


CARDIOVASCULAR - 4

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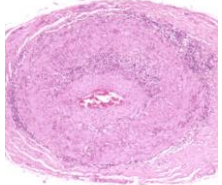
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ARTERIES

Inflammation of Arteries

- Arteritis is characterized by the presence of inflammatory exudate (**neutrophils, etc.**) within the layers of the vessel wall.
- Non-specific types of arteritis is a component of all acute inflammatory lesions.
- The inflammatory reaction occurs in arteries which pass through inflamed areas, or which contain infected thrombi or emboli.
- It is usually the smaller arteries that are involved and the arteritis is, therefore, of little consequence except in cases of thrombotic infarction or embolism




<http://eyepathologist.com/disease.asp?IDNUM=315970>



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- In general, non-specific arteritis is secondary to and correlates directly with the inciting cause.
- Specific types of arteritis occur in a wide variety of systemic infectious diseases.
- Damage may occur due to the direct effect of a microbial agent or its toxin on any component of the vascular wall.
- In the **horse**, arteritis commonly occurs subsequent to invasion of the **anterior mesenteric artery** by immature *Strongylus vulgaris*.
- Also, arteritis is an important lesion in **Newcastle disease** in birds, **equine viral arteritis**, **MCF** in cattle, **renal insufficiency** in dogs, **dirofilariasis** in dog and some other carnivores, etc.



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- Arteritis subsequent to immunologic injury occurs when **immune complexes (antigen/antibody/complement)** attach to vascular endothelium.
 - Initially, antigens localizes in vascular walls and subsequently form complex with circulating precipitating antibodies.
 - The antigen/antibody complexes attract complement. The arteritis is caused by **neutrophils** for which the complement containing complexes are chemotactic.
 - Immunologic arteritis occurs in the **Arthus reaction**, **acute serum sickness** and in cases of **glomerulonephritis**



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EQUINE VIRAL ARTERITIS (RNA virus)

- is an **acute contagious disease** of horses characterized by extensive necrosis in the **T. media** of small muscular arteries of the **intestine, lymphoid tissue, and visceral organs**.
- Initially, the virus destroys the endothelium in the vascular supply (**vasa vasorum**) of small muscular arteries.
- Subsequently, there is **endothelial swelling** and **necrosis** of the **media** of small muscular arteries.
- Grossly, the lesions of equine viral arteritis are attributable to the vascular changes and consist principally of **extensive hemorrhages** and **generalized edema**.



- The distribution of edema in the intestine is considered to be characteristic. "**Edematous segments of the intestine (1-3 feet), alternate with segments of normal thickness.**"
- **Clinically**, the disease is characterized by **depression, fever, leucopenia, limb edema, abortion** in pregnant mares (**up to 80%**), **enteritis** and **pneumonic** complications.



ANEURYSM OF ARTERIES

- An aneurysm is a pathological, more-or-less circumscribed, **dilatation** of an **artery (or chamber of the heart)**.
- The arterial wall is composed of **stretched intima** and **adventitia** with only **remnants of media**.
- There is a tendency for aneurysms to enlarge progressively and to ultimately rupture.
- A **false aneurysm** is a blood-containing cavity that communicates with the arterial lumen. The wall is formed from surrounding tissues.
- A **dissecting** aneurysm is characterized by the presence of blood between the layers of the arterial wall (**usually in the media**).
 - **The blood gains access through a defect in the media** and the resulting blood pressure forces the blood for some distance between the layers.



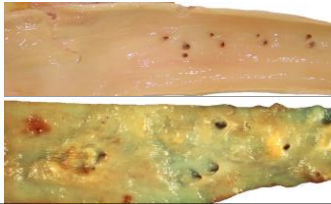
HYPERTROPHY OF ARTERIES

- Hypertrophy of arteries may affect one or all components of the vascular wall.
- It occurs in response to the need to carry an extra load.
- **Medial hypertrophy** of the pulmonary arteries occurs commonly in the lungs of cats.
- The condition is characterized by marked hypertrophy of the muscular media so that the lumen is reduced to rather small slits.



ARTERIOSCLEROSIS

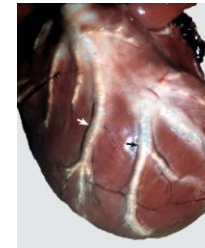
- Literally means hardening of the arteries.
- It includes those degenerative changes characterized by **fibrous thickening, loss of elasticity, and narrowing of the lumen.**
- usually arteriosclerotic lesions develop as multiple or focal sclerotic changes superimposed upon a generalized, age-related increase in connective tissue elements of the vessel wall.



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- The "**hallmark**" of arteriosclerosis is the **fibrous plaque** which appears as a white, firm, glistening elevation on the luminal surface of arteries.
- The well-developed fibrous plaque consists largely of "modified" smooth muscle cells surrounded by increased amounts of extracellular matrix.

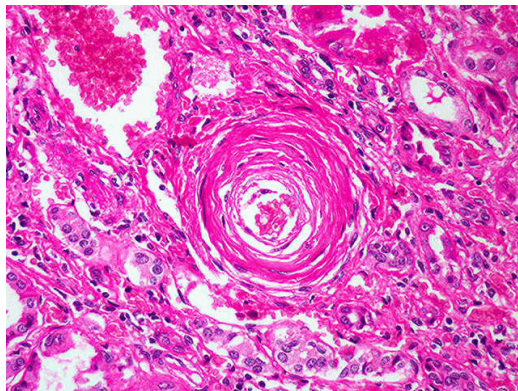


**Arteriosclerosis
Of Coronary
Arteries**



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- Subsequent to **injury to endothelial** cells of an artery, allows fractions of **plasma protein** to pass into the media.
- These plasma protein fractions serve as stimuli for myocyte migration from the media into the intima.
- The **medial myocytes** migrate through the internal elastic membrane **into the intima.**
- In the intima, the **myocytes undergo hyperplastic** changes and deposit connective tissue components (**elastin, collagen, ground substance, etc.**).



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– Sub-classifications within the broad category of arteriosclerosis are

- **atherosclerosis,**
- **medial sclerosis,**
- **arteriolosclerosis.**

– Atherosclerosis is characterized by the accumulation of lipid in **larger arteries** in the form of elevated, lipid-filled plaques called atheromas.

• **The pathogenesis of the atheroma involves the following:**

– **Endothelial damage**

- Myocyte migration through the internal elastic membrane



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- Proliferation of myocytes in foci within the intima
- Accumulation of lipid within the cytoplasm of myocytes
- Focal clusters of myocytes become distended by cytoplasmic lipid giving these cells the name of "**foam cells.**"
- Aggregates of foam cells appear grossly as **small elevated fatty streaks** in the arterial luminal surface.
- In progressively expanding lesions, foam cells become **necrotic** and the liberation of **free lipid** incites **fibrosis** and **calcification.**



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– Advanced atheromas are complicated by hemorrhage, thrombosis, ulceration, and the infiltration of the lesions by plasma proteins.

– **In animals,** atherosclerosis occurs primarily in the aorta and small muscular arteries.

– **In the dog,** severe systemic atherosclerosis is associated with advanced age, obesity, and hyper-lipoproteinemia.



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VEINS

Inflammation of Veins

- **Phlebitis** is characterized by the presence of inflammatory exudate in the wall of veins.
- The condition is less common than arteritis.
- Acute phlebitis occurs in "**naval infection**" (**omphalophlebitis**) of **calves, lambs and foals.**
- The resulting bacteremia may lead to acute death or give rise to widespread suppurative lesions (**abscesses**).



<http://pictures.doccheck.com/de/photos/53725/9451/omphalophlebitis-beim-kalb/>



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Varicose Veins

- Dilated and elongated, tortuous veins are referred to as varicose veins.
- Such veins follow an irregular and tortuous course and hold an abnormally large amount of blood.
- varicose veins are less common in animals than in man.



<http://en.wikipedia.org/wiki/File:GnarlyUdderVeins4589.JPG>



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LYMPHATICS

LYMPHANGITIS

- Inflammatory reactions occur under circumstances similar to those discussed for veins.
- In most instances, the involved vessels are so small as to have no significance;
- Lymphangitis is associated with several specific diseases, including:
 - anthrax in dogs, pigs and horses (**acute thrombotic lymphangitis**),
 - mycobacterium infections (**granulomatous lymphadenitis**)
 - cutaneous glanders of horses (**ulcerative lymphangitis**).



https://www.gaitpost.com/Equestrian-Article.aspx?ARTICLE_ID=1124



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Dilatation (ectasis)

- Of lymph channels usually develops subsequent to some form of obstruction.
- This lead to the accumulation of excess interstitial fluid in the drainage area (**local edema**).
- The more common causes of lymphatic obstruction include infiltrating neoplasms and thrombosis of the channels.

Ruptures

- Of lymph channels are important only when the thoracic duct or larger vessels are the sites of injury.
- Leakage of lymph usually occur in the thoracic cavity and the condition is referred to as chylothorax.



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- McGavin, MD and JF Zachary, 2006. Pathologic basis of Veterinary Disease, 4th Edition. Mosby Elsevier, Elsevier Health Sciences



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