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Arthrology

"Arthro" means Joint or Articulation

Definition: An articulation or joint is formed by the union of two or more bones or cartilages by other tissues. Joints may be freely movable or slightly movable or fixed which depends on gap between bones.

Classification of joints

I. On the basis of mobility
- Synarthrosis: fixed or immovable joints; e.g. joints between the bones of the skull.
- Diarthrosis: freely movable joint; e.g. shoulder joint
- Amphiarthrosis: slightly movable. e.g. pelvic symphysis

II. On the basis of nature of uniting medium
- Fibrous joint: uniting medium is fibrous tissue.
- Cartilagenous joint: uniting medium is cartilage; e.g. pelvic symphysis.
- Synovial joint: characterized by presence of synovial membrane; e.g. shoulder joint

Classification of Fibrous Joint (uniting medium is fibrous tissue)

- Connective tissue joints (syndesmoses), e.g. the attachment of the dew claws of ox
- Sutures- Joints between the bones of the skull. e.g.
  – Serrated suture (sutura serrata),
  – Flat suture (sutura plana),
  – Squamous suture (sutura squamosa),
  – Foliate suture (sutura foliata)
- Gomphosis: e.g. the anchoring of the teeth roots in the dental alveoli.

Classification of Cartilagenous Joint (united by cartilage)

- Hyaline cartilage unions (synchondroses), e.g. between base of the skull and the hyoid bone,
- Fibrocartilage unions (symphyses), e.g. the pelvic symphysis.

Classification of synovial joint (Characterized by joint gap)

- *On the basis of number of bones*

  I. Simple joint: formed by two bones, e.g., shoulder joint
  II. Compound joint/Composite joint: formed by more than two bones, e.g., carpal joints

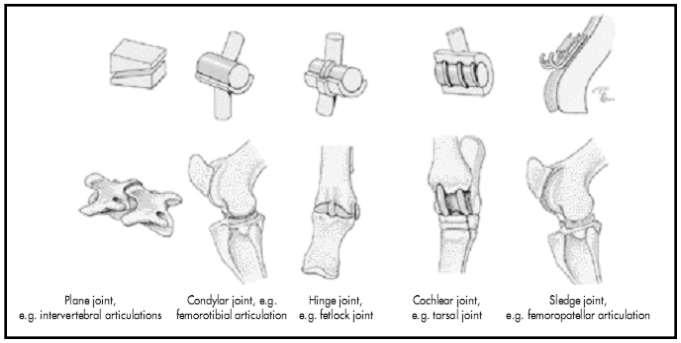
- *On the basis of type of movement:*

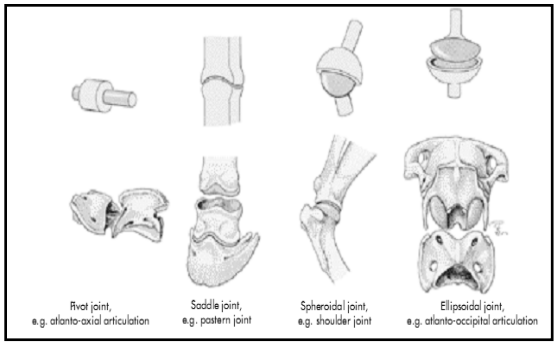
  I. Uniaxial joint
  II. Hinge joint (ginglymus): joint axis perpendicular to the long axis of bone. e.g. elbow/tibiotarsal joint.
  III. Pivot joint: the joint axis is parallel to the long axis of the bones (e.g. atlantoaxial joint between the 1st and 2nd cervical vertebrae),
  IV. Biaxial joints:
  – Saddle joint: e.g. between the interphalangeal joints,
  – Ellipsoidal joint: e.g. atlantooccipital joint

V. Multiaxial joints:
– Spheroidal or ball-and-socket joint: e.g. shoulder joint or hip joint

- *Form of the articular surfaces:*

I. Spheroidal or ball-and-socket: shoulder joint or hip joint,
II. Ellipsoidal joint: e.g. between the occipital bone and the 1st cervical vertebra,
III. Saddle joint : interphalangeal joints, and
IV. Condylar joint: femorotibial joint.

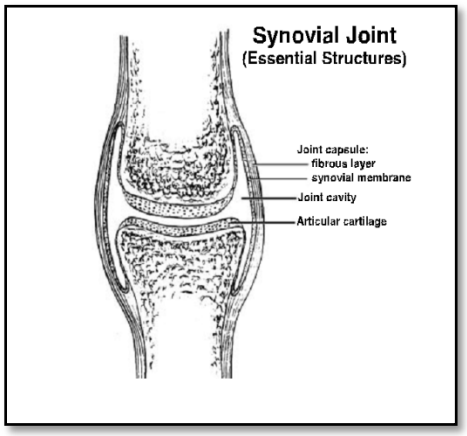




Structure of Synovial Joint/Diarthrodial joint/True joint

A true or synovial joint characterized by a joint gap/cavity. A true joint consists of following structure:

1. Articular surfaces
2. Articular cartilages-layer of hyaline cartilage
3. Articular cavity/joint cavity
4. Articular capsule/Joint capsule-consists of 2 layer:
   - Outer fibrous layer
   - Inner synovial layer



Fibrous layer:

– Outer capsule layer.
– Mechanically joins the bones
– Blends with periosteum
– Form capsular ligaments.

Synovial layer/membrane: (Syn-with; ovia: egg white)

– Lines the joint cavity
– Secretes pale, yellow, viscous fluid called synovial fluid into the joint cavity.
– Primary function is to lubricate the joint, thus reducing friction between articular surfaces.

5. Ligaments- band of dense white fibrous tissue which binds bone together. Generally 2 types:
   - Intra-capsular ligament-found within the joint capsule. e.g., Cruciate ligament of the stifle.
   - Extra-capsular ligament-found outside of the joint capsule. e.g., Collateral ligament. Dorsal, palmer, planter and annular ligaments.
6. Articular discs or menisci-found in some joint.
7. Marginal cartilage- Deepen the concave part of the acetabulum.

Joints of the forelimb

1. Shoulder joint (Humeral joint)-formed by the glenoid cavity of scapula to the humeral head.
2. Elbow joint- formed by the humeral condyle with the trochlear notch of the ulna and the radial head.

3. Carpal (knee joint)-is a composite joint which include-
   - Ulnarcarpal and radiocarpal joint -between the radius and ulna and the proximal carpal bones.
   - Middle carpal joint-between the proximal and distal carpal bones
   - Intercarpal joint-between the individual carpal bones of each row and
   - Carpo-metacarpal joints- between the distal carpal bones and the metacarpal bones.

4. Phalangeal joints-
   - Metacarpo-phalangeal joints or fetlock joint
   - Proximal interphalangeal joints or pastern joint
   - Distal interphalangeal joints or coffin joint

Joints of the hindlimb

1. Hip joint (Coxofemoral joint): formed by the head of the femur articulating with the acetabulum.
2. Stifle joint- it comprises:
   - femorotibial joint-formed by the femur and tibia and
   - femoropatellar joint- formed by the femur and patella. Ligament: medial, middle, and lateral patellar.
3. Tarsal joint or hock-formed between the tibia and fibula, the tarsal bones and the metatarsal bones.
4. Phalangeal joints-
   - Metatarso-phalangeal joints or fetlock joint
   - Proximal interphalangeal joints or pastern joint
   - Distal interphalangeal joints or coffin joint

Joints of the Axial Skeleton

- **Sutures**-joints of the skull
- **Temporomandibular joint** between the mandible and the temporal bone of the skull
- **Atlanto-occipital joint** between the occipital bone of the skull and atlas
- **Atlantoaxial joint**
- **symphyseal (fibrocartilaginous) joints** between adjacent vertebrae throughout the rest of the vertebral column

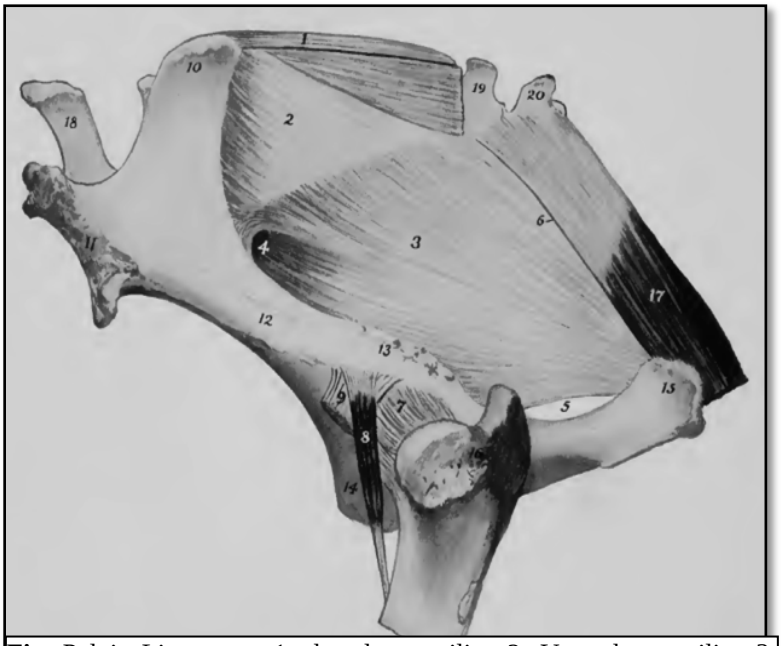


Fig. Pelvic Ligaments. 1: dorsal sacro-iliac 2: Ventral sacro-iliac 3: sacro-iliac ligament 4: Greater ischiatic foramen

Ligaments of the pelvic girdle

1. Dorsal sacro-iliac ligament- attached to the tuber sacrale and the summits of the sacral spines.
2. Ventral sacro-iliac ligament- tuber sacrale and adjacent part of the medial border of the ilium
3. Sacro-ischiatic/sacrotuberous ligament- extensive quadrilateral sheet which completes the lateral pelvic wall.

Ligament of the stifle joint of Dog:

Stifle held in position by 2 collateral and 2 intra-articular ligaments.

- ❖ Collateral ligaments are:
  1. Medial collateral
  2. Lateral collateral

❖ Intra-articular ligaments: cranal and caudal cruciate (X-shaped) ligament

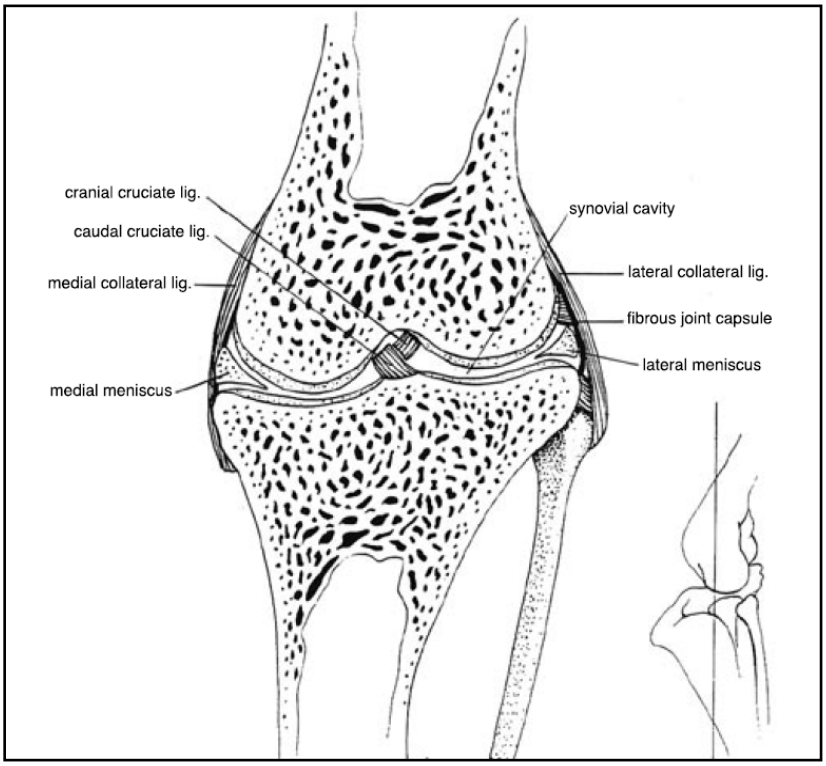


Fig. Stifle joint of dog