THE SHOULDER JOINT

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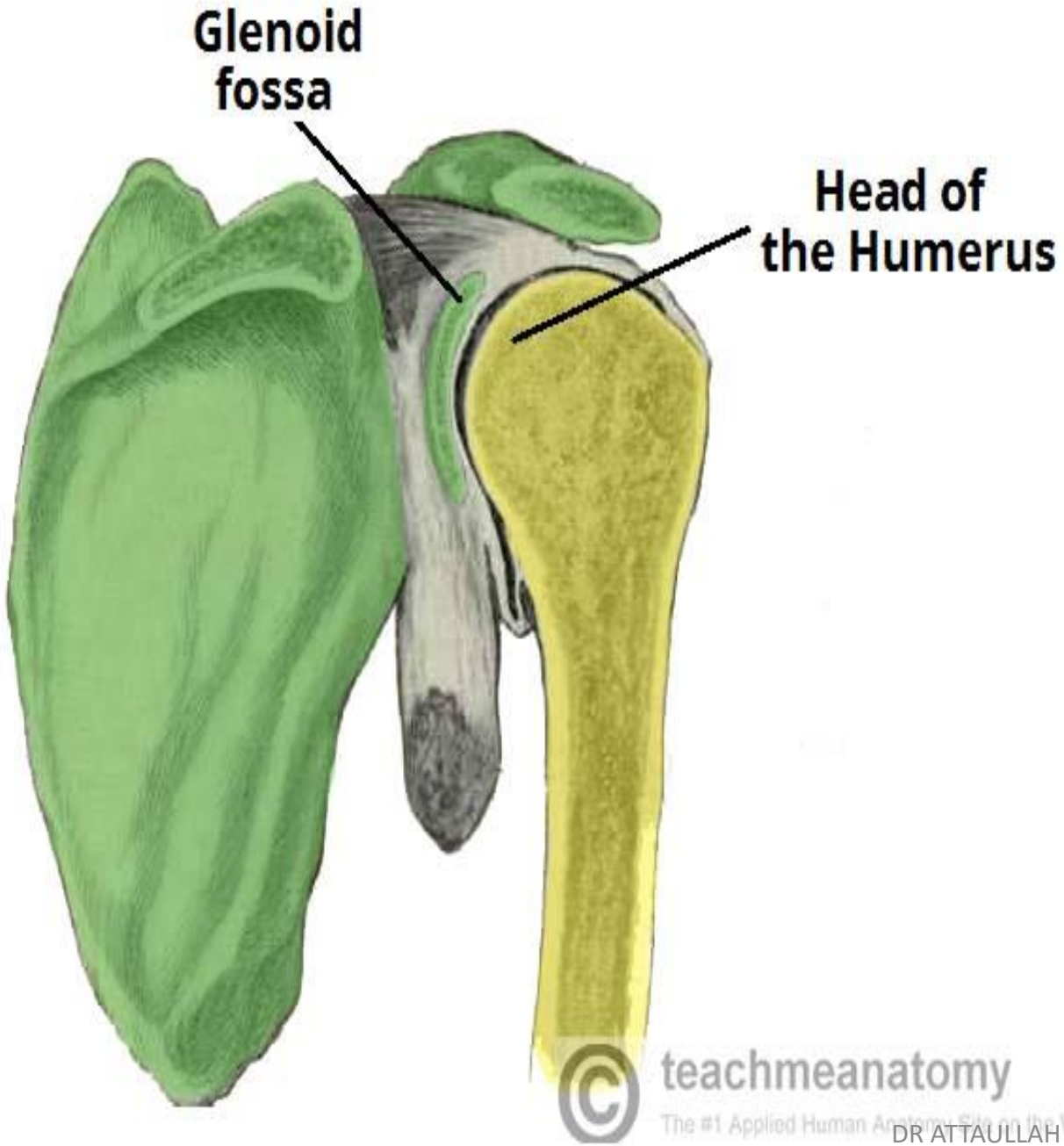
THE SHOULDER JOINT

- The shoulder joint (glenohumeral joint) is a ball and socket joint between the **scapula** and the **humerus**.
- It is the major joint connecting the upper limb to the trunk.
- It is one of the most mobile joints in the human body, at the cost of joint stability.

Structures of the Shoulder Joint

- **Articulating Surfaces**
- The shoulder joint is formed by the articulation of the **head** of the humerus with the **glenoid cavity** (or fossa) of the scapula.
- This gives rise to the alternate name for the shoulder joint – the glenohumeral joint.
- Like most synovial joints, the articulating surfaces are covered with **hyaline cartilage.**
- The head of the humerus is much larger than the glenoid fossa, giving the joint a wide range of movement at the cost of inherent instability.
- To reduce the disproportion in surfaces, the glenoid fossa is deepened by a fibrocartilage rim, called the **glenoid labrum**.


Glenoid fossa
Head of the Humerus
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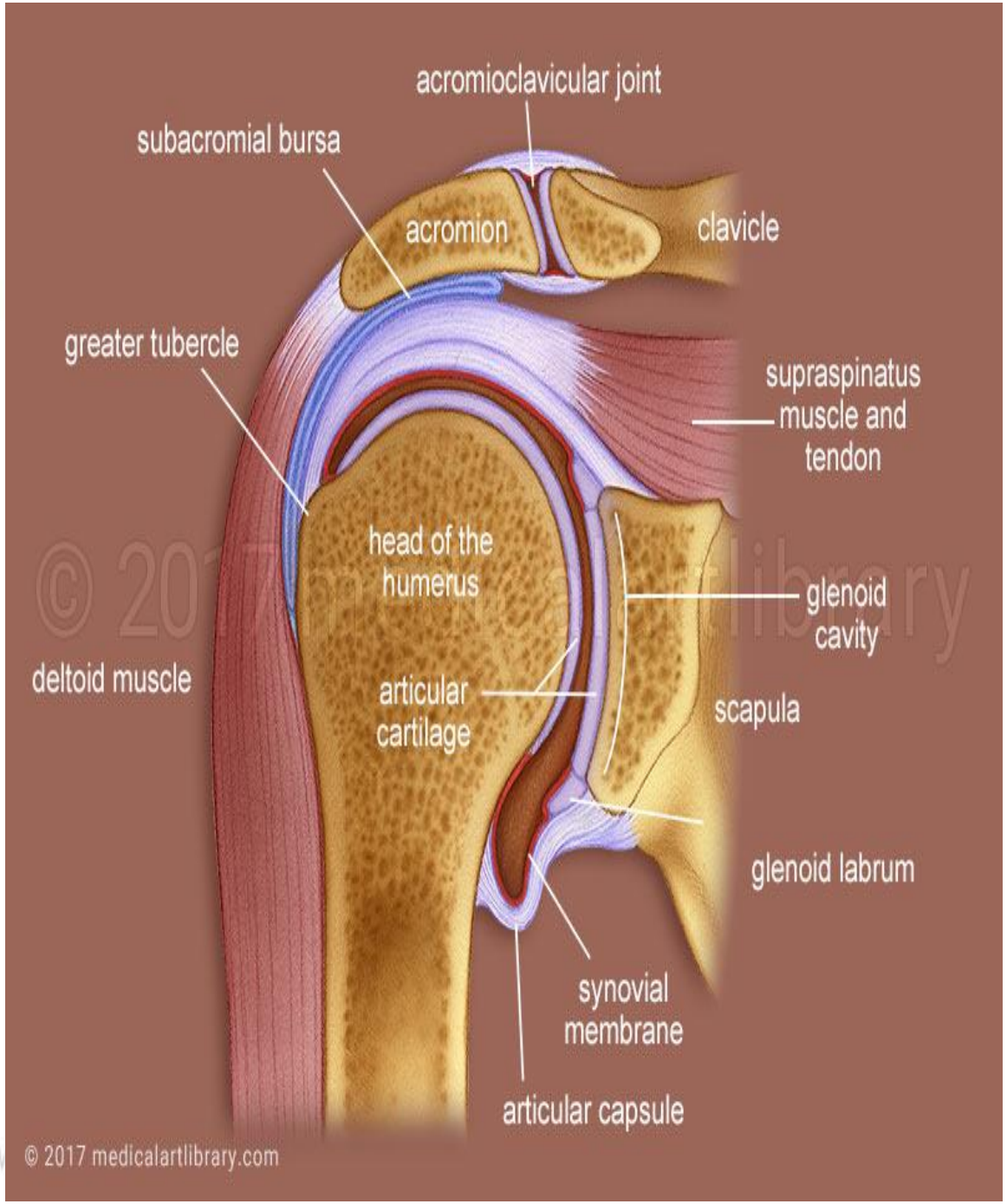
acromioclavicular joint
subacromial bursa
acromion
clavicle
greater tubercle
supraspinatus muscle and tendon
head of the humerus
glenoid cavity
deltoid muscle
articular cartilage
scapula
glenoid labrum
synovial membrane
articular capsule
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Joint Capsule and Bursae

- The **joint capsule** is a fibrous sheath which encloses the structures of the joint.
- It extends from the **anatomical neck** of the humerus to the border or ‘rim’ of the glenoid fossa. The joint capsule is lax, permitting greater mobility (particularly abduction).
- The **synovial membrane** lines the inner surface of the joint capsule, and produces synovial fluid to reduce friction between the articular surfaces.
- To reduce friction in the shoulder joint, several **synovial bursae** are present.
- A bursa is a synovial fluid filled sac, which acts as a cushion between tendons and other joint structures.
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Ligaments

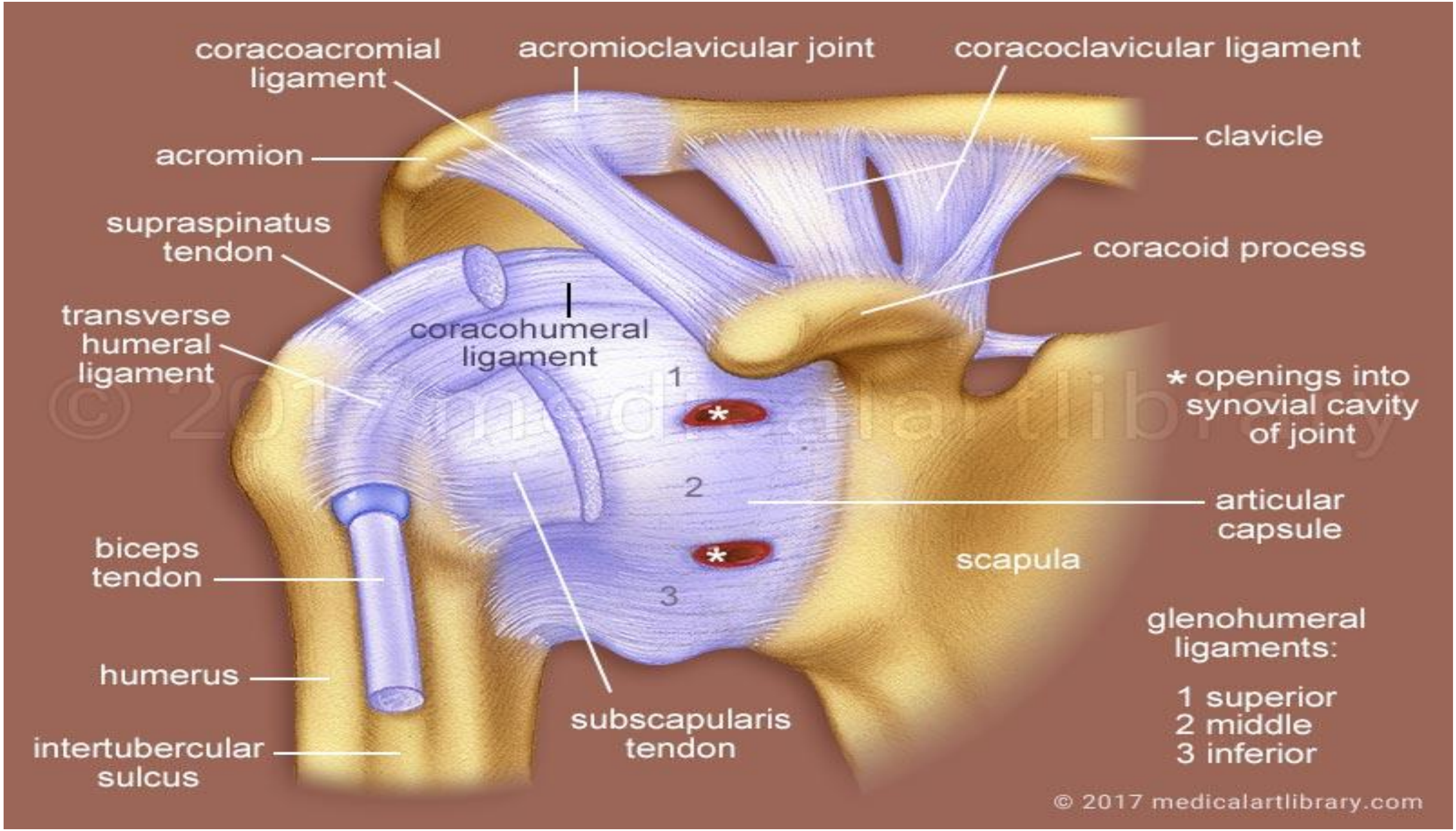
- In the shoulder joint, the ligaments play a key role in stabilising the bony structures.
- Glenohumeral ligaments (superior, middle and inferior) – the joint capsule is formed by this group of ligaments connecting the humerus to the glenoid fossa.

- They are the main source of stability for the shoulder, holding it in place and preventing it from dislocating anteriorly. They act to stabilise the anterior aspect of the joint.
- Coracohumeral ligament – attaches the base of the coracoid process to the greater tubercle of the humerus. It supports the superior part of the joint capsule.
- Transverse humeral ligament – spans the distance between the two tubercles of the humerus. It holds the tendon of the long head of the biceps in the intertubercular groove.]

Ligaments

- Coraco–clavicular ligament – composed of the trapezoid and conoid ligaments and runs from the clavicle to the coracoid process of the scapula. They work alongside the acromioclavicular ligament to maintain the alignment of the clavicle in relation to the scapula.

- The other major ligament is the coracoacromial ligament. Running between the acromion and coracoid process of the scapula it forms the coraco-acromial arch. This structure overlies the shoulder joint, preventing superior displacement of the humeral head.


coracoacromial ligament
acromioclavicular joint
coracoclavicular ligament
acromion
clavicle
supraspinatus tendon
coracoid process
transverse humeral ligament
coracohumeral ligament
1
* openings into synovial cavity of joint
2
articular capsule
biceps tendon
scapula
3
glenohumeral ligaments:
1 superior
2 middle
3 inferior
humerus
subscapularis tendon
intertubercular sulcus
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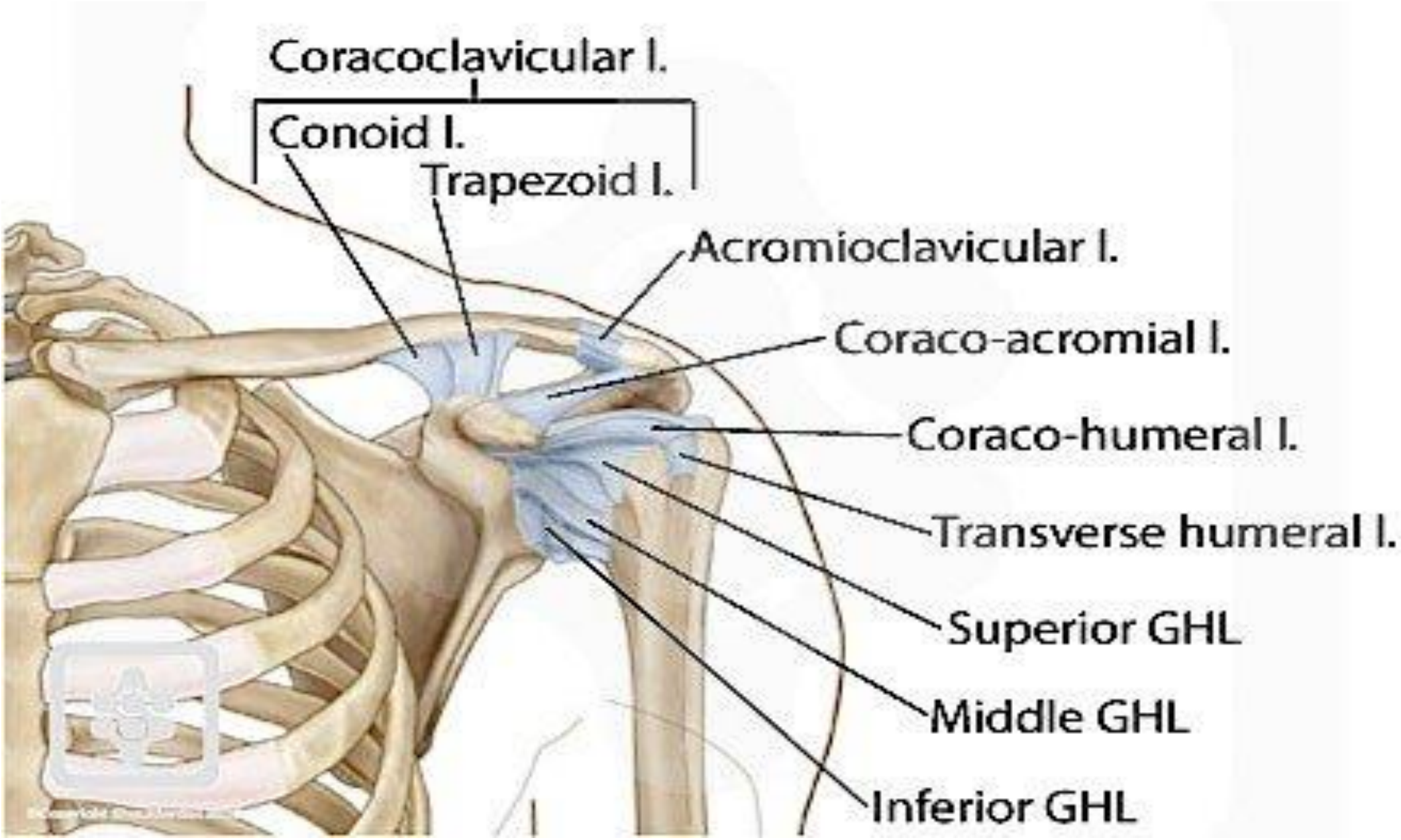
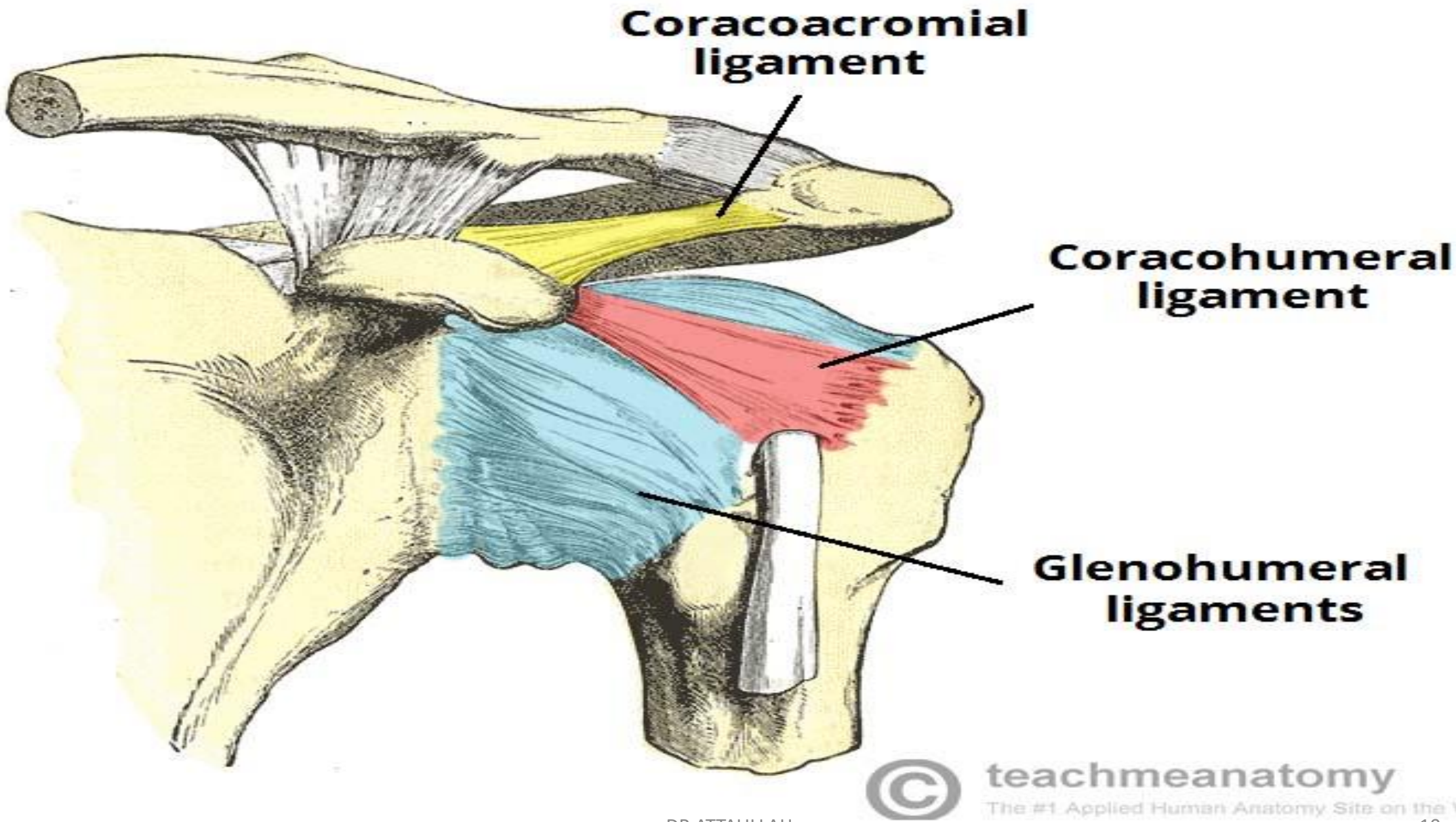

Coracoclavicular l.
Conoid l.
Trapezoid l.
Acromioclavicular l.
Coraco-acromial l.
Coraco-humeral l.
Transverse humeral l.
Superior GHL
Middle GHL
Inferior GHL


Coracoacromial ligament
Coracohumeral ligament
Glenohumeral ligaments
teachmeanatomy
The #1 Applied Human Anatomy Site on the Web.

Movements

- As a **ball and socket** synovial joint, there is a wide range of movement permitted:
- **Extension (upper limb backwards in sagittal plane)** – posterior deltoid, latissimus dorsi and teres major.
- **Flexion (upper limb forwards in sagittal plane)** – pectoralis major, anterior deltoid and coracobrachialis. Biceps brachii weakly assists in forward flexion.
- **Abduction (upper limb away from midline in coronal plane):**
  - The first 0-15 degrees of abduction is produced by the supraspinatus.
  - The middle fibres of the deltoid are responsible for the next 15-90 degrees.
  - Past 90 degrees, the scapula needs to be rotated to achieve abduction – that is carried out by the trapezius and serratus anterior.

Movements

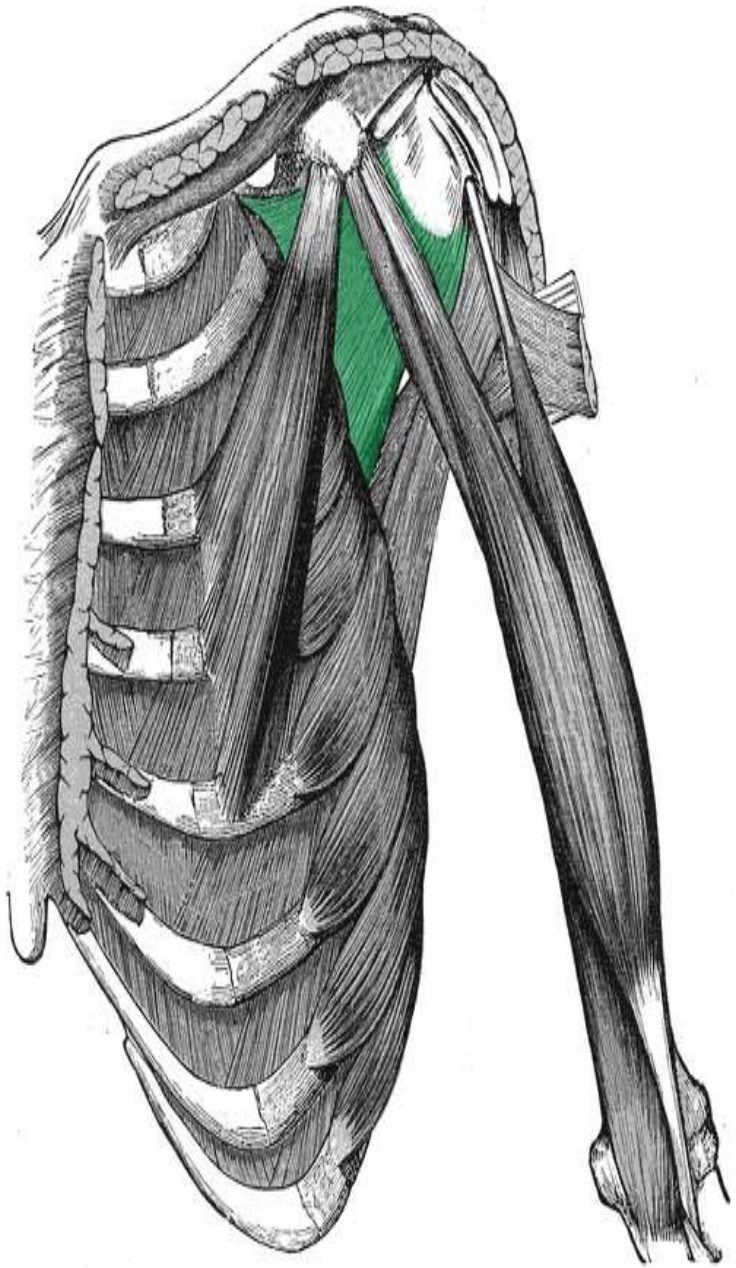
- **Adduction (upper limb towards midline in coronal plane)** – pectoralis major, latissimus dorsi and teres major.
- **Internal rotation (rotation towards the midline, so that the thumb is pointing medially)** – subscapularis, pectoralis major, latissimus dorsi, teres major and anterior deltoid.
- **External rotation (rotation away from the midline, so that the thumb is pointing laterally)** – infraspinatus and teres minor.

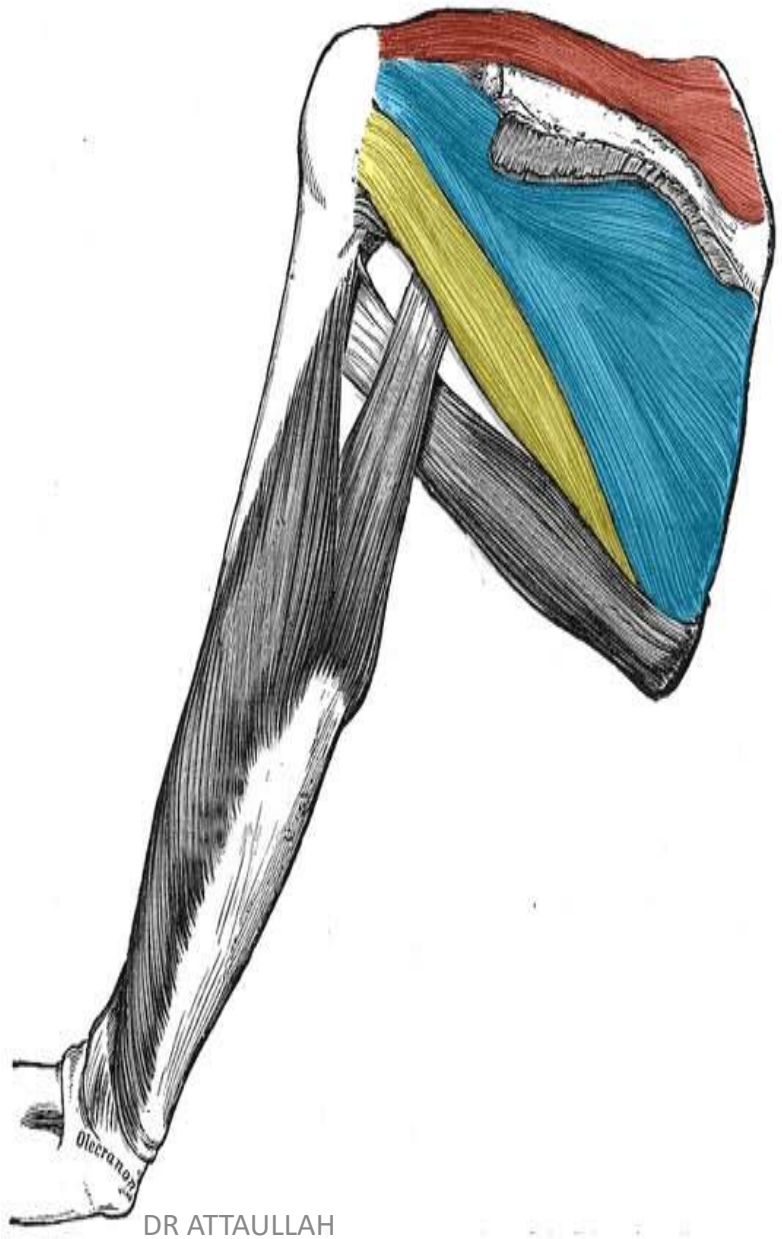
Mobility and Stability

- The shoulder joint is one of the most mobile in the body, at the expense of stability. Here, we shall consider the factors the permit movement, and those that contribute towards joint structure.
- **Factors that contribute to mobility:**
- **Type of joint** – ball and socket joint.
- **Bony surfaces** – shallow glenoid cavity and large humeral head
- Inherent laxity of the **joint capsule**.

Mobility and Stability

- **<u>Factors that contribute to stability:</u>**
- **Rotator cuff muscles** – surround the shoulder joint, attaching to the tuberosities of the humerus, whilst also fusing with the joint capsule. The resting tone of these muscles act to compress the humeral head into the glenoid cavity.
- **Glenoid labrum** – a fibrocartilaginous ridge surrounding the glenoid cavity. It deepens the cavity and creates a seal with the head of humerus, reducing the risk of dislocation.
- **Ligaments** – act to reinforce the joint capsule, and form the coraco-acromial arch.
- **Biceps tendon** – it acts as a minor humeral head depressor, thereby contributing to stability.





Subscapularis

Supraspinatus

Infraspinatus

Teres minor

Neurovasculature

- The shoulder joint is supplied by the **anterior** and **posterior circumflex humeral** arteries, which are both branches of the axillary artery.
- Branches of the **suprascapular artery**, a branch of the thyrocervical trunk, also contribute.
- Innervation is provided by the **axillary**, **suprascapular** and **lateral pectoral** nerves.

Clinical Relevance: Common Injuries Dislocation of the Shoulder Joint

- Clinically, dislocations at the shoulder are described by where the humeral head lies in relation to the **glenoid fossa**. Anterior dislocations are the most prevalent (95%), although posterior (4%) and inferior (1%) dislocations can sometimes occur.

- Superior displacement of the humeral head is prevented by the **coraco-acromial arch**.
- An anterior dislocation is usually caused by excessive **extension** and **lateral rotation** of the humerus. The humeral head is forced anteriorly and inferiorly – into the weakest part of the joint capsule. Tearing of the joint capsule is associated with an increased risk of future dislocations.
- Indeed, so-called 'reverse Hill-Sachs lesions' (impaction fracture of anteromedial humeral head) and 'reverse Bankart lesions' (detachment of posteroinferior labrum) can be seen in posterior dislocations.
- The **axillary nerve** runs in close proximity to the shoulder joint and around the surgical neck of the humerus, and so it can be damaged in the dislocation or with attempted reduction. Injury to the axillary nerve causes paralysis of the deltoid, and loss of sensation over regimental badge area.

THANK YOU