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lecture no : 13 (Joints)

Definition: a joint is a point where two bones or a bone and cartilage make contact.

Arthrology: is the science of studying the anatomy and function of joints.

→ Arthritis التهاب المفاصل

Can be classified **structurally**:

- 1. Fibrous joints
- 2. Cartilaginous joints
- 3. Synovial joints

Or **functionally**:

- 1. synarthrosis (immovable)
- 2. amphiarthrosis (slightly movable) → limited
- 3. diarthrosis (freely movable)

- 1. Fibrous joints >> immobile to slightly mobile joints
- 2. Cartilaginous joints >> immobile to slight movement
- 3. Synovial joints >> freely movable joints

Types of joints & there movements

← لو ما كان في اسي بين two bones كان صاعد عامل للكم

Fibrous joints → fibrous tissue

- Immobile or limited movement
- No joint cavity

• Types:

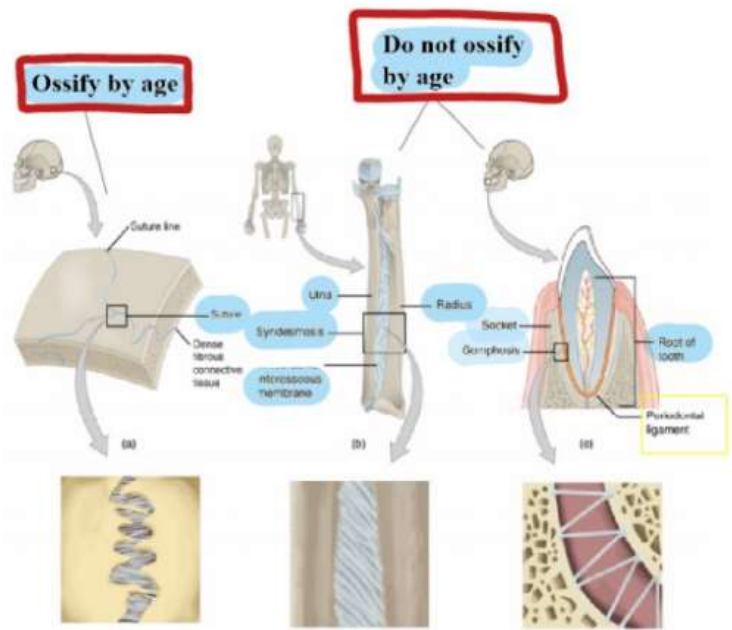
→ Sutures of skull (immobile).

coronal sagittal lambdoid

Syndesmoses: two bones are connected by strong fibrous tissue (slight movement)

- * Interosseous ligament, between radius and ulna. (middle radioulnar joint)
- * Ligament, Distal tibiofibular joint.

Gomphoses: fibrous joints between the roots of the teeth and the alveolar part of the maxilla and mandible (immobile). or



Ligments hold tooth in their bony socket if it's a loose teeth ↓ Pathology

Cartilagenous joints

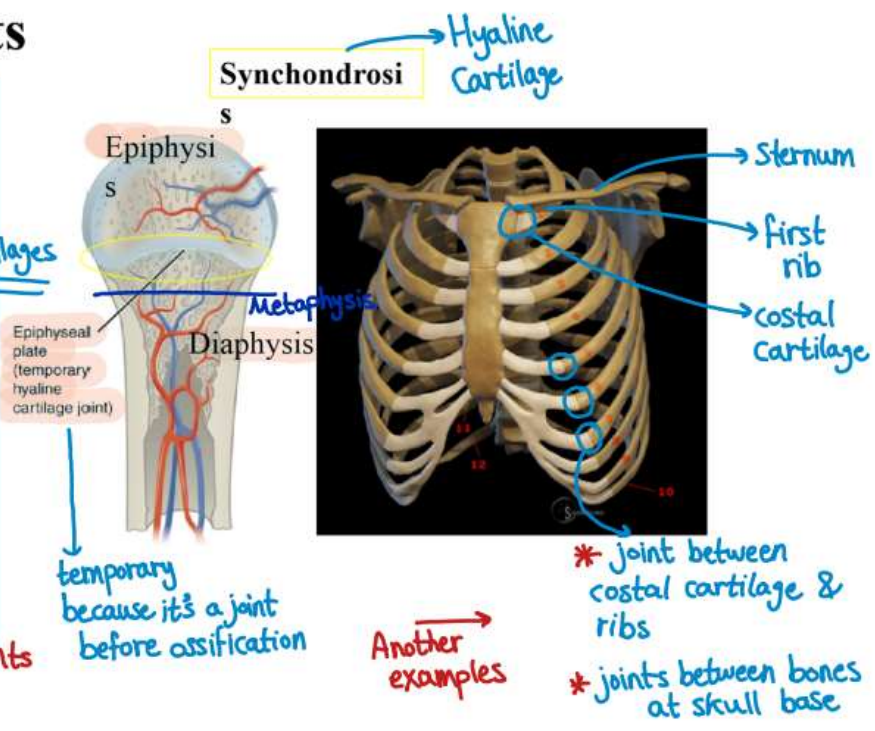
- When two bones articulate with each others by cartilage
- Hyaline cartilage** or **fibrocartilage**

Types of cartilages

1. **Primary (synchondroses)** will ossify with age, e.g., joint between first costal cartilage and sternum and joints between epiphysis and diaphysis in growing long bone.

no movement
Hyaline cartilage joints

Types of cartilagenous joints



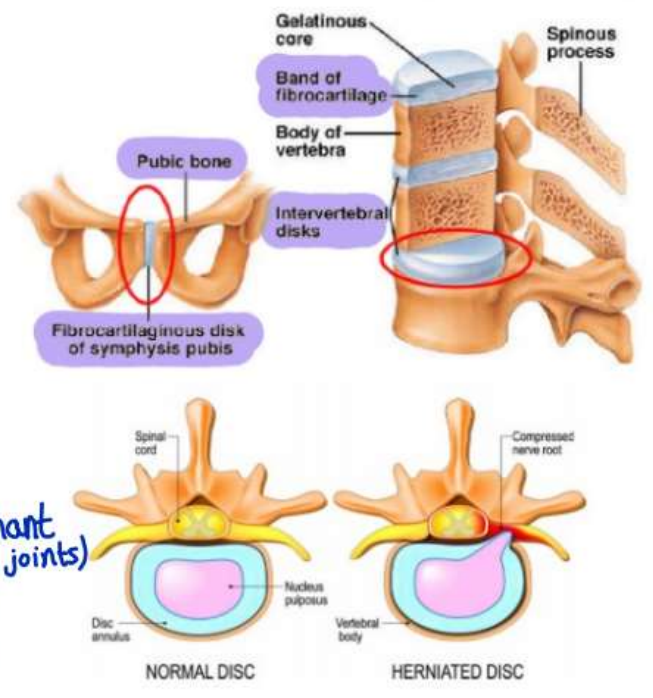
Cartilagenous joints

2. **Secondary cartilagenous joints (symphysis):** when two bones are joined with fibrocartilage. e.g., **intervertebral disk** and **pubic symphysis**.

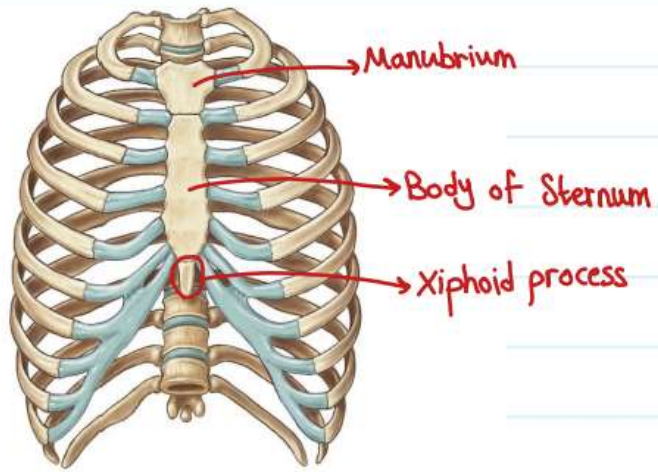
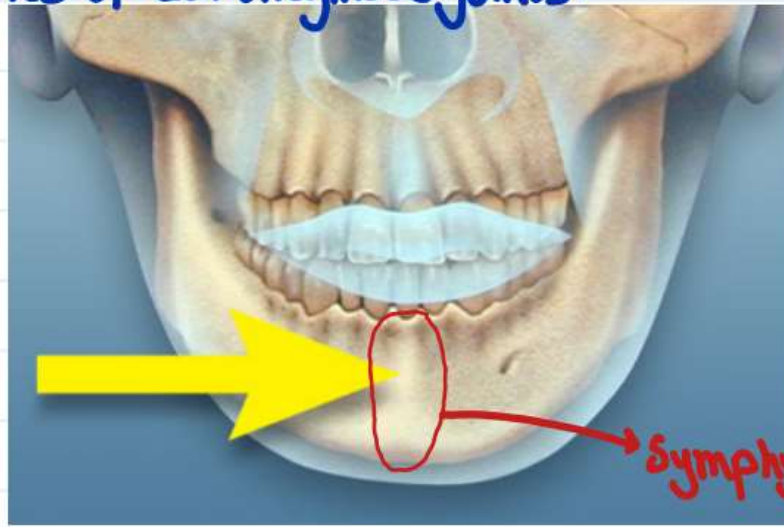
the strongest type of cartilage in our body

rarely ossify by age (permenant joints)
mostly located in the midline of the body

Cartilagenous Joint — Symphysis



Another examples of Cartilaginous joints:



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Cartilaginous joints

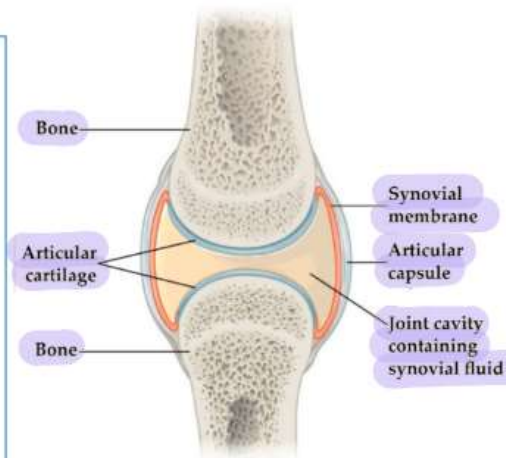
(b)

- joint between Manubrium & Body of sternum
- joint between Body of sternum & Xiphoid process

Synovial joints

- Freely movable and has a joint cavity
- Consists of:
 - **Articular hyaline cartilage** covering the articular surfaces of bone
 - **Fibrous capsule**
 - **Synovial membrane:** lines the fibrous capsule from inside and the margins of the articular surfaces
 - **Synovial fluid (Synovia)**

صوف

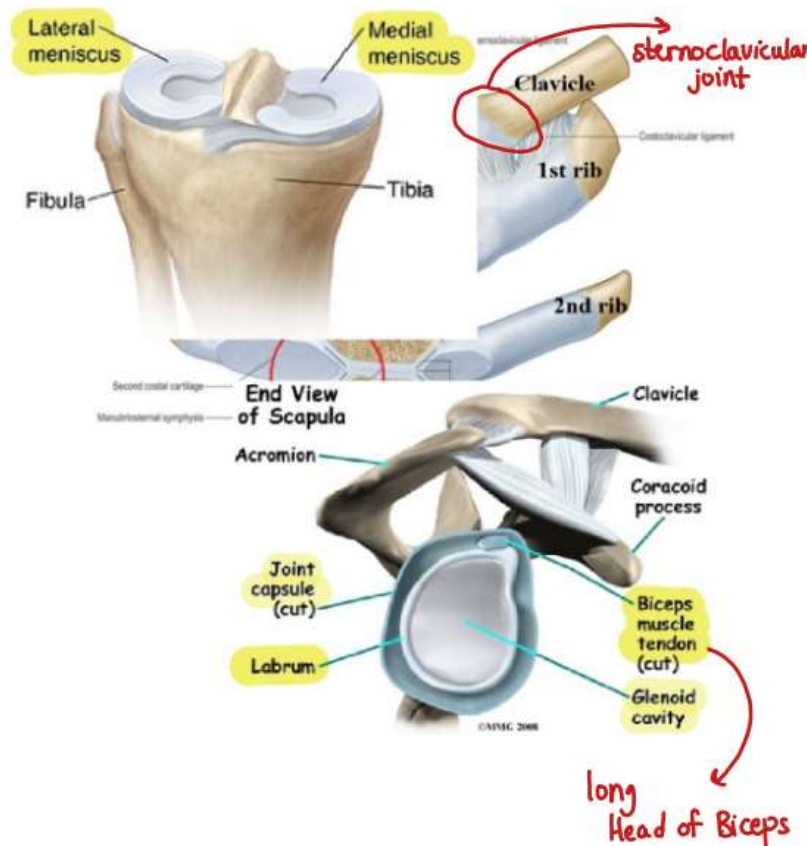


Hyaline cartilage is avascular !

↓
lack of blood vessels
لا يوجد فيه أوعية دموية

Synovial joints

- **Intra-capsular structures:**
- fibrocartilage;**
- * **articular disk** (TMJ and sternoclavicular joint),
- * **menisci** (knee joint), and
- * **labrum** (hip and shoulder joint), or **tendons;**
- tendon of long head of biceps brachii.



long head of Biceps

- Can be classified according to the **shape of articular surfaces:**
 - Pivot joint
 - Hinge joint
 - Saddle joint
 - Plane joint
 - Condyloid joint
 - Ball and socket joint

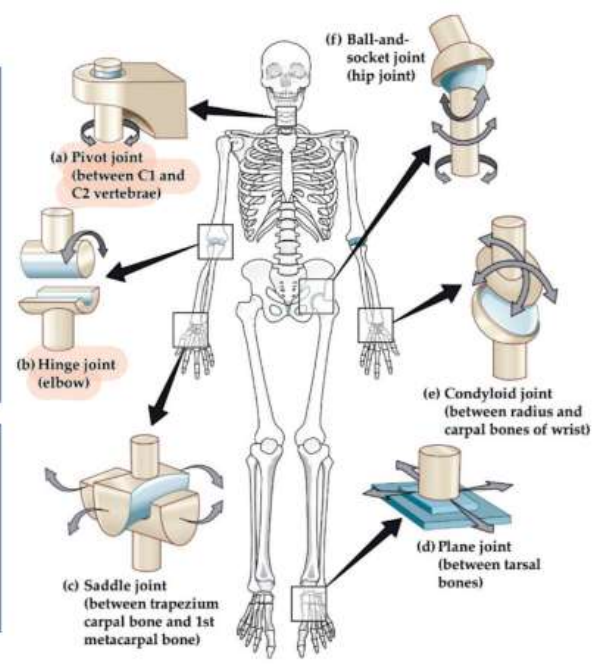


Or according to **the axis around which the movement occur:**

- Uniaxial** movement around one axis only
- Biaxial** movement around two axes
- Multiaxial** movement around more than two axes



↓
or Polyaxial



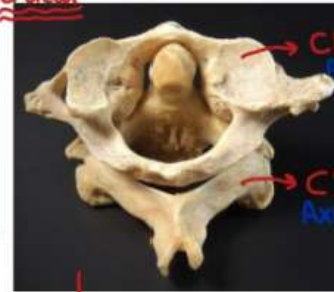
Pivot joints

- Uniaxial joints**
- Rotation around longitudinal axis**
- Examples: **median atlanto-axial joint** and **proximal radioulnar joint**.

movement

↓ Axis of movement

↓ vertical



↓
median atlanto axial joint (between C1, C2-Cervical vertebrae)

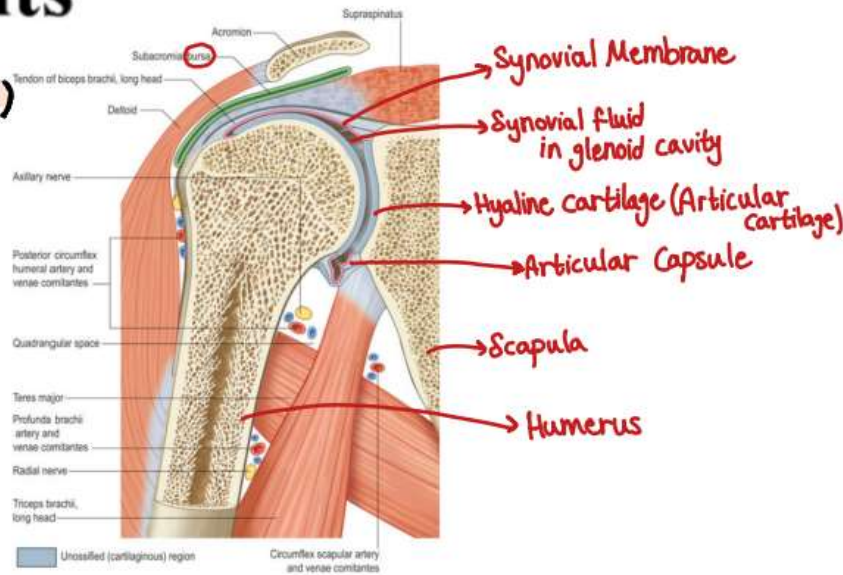


proximal radioulnar joint

Ball and socket joints

* Glenohumeral joint (shoulder joint)

- Most mobile and most frequently dislocated → **يبتلع**
- **Ball and socket joint, multiaxial**
- A fibrocartilaginous rim named **glenoid labrum** deepens the glenoid cavity (**↑stability**)



Bursae is a synovial fluid-filled sac develops at points of friction → **احتكاك**

استادها عنى
مطالعة

- Movements:
- Flexion-Extension
 - Adduction-Abduction
 - Medial rotation-Lateral rotation

-Circumduction

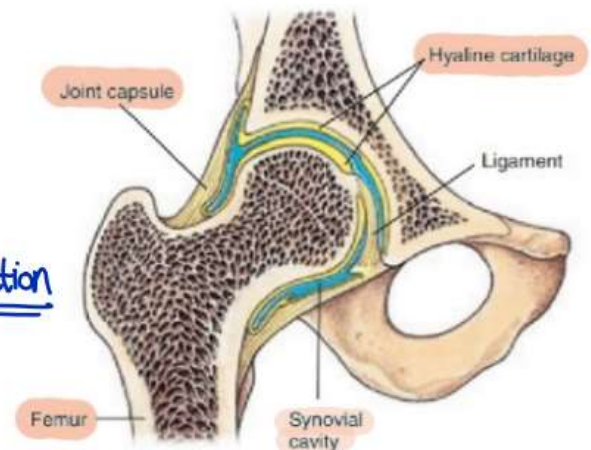
↓
 All types of movement

A convex sphere articulates with a concave depression.

} shape of articulation

* Acetabulo-femoral joint (Hip joint)

- More stable compared to shoulder joint (shape of articular surfaces).



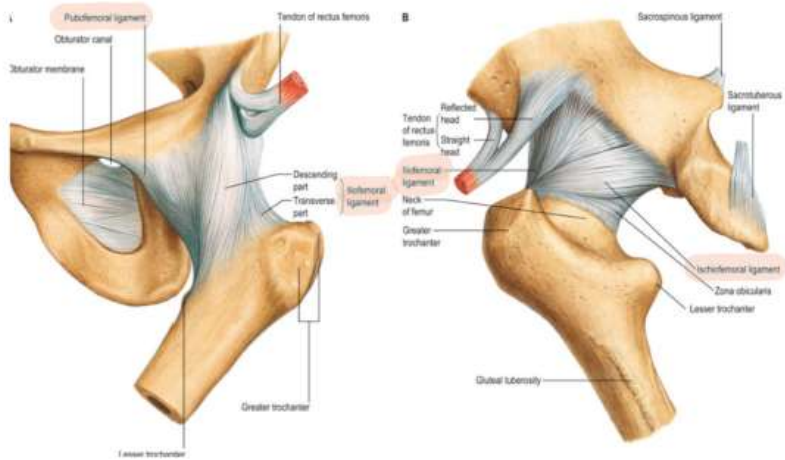
Ball and socket joints

Acetabulo-femoral joint (Hip joint)

Ligaments of hip joint:

1. Iliofemoral ligament
2. Pubofemoral
3. Ischiofemoral

Ligaments are important in connecting bones and providing support and stability to the joint



Ligaments → dense connective tissue

Hinge joints

* Elbow joint

Humerus, radius and ulna.

Uniaxial joint

Movement: flexion-extension (across transverse axis)

↓
or horizontal

↓ Another examples:

* Ankle Joint

* Interphalangeal Joints

* Knee joint

- The largest and most complex joint in the body
- The most commonly injured joint
- Modified hinge joint, uniaxial → Bicondylar joint
- Minimal medial and lateral rotation & flexion + Extension



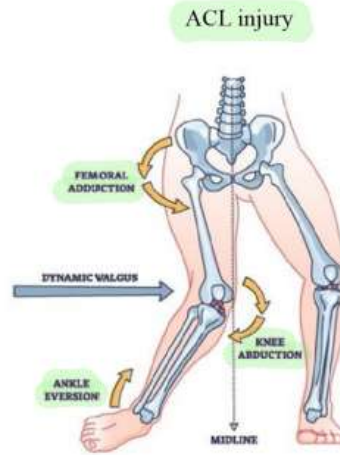
But not Fibula!!



Knee joint

Injuries of knee joint:
Most commonly injured part is the ACL, medial meniscus and MCL.

↓ آسیب
football players



- There are a number of bursae that protect the knee joint.
- The main function of a bursa is to **reduce friction between adjacent moving structures.**
- **Bursitis** is the inflammation of bursa.

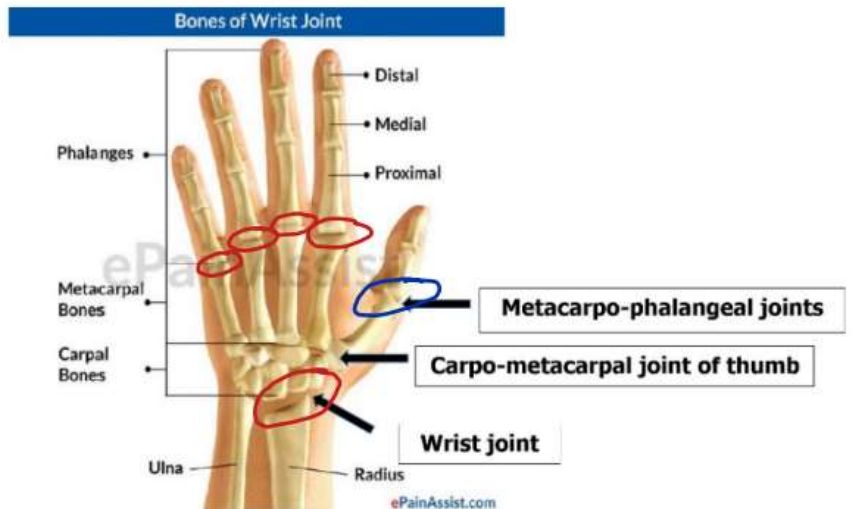
Condylloid and ellipsoid joints

- **Biaxial joints**
- * **wrist joint (ellipsoid).**
- * **Metacarpophalangeal joint (knuckle joint) as condyloid joint.**

A condyle articulates with an elliptical depression.

Concavo-convex surfaces articulate together.

Movement:
Flexion-Extension
Adduction-Abduction



Saddle joints

Biaxial joints

* 1st carpometacarpal joint (thumb) and sternoclavicular joint.

Bones have concave-convex articular surfaces

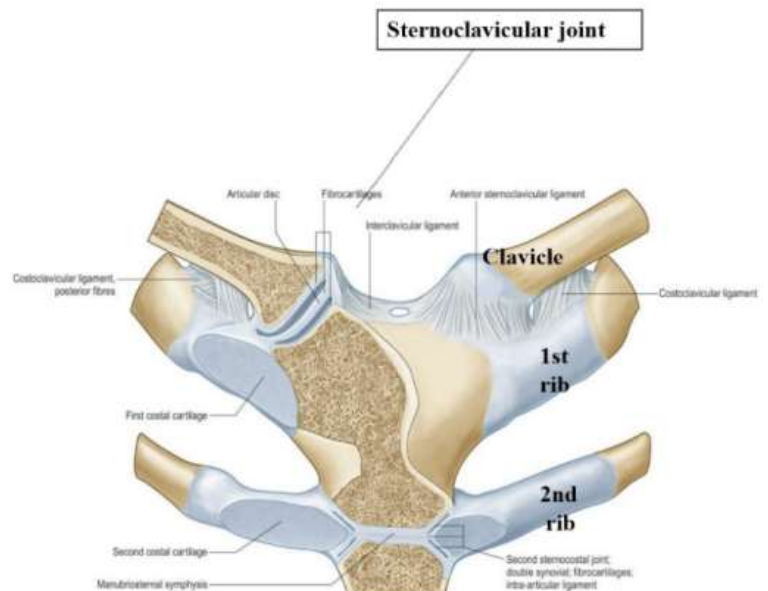
Movement:

Flexion-Extension

Adduction-Abduction

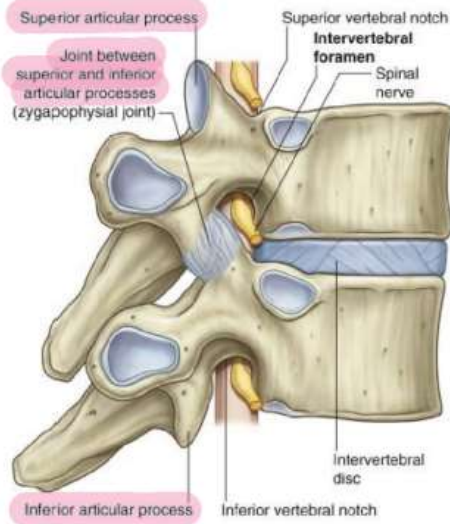
Opposition (*Medial Rotation*)

* Sternoclavicular joint is synovial saddle-type joint



Plane joints → least movement

- حركة انزلاقية
 ➤ Gliding movement. (in all directions—nonaxial joint)
 * ➤ between the superior and inferior articular processes on adjoining vertebrae.
 متجاورة
 * ➤ Between carpal bones
 * ➤ Between tarsal bones
 * ➤ Acromio-clavicular joint.



Remember!
 Intervertebral disk is a cartilaginous joint

	1. Sutures of skull	2. Syndesmosis	3. Gomphosis
* Example:	Sagittal suture of skull.	Inferior tibio-fibular joint.	Teeth (Peg & socket).
* Ossification:	Ossifies with age.	Do not ossify.	Do not ossify.
* Nature:	Articular surfaces are connected together by strong fibrous tissue.	Bones are connected together by an interosseous ligament.	The joint is between the root of the tooth & the jaw (mandible or maxilla).
* Movement:	Allows slight movement during delivery.	No movement.	No movement. If movement occurs & the tooth becomes loose → pathological case.

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	1. Primary Cartilaginous joint (Synchondrosis)	2. Secondary Cartilaginous joint (Symphyses)
* Nature:	The articular surfaces are connected together by hyaline cartilage.	The articular surfaces are connected together by hyaline & fibrocartilage.
* Ossification:	Ossifies with age (i.e. temporary joint).	Do not ossify with age (i.e. permanent joint).
* Movement:	No movement (immobile).	Allows slight movement.
* Examples:	<ol style="list-style-type: none"> 1. Epiphyseal plate of long bones. 2. Joints between ribs & costal cartilages. 3. Joint between sternum & 1st costal cartilage. 4. Joints between bones in base of skull. 	Midline joints: <ol style="list-style-type: none"> 1. Intervertebral discs. 2. Symphysis menti. 3. Symphysis pubis. 4. Joints between parts of sternum.

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I. Uniaxial Joints (Movement around one axis)

	Hinge joint	Pivot joint	Bicondylar joint (modified hinge)
* Axis of movement:	Movement around a horizontal axis.	Movement around a vertical (or longitudinal) axis.	Movement around a horizontal axis + slight rotation.
* Movements:	Flexion & extension.	Rotation.	Flexion & extension + slight rotation.
* Examples:	1. Elbow joint. 2. Interphalangeal joints. 3. Ankle joint.	1. Superior & inferior radio-ulnar joints. 2. Median atlanto-axial joint.	1. Knee joint.

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II. Biaxial Joints (Movement around two axes)

	Ellipsoid (condyloid) joint	Saddle joint
* Shape of articular surfaces:	A condyle articulates with an elliptical depression.	Concavo-convex surfaces articulate together.
* Movements:	* Flexion & extension. * Abduction & adduction.	* Flexion & extension. * Abduction & adduction. + Rotation (or opposition or circumduction).
* Examples:	1. Wrist joint. 2. Metacarpo-phalangeal js.	Carpo-metacarpal joint of thumb.

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III. Multiaxial (Polyaxial) Joints (Movement around more than two axes)

	Ball & Socket joint	Plane joint
* Shape of articular surfaces:	A convex sphere articulates with a concave depression.	Gliding flat surface.
* Movements:	All types of movements: * Flexion & extension. * Abduction & adduction. * Medial & lateral rotation * Circumduction	* Least moveable joints. * Slight movements in all directions. * Non-axial joint.
* Examples:	Shoulder & hip joints.	Acromio-clavicular joint.

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Factors affecting stability of joints

1. Shape of articular surface.
2. Strength of the ligaments & the capsule of the joint.
3. The strength & tone of surrounding muscles.

Nerve supply to the joints

- * The capsule and ligaments are rich in sensory nerves.
- * The blood vessels of joints are supplied by sympathetic nerve fibers.
- * **Hilton's law:** a nerve supplying a joint also supplies the muscles moving the joint and the skin over the insertion of the muscles.

* Sprains = torn ligaments:

تعرفه الأربطة

* They heal slowly (because ligaments are relatively avascular).

* May lead to joint dislocation.

معلومة

ضخ

قليلًا من التفاؤل يصنع ألف طريق نحو السعادة..
بالتوفيق



#النادي_الطبي
#معكم_خطوة_بخطوة