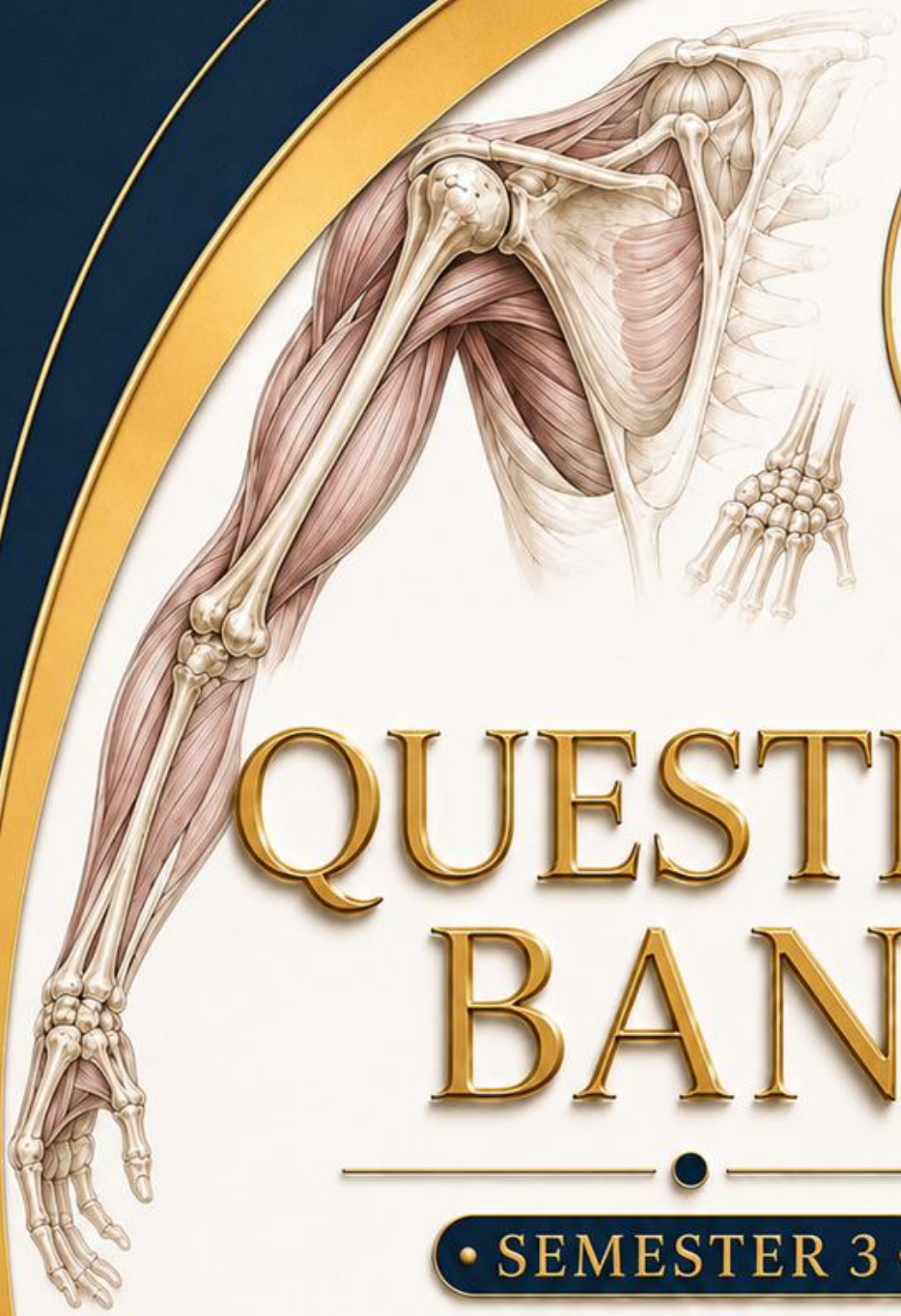

MEDWAY
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QUESTION BANK

SEMESTER 3

MSK MODULE

ANATOMY

Lecture 1 - Anatomical Basis of Movements of the Shoulder Girdle

Part 1: MCQs (Choose the correct answer):

1. A 21-year-old rugby player is brought to the emergency department after falling directly on his shoulder with the arm at his side. Radiographs show a fracture of the clavicle. Which part of the bone is most likely to be fractured?

A. The sternal end
B. The acromial end
C. The middle one-third
D. The subclavian groove only
E. The clavicular notch

2. In the same patient, the proximal (medial) fragment of the fractured clavicle is seen to be lifted superiorly. Which muscle is responsible for this displacement?

A. Sternomastoid
B. Subclavius
C. Pectoralis minor
D. Trapezius
E. Serratus anterior

3. The same radiograph shows the distal (lateral) fragment of the clavicle displaced downwards. Which of the following best explains this inferior displacement?

A. It is pulled inferiorly by the sternomastoid
B. It is pulled inferiorly by the upper fibres of trapezius
C. It is pulled inferiorly by the levator scapulae
D. It is pulled inferiorly by the arm
E. It is pulled inferiorly by the interclavicular ligament

4. The orthopaedic team counsels the same patient about management of his mid-clavicular fracture. Which of the following is the usual treatment?

A. Open reduction and plating in all cases
B. Nonoperative treatment
C. Excision of the medial fragment
D. Immediate shoulder arthrodesis
E. Resection of the acromion

5. During a clinical tutorial, a student is asked why the clavicle is important for the mobility of the upper limb. Which of the following is a function of the clavicle?

A. It forms the glenoid cavity for the head of the humerus
B. It gives origin to the serratus anterior
C. It forms the apex of the axilla posteriorly
D. It contains the largest marrow cavity of the upper limb
E. It acts as a bar that distances the scapula and upper limb from the chest wall

6. A 6-year-old child sustains a birth-related clavicular injury that is being reviewed. Which of the following statements about the clavicle is correct?

A. It lacks marrow and ossifies in membrane
B. It ossifies entirely in cartilage
C. It articulates with the coracoid process of the scapula
D. It articulates with the head of the humerus
E. It transmits no force to the axial skeleton

7. A patient is examined after a shoulder injury and the doctor palpates a groove on the inferior surface of the clavicle. Which structure is identified?

A. The scapular notch
B. The supraspinous fossa
C. The subclavian groove
D. The infraglenoid tubercle
E. The clavicular notch of the manubrium

8. A 30-year-old man dislocates his shoulder and radiographs are taken to assess the articulation of the scapula with the humerus. At which part of the scapula does this articulation occur?

A. The subscapular fossa
B. The coracoid process
C. The supraspinous fossa
D. The infraspinous fossa
E. The glenoid cavity (fossa)

9. A 28-year-old cyclist falls on his shoulder and complains of pain over the medial end of the clavicle. Which type of joint has been injured?

A. Plane synovial joint
B. Saddle synovial joint
C. Ball and socket synovial joint
D. Fibrous joint
E. Primary cartilaginous joint

10. In the same patient, the articular surfaces of the injured sternoclavicular joint are described. Which of the following forms one of these articular surfaces?

A. The clavicular facet of the acromion process
B. The coracoid process of the scapula
C. The outer border of the 1st rib
D. The clavicular notch of the manubrium sterni and the 1st costal cartilage
E. The upper border of the scapula

11. A pathologist examines the sternoclavicular joint of a cadaver. The articular surfaces of this joint are covered by which of the following?

A. Hyaline cartilage
B. Elastic cartilage
C. Dense fibrous tissue only
D. Synovial membrane only
E. Fibrocartilage

12. During arthroscopy of the sternoclavicular joint the surgeon notes that the joint cavity is divided into two separate compartments. Which structure is responsible for this?

A. The costoclavicular ligament
B. A fibrocartilaginous disc attached to the capsule
C. The interclavicular ligament
D. The anterior sternoclavicular ligament
E. The subclavius muscle

13. A 35-year-old wrestler sustains a forceful traction injury to the medial end of the clavicle, yet the sternoclavicular joint remains stable. Which structure is the major stabilizing factor of this joint?

A. The costoclavicular ligament
B. The anterior sternoclavicular ligament
C. The posterior sternoclavicular ligament
D. The interclavicular ligament
E. The coracoclavicular ligament

14. In the same patient, the surgeon identifies the costoclavicular ligament just lateral to the joint. This ligament connects the clavicle to which of the following?

A. The manubrium sterni only
B. The coracoid process of the scapula
C. The acromion process of the scapula
D. The 1st costal cartilage and the 1st rib
E. The upper border of the scapula

15. A 26-year-old footballer falls onto his outstretched arm. Examination shows separation at the joint between the clavicle and the acromion. Which type of joint is this?

A. Saddle synovial joint
B. Hinge synovial joint
C. Plane synovial joint
D. Pivot synovial joint
E. Secondary cartilaginous joint

16. In the same patient the acromion is pushed under the clavicle. Which ligament is torn in this injury?

A. The costoclavicular ligament
B. The interclavicular ligament
C. The anterior sternoclavicular ligament
D. The coracoclavicular ligament
E. The clavipectoral fascia

17. The surgeon repairing the same acromioclavicular injury reconstructs the ligament that is the principal factor providing stability to this joint. Which are the two parts of this ligament?

A. Anterior and posterior parts
B. Superior and inferior parts
C. Medial and lateral parts
D. Superficial and deep parts
E. Trapezoid and conoid parts

18. A 45-year-old woman develops winging of the scapula after a radical mastectomy. Which nerve was most likely injured during the operation?

A. The dorsal scapular nerve
B. The nerve to subclavius
C. The long thoracic nerve
D. The spinal part of the accessory nerve
E. The thoracodorsal nerve

19. In the same patient, paralysis of which muscle produces the winging of the scapula?

A. Serratus anterior
B. Trapezius
C. Pectoralis major
D. Pectoralis minor
E. Levator scapulae

20. The same patient is examined further. Which finding is expected in paralysis of the serratus anterior?

A. Loss of retraction of the scapula only
B. Weakness in abduction of the arm above 90 degrees
C. Flattening in the lower neck
D. Sagging of the shoulder with loss of elevation
E. Complete loss of depression of the scapula

21. The doctor asks the same patient to push against the wall, and the medial and inferior borders of the scapula become prominent. This test is used to assess which muscle?

A. Rhomboideus major
B. Serratus anterior
C. Levator scapulae
D. Subclavius
E. Middle fibres of trapezius

22. A student is asked about the attachments of the muscle paralysed in the previous patient. Which of the following describes the serratus anterior?

A. From the upper ribs to the coracoid process of the scapula
B. From the 1st rib and its costal cartilage to the clavicle
C. From the skull and upper half of the vertebral column to the scapula and clavicle
D. From the upper 8 or 9 ribs anteriorly to the medial border of the scapula posteriorly
E. From the transverse processes of C1-C4 to the superior angle of the scapula

23. A 32-year-old man cannot raise his arm above 90 degrees after an injury to the posterior triangle of the neck. Examination shows flattening in the lower neck and sagging of the shoulder. Which nerve is injured?

A. The long thoracic nerve
B. The dorsal scapular nerve
C. The nerve to subclavius
D. The suprascapular nerve
E. The spinal part of the accessory nerve (11th cranial nerve)

24. In the same patient, which additional finding is expected?

A. Weakness in retraction of the scapula
B. Winging of the scapula
C. Loss of protraction of the scapula
D. Inability to stabilize the clavicle
E. Loss of all depression of the scapula

25. A physiotherapist asks a patient to shrug (elevate) the shoulders. Which fibres of the trapezius are being tested?

A. The middle fibres
B. The lower fibres
C. The upper fibres
D. The upper and lower fibres together
E. The middle and lower fibres together

26. During rehabilitation, a patient is asked to raise the arm above 90 degrees. Which two muscles act together to rotate the scapula for this movement?

A. Pectoralis minor and subclavius
B. Levator scapulae and rhomboideus major
C. Rhomboideus minor and rhomboideus major
D. Pectoralis major and latissimus dorsi
E. Trapezius and serratus anterior

27. A 40-year-old patient has an injury of the dorsal scapular nerve. Which group of muscles is paralysed?

A. Serratus anterior and subclavius
B. Trapezius and latissimus dorsi
C. Pectoralis major and pectoralis minor
D. Levator scapulae, rhomboideus minor and rhomboideus major
E. Subscapularis and teres major

28. In the same patient, which movements of the scapula are mainly weakened?

A. Protraction and depression
B. Elevation and retraction
C. Protraction and lateral rotation
D. Depression and lateral rotation
E. Elevation and protraction

29. A patient with a tight muscle extending between the upper ribs and the coracoid process of the scapula complains of a drooping shoulder. Which actions are produced by this muscle?

A. Elevation and retraction of the scapula
B. Retraction and lateral rotation of the scapula
C. Protraction and depression of the scapula
D. Elevation and protraction of the scapula
E. Stabilization of the clavicle only

30. A 33-year-old man sustains a stab wound in the axilla. Which of the following is a content of the axilla that may be injured?

A. The brachial plexus
B. The subclavius muscle
C. The clavipectoral fascia
D. The coracoclavicular ligament
E. The outer border of the 1st rib

Part 2: Essay / Short-Answer Questions:

1. A 21-year-old rugby player is admitted after falling directly on his right shoulder with the arm at his side. Radiographs show a fracture of the middle one-third of the clavicle, with the medial fragment lying above the level of the lateral fragment.

A. Name the two bones that form the shoulder girdle and mention two functions of the clavicle.

B. Explain the displacement of the proximal and the distal fragments in this patient.

C. Mention the usual treatment of this fracture and the most common mechanism of injury.

2. A 26-year-old footballer falls onto his outstretched arm. Examination shows a step deformity at the lateral end of the clavicle and the acromion appears to be displaced beneath it.

A. Name the joint involved, mention its type and its articular surfaces.

B. Name the accessory ligaments of this joint and state which one is the principal stabilizing factor, mentioning its two parts.

C. Explain the mechanism of separation of this joint in the present patient.

3. A 28-year-old man is struck over the medial end of his clavicle in a road traffic accident. He has pain and swelling over the joint between the clavicle and the sternum, but the joint is clinically stable.

A. Mention the type of this joint and its articular surfaces.

B. What covers the articular surfaces, and which structure divides the joint into two cavities?

C. Name the accessory ligaments of this joint, and state which one is the major stabilizing factor and its attachments.

4. A 45-year-old woman underwent a radical mastectomy. Postoperatively she cannot abduct her arm above 90 degrees and cannot use the arm to push. When she presses against the wall, the medial and inferior borders of her scapula become prominent.

A. Name the nerve injured and the muscle paralysed, and give the attachments of this muscle.

B. Enumerate the effects of paralysis of this muscle in this patient.

C. Mention the normal actions of this muscle and how it is tested clinically.

5. A 32-year-old man sustains a penetrating injury of the posterior triangle of the neck. Examination reveals flattening of the lower neck, sagging of the shoulder, weakness in raising the arm above 90 degrees and weakness in retracting the scapula.

A. Name the muscle paralysed, its nerve supply and its attachments.

B. Mention the action of the upper, middle and lower fibres of this muscle.

C. Enumerate the signs of paralysis of this muscle and explain the weakness in raising the arm above 90 degrees.

6. A 33-year-old man is stabbed in the axilla. He bleeds profusely and there is neurological deficit in the upper limb. The surgeon explores the pyramidal space between the upper part of the arm and the chest.

A. Define the axilla and describe its base and its apex, mentioning the boundaries of the apex.

B. Mention the structures forming the anterior, posterior, medial and lateral walls of the axilla.

C. Enumerate the contents of the axilla and name the muscles forming the anterior and posterior axillary folds.

7. A 38-year-old patient attends the physiotherapy department for assessment of shoulder girdle function after prolonged immobilization. The therapist tests each of the movements of the scapula in turn.

A. Enumerate the movements of the scapula (shoulder girdle).

B. Mention the muscles producing elevation, depression, protraction and retraction of the scapula.

C. Mention the muscles producing lateral (upward) and medial (downward) rotation of the scapula, and give the nerve supply of the muscles of the deep layer of the back that move the scapula.

Part 1: MCQ Answer Key (with slide references)

1. C – The middle one-third Slide 28 (the fracture usually occurs in the middle one-third of the clavicle)
2. A – Sternomastoid Slide 28 (the proximal piece is lifted superiorly by the sternomastoid muscle)
3. D – It is pulled inferiorly by the arm Slide 28 (the distal fragment is pulled inferiorly by the arm)
4. B – Nonoperative treatment Slide 28 (the treatment of a mid-third clavicular fracture is usually nonoperative)
5. E – It acts as a bar that distances the scapula and upper limb from the chest wall Slide 3 (the clavicle acts as a bar to distance the scapula and upper limb from the chest wall; it also articulates with the sternum and the acromion and transmits forces to the axial skeleton)
6. A – It lacks marrow and ossifies in membrane Slide 3 (the clavicle lacks marrow and ossifies in membrane)
7. C – The subclavian groove Slide 3 (the subclavian groove lies on the inferior surface of the clavicle)
8. E – The glenoid cavity (fossa) Slide 4 (the triangular scapula articulates with the humerus at the glenoid fossa)
9. B – Saddle synovial joint Slide 7 (the sternoclavicular joint is a saddle synovial joint)
10. D – The clavicular notch of the manubrium sterni and the 1st costal cartilage Slide 7 (articular surfaces: the sternal end of the clavicle, and the clavicular notch of the manubrium sterni with the upper surface of the 1st costal cartilage)
11. E – Fibrocartilage Slide 7 (the articular surfaces of the sternoclavicular joint are covered by fibrocartilage)
12. B – A fibrocartilaginous disc attached to the capsule Slide 8 (a fibrocartilaginous disc attaches to the capsule and divides the joint into two cavities)
13. A – The costoclavicular ligament Slide 8 (the costoclavicular ligament is very strong and is the major stabilizing factor of the sternoclavicular joint)
14. D – The 1st costal cartilage and the 1st rib Slide 8 (just lateral to the joint the costoclavicular ligament connects the clavicle to the 1st costal cartilage and the 1st rib)
15. C – Plane synovial joint Slide 9 (the acromioclavicular joint is a plane synovial joint)
16. D – The coracoclavicular ligament Slide 29 (the acromion is pushed under the clavicle, tearing the coracoclavicular ligament)
17. E – Trapezoid and conoid parts Slide 9 (the coracoclavicular ligament is the principle factor providing stability to the joint; its two parts are the trapezoid and the conoid)
18. C – The long thoracic nerve Slide 18 (the long thoracic nerve may be injured in radical mastectomy operations)
19. A – Serratus anterior Slides 19 & 35 (winging of the scapula is due to paralysis of the serratus anterior)
20. B – Weakness in abduction of the arm above 90 degrees Slide 19 (paralysis of serratus anterior gives weakness of abduction above 90 degrees, inability to push with the arm, and winging of the scapula)
21. B – Serratus anterior Slide 19 (serratus anterior is tested by making the patient push against the wall)
22. D – From the upper 8 or 9 ribs anteriorly to the medial border of the scapula posteriorly Slide 16 (serratus anterior runs from the upper 8 or 9 ribs anteriorly to the medial border of the scapula posteriorly; nerve supply: long thoracic nerve)
23. E – The spinal part of the accessory nerve (11th cranial nerve) Slides 22 & 24 (trapezius is supplied by the spinal part of the accessory nerve (11th cranial nerve); its paralysis gives flattening in the lower neck and sagging of the shoulder)
24. A – Weakness in retraction of the scapula Slide 24 (paralysis of trapezius causes weakness in raising the arm above 90 degrees and weakness in retraction of the scapula)
25. C – The upper fibres Slide 22 (upper fibres of trapezius elevate the scapula, middle fibres retract it and lower fibres depress it)
26. E – Trapezius and serratus anterior Slides 16 & 22 (trapezius acts with serratus anterior to rotate the scapula and raise the arm above 90 degrees)
27. D – Levator scapulae, rhomboideus minor and rhomboideus major Slide 26 (levator scapulae and the rhomboids run between the vertebral column and the medial border of the scapula and are supplied by the dorsal scapular nerve)
28. B – Elevation and retraction Slides 26 & 27 (levator scapulae elevates the scapula and the rhomboids retract it)
29. C – Protraction and depression of the scapula Slide 12 (pectoralis minor runs from the upper ribs to the coracoid process and produces protraction and depression of the scapula)
30. A – The brachial plexus Slide 33 (contents of the axilla: the axillary artery and its branches, the axillary vein and its tributaries, the axillary lymph nodes and the brachial plexus)

Part 2: Essay Answer Key (with slide references)

1. Fractured middle third of the clavicle — Slides 3 & 28

• A. Shoulder girdle = clavicle + scapula; together they give a mobile base attaching the upper limb to the trunk.

• A. Clavicle: a bar distancing the scapula and upper limb from the chest wall; articulates with the sternum and the acromion; transmits forces to the axial skeleton; lacks marrow and ossifies in membrane.

• B. Proximal fragment lifted superiorly by sternomastoid; distal fragment pulled inferiorly by the arm.

• C. Usually nonoperative. Mechanism: a fall directly on the shoulder with the arm at the side (contact sports).

2. Acromioclavicular joint separation — Slides 9 & 29

• A. Acromioclavicular joint; plane synovial. Surfaces: acromial end of the clavicle + clavicular facet of the acromion process.

• B. Acromioclavicular ligament (covers the upper aspect); coracoclavicular ligament - extremely strong, the principle stabilizing factor; parts: trapezoid and conoid.

• C. A fall onto the shoulder or outstretched arm pushes the acromion under the clavicle, tearing the coracoclavicular ligament.

3. Sternoclavicular joint — Slides 7 & 8

• A. Sternoclavicular joint; saddle synovial. Surfaces: sternal end of the clavicle + clavicular notch of the manubrium sterni with the upper surface of the 1st costal cartilage.

• B. Surfaces covered by fibrocartilage; a fibrocartilaginous disc attached to the capsule divides the joint into two cavities (a synovial capsule encloses the joint).

• C. Anterior and posterior sternoclavicular ligaments reinforce the capsule; the costoclavicular ligament (clavicle to 1st costal cartilage and 1st rib) is very strong and is the major stabilizing factor.

4. Long thoracic nerve injury - winging of the scapula — Slides 16, 18 & 19

• A. Long thoracic nerve (injured in radical mastectomy); serratus anterior - from the upper 8 or 9 ribs anteriorly to the medial border of the scapula posteriorly.

• B. Weakness of abduction above 90 degrees; the arm cannot be used to push; winging of the scapula, the medial and inferior borders becoming prominent.

• C. Actions: protraction, and rotation of the scapula to raise the arm above 90 degrees. Tested by making the patient push against the wall.

5. Trapezius paralysis (spinal part of the accessory nerve) — Slides 22 & 24

• A. Trapezius; spinal part of the accessory nerve (11th cranial nerve); from the skull and upper half of the vertebral column to the scapula and clavicle.

• B. Upper fibres elevate, middle fibres retract and lower fibres depress the scapula.

• C. Signs: weak raising of the arm above 90 degrees, weak retraction, flattening of the lower neck, sagging shoulder. Raising above 90 degrees is weak because trapezius normally acts with serratus anterior to rotate the scapula.

6. The axilla — Slides 30, 31, 32 & 33

• A. A pyramidal space between the upper part of the arm and the chest, with an apex, a base and 4 walls. Base: skin and fascia. Apex = cervicoaxillary canal, triangular: clavicle anteriorly, upper border of the scapula posteriorly, outer border of the 1st rib medially.

• B. Anterior: pectoralis major and minor, subclavius, clavipectoral fascia. Posterior: subscapularis, teres major, latissimus dorsi. Medial: serratus anterior and the first 4 ribs with intercostals. Lateral: humerus, coracobrachialis, biceps brachii.

• C. Contents: axillary artery and branches; axillary vein and tributaries; axillary lymph nodes; brachial plexus. Folds: anterior = pectoralis major; posterior = latissimus dorsi and teres major.

7. Movements of the scapula and the muscles producing them — Slides 10, 26 & 27

• A. Elevation; depression; protraction (forward); retraction (backward); lateral (upward) rotation; medial (downward) rotation.

• B. Elevation: upper trapezius + levator scapulae. Depression: lower trapezius + pectoralis minor. Protraction: serratus anterior + pectoralis minor. Retraction: middle trapezius + rhomboids.

• C. Lateral rotation: upper and lower fibres of trapezius + lower 5 digitations of serratus anterior. Medial rotation: levator scapulae + rhomboids (both supplied by the dorsal scapular nerve).