17/11/2023.

OSSIFICATION

- process of bone formation → ossification.
- bone cell → mature - Osteocytes.
  → immature - Osteoblast
- fibres → collagen.
- matrix : Hard → calcium / mineral deposits.
- mesodermal Origin.
- complete around 18 years
- Ossification → Endochondral ossification
  → Intramembranous ossification.

~~Intra~~a

Intramembranous

- mesenchyme - cells of mesoderm.

steps.

(1) mesenchymal condensation. : aggregate @ site of formation.
↓
(2) some mesenchymal cells secrete collagen fibres.
↓
(3) cells that secreted collagen get converted to osteoblast. by acquiring a basophilic cytoplasm.
↓
(4) Osteoblast secretes ground substance.
(5) both collagen fibres & ground substance form a layer → osteon.
(6) osteoblast will arrange in a single layer over osteon.
(7) osteoblast secretes calcium salts into osteon.

↓

- a single lamella of bone containing calcium, collagen fibres, ground substance

↓

- Subsequent lamellae will be formed
- most cells ~~osteocytes~~ osteoblast go to form next lamella
- some gets trapped in btw → osteocyte, in spaces called lacunae. they have canaliculi.

eg: vault of skull, mandible,

Endochondral Ossification.

- formation of bone which is preceded by formation of a cartilagenous model. is called endochondral ossification.
- Such bones are cartilagenous bones
- seen in all long bones.

Steps.

(1) mesenchymal condensation.

↓

(2) some cells converted to chondroblast.

↓

(3) chondroblast secrete Hyaline cartilage.

↓

(4) at site where bone formation is to be started, chondroblasts enlarge.

↓

(5) these chondroblast will secrete

(6) calcification occurs in between & around enlarged cells.

↓

(7) perichondrium (vascular). → osteo progenitor cells. + blood vessels

↓

(8) after calcification, No blood supply → death.

- space called primary areola.

↓

Secondary areola: blood vessels + progenitor cells } periosteal bud

enter into it, eat up calcified matrix & form large cavity → 2° areola. wall is formed by thin layer of un-dissolved cartilage cells. (~~periosteal bud~~)

↓

. Osteoprogenitor → osteoblast.

→ arrange around bony calcified matrix.

Haversian canal + Osteons → Haversian system.

Ossification centre: site where bone formation starts.

→ 1° OC → before birth

2° OC → after birth.

1 ossification centre → forms diaphysis.
ie, formed before birth

part of bone formed from 2° ossification centre is epiphysis. → ie, formed after birth.

space in btwn → epiphyseal plate.

1 centre after birth → talus, tarsal & carpal except talus & calcaneum & cuboid.

all 2° centres appear after birth except lower end of femur & upper end of tibia.

the cartilage that persists btwn epiphysis & diaphysis.

part of diaphysis adjoining epiphyseal plate.

metaphysis → most valcularized.
→ most chance for infection
→ osteomyelitis.

Rule of ossification.

- state that secondary centre that appears first fuses with shaft last.
- Exception → fibula. (Imp. asked)

applied anatomy.

Estimation of bone age.
Achondroplasia
Scurvy → vit c def → affect collagen synth in bone.
Osteoporosis → bone resorption more.
Osteogenesis imperfecta → defective calcification of bone.