Lecture (2)

Osteology

The Skeleton

The skeleton term is applied to the framework of the hard structures which support and protects the soft tissues of animal.

It is restricted to the bones and cartilages with ligaments.

The skeleton is divided into three parts:

1- **Axial :-** comprises the vertebral column, ribs, sternum and skull.
2- **Appendicular :- includes** the bones of the limbs.

3- Splanchnic or visceral :- consist of certain bones developed in the substance of some of the viscera or soft organs such as **OS penis** of dog and **OS cardis** of ox.

The bones are commonly divided into four classes according to their shape and function.

1- **Long bones :** Elongated, cylindrical form with enlarged ends or extremities: they are present in the limbs and act as a lever .

2- **Flat bones:** expanded in two directions , they give attachment for muscles and afford (give) protection to the organs which they cover.

3- **Short bones :** such as corpus and tarsus ; The chief function appears to be that of diffusing concussion .

Sesamoid bones : develop in the capsules of some joins or in tendon , may be included in this group, reduce friction or change the direction of tendon.

4- **Irregular bones :** bones of irregular shapes such as vertebrae , bones of cranial base of skull.

According to the Structure of bone

1- Compact bone (Hard bone)

Example: long bones , it is thickest near the middle part of the shaft and thinnest at extremities.

The thickest part are found at points which are subject to special pressure or traction .

2- Spongy bone

Consist of delicate bony plate and spicules which run in various direction ; In between spicules , termed bone marrow space , it form the bulk of short bones and the extremities of long bones , it extend to variable distances of shaft.

Sinus

A type of bone filled with air (pneumatic bone), lined by mucus membrane which is connect to the external air indirectly.

Periosteum

Is a membrane which invests the outer surface of bone , it invests the outer surface of bone except; were it is covered with cartilage , it consist of an outer protective fibrous layer and an inner cellular osteogenic layer.

The endosteum is a thin fibrous membrane , which lines the medullary cavity.

The marrow occupies the spaces between the spicules of the spongy bones and medullary cavity of the long bones.

The marrow is two types:

1- **Red Bone Marrow**

Present in young subjects, containing different stages of red blood cells (RBCs) and White Blood Cells (WBCs).

2- **Yellow Bone marrow**

Replaced at later stages , the red into yellow bone marrow with fat cells.

Blood Vessels and Nerves

1- **Arteries ;** Periosteal and medullary small arteries pass into the Volkmann's and Haversian canals.

Nutrient artery or medullary artery pass from nutrient foramen to the compact bone and ramify in the marrow of bone.

2- **Veins ;** Form a network of small veins pass in the form of periosteal, medullary and nutrient vein outside the bone.

3- **Lymph vessels :** Pass from canals of bone , outside to the lymph node.

Development of bones

There are two types

1- **Endochondral ossification**

2- **Intramembranous ossification**

Endochondral ossification ; from the primitive embryonal skeleton of cartilage which next develop into the bones in a process called osteogenesis or ossification by the aid of osteoblasts.

Intramembranous ossification

Bone development is by transformation into bone formation . A center of ossification is mesenchymal membrane , the cells transform into osteoblasts , trabeculae of bones will be form and successive layers of bony plates will be formed from transformation of mesenchymal cells into osteoblasts which deposit the bony materials.

The bony material are

1- **Organic materials such as**

- Osteocytes
- Osteoblasts
- Collagen fibers

- Periosteum and Endosteum

2- <u>Inorganic materials such as</u>

- Calcium
- Phosphates
- Carbonates
- Magnesium