



CARDIOVASCULAR SYSTEM - 2

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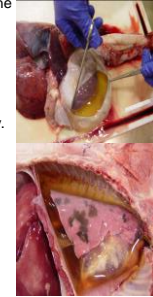
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PERICARDIUM

- The pericardium is the fibro-serous sac which encloses the heart.
- It is thin but strong and inelastic.
- It contains a small amount of clear serous fluid.
- Most diseases of the pericardium are secondary to diseases
 - in the heart, lungs, pleura, and other sites in the body.

HYDROPERICARDIUM

- Hydropericardium is caused by those factors responsible for generalized and/or local edema.
- The volume of fluid varies greatly
- The rate at which fluid accumulates is important.
- If fluid accumulates **rapidly, the pericardium is placed under considerable tension (generalized venous congestion).**
- However, when fluid accumulates **slowly, there is time for the pericardium to stretch and adapt.**



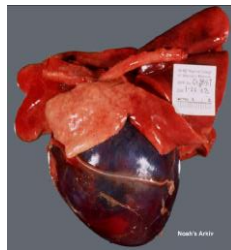
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PERICARDIUM

HEMOPERICARDIUM

- Accumulation of pure blood in the pericardial sac.
- The condition is uncommon in animals except in the following instances
 - Following cardiac punctures.
 - Spontaneous rupture of the intrapericardial aorta in horses.
 - In uremic dogs with ulcerative atrial endocarditis.
 - Following rupture of the coronary artery.
- **CARDIAC TAMPONADE** refers to compression of the heart subsequent to the accumulation of any fluid within the pericardial sac.



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PERICARDIUM

INFLAMMATION OF THE PERICARDIUM

- Pericarditis refers to inflammation of both the parietal and visceral surfaces of the pericardium.
- A true pericarditis is nearly always infectious with an accumulation of exudate within the sac.
- Infectious agents usually reach
 - by extension from surrounding structures and/or
 - by blood stream (**hematogenous route**).
- The hematogenous route of infection is most common
- The exudate tends to be of the fibrinous or sero-fibrinous type.



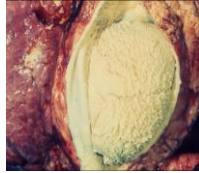
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PERICARDIUM

Fibrinous Pericarditis

- Characterized by an accumulation of fibrin within the pericardial sac.
- Exudation of fluid is not a prominent feature.
- **Grossly,**
 - the fluid is grayish to yellow,
 - flecks of blood may be present.
 - In cattle
 - » it is commonly a part of blackleg,
 - » pasteurellosis,
 - » contagious bovine pleuropneumonia,
 - » sporadic bovine encephalomyelitis,
 - » Some forms of neonatal coliform infections.



PERICARDIUM

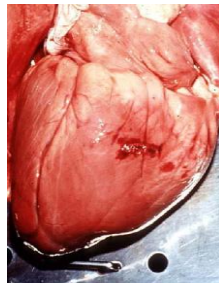
Purulent Pericarditis

- Characterized by the accumulation of pus in the pericardial sac.
- It occurs most commonly as a result of traumatic perforation by a foreign body originating from the reticulum (**traumatic pericarditis**).
- Also, in traumatic pericarditis the exudate may be fibrinous or fibrino-purulent in nature.
- Pus within the pericardial sac may appear as
 - a thin cloudy exudate,
 - as creamy exudate, or
 - as a purulent exudate.
- The accumulation of pus — tension on the pericardium (**congestive heart failure**).
- In both fibrinous and purulent pericarditis, healing is usually by organization.
- Ultimately, adhesive pericarditis.
- Thus, considerable pressure is exerted, and the heart muscles become more or less rigid (**constrictive pericarditis**).
- Subsequently, **congestive heart failure**.

PERICARDIUM

Traumatic Pericarditis

- Occurs in cattle as a result of traumatic perforation of the pericardium by a foreign body originating in the reticulum (**traumatic reticulitis**).
- Ingested foreign bodies enter the reticulum; pierce the wall of the reticulum, overlying peritoneum and diaphragm and enter the thoracic cavity.
- Subsequently the foreign body may enter the pericardial sac (as well as the myocardium and endocardium resulting in an exudative pericarditis).



PERICARDIUM

Serous Atrophy of Pericardial Fat

- Indication of cachexia and/or debilitating condition,
- there is progressive mobilization of depot fat, including that beneath the epicardium.
- As normal lipid vacuoles are reduced in size, they are replaced by a **proteinaceous fluid**
- Subsequently, normal fat is converted to **grayish-brown gelatinous masses**.

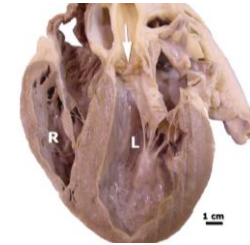


ENDOCARDIUM**INFLAMMATION**

- Inflammation of the endocardium which may be **valvular** or **mural**.
- In domestic animals, **valvular** endocarditis is more frequent than mural.
- Apparently, endocarditis occurs subsequent to a sustained or recurrent bacteremia.
- Thrombi are formed in those areas where the endothelium is damaged (**valvular or mural**).
- The terms "**vegetative**" or "**cauliflower**" are commonly used to describe the gross appearance of these thrombi.

**ENDOCARDIUM**

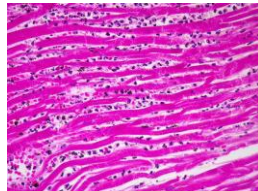
- The surfaces of the thrombi are friable and **embolism** may occur.
- Organization proceeds from the base by the usual process of granulation.
- Valvular thrombi are almost always serious
- they tend to obstruct the normal flow of blood,
- prevent perfect closure of the valves, and/ or
- result in embolism.

**MYOCARDIUM****INFLAMMATION**

- Inflammation of the myocardium, is usually secondary to a wide variety of systemic diseases.
- Haematogenous
- The lesions are usually focal and may be overlooked on casual gross inspection.

Suppurative Myocarditis

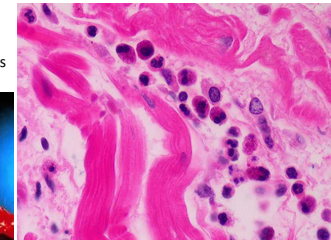
- Is associated with the presence of pyogenic organisms, and abscess formation is common.

**MYOCARDIUM****Eosinophilic Myocarditis**

- Characterized by an infiltration of eosinophils in the myocardium.
- The condition is occasionally observed in cattle, and the cause is unknown.
- In addition, an eosinophilic myocarditis is observed in animals given excessive amounts of **sulfonamides** and occasionally in **penicillin** hypersensitivity.

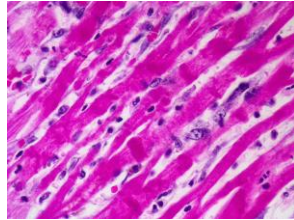
Parasitic Myocarditis

- May be caused by a variety of parasites

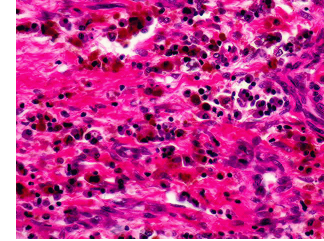


MYOCARDIUM**Necrosis and Ischemia**

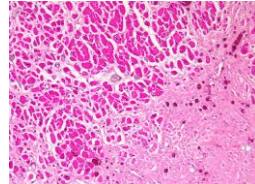
- Myocardial infarction is **rare** in domestic animals.
- however, acute obstruction of the coronary arteries due to **emboli** occurs with some frequency, with the development of infarction.
- if the coronary obstruction is **chronic**, the end result is diffuse scarring of the myocardium and markedly altered function.
- **Coagulative necrosis** of the myocardium is a lesion commonly associated with **vitamin E** and **selenium** deficiency (**white muscle disease**) in **lambs, calves, and pigs**.

**MYOCARDIUM****Haemorrhages**

- Petechial, ecchymotic, and larger hemorrhages occur beneath the epicardium and endocardium as **agonal changes** (changes around death).
- Agonal hemorrhages are due to **anoxia** and **rupture of small vessels** that occur during the process of dying.
- Also, sub-endocardial and sub-epicardial hemorrhages are commonly associated with **septicemias, bacteraemias, toxemias, and hypoxic** conditions.

**MYOCARDIUM****DEGENERATIVE / RELATED CHANGES**

- Cardiac muscle is subject to the same type of degenerative changes as skeletal muscle.
- Hyaline Changes (and necrosis)**
- Occurs as a part of "**white muscle disease syndrome**" and **gossypol poisoning**.
 - Calcification of the myocardium is usually dystrophic in type, and it occurs whenever there are dead or dying myocytes.
 - In **organo-mercurial** poisoning of cattle, calcium salts are selectively deposited in the **purkinje** network.

**References**

- Jubb, Kennedy & Palmer's, 2007. Pathology of Domestic Animals (Fifth Edition). Saunders Ltd.
- McGavin, MD and JF Zachary, 2006. Pathologic basis of Veterinary Disease, 4th Edition. Mosby Elsevier, Elsevier Health Sciences