin and cellular debris.

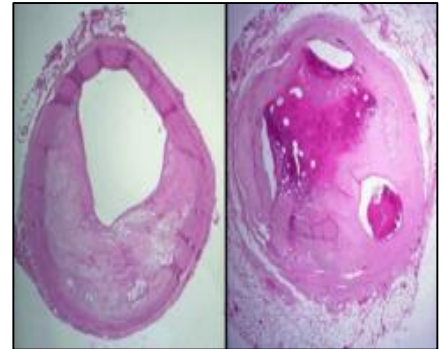
#Microscopic :



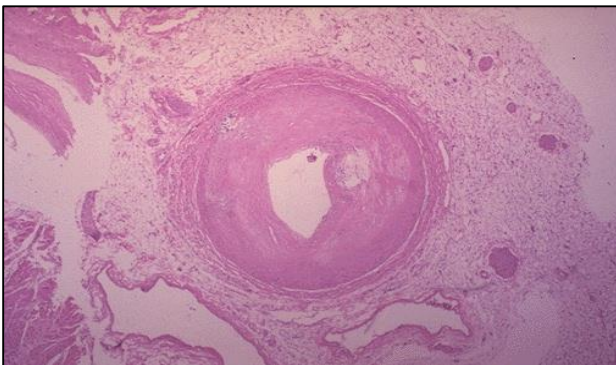
A normal coronary artery with no atherosclerosis and a widely patent lumen that can carry as much blood as the myocardium requires



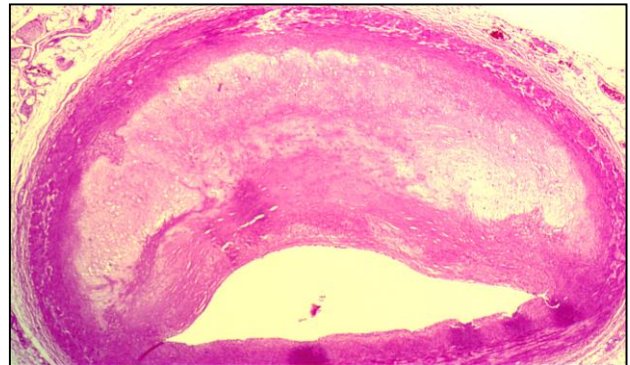
Atheromatous plaque in a coronary artery that shows endothelial denudation with disruption and overlying thrombus formation at the right. The arterial media is at the left



Occlusive coronary atherosclerosis. The coronary at the left is narrowed by 60 to 70%. The coronary at the right is even worse with evidence for previous thrombosis with organization of the thrombus

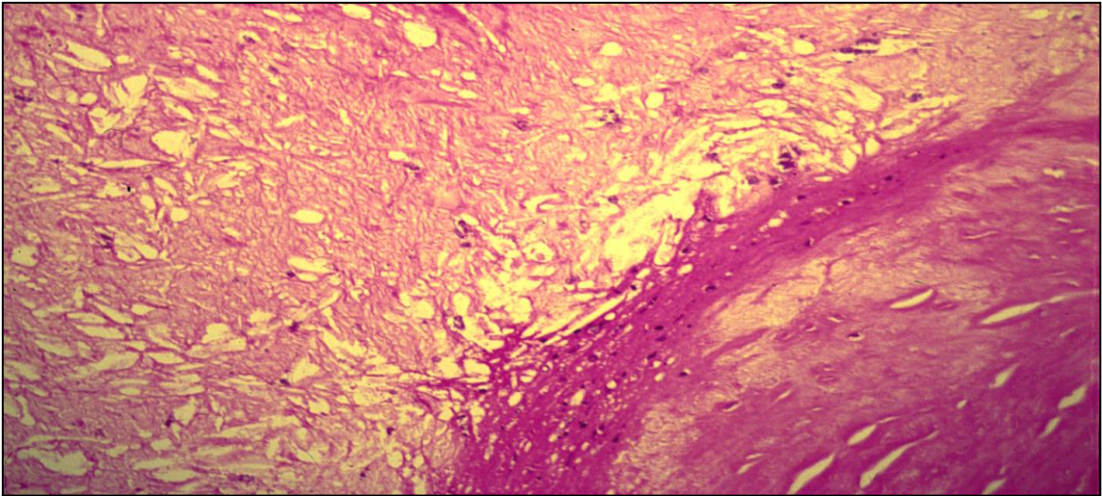


This distal portion of coronary artery shows significant narrowing. Such distal involvement is typical of severe coronary atherosclerosis, such as can appear with diabetes mellitus or familial hypercholesterolemia.

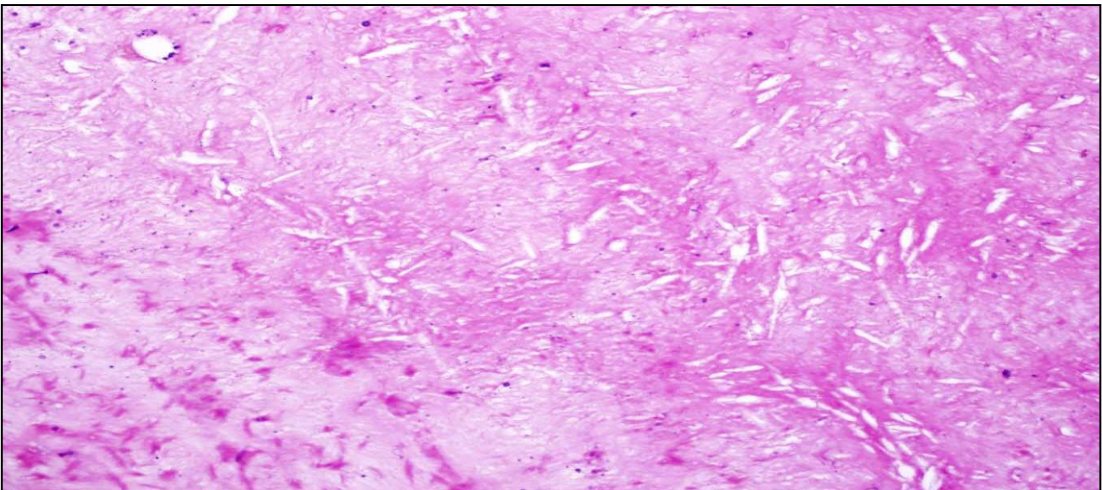


Severe coronary atherosclerosis with narrowing of the lumen

*Coronary Atherosclerosis:

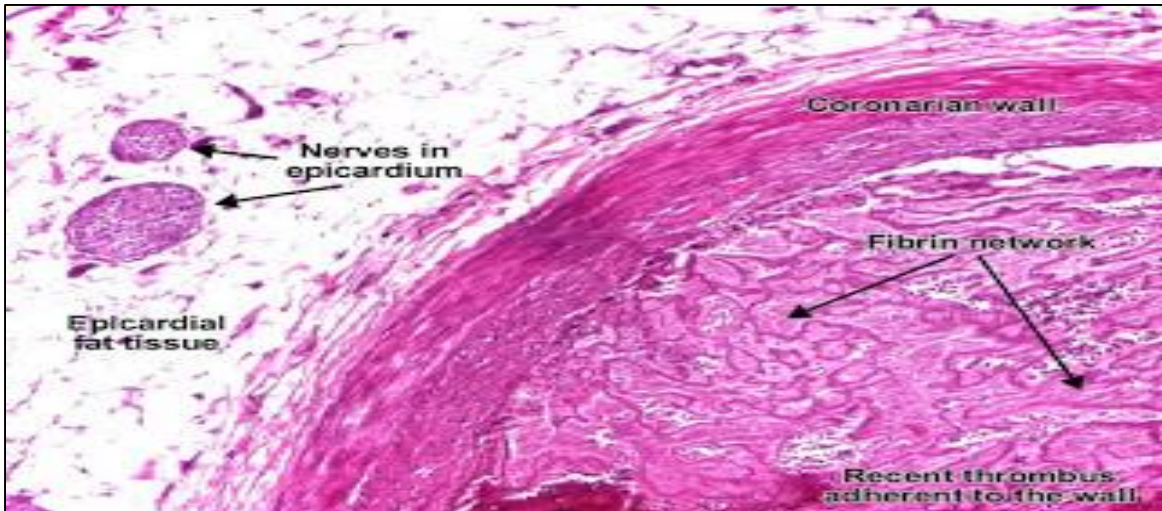


Partial occlusion of the lumen by an atheromatous plaque.
The plaque consists of dissolved, cholesterol clefts,
hyaline fibrous tissue and some blood capillaries.



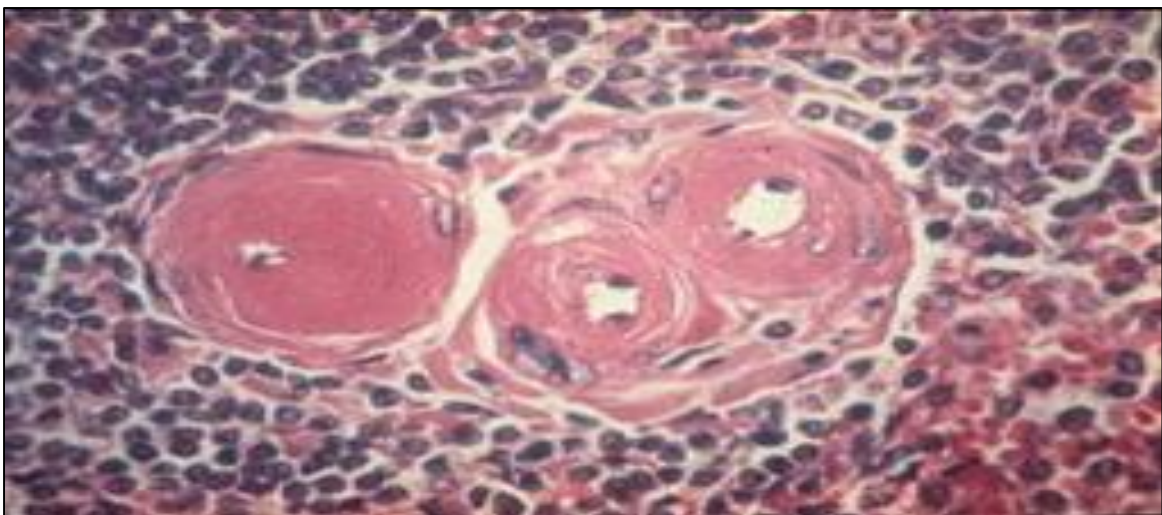
The internal elastic lamina is thin and fragmented.
Pressure atrophy of the media opposite atheromatous plaque
consists of cholesterol clefts, hyaline fibrous tissue and some
blood capillaries.

*Recent Thrombus in coronary Artery :



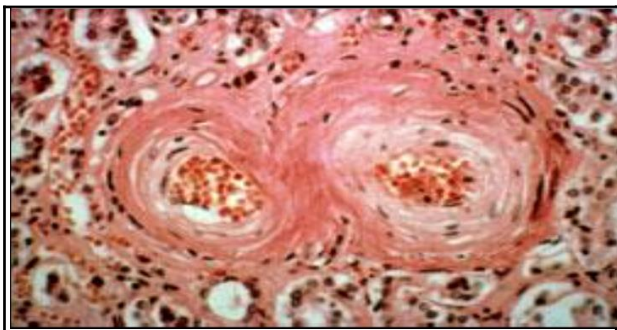
Recent thrombus in a coronary artery: The arterial lumen is completely obstructed by a recent thrombus - fibrin network (pink) containing red blood cells and platelets. The thrombus is developed on an ulcerated atherosclerotic (fibrous) plaque and is adherent to the arterial wall.

*Hyaline Arteriosclerosis:



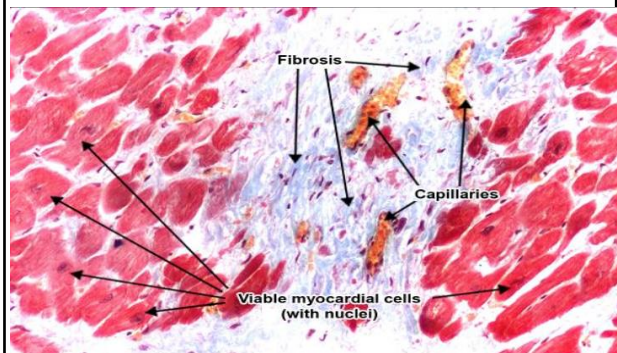
Arteriosclerosis (hardening of the arteries) involves both small and large vessels. It is commonly found in diabetics and hypertensives.

*Hyperplastic arteriolar sclerosis - HPF



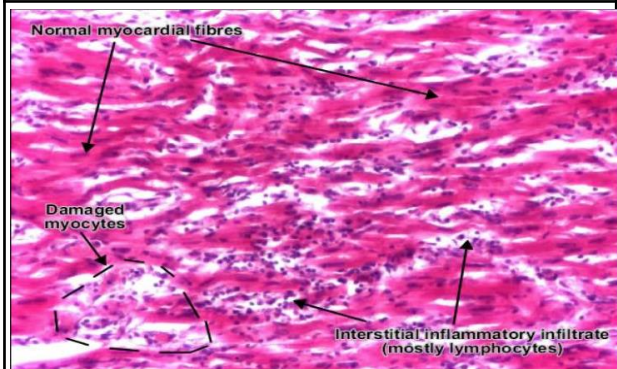
-**Hyperplastic arteriolar sclerosis**: This is the other type of small vessel arteriosclerosis. It is predominantly seen in malignant hypertension and renal disease associated with polyarteritis nodosa and progressive systemic sclerosis.

Ischemic fibrosis of myocardium (diffuse ventricular myocardial fibrosis)



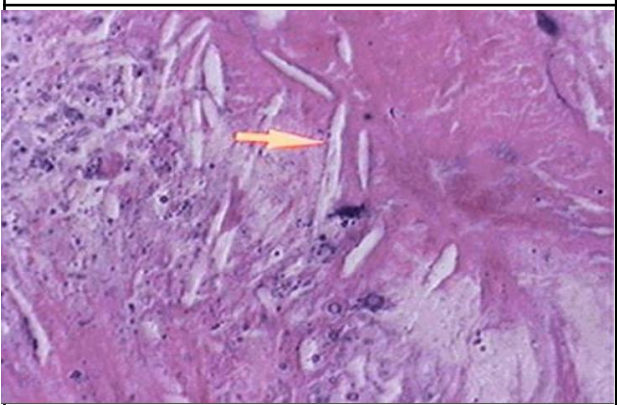
-**Diffuse myocardial fibrosis** (Ischemic fibrosis of the myocardium) Myocardial cells (red) intermingled with collagen-rich fibrosis (blue) which completely replaced the necrotic myocardial cells. Capillaries (with yellow-orange red blood cells) within fibrosis remained from repair by connective tissue process.

Acute viral myocarditis - MPF



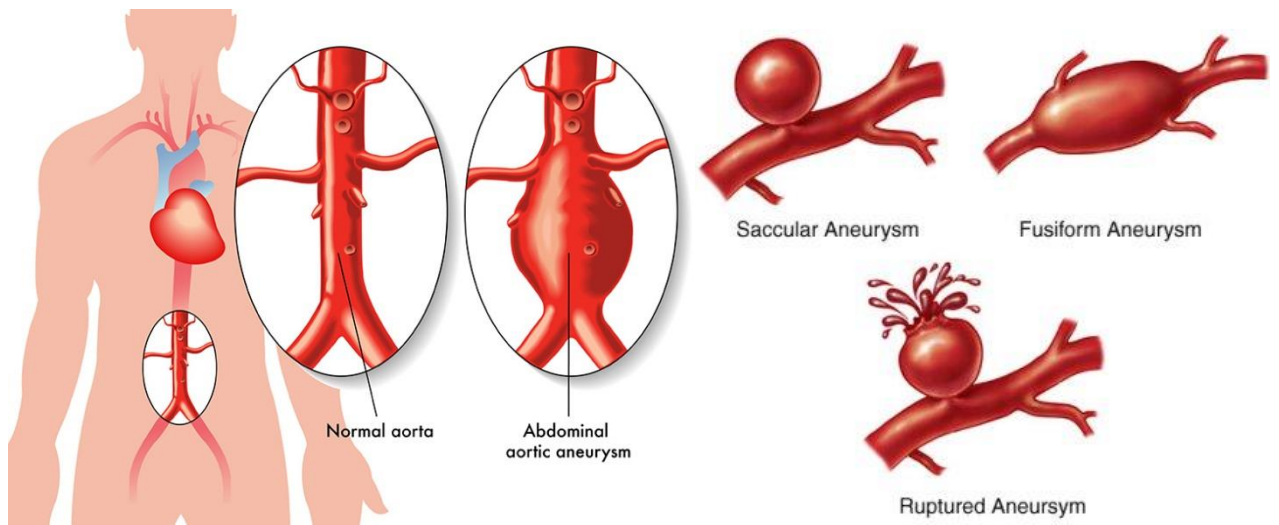
-**Myocarditis** is an inflammation of the myocardium. Acute viral myocarditis is produced most often by **Coxsackie B virus** and **echoviruses**. Myocardial interstitium presents an abundant edema and inflammatory infiltrate, mainly with lymphocytes and macrophages.

Aortic atherosclerosis - HPF



-High power view of intimal aspect of atherosclerotic plaque showing stippling by blue calcific spherules, cholesterol crystal clefts, and fibrous cap.

#Case3
ANEURYSM OF ABDOMINAL AORTA



*Types of Aneurysms:

1-Fusiform 2-Saccular 3- Raptured

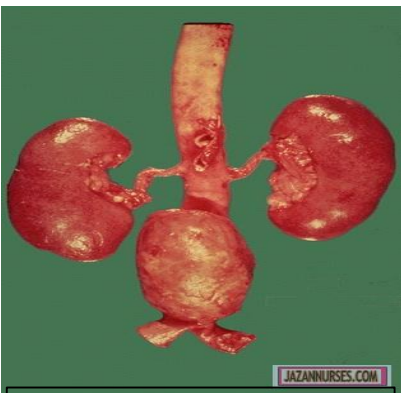
*Complication: Rapture of the aneurysm

*The most likely causes of aneurysms are:

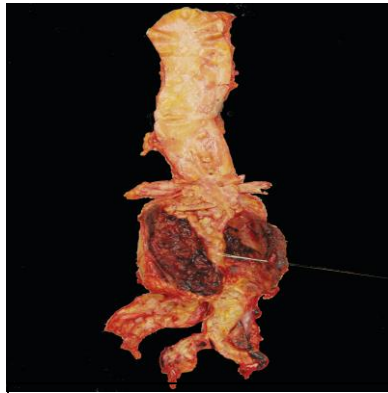
atherosclerosis , mycotic, syphilitic and congenital

*Abdominal Aortic Aneurysm:

#Gross

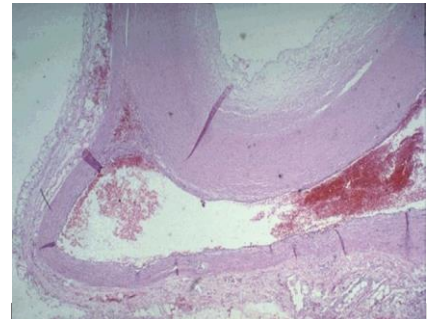


atherosclerotic aneurysm of the aorta in which a large "bulge" appears just above the aortic bifurcation.



Aneurysmal dilatation of the abdominal aorta with **rupture , intraluminal thrombus and extensive aortic atherosclerosis** . The patient had suddenly developed severe abdominal pain, shocked and collapsed.

#Dissecting aortic aneurysm LPF



A dissecting aortic aneurysm occurs when blood enters the aortic wall through a defect and moves between two layers of the wall, **stripping the inner layer from the outer layer** , Usually associated with atherosclerosis, inflammation, and degeneration of the connective tissue of the tunica media

#Case4

VEGETATIONS OF RHEUMATIC FEVER ON MITRAL AND AORTIC VALVES

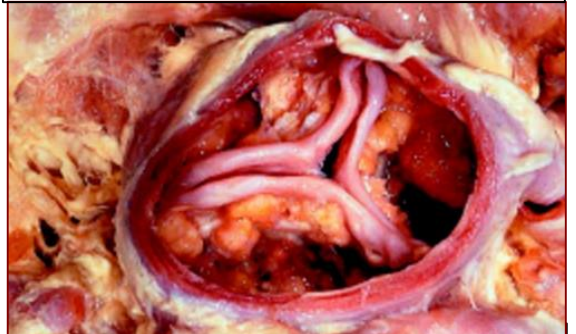
#Gross :

Acute Rheumatic Mitral valvulitis



- Multiple warty vegetations are firm and adherent.
- small (1-3 mm) in diameter .
- Form along the line of valve closure over areas of endocardial inflammation.

Rheumatic Aortic valvulitis

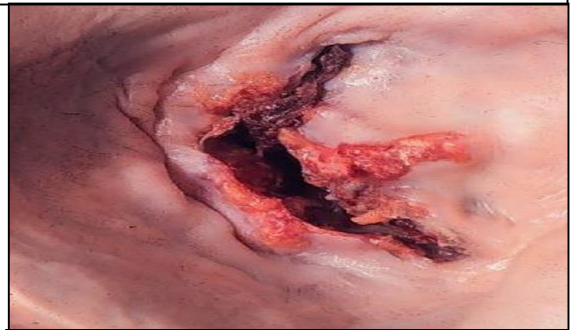


Aorta has been removed to show thickened, fused aortic valve leaflets .

Chronic Rheumatic Mitral valvulitis



- Large vegetations
- Hemorrhage along the free margins of mitral valve.



- Fusion of the commissures.
- Calcification of the cusps
- Vegetations.
- “fish mouth” deformity.

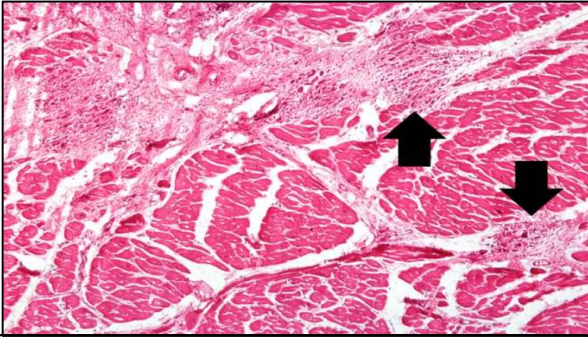


- The valve leaflets are thick, fibrotic and fused.
- Short, thickened, fused chordae tendinae.
- Stenosis and \ or incompetence.

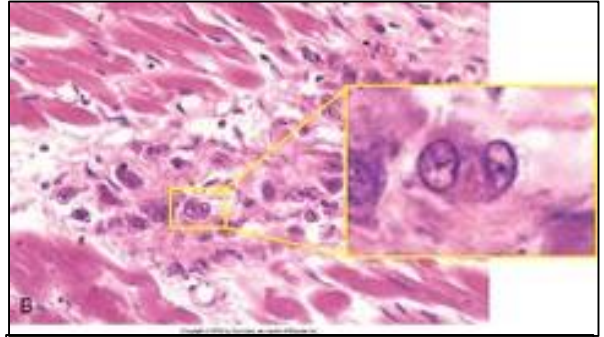
#Case5

RHEUMATIC MYOCARDITIS

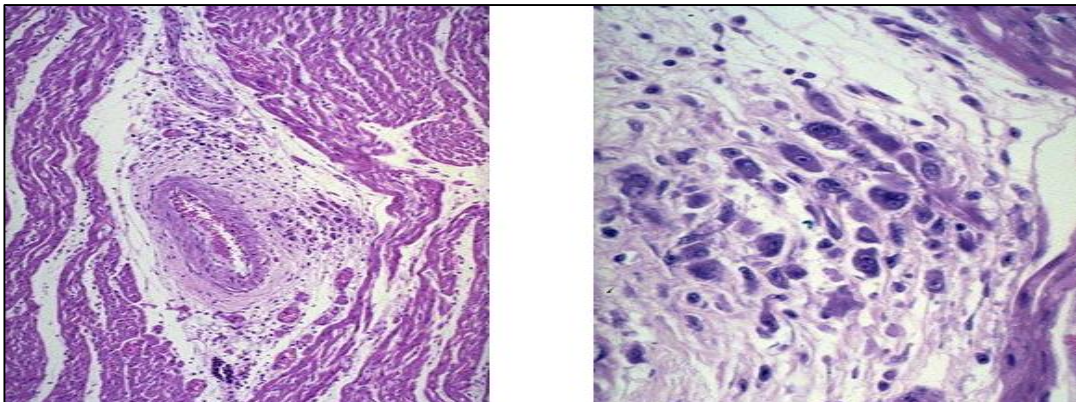
#Microscopic :



The myocardium showing cellular accumulations of Aschoff bodies (arrow) within the interstitium of the myocardium



An **Aschoff nodule** at high magnification



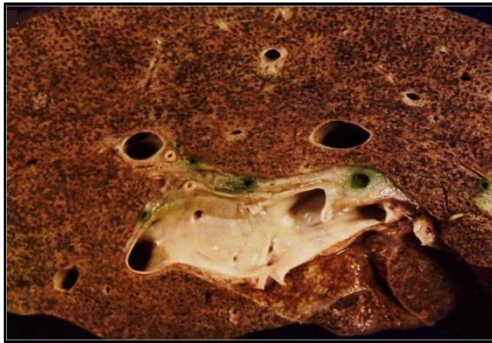
- Aschoff bodies in the intermuscular fibrous septa.
- They are oval in shape and seen in relation to blood vessels.
- fibrinoid necrosis .
- Few lymphocytes and macrophages.
- small giant cells with one or several nuclei (Aschoff giant cell).

#Theoretical information:

- **Aschoff nodules consists of:**
 - 1- macrophages including Aschoff giant cells.
 - 2- Collagen necrosis.
- **Major Jones criteria:**
 - 1-Carditis. 2- Polyarthrititis. 3- Chorea.
 - 4- Erythema marginatum. 5- Subcutaneous nodules.
- **Serological Test for Rheumatic carditis: Anti – streptolysin Antibodies.**
- **The most likely organism: group A beta hemolytic streptococci. #**

#Case6
HEART FAILURE

***Right-sided heart failure :**
(Chronic venous congestion of the liver)



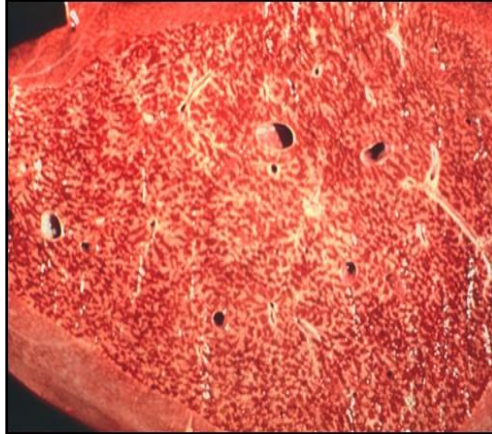
NUTMEG LIVER – Cut surface

Section of liver showing alternating pale and dark areas with a nutmeg (نبتة جوزة الطيب) like appearance possibly due to passive congestion secondary to right sided heart failure.



NUTMEG LIVER – Cut surface

The hepatic parenchyma contains a faintly nodular pattern and nutmeg staining due to chronic passive congestion due to Right sided heart failure.

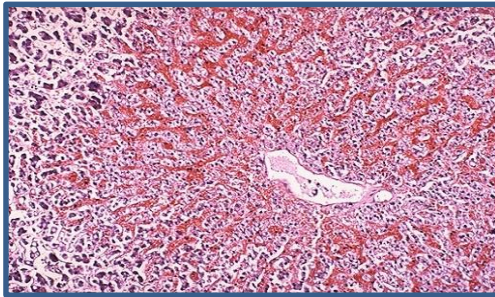


Chronic Congestion of the Liver - CS

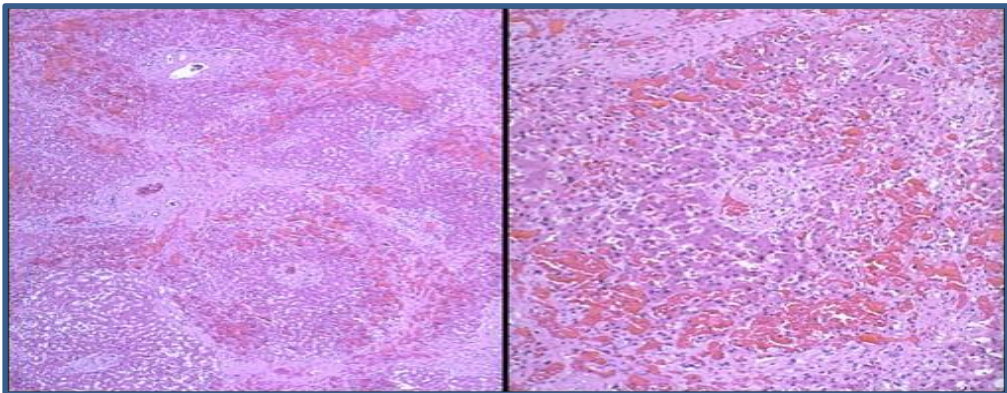
A gross view of nutmeg appearance of liver characteristic of centrolobular or necrosis or passive congestion of the liver. The central areas of the liver are congested and take on a sort of dusky appearance. They are soft in consistency and they are surrounded by the paler areas of fatty liver that are more normal in appearance microscopically

*Right-sided heart failure :
(Chronic venous congestion of the liver)

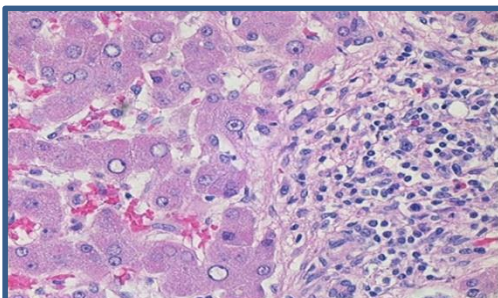
#Microscopic:
LPF/HPF



The central portion of liver lobules shows congestion and dilatation of central veins and blood sinusoids, with atrophy and necrosis of liver cells.



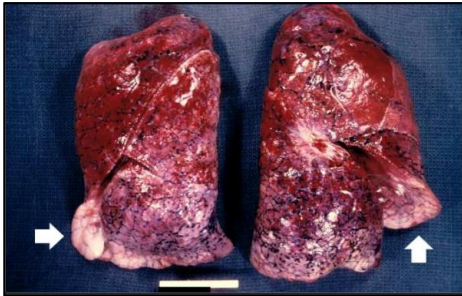
Central veins dilated and congested , necrotic hepatocytes , kupffer cells and steatosis



The central portion of liver lobules shows congestion and dilatation of central veins and blood sinusoids, with atrophy and necrosis of liver cells.

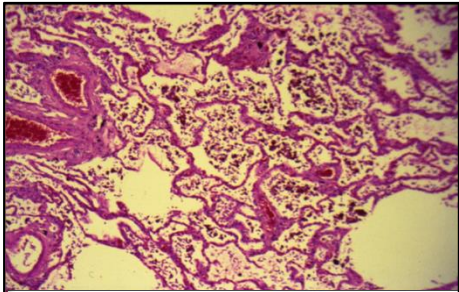
*Left-sided heart failure :
(Chronic venous congestion of the lung)

#Gross :



This is a gross photograph of lungs that are distended and red. The reddish coloration of the tissue is due to congestion. Some normal pink lung tissue is seen at the edges of the lungs (arrows).

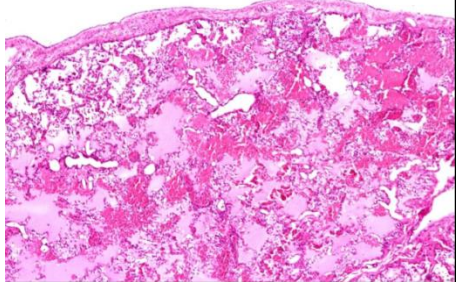
#Microscopic :



(LPF)

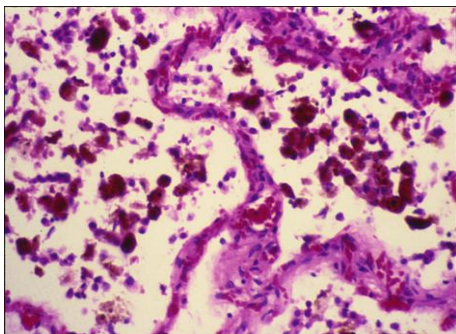
The alveolar walls are thickened by dilated and engorged capillaries.

*RBCs present in the alveolar spaces



(LPF)

Lung, pulmonary edema in patient with congestive heart failure due to heart transplant rejection

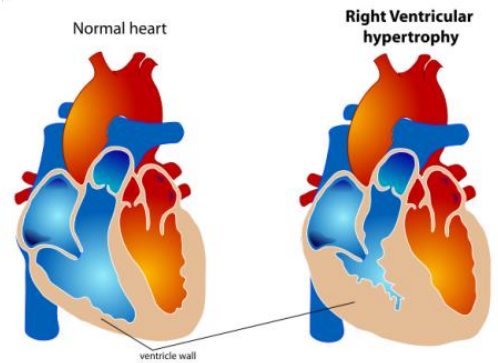
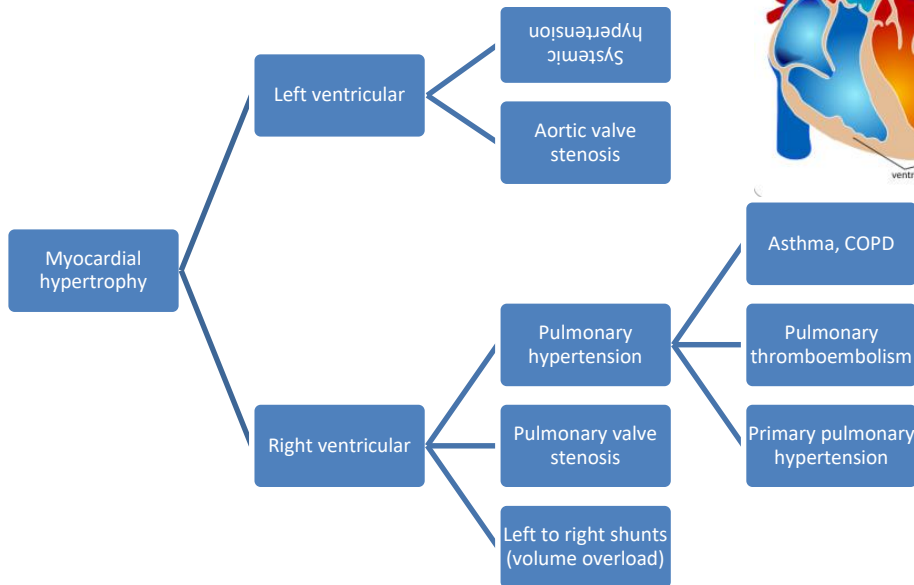


(HPF)

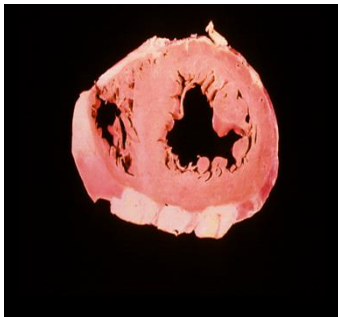
The alveoli contain edematous fluid, red blood cells and large alveolar macrophages (**heart failure cells**), which are filled with haemosiderin pigment derived from red cells breakdown.

#Case7 MYOCARDIAL HYPERTROPHY

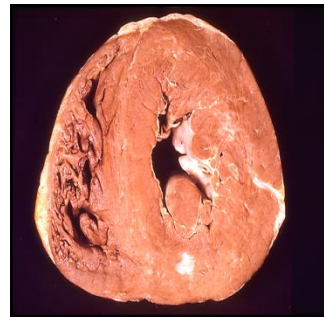
*The ventricle is working against high pressure , or “pumping” higher than normal volume leading to myocardial hypertrophy.



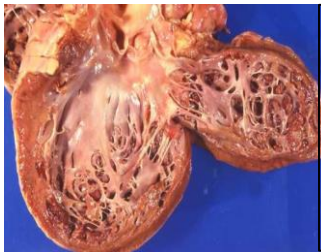
#Gross :



Normal ventricle



Hypertrophied ventricle

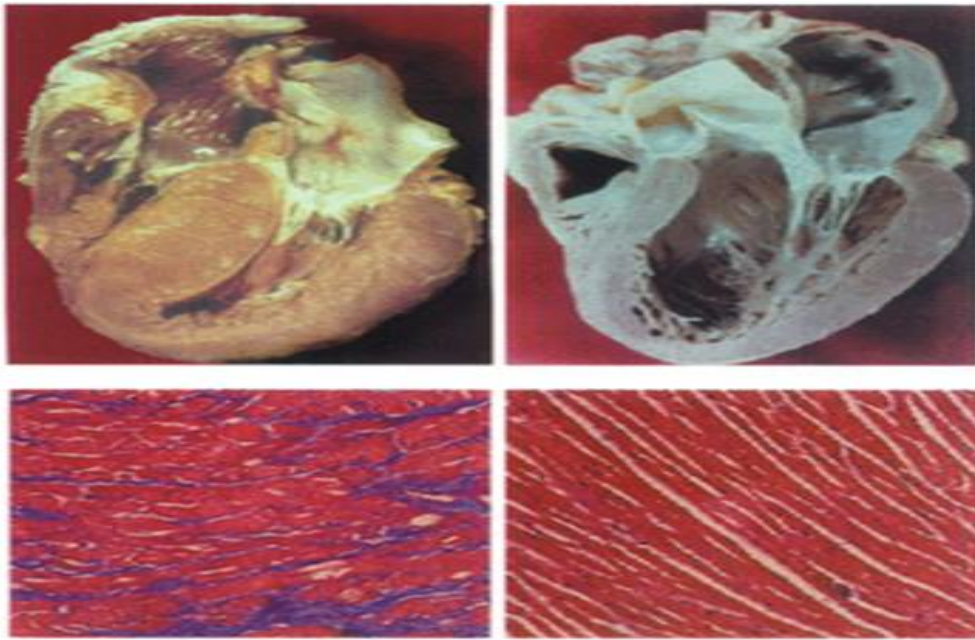


This cross section view of the heart shows:

- the left ventricle in the left of the picture.
- The heart is from a severe **hypertensive**.
- **The left ventricle is grossly thickened.**
- The myocardial fibers have **undergone hypertrophy**.



Heart from a hypertensive patient. The left ventricle is **very thick** (over 2 cm). However the rest of the heart is fairly normal in size as is typical for hypertensive heart disease. **The hypertension creates a greater pressure load on the heart to induce the hypertrophy .**



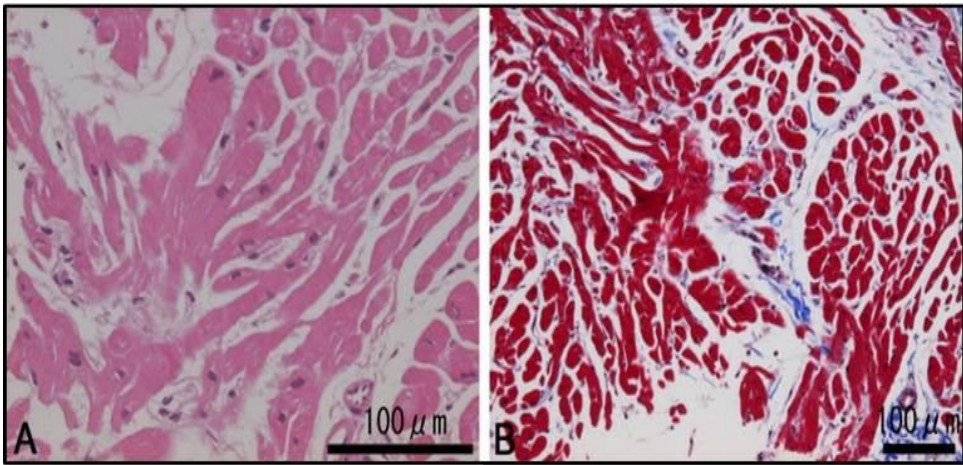
HCM

Normal

Histopathology showing significant **myofiber disarray** and **interstitial fibrosis**

Histopathology showing **Normal myocytes**

#Microscopic:



A Haematoxylin-eosin stain

B Masson's trichrome stain

Histopathology of heart sections of ventricular septum showing significant **myofiber disarray** and **slight interstitial fibrosis** indicating hypertrophic cardiomyopathy (HCM).

#Case8
MYOCARDIAL INFARCTION

***Definition:** (MI), also commonly referred to as “heart attack,” is necrosis of heart muscle resulting from ischemia

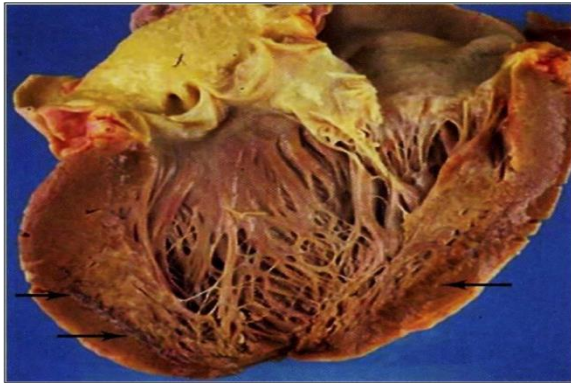
***Complications that might occur in MI:**

- Heart Failure.
- Myocardial rupture (3 days).
- Ventricular aneurysm (7 days).

***Enzymes elevated:**

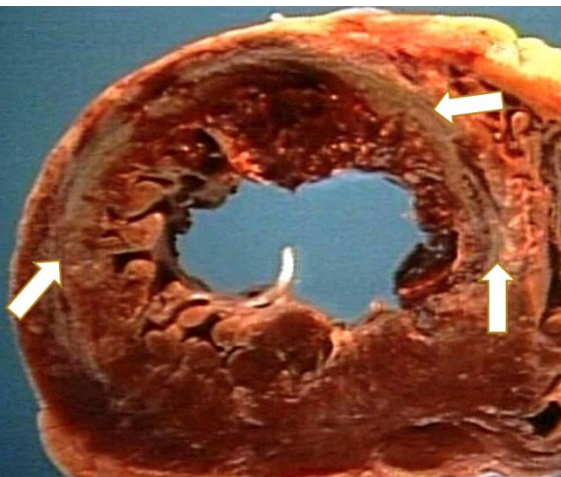
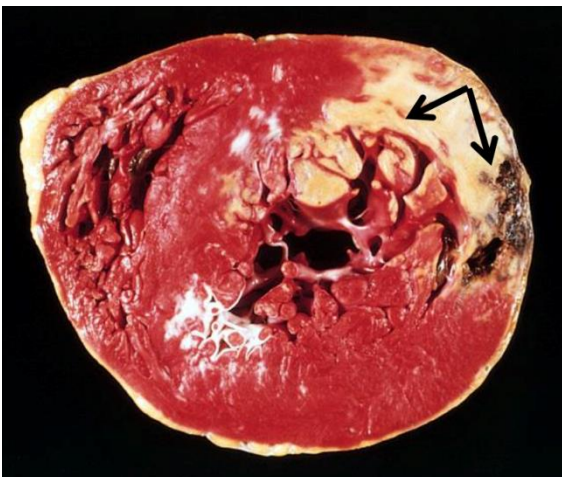
- a. Troponin
- b. CK-MB (Creatine Kinase).
- c. LDH (Lactic dehydrogenase). d. Myoglobin.

#Gross:



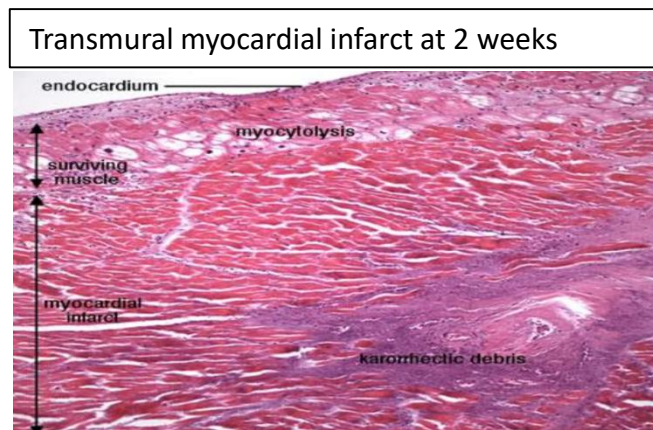
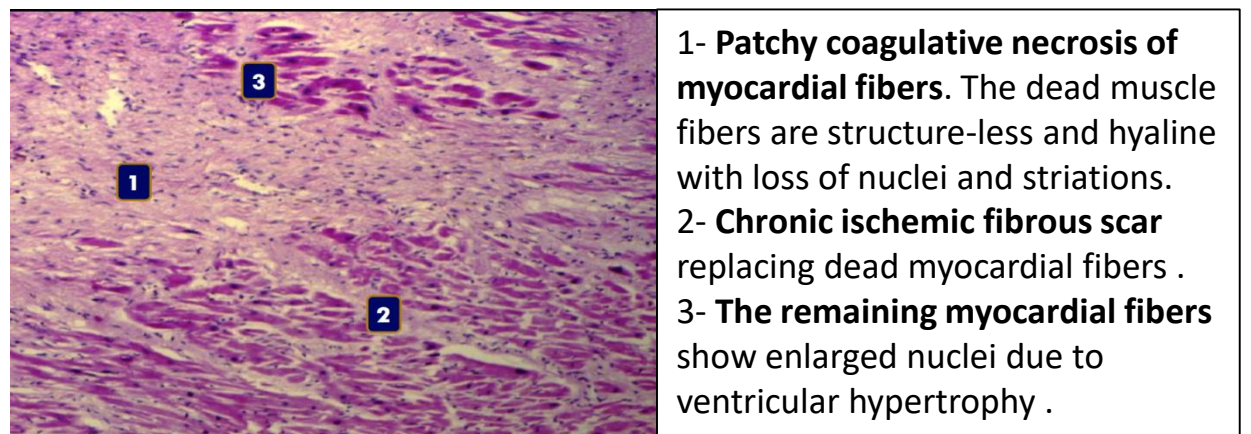
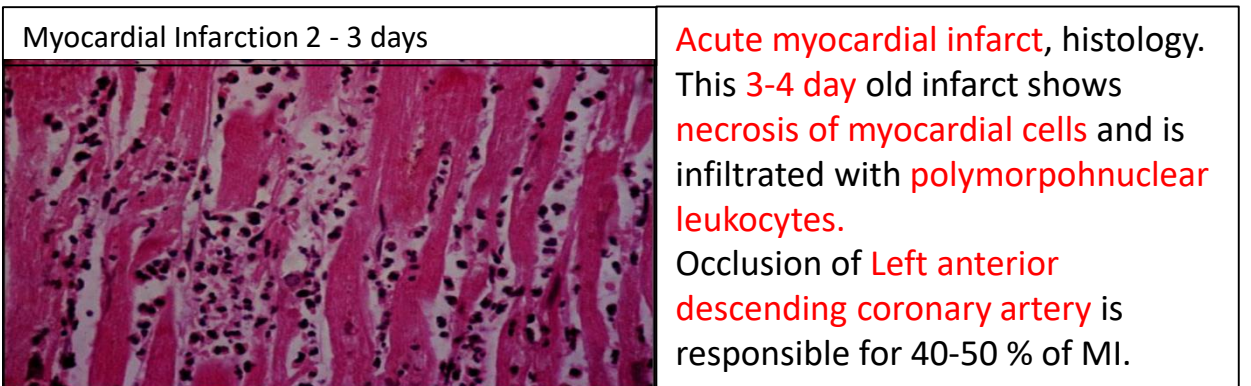
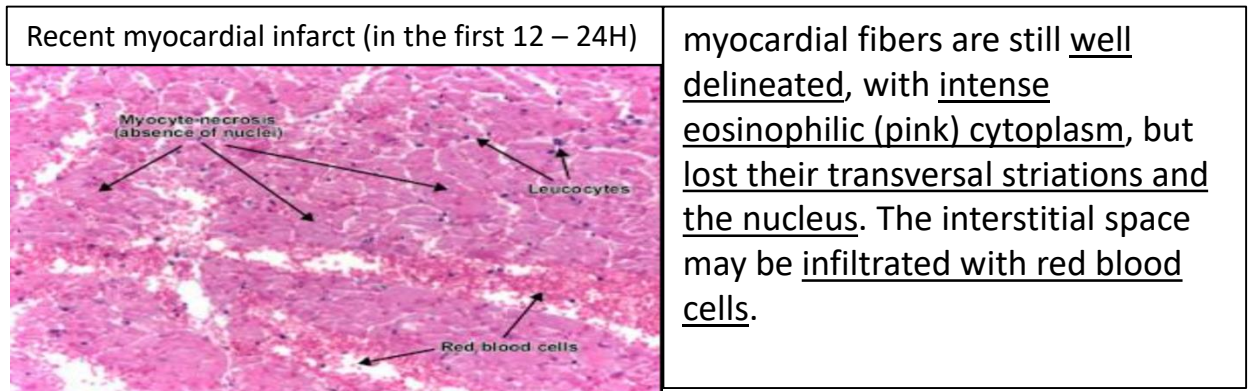
- Black arrows show soft hemorrhagic areas, consistent with MI.

- Part of the heart which is affected: **Left ventricle.**



In both pictures we see: Cross section of the **left and right ventricles** showing a **pale and irregular focal fibrosis in the left ventricular wall with increased thickness**

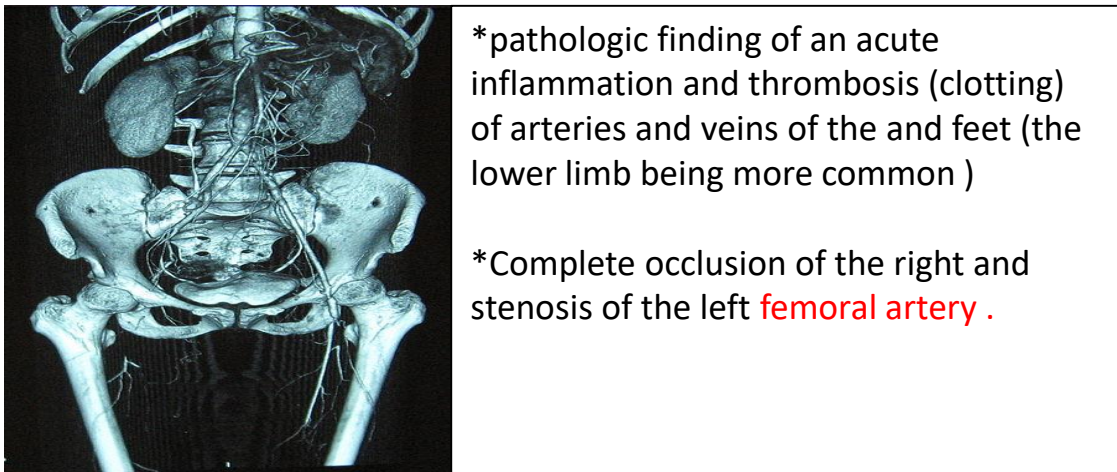
#Microscopic:



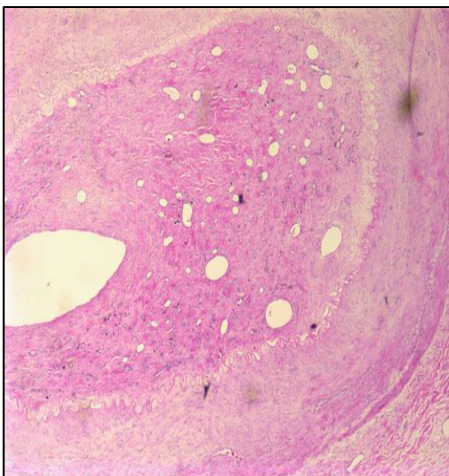
#Case9

THROMBOANGITIS OBLITERANS (BUERGER'S DISEASE)

#Gross :



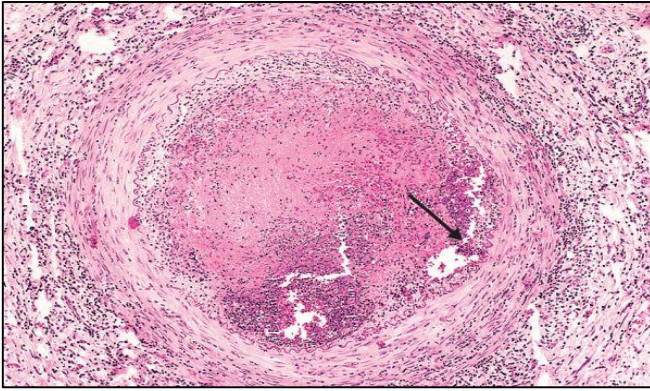
#Microscopic LPF:



Thromboangiitis obliterans (Buerger's disease) is a non atherosclerotic, segmental, inflammatory, vaso-occlusive disease that affects the small- and medium-sized arteries and veins of the upper and lower extremities.

Wegener's granulomatosis (Granulomatous polyangiitis) is a destructive vasculitis characterized by the formation of ill-defined granulomas in vessel wall together with common renal and lung involvement.

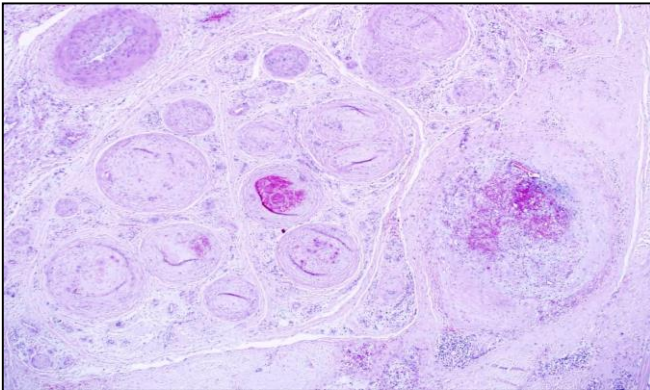
#Microscopic LPF:



- a. Thrombus.
- b. Microabscesses within the thrombus.
- c. Vasculitis (infiltration of the vessel wall by neutrophils).

*Sometimes nerves are also involved giving rise to pain in affected areas.

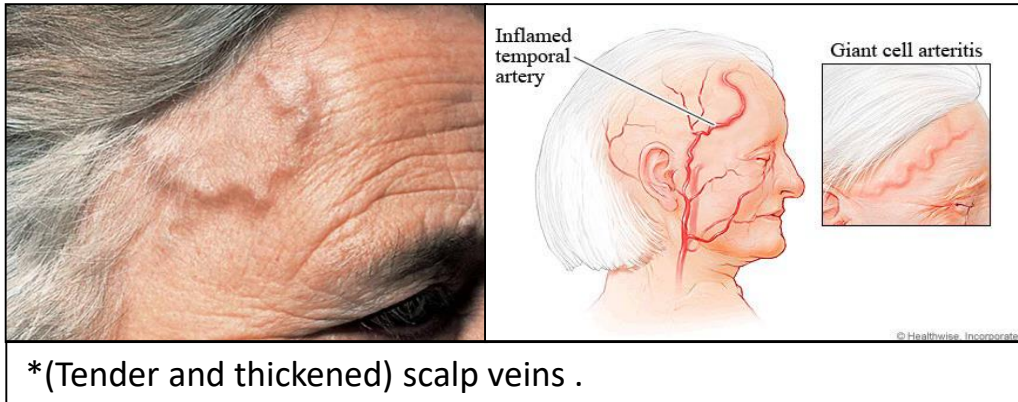
#Microscopic HPF:



Some blood vessels show recent organizing thrombi while others show infiltration of the wall and surrounding tissue by chronic inflammatory cells

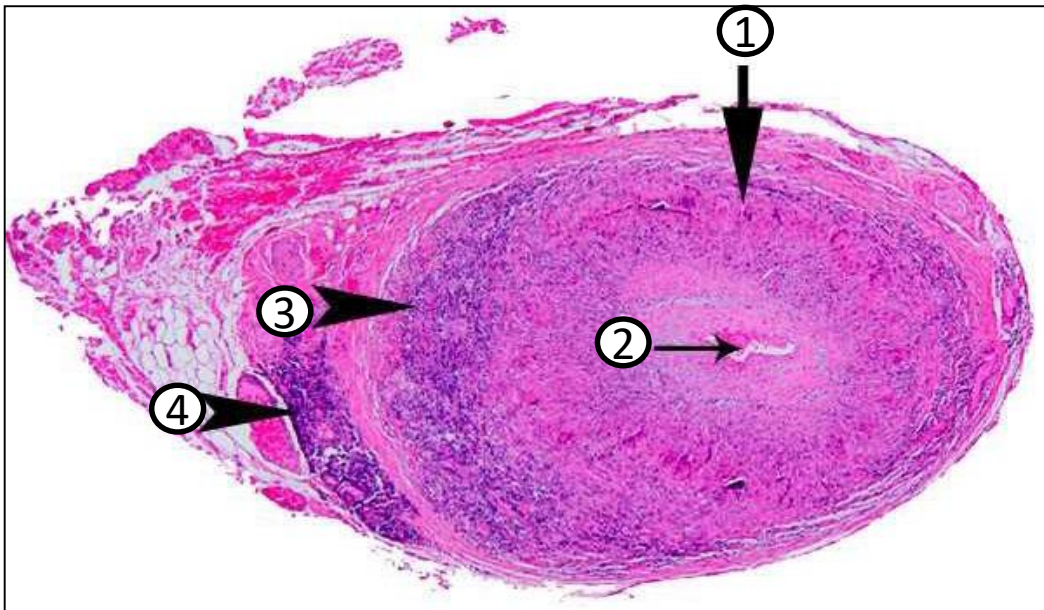
#Case10
GIANT CELL / TEMPORAL ARTERITIS

#Gross :



*(Tender and thickened) scalp veins .

#Microscopic:



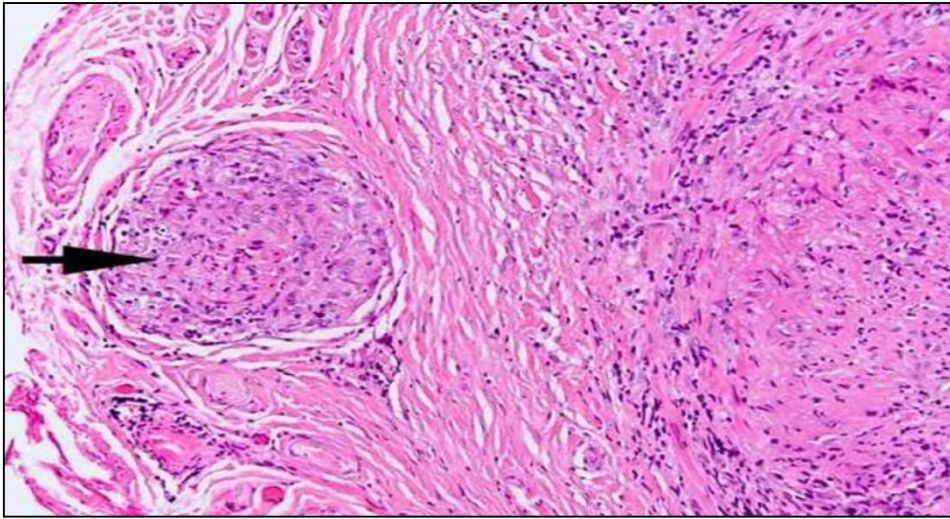
(LPF)

①Circumferential involvement of the vascular media is present .
②Chronic lymphocytic inflammation in the media and adventitia ,
Reactive intimal fibroplasias lead to luminal stenosis with <10% of
its original luminal diameter .

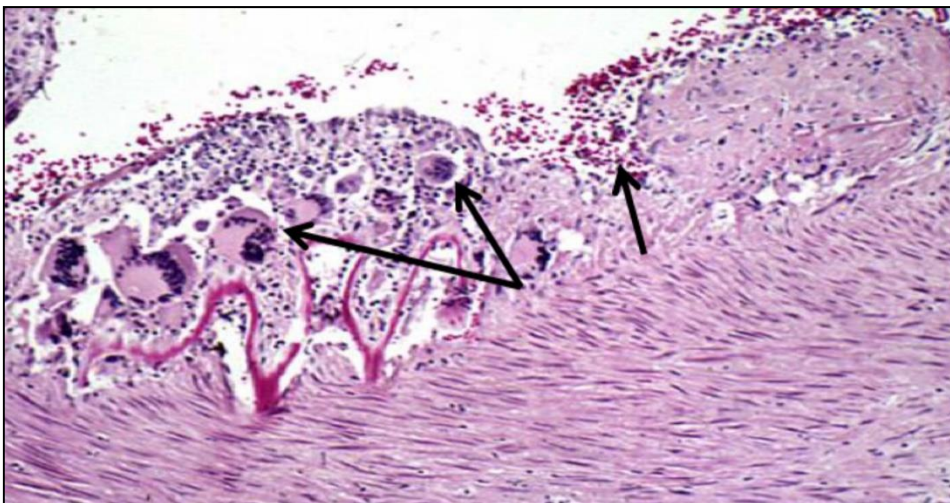
(HPF)

③ Giant cells can be of Langhans type or foreign-body type , and
may show fragments of disrupted
internal elastic lamina .
④ Dense chronic lymphocytic inflammation traversing through
circumferential smooth muscle fibers
of vascular media .

#Microscopic HPF:



- * **single granuloma** in the adventitia of the artery.
- * granulomatous in addition to both acute and chronic inflammatory cells , acute inflammation when present is generally mild and represents an early stage of the disease.



- * **Disruptions of the elastic lamina with inflammation and giant cells.**
- * Segmental inflammatory lesions with intimal thickening , medial granulomatous inflammation with giant cells and chronic inflammatory cells and internal elastic lamina fragmentation.

#Case11
LEUKOCYTOCLASTIC / HYPERSENSITIVITY VASCULITIS
(MICROSCOPIC POLYANGITIS)

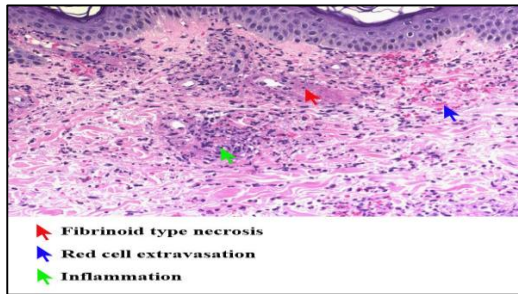
#Gross:



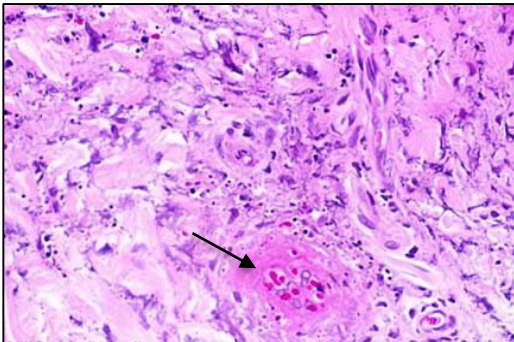
*Clinical sign: vasculitis is secondary to deposition of immunoglobulin and complement in vessel wall .
 Hypersensitivity vasculitis might be complicated with **necrotizing glomerulonephritis** (Hematuria) and hemoptysis due to pulmonary capillaritis .



(The purpuric patches because of Subcutaneous bleeding)
 Most pronounced in dependent areas.

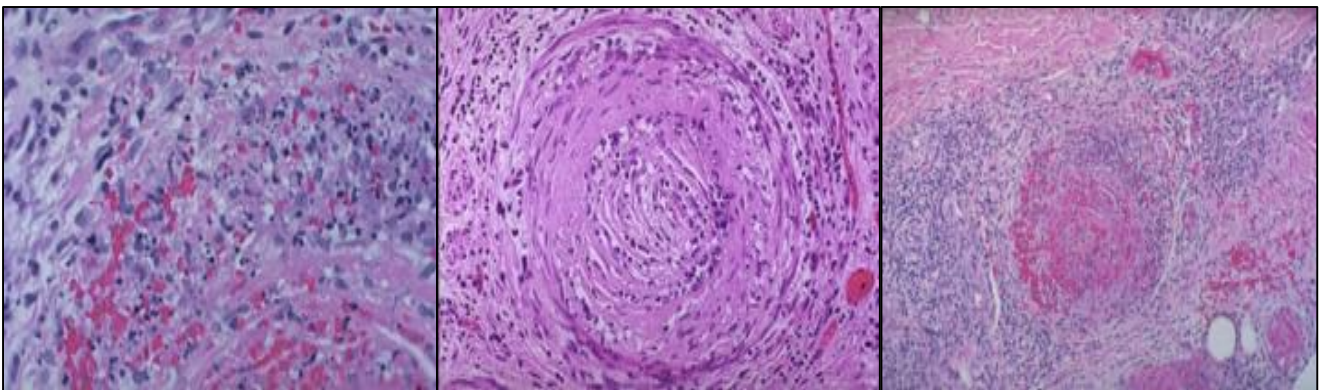


#Microscopic:



1- Fibrinoid necrosis of small dermal vessels is present , necessary to establish the diagnosis of **leukocytoclastic vasculitis (black arrow)**

2-surrounding tissue is showing Nuclear debris and neutrophils .



This muscular artery shows a more severe vasculitis with acute and chronic inflammatory cell infiltrates, along with necrosis of the vascular wall

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