Anatomy: Shoulder and Arm

A patient presents to ED having injured his right shoulder playing basketball. You establish he has torn the most commonly injured rotator cuff muscle. Which of the following movements would you most expect to be impaired:

a. Extension of the arm
b. Medial rotation of the arm
c. Lateral rotation of the arm
d. Abduction of the arm
e. Adduction of the arm
Anatomy: Shoulder and Arm

Question 1 of 123

A patient presents to ED having injured his right shoulder playing basketball. You establish he has torn the most commonly injured rotator cuff muscle. Which of the following movements would you most expect to be impaired:

a) Extension of the arm
b) Medial rotation of the arm
c) Lateral rotation of the arm
d) Abduction of the arm
e) Adduction of the arm

Answer

The supraspinatus is the most commonly injured rotator cuff muscle – it acts to initiate abduction and then assist the deltoid with continued abduction.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Supraspinatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Initiation of abduction of shoulder to 15 degrees (and then assistance of deltoid with continued abduction)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Suprascapular nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Empty can test – position the patient in the empty can position and ask the patient to forward flex the arm OR CR test abduction of the arm starting from complete abduction</td>
</tr>
</tbody>
</table>

The supraspinatus is part of the rotator cuff group of muscles.

It is innervated by the suprascapular nerve (C5 - C6).

It acts to initiate abduction of the arm to 15 degrees and then assists the deltoid with continued abduction to 90 degrees.

The two main disorders of the rotator cuff are impingement and tendinopathy. The supraspinatus muscle is the most commonly injured rotator cuff muscle as it passes beneath the acromion and the acromioclavicular ligament. This space is fixed, therefore any swelling of the supraspinatus muscle, excessive fluid in the subacromial/subdeltoid bursa or subacromial bony spurs, may produce significant impingement when the arm is abducted. The blood supply to the supraspinatus tendon is relatively poor and the tendon is susceptible to degenerative change, which in turn, makes it more susceptible to trauma and partial or full thickness tears may occur. This will result in painful or weak abduction of the arm at the shoulder.

The supraspinatus muscle can be assessed by either testing abduction of the arm against resistance, starting from complete abduction, or using the "empty can test." The "empty can test" can be performed by positioning the patient with the arm in 90 degrees of forward flexion, in the plane of the scapula (approximately 30 degrees of abduction) and in full internal rotation with the thumb pointing down (as if emptying a can). The patient is asked to forward flex their arm against resistance, and the test is considered positive if there is significant pain and/or weakness.
Anatomy: Shoulder and Arm

Question 2 of 125

Your consultant asks you to examine the shoulder of a 35 year old man as he has some positive findings. The patient is unable to adduct, medially rotate and extend his shoulder. You suspect an injury or pathology to the nerve supplying the latissimus dorsi. The latissimus dorsi muscle is innervated by which of the following nerves:

- a Pectoral nerves
- b Spinal accessory nerve
- c Thoracodorsal nerve
- d Long thoracic nerve
- e Axillary nerve

Question Navigator

1 Answered
2 Current Question
3 ...
4 ...
5 ...
6 ...
7 ...
8 ...
9 ...
10 ...
11 ...
12 ...

< Previous Next > See Answer Something wrong?
Anatomy: Shoulder and Arm

Your consultant asks you to examine the shoulder of a 25 year old man as he has some positive findings. The patient is unable to adduct, medially rotate and extend his shoulder. You suspect an injury or pathology to the nerve supplying the latissimus dorsi. The latissimus dorsi muscle is innervated by which of the following nerves?

- Pectoral nerve
- Spinal accessory nerve
- Thoracodorsal nerve
- Long thoracic nerve
- Axillary nerve

Answer

The latissimus dorsi is innervated by the thoracodorsal nerve (C8 – CBL).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Latissimus dorsi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Spinous processes of lower 6 thoracic vertebrae, thoracolumbar fascia, iliac crest lower 3 – 4 ribs</td>
</tr>
<tr>
<td>Occlt Attachment</td>
<td>Intertubular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Adduction, medial rotation and extension of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Thoracodorsal nerve (C8, C7, C6)</td>
</tr>
</tbody>
</table>

The latissimus dorsi muscle forms much of the muscle mass underlying the posterior axillary skin fold extending obliquely upwards from the trunk to the arm.

The latissimus dorsi is attached proximally to the spinous processes of the lower six thoracic vertebrae and related intertransversarial ligaments, via the thoracolumbar fascia to the spinous processes of the lumbar vertebrae and the iliac crest and the inferior 3 or 4 ribs. Distally it is attached to the floor of the intertubular sulcus of the humerus.

The latissimus dorsi is innervated by the thoracodorsal nerve (C8 – CBL).

The latissimus dorsi acts to extend, adduct and medially rotate the humerus at the glenohumeral joint.
Anatomy: Shoulder and Arm

Question 3 of 125

A 34 year old presents to the ED following a road traffic collision. His primary survey is unremarkable. During secondary survey you note the patient has signs of a weakness to the left serratus anterior muscle. The serratus anterior muscle is innervated by which of the following nerves:

- Pectoral nerves (a)
- Spinal accessory nerve (b)
- Thoracodorsal nerve (c)
- Long thoracic nerve (d)
- Axillary nerve (e)

< Previous  Next >  See Answer  

Something wrong?
Anatomy: Shoulder and Arm

Question 1 of 15

A 34-year-old presents to the ED following a road traffic collision. His primary survey is unremarkable. During secondary survey you note the patient has signs of a weakness to the left serratus anterior muscle. The serratus anterior muscle is innervated by which of the following nerves:

- a) Proximal nerves
- b) Spinal accessory nerve
- c) Thoracodorsal nerve
- d) Long thoracic nerve
- e) Axillary nerve

Answer

The serratus anterior is innervated by the long thoracic nerve (CS – C7).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Serratus Anterior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Upper 8 – 9 ribs</td>
</tr>
<tr>
<td>Clavicular Attachment</td>
<td>Medial border of scapula</td>
</tr>
<tr>
<td>Actions</td>
<td>Protraction and retraction of scapula</td>
</tr>
<tr>
<td>Innervation</td>
<td>Long thoracic nerve (CS, C6, C7)</td>
</tr>
</tbody>
</table>

The serratus anterior arises from the lateral aspects of the upper 8–9 ribs and anteriorly inserts into the medial border of the scapula. It acts to rotate the scapula, allowing the arm to be raised over 90 degrees, and also protracts the scapula and holds it against the thoracic wall. It is innervated by the long thoracic nerve (CS – C7).

The long thoracic nerve is prone to injury due to its extensive length. Injury to this nerve may occur due to trauma or surgery, direct blow to the ribcage, over-stretching or strenuous repetitive movements of the arm, and sustained bearing of excessive weight over the shoulder. Damage to this long thoracic nerve results in weakness/paralysis of the serratus anterior muscle, causing difficulty abducting the upper limb above 90 degrees, and giving a "winged" scapula appearance where the medial border of the scapula moves laterally and posteriorly away from the thoracic wall. This becomes more pronounced if the patient paces the upper limbs against a wall. An image of a winged scapula (left side) is shown below.

Resources

- The Red Bag of Emergencies
- Advanced Trauma Life Support
- Royal College of Surgeons (UK)
- British Society of Emergency Medicine
- Nick Natter’s Emergency Medical Resources
- Nick Natter’s Injury Support Group
- Natter’s Trauma Podcast
- Nick Natter’s Emergency Medical Resources
- Nick Natter’s Injury Support Group
- Nick Natter’s Trauma Podcast
- Nick Natter’s Emergency Medical Resources
- Nick Natter’s Injury Support Group
- Nick Natter’s Trauma Podcast
Anatomy: Shoulder and Arm

A 23 year old woman presents to the ED after falling and sustaining a dislocation of the right elbow. Regarding the ligaments of the elbow, which of the following statements is CORRECT:

- The radial collateral ligament arises from the medial epicondyle of the humerus.
- The radial collateral ligament distally attaches to the radial tuberosity.
- The annular ligament is attached at both ends to the anterior and posterior head of the radius.
- The ulnar collateral ligament distally attaches to both the olecranon and the coronoid process of the ulnar.
- The annular ligament holds the radial head in contact with the humerus.
Anatomy: Shoulder and Arm

A 23 year old woman presents to the ED after falling and sustaining a dislocation of the right elbow. Regarding the ligaments of the elbow, which of the following statements is correct?

a) The radial collateral ligament arises from the medial epicondyle of the humerus.

b) The radial collateral ligament distally attaches to the radial tuberosity.

c) The ulnar collateral ligament is attached at both ends to the anterior and posterior head of the radius.

d) The elbow collateral ligament distally attaches to both the olecranon and the coronoid process of the ulna.

e) The annular ligament holds the radial head in contact with the humerus.

Answer

The radial collateral ligament arises from the lateral epicondyle of the humerus and laterally distally to the annular ligament of the radius. The ulnar collateral ligament arises from the medial epicondyle and distally attaches to the olecranon and coronoid process of the ulna. The ulnar collateral ligament is a strong band of fibers that encircles the head of the radius, and is the last to contact with the radial notch of the ulna. The annular ligament is attached by both its ends to the anterior and posterior margins of the radial notch of the ulna.

Notes

<table>
<thead>
<tr>
<th>Joint</th>
<th>Elbow joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Synovial hinge joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Trabecula of humerus with trochlear notch of ulna and capitulum of humerus with head of radius</td>
</tr>
<tr>
<td>Stabilizing factors</td>
<td>Joint capsule, radial and ulnar collateral ligaments</td>
</tr>
<tr>
<td>Movements</td>
<td>Flexion and Extension</td>
</tr>
</tbody>
</table>

The elbow is a synovial hinge joint. It is formed by the articulations between the trochlea of the humerus and the trochlear notch of the ulna and between the capitulum of the humerus and the head of the radius. The movements of the elbow joint are extension and flexion.

<table>
<thead>
<tr>
<th>Movement</th>
<th>Muscles Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>Biceps brachii, brachialis, brachioradialis</td>
</tr>
<tr>
<td>Extension</td>
<td>Triceps brachii, anconeus</td>
</tr>
</tbody>
</table>

The collateral ligaments of the elbows are medial and lateral collateral ligaments of the joint capsule. The radial collateral ligament arises from the lateral epicondyle of the humerus and distally attaches to the annular ligament of the radius. The ulnar collateral ligament arises from the medial epicondyle and distally attaches to the olecranon and coronoid process of the ulna.

The posterior radial-ulnar joint is a distinct joint located within the same joint capsule. It is formed by the articulation of the head of the radius and the radial notch of the ulna, and is lined with synovium and synovial membrane of the fossae. The ulnar collateral ligament is a strong band of fibers that encircles the head of the radius, and is the last to contact with the radial notch of the ulna. The annular ligament is attached by both its ends to the anterior and posterior margins of the radial notch of the ulna.
Anatomy: Shoulder and Arm

Question 5 of 125

You are asked by a consultant to perform a neurological examination of the upper limb on a gentleman presenting with left arm weakness. You note he has marked weakness of the triceps brachii. The triceps brachii is innervated by which of the following nerves:

- Musculocutaneous nerve
- Brachial nerve
- Radial nerve
- Axillary nerve
- Median nerve

< Previous Next > See Answer

Something wrong?
Anatomy: Shoulder and Arm

You are asked by a consultant to perform a neurological examination of the upper limb on a gentleman presenting with left arm weakness. You note he has marked weakness of the triceps brachii. The triceps brachii is innervated by which of the following nerves:

- a) Musculocutaneous nerve
- b) Brachial nerve
- c) Radial nerve
- d) Axillary nerve
- e) Median nerve

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Triceps brachii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Extension of elbow, extension and adduction of shoulder (long head)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Radial nerve (C6 – C8)</td>
</tr>
</tbody>
</table>

The triceps muscle is innervated by the radial nerve (C6 – C8). The triceps tendon reflex tap predominantly tests spinal cord segment C7.

It is the chief extensor of the forearm at the elbow joint and acts as an accessory adductor and extensor of the arm at the glenohumeral joint via its long head.

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We are an online revision resource for FRCEM Primary and Intermediate exam preparation.

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TusharMcAnatomy
- Trauma.org
- Rattipedia

- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Trauma Anatomy
- Patient Leaflet

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Anatomy: Shoulder and Arm

Question 6 of 125

A 35 year old woman has undergone a total mastectomy for breast cancer. Postoperatively she complains of loss of sensation in the inner aspect of the arm and axilla. Which of the following nerves was most likely injured during the procedure:

a) Long thoracic nerve  
b) Intercostobrachial nerve  
c) Spinal accessory nerve  
d) Axillary nerve  
e) Thoracodorsal nerve
Anatomy: Shoulder and Arm

A 35-year-old man has undergone a total shoulder arthroplasty for chronic shoulder pain.

Postoperatively, he complains of loss of motion in the lower extremity of the arm and axilla. A CT of the following region was recently obtained and reviewed.

Long thoracic nerve
Spinal accessory nerve
Posterior cord nerve
Phrenic nerve

Answer

The left lateral cutaneous nerve of the arm is the cutaneous nerve of the second intercostal nerve and supplies skin over the medial arm and axilla.

Notes

- Nerve Origin Skin supplied
  - Latissimus dorsi nerve (axilla)
  - Musculocutaneous nerve (limb)
  - Radial nerve (limb)
  - Ulnar nerve (limb)
  - Median nerve (limb)
  - Posterior cord nerve (limb)

- The lateral cutaneous nerve of the arm, branch of the ventral cord, supplies the skin over the upper half of the lateral aspect.
- The superior lateral cutaneous nerve of the arm, branch of the ventral cord, supplies the skin over the lower half of the lateral aspect.
- The ulnar cutaneous nerve of the arm is the end sensory branch of the third thoracic spinal nerve, supplies the skin over the medial arm.
- The thoracodorsal nerve is the sensory branch of the ventral cord of the 8th thoracic spinal nerve, supplies the skin over the posterior arm.
- The medial cutaneous nerve of the arm, branch of the ventral cord, supplies the skin over the medial aspect.
- The posterior cord nerve, branch of the ventral cord, supplies the skin over the posterior aspect of the forearm.

- The superior lateral cutaneous nerve of the arm, branch of the radial nerve, supplies the skin over the lateral aspect of the forearm.
- The posterior cord nerve, branch of the ventral cord, supplies the skin over the posterior aspect of the forearm.
- The medial cutaneous nerve of the forearm is the sensory branch of the fourth thoracic spinal nerve, supplies the skin over the ulnar aspect of the forearm.
- The thoracodorsal nerve is the sensory branch of the ventral cord of the 8th thoracic spinal nerve, supplies the skin over the posterior aspect of the arm.
- The ulnar cutaneous nerve of the arm is the sensory branch of the 7th thoracic spinal nerve, supplies the skin over the ulnar aspect of the arm.
- The posterior cord nerve, branch of the ventral cord, supplies the skin over the posterior aspect of the arm.
Anatomy: Shoulder and Arm

Question 7 of 125

You are performing the secondary survey of a 21 year old gymnast who fell from a parallel bar, landing on her neck. She tells you she cannot feel her upper left arm. On examination you note loss of sensation over the upper half of the left deltid muscle. The skin over the upper half of the deltid muscle is supplied by which of the following nerves:

a. The lateral cutaneous nerve of the cervical plexus
b. The inferior lateral cutaneous nerve of the arm
c. The superior lateral cutaneous nerve of the arm
d. The lateral supraclavicular nerve
e. The intercostobrachial nerve

< Previous  Next >  See Answer  Something wrong?
Answer: The lateral superficial branch of the brachial plexus supplies the skin over the upper half of the deltoid muscle.

Notes:

- The lateral superficial branch (A branch of the axillary nerve) supplies the skin over the upper half of the deltoid muscle.
- The lateral superficial branch of the brachial plexus, branch of the axillary nerve, supplies the skin over the upper half of the deltoid muscle.
- The lateral superficial branch of the brachial plexus supplies the skin over the upper half of the deltoid muscle.
- The lateral superficial branch of the brachial plexus, branch of the axillary nerve, supplies the skin over the upper half of the deltoid muscle.
- The lateral superficial branch of the brachial plexus supplies the skin over the upper half of the deltoid muscle.
Anatomy: Shoulder and Arm

Question 8 of 125

You are asked to review a 27 year old woman who presents to the ED after she was stabbed in the posterior shoulder during an altercation. There is no immediate life threatening injury. You note that her medial rotation and extension of the shoulder is weak, you suspect an injury to the nerve supplying the teres major. The teres major muscle is innervated by which of the following nerves:

- a  Lower subscapular nerve
- b  Upper subscapular nerve
- c  Suprascapular nerve
- d  Axillary nerve
- e  Thoracodorsal nerve
Anatomy: Shoulder and Arm

Question 8 of 125

You are asked to review a 27 year old woman who presents to the ED after she was stabbed in the posterior shoulder during an altercation. There is no immediate life threatening injury. You note that her medial rotation and extension of the shoulder is weak, you suspect an injury to the nerve supplying the teres major. The teres major muscle is innervated by which of the following nerves:

a) Lower subscapular nerve ✓
b) Upper subscapular nerve
c) Suprascapular nerve
d) Axillary nerve
e) Thoracodorsal nerve

Answer

The teres major is innervated by the lower subscapular nerve (CS, C6).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Teres major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Posterior surface of inferior angle of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation and extension of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Lower subscapular nerve (CS - C7)</td>
</tr>
</tbody>
</table>

The teres major muscle passes from the inferior angle of the scapula to the upper humerus and contributes to the posterior axillary skin fold laterally.

The teres major originates from the posterior surface of the inferior angle of the scapula and inserts into the medial lip of the intertubercular sulcus of the humerus.

It is innervated by the lower subscapular nerve (CS, C6).

It acts to extend and medially rotate the arm at the glenohumeral joint.
Anatomy: Shoulder and Arm

An 18 year old man presents to the ED following a street robbery. He has received a single stab wound to the right axilla. On examination of the upper limb you note an area of decreased sensation that leads you to believe he may have sustained a musculocutaneous nerve injury. The musculocutaneous nerve supplies which of the following areas of skin:

a. Lateral arm
b. Medial arm
c. Lateral forearm
d. Medial forearm
e. Axilla
Anatomy: Shoulder and Arm

Question 9 of 125

An 18 year old man presents to the ED following a street robbery. He has received a single stab wound to the right axilla. On examination of the upper limb you note an area of decreased sensation that leads you to believe he may have sustained a musculocutaneous nerve injury. The musculocutaneous nerve supplies which of the following areas of skin:

- a) Lateral arm
- b) Medial arm
- c) Lateral forearm ✅
- d) Medial forearm
- e) Axilla

Answer

The musculocutaneous nerve gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 – C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
</tr>
</tbody>
</table>

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 – C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of Injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- SouthMedicine
- Traumasing
- Radiopaedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- InstantAnatomy
- Patient.co.uk
Anatomy: Shoulder and Arm

You have been called urgently to assess a patient. They have sustained a deep laceration to the right deltoid muscle after an alleged assault. There are no other injuries and a full primary survey has been performed. The deltoid muscle primarily acts to produce which of the following movements:

a. Abduction of the arm
b. Adduction of the arm
c. Flexion of the arm
d. Extension of the arm
e. Lateral rotation of the arm

< Previous  Next >  See Answer

Question Navigator

1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
7. Answered
8. Answered
9. Answered
10. Current Question
11. ...
12. ...
Something wrong?
Anatomy: Shoulder and Arm

Question 10 of 13

You have been called urgently to assess a patient. They have sustained a deep laceration to the right deltoide muscle after an alleged assault. There are no other injuries and a full primary survey has been performed. The deltoide muscle primarily acts to produce which of the following movements?

a) Abduction of the arm
b) Adduction of the arm
c) Flexion of the arm
d) Extension of the arm
e) Lateral rotation of the arm

Answer

The deltoide muscle is the major abductor of the arm (beyond the initial 15 degrees achieved by the supraspinatus).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Deltoide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Major abductor of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Axillary nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Position the patient with the arm abducted to 90 degrees and ask them to abduct their arm further</td>
</tr>
</tbody>
</table>

The deltoide muscle forms the muscular eminence inferior to the acromion and around the glenohumeral joint. The axillary nerve passes posteriorly around the surgical neck of the humerus deep to the deltoide muscle.

The deltoide is innervated by the axillary nerve (C5, C6).

The deltoide muscle is the major abductor of the arm (beyond the initial 15 degrees achieved by the supraspinatus), although it receives some assistance from the supraspinatus. Anterior fibres assist in flexion of the arm. Posterior fibres assist in extension of the arm.

The deltoide can be assessed by testing abduction of the arm started from 90 degrees of abduction.

The axillary nerve may be damaged by a fracture of the surgical neck of the humerus, or by internal dislocation of the humerus. It results in weakness of lateral rotation (due to paralysis of the teres minor muscle) and abduction (due to paralysis of the deltoide muscle) of the arm and loss of sensation in the distribution of the lateral brachial cutaneous nerve, the ‘regimental band’ area on the lateral arm.

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Resources

- The Royal College of Emergency Medicine
- AHA Association for Emergency Medicine
- Advanced Trauma Life Support
- Association of Operating Rooms (AOR)
- South East Thames
- Trust Care
- Radiopods
- Advanced UK Triage Group
- Emergency Medicine Journal
- Ultrasound Bane
- Radiology
- Radiopaedia

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Anatomy: Shoulder and Arm

Question 11 of 125

You have been asked to review a 65 year old woman who presents with a 2 week history of pain and weakness of the left shoulder. On examination you note weakness of lateral rotation at the glenohumeral joint, you suspect an infraspinatus pathology. The infraspinatus muscle is innervated by which of the following nerves:

a. Lower subscapular nerve
b. Upper subscapular nerve
c. Axillary nerve
d. Suprascapular nerve
e. Long thoracic nerve

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 11 of 125

You have been asked to review a 65 year old woman who presents with a 2 week history of pain and weakness of the left shoulder. On examination you note weakness of lateral rotation at the glenohumeral joint, you suspect an infraspinatus pathology. The infraspinatus muscle is innervated by which of the following nerves:

da) Lower subscapular nerve  
b) Upper subscapular nerve  
c) Axillary nerve  
d) Suprascapular nerve  
e) Long thoracic nerve

Answer

The infraspinatus muscle is innervated by the suprascapular nerve (C5, C6).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Infraspinatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Lateral rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Suprascapular nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Tested with the teres minor – position the patient with their arm adducted with the elbow flexed to 90 degrees and ask them to laterally rotate the arm</td>
</tr>
</tbody>
</table>

The infraspinatus is part of the rotator cuff group.

It is innervated by the suprascapular nerve (C5, C6).

It acts to laterally rotate the arm at the glenohumeral joint, together with the teres minor.

The infraspinatus is assessed by testing lateral rotation against resistance, with the arm adducted and the elbow flexed to 90 degrees.
Anatomy: Shoulder and Arm

You have been asked to review a 32 year old javelin thrower who complains of pain in the right shoulder. On examination you note tenderness of the supraspinatus. The supraspinatus muscle acts to produce which of the following movements:

a. Adduction of the arm
b. Flexion of the arm
c. Abduction of the arm
d. Medial rotation of the arm
e. Lateral rotation of the arm

< Previous  Next  >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 12 of 12

You have been asked to review a 32 year old javelin thrower who complains of pain in the right shoulder. On examination you note tenderness of the supraspinatus. The supraspinatus muscle acts to produce which of the following movements:

- a) Abduction of the arm
- b) Flexion of the arm
- c) Abduction of the arm ✔
- d) Medial rotation of the arm
- e) Lateral rotation of the arm

Answer

The supraspinatus acts to initiate abduction of the arm to 15 degrees and then assists the deltoid with continued abduction to 90 degrees.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Supraspinatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Initiation of abduction of shoulder to 15 degrees (and then assistance of deltoid with continued abduction)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Suprascapular nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Empty can test – position the patient in the empty can position and ask the patient to forward flex the arm OR test abduction of the arm starting from complete adduction</td>
</tr>
</tbody>
</table>

The supraspinatus is part of the rotator cuff group of muscles.

It is innervated by the suprascapular nerve (C5 – C6).

It acts to initiate abduction of the arm to 35 degrees and then assists the deltoid with continued abduction to 90 degrees.

The two main disorders of the rotator cuff are impingement and tendinopathy. The supraspinatus muscle is the most common injured rotator cuff muscle as it passes beneath the acromion and the acromioclavicular ligament. This space is fixed, therefore any swelling of the supraspinatus muscle, excessive fluid in the subacromial/subdeltoid bursa or subacromial bony spurs, may produce significant impingement when the arm is abducted. The blood supply to the supraspinatus tendon is relatively poor and the tendon is susceptible to degenerative change, which in turn, makes it more susceptible to trauma and partial or full thickness tears may occur. This will result in painful or weak abstraction of the arm at the shoulder.

The supraspinatus muscle can be assessed by either testing abduction of the arm against resistance, starting from complete abstraction, or using the ‘empty can’ test. The ‘empty can’ test can be performed by positioning the patient with the arm in 90 degrees of forward flexion, in the plane of the scapula (approximately 30 degrees of abduction) and in full internal rotation with the thumb pointing down (as if emptying a can). The patient is asked to forward flex their arm against resistance, and the test is considered positive if there is significant pain and/or weakness.

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TraumaQuiz
- VitalsQuiz
- Advanced Life Support Group
- Emergency Medicine Journal
- Liberations
- Instant Anatomy
- Patient.co.uk
Anatomy: Shoulder and Arm

A 28 year old man is brought to ED with a severely painful arm after being involved in a collapsed scrum. An x-ray of his arm is shown below. Which of the following nerves is most commonly injured in this type of injury:

- Radial nerve
- Axillary nerve
- Median nerve
- Ulnar nerve
- Long thoracic nerve

By Hellerhoff (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons
Anatomy: Shoulder and Arm

Question 5 of 55

A 28-year-old man is brought to ED with a severely painful arm after being involved in a collapsed store. An x-ray of his arm is shown below. Which of the following nerves is most commonly injured in this type of injury?

a) Radial nerve
b) Axillary nerve  ✔
c) Median nerve
d) Ulnar nerve
long thoracic nerve

Answer

The x-ray shows an anterior shoulder dislocation – the axillary nerve is the most commonly injured nerve in this type of injury where it wraps around the surgical neck of the humerus.

Answer

The axillary nerve arises from the posterior cord containing fibres from the nerve roots C5 and C6.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Posterior cord</td>
</tr>
<tr>
<td>Motor supply</td>
<td>Deltoid, tensor minor</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>The regnential budgy area on the upper lateral arm via the superiour lateral cutaneous nerve of the arm</td>
</tr>
</tbody>
</table>

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

The axillary nerve innervates the deltoid, muscles and the tensor minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regnential budgy area on the upper lateral arm.

Injury to the axillary nerve may be caused by:
- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary cutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (tensor minor) and loss of sensation over the regnential budgy area. In longstanding cases, there may be atrophy of the deltoid giving the shoulder a flattened appearance.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of axillary cutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abduction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regeniental budgy area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoid – flattened shoulder appearance</td>
</tr>
</tbody>
</table>

[Image: https://commons.wikimedia.org/wiki/File:Fracture_of_the_scapula_with_proximal_lesion.png]

By Inukshook (Own work) (CC BY-SA 3.0) via Wikimedia Commons
Anatomy: Shoulder and Arm

Question 14 of 125

You have been asked to perform a neurological exam of the upper limb of a patient brought in following a fall onto his left shoulder. Whilst testing sensation in the limb the patient reports no sensation over the lower half of the deltoid muscle. The skin over the lower half of the deltoid muscle is supplied by which of the following nerves:

- **a** The superior lateral cutaneous nerve of the arm, branch of the axillary nerve
- **b** The superior lateral cutaneous nerve of the arm, branch of the musculocutaneous nerve
- **c** The superior lateral cutaneous nerve of the arm, branch of the radial nerve
- **d** The lateral supraclavicular nerve
- **e** The intercostobrachial nerve

< Previous  Next  >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

**Answer**

The superior lateral cutaneous nerve of the arm, branch of the axillary nerve, supplies the skin over the lower half of the biceps brachii muscle. It supplies the skin over the lower half of the biceps brachii muscle and is thought to be the motor nerve to the brachioradialis muscle.

The inferior lateral cutaneous nerve of the arm, branch of the thoracodorsal nerve, supplies the skin over the lower half of the biceps brachii muscle. It is the only cutaneous nerve that supplies the skin over the lower half of the biceps brachii muscle and is thought to be the motor nerve to the brachioradialis muscle.
Anatomy: Shoulder and Arm

Question 15 of 125

You are part of the trauma team caring for a 43 year old motorcyclist who has fallen from his bike in bad weather. His primary survey is unremarkable. You perform secondary survey and note weakness in the right hand. You suspect an ulnar nerve or brachial plexus injury. The ulnar nerve arises from which of the following cord(s) of the brachial plexus:

a Medial cord
b Lateral cord
c Posterior cord
d Medial and lateral cord
e Lateral and posterior cord
Anatomy: Shoulder and Arm

The shoulder is a complex joint that allows for a wide range of motion. It is composed of the glenohumeral joint, which is formed by the head of the humerus fitting into the glenoid fossa of the scapula. The joint is stabilized by the rotator cuff, which consists of four muscles that help to keep the humerus in the glenoid fossa and provide rotation and abduction.

The arm is composed of the humerus, radius, and ulna. The humerus is the bone of the upper arm that connects to the shoulder and connects to the elbow. The radius and ulna are the two bones of the lower arm that connect to the wrist and hand.

Clinical Decision Making

Case 1: A 35-year-old female presents with left shoulder pain and decreased range of motion. She reports experiencing sudden pain while lifting a heavy object.

1. Take a thorough history of the patient's symptoms, including the duration and severity of pain.
2. Perform a physical examination to assess range of motion, stability, and tenderness.
3. Consider imaging studies, such as an MRI, to rule out any underlying structural issues.

Case 2: A 50-year-old male presents with right arm pain and weakness. He reports experiencing gradual onset of symptoms over several weeks.

1. Assess the patient's symptoms, including the type and location of pain, and any associated weakness or numbness.
2. Perform a thorough physical examination to assess muscle strength and reflexes.
3. Consider further testing, such as EMG or nerve conduction studies, to evaluate nerve function.

The shoulder and arm are complex anatomical structures that require careful consideration in clinical decision making. Proper diagnosis and addressing underlying issues are crucial to ensure optimal patient outcomes.
Anatomy: Shoulder and Arm

A 28 year old patient presents to ED having been involved in a road traffic accident where he was thrown off his motorbike. After excluding life-threatening injuries you note his right upper limb is adducted, medially rotated, and flexed at the wrist. Which part of the brachial plexus was most likely injured:

- Superior trunk
- Middle trunk
- Inferior trunk
- Medial cord
- Lateral cord
Anatomy: Shoulder and Arm

Question:
A 20-year-old patient presents to ED having been involved in a motor vehicle accident where he was thrown off his motorbike. After excluding life-threatening injuries you note his right upper limb is addicted, medially rotated, and flexed at the wrist. Which part of the brachial plexus was most likely injured?

a) Supraclavicular fossa
b) Axillary fossa
c) Intercostal fossa
d) Medial cord
e) Lateral cord

Answer:
This patient describes the ‘wadder’s triad’ deformity seen in Brachial plexus injuries, usually resulting from an injury to the suprascapular nerve and involving the C5 and T1 nerve roots. There is loss of abduction, external rotation of the arm, flexion and adduction of the forearm and extension of the wrist.

Notes:
The brachial plexus is formed by the union of the anterior root of spinal nerves C5–T1.

In the posterior neck, the roots of the brachial plexus are located in three trunks:

- A posterior trunk (made of the C5 and C6 nerves)
- A medial trunk (made of the C5 nerve) and
- A lateral trunk (the union of the C7 and T1 nerves).

Within the posterior triangle of the neck, the trunks divide into anterior and posterior divisions.

Within the axilla, the divisions then rejoin to form three cords formed by their relation to the axillary artery.

- The lateral cord (contains the anterior division of the posterior cord and the medial cord)
- The medial cord (contains the posterior division of the anterior cord and the lateral cord)
- The posterior cord (contains the posterior divisions of all three brachial plexus cords)

The cords give rise to the major branches of the brachial plexus.

Brachial plexus injuries are usually the result of hard trauma precipitating nerve axon disruption and degeneration.

Resources:
- FrCEMFoCus
- FRCCEMFoCus
- The Royal College of Emergency Medicine
- National Asthma Council Australia
- National Asthma Council Australia (AAP)
- RACGP Advocacy
- Emergency Medicine
- *Advised and Updated: Support for Interprofessional Training*

*Disclaimer: Information is intended for emergency physicians, medical professionals, and medical students. It is not intended for use in emergency situations.*

*FrCEMFoCus: 2017 FrCEMFoCus Australia (Medical and Surgical) Graduates: White Paper.*

*FRCCEMFoCus: 2017 FRCCEMFoCus Australia (Medical and Surgical) Graduates: White Paper.*

*Advanced Life Support Group*
*Advanced Life Support Group*
*Alcohol and Other Drugs*
*Alcohol and Other Drugs*
*Emergency Medicine*
*Emergency Medicine*
Anatomy: Shoulder and Arm

A 23 year old woman is thrown off her horse during a show jumping competition, landing on her shoulder. Imaging shows a fracture of the lesser tubercle of the humerus. Which of the following movements would you most expect to be affected by this injury:

- a. Lateral rotation of the arm
- b. Medial rotation of the arm
- c. Abduction of the arm
- d. Adduction of the arm
- e. Extension of the arm

< Previous  Next >  See Answer  Something wrong?
A 23 year old woman is thrown off her horse during a show jumping competition, landing on her shoulder. Imaging shows a fracture of the lesser tubercle of the humerus. Which of the following movements would you most expect to be affected by this injury:

a) Lateral rotation of the arm  
(b) Medial rotation of the arm  
(c) Abduction of the arm  
(d) Adduction of the arm  
e) Extension of the arm

Answer

The subscapularis inserts into the lesser tubercle of the humerus, and acts to produce medial rotation of the arm (together with the teres major). The supraspinatus (abduction), infraspinatus (lateral rotation) and teres minor (lateral rotation) all insert into the greater tubercle of the humerus.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Subscapularis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Subscapular fossa of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Lesser tubercle of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Upper and lower subscapular nerves (CS – C7)</td>
</tr>
</tbody>
</table>

The subscapularis forms the largest component of the posterior wall of the axilla.

It originates from the subscapular fossa on the anterior surface of the scapula and inserts into the lesser tubercle of the humerus.

The subscapularis is innervated by the upper and lower subscapular nerves (CS – C7), branches of the brachial plexus.

Together with three muscles of the posterior scapula region (the supraspinatus, infraspinatus and teres minor muscles) the subscapularis is a member of the rotator cuff muscle group, which stabilizes the glenohumeral joint.

The subscapularis acts to medially rotate the arm at the glenohumeral joint. To isolate the subscapularis muscle in examination, place the dorsum of the patient’s hand in full medial rotation on the lower back and ask them to push their hand off the back (the 10th off test). Loss of power suggests a tear while pain on forced medial rotation suggests tendinitis.
Anatomy: Shoulder and Arm

A 23 year old decorator presents to ED complaining of pain and weakness in his shoulder after painting a ceiling. You suspect a rotator cuff disorder. Which of the following muscles would you not expect to be affected:

a. Subscapularis
b. Teres major
c. Supraspinatus
d. Infraspinatus
e. Teres minor

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 18 of 120

A 23 year old decorator presents to ED complaining of pain and weakness in his shoulder after painting a ceiling. You suspect a rotator cuff disorder. Which of the following muscles would you not expect to be affected:

a) Subscapularis
b) Teres major ✓
c) Supraspinatus
d) Infraspinatus
e) Teres minor

Answer

The rotator cuff group acts to stabilise the glenohumeral joint and is comprised of the subscapularis, the supraspinatus, the infraspinatus and the teres minor. The teres major is not a rotator cuff muscle.

Notes

<table>
<thead>
<tr>
<th>Rotator Cuff Muscle</th>
<th>Action</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supraspinatus (supracapsular nerve)</td>
<td>Initiation of abduction of arm to 15 degrees (and then assists deltoid with further abduction)</td>
<td>Empty can’ test - position the patient in the empty can position and ask the patient to forward flex the arm. Off test abduction of the arm starting from complete abduction</td>
</tr>
<tr>
<td>Infraspinatus (supracapsular nerve)</td>
<td>Lateral rotation of arm</td>
<td>Tested with the teres minor - position the patient with their arm abducted with the elbow flexed to 90 degrees and ask them to laterally rotate the arm</td>
</tr>
<tr>
<td>Teres minor (spinal nerve)</td>
<td>Lateral rotation of arm</td>
<td>Tested with the infraspinatus as above.</td>
</tr>
<tr>
<td>Subscapularis (bursa) (spinacapsular nerve)</td>
<td>Medial rotation of arm</td>
<td>Lift off’ test - Position the patient in full medial rotation with their dorum of their hand on their lower back and ask them to lift their hand away from their back</td>
</tr>
</tbody>
</table>

By Henry Varadyke Carter (Public domain), via Wikimedia Commons
Anatomy: Shoulder and Arm

Question 19 of 125

You are asked to review a 45 year old carpenter who presents with weakness and pain in his left arm. You decide to test the strength of his left arm movements. The coracobrachialis muscle acts to perform which of the following movements:

- Flexion of the forearm
- Flexion and supination of the forearm
- Supination of the forearm
- Flexion of the arm
- Extension of the forearm

< Previous   Next >   See Answer   Something wrong?

Question Navigator

6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered
13 Answered
14 Answered
15 Answered
16 Answered
17 Answered

Clear Exam
Question 13 of 125

You are asked to review a 45 year old carpenter who presents with weakness and pain in his left arm. You decide to test the strength of his left arm movements. The coracobrachialis muscle acts to perform which of the following movements:

a) Flexion of the forearm
b) Flexion and supination of the forearm
c) Supination of the forearm

d) Flexion of the arm ✓
e) Extension of the forearm

Answer

The coracobrachialis acts to flex the arm at the glenohumeral joint.

Notes

The anterior compartment of the arm consists of three muscles.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Actions</th>
<th>Innervation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coracobrachialis</td>
<td>Flexion of arm</td>
<td>Musculocutaneous nerve (C5 - C7)</td>
</tr>
<tr>
<td>Biceps brachii</td>
<td>Flexion and supination of forearm, flexion of arm</td>
<td>Musculocutaneous nerve (C5, C6)</td>
</tr>
<tr>
<td>Brachialis</td>
<td>Flexion of forearm</td>
<td>Musculocutaneous nerve (C5, C6), small contribution by radial nerve (C7) to lateral muscle</td>
</tr>
</tbody>
</table>

The coracobrachialis (green) is innervated by the musculocutaneous nerve (C5 – C7). It acts to flex the arm at the glenohumeral joint.

The biceps brachii (red) is innervated by the musculocutaneous nerve (C5 – C6). The biceps is primarily a powerful flexor and supinator of the forearm at the elbow joint. It also assists with flexion of the arm at the shoulder joint (with the coracobrachialis muscle). The biceps reflex tap predominantly tests spinal cord segment C6.

The brachialis (blue) is innervated primarily by the musculocutaneous nerve (C5, C6) with a small contribution from the radial nerve (C7). The brachialis flexes the forearm at the elbow joint.

Modified by FRCEM Success. Original by Henry Van de Velde Carton (Public domain) via Wikimedia Commons
Anatomy: Shoulder and Arm

Question 20 of 125

You have been asked to give a teaching session to the final year medical students attached to your ED. As part of the session you decide to summarise the actions of the shoulder muscles. The teres minor muscle acts to produce which of the following movements:

- a. Adduction of the arm
- b. Flexion of the arm
- c. Abduction of the arm
- d. Medial rotation of the arm
- e. Lateral rotation of the arm

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 20 of 125

You have been asked to give a teaching session to the final year medical students attached to your ED. As part of the session you decide to summarise the actions of the shoulder muscles. The teres minor muscle acts to produce which of the following movements:

- a) Adduction of the arm
- b) Flexion of the arm
- c) Abduction of the arm
- d) Medial rotation of the arm
- e) Lateral rotation of the arm

Answer

The teres minor acts to laterally rotate the arm at the glenohumeral joint.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Teres minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Lateral rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Axillary nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Tested with the infraspinatus – position the patient with their arm adducted with the elbow flexed to 90 degrees and ask them to laterally rotate the arm</td>
</tr>
</tbody>
</table>

The teres minor is part of the rotator cuff.

It is innervated by the axillary nerve (C5, C6).

It acts to laterally rotate the arm at the glenohumeral joint, together with the infraspinatus.

The teres minor is assessed by testing lateral rotation against resistance, with the arm adducted and the elbow flexed to 90 degrees.
Anatomy: Shoulder and Arm

You are reviewing a 23 year old woman who has sustained a fracture to the surgical neck of the humerus after falling from her bike. On examination she has features of an axillary nerve injury. Injury to the axillary nerve is most likely to result in which of the following clinical features:

- a. Weakness of shoulder flexion
- b. Weakness of shoulder extension
- c. Weakness of shoulder abduction
- d. Weakness of shoulder adduction
- e. Weakness of shoulder medial rotation

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

You are reviewing a 23 year old woman who has sustained a fracture to the surgical neck of the humerus after falling from her bike. On examination she has features of an axillary nerve injury. Injury to the axillary nerve is most likely to result in which of the following clinical features:

a) Weakness of shoulder flexion
b) Weakness of shoulder extension
c) Weakness of shoulder abduction [✓]
d) Weakness of shoulder adduction
e) Weakness of shoulder medial rotation

Answer

There is weakness of shoulder abduction (deltoit) and lateral rotation (teres minor) and loss of sensation over the regmental badge area. In longstanding cases, there may be atrophy of the deltoit giving the shoulder a flattened appearance.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Posterior cord</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Deltoid, teres minor</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>The regmental badge area on the upper lateral arm via the superior lateral cutaneous nerve of the arm</td>
</tr>
</tbody>
</table>

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

The axillary nerve innervates the deltoit muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regmental badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:

- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary crutches

There is weakness of shoulder abduction (deltoit) and lateral rotation (teres minor) and loss of sensation over the regmental badge area. In longstanding cases, there may be atrophy of the deltoit giving the shoulder a flattened appearance.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
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<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of axillary crutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abduction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regmental badge area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoit – flattened shoulder appearance</td>
</tr>
</tbody>
</table>

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TeachMeAnatomy
- Knowledge
- Radiopaedia
- Advanced Life Support Group
- Emergency Medicine Journal
- LifethatSave
- Instant Answers
- Patient.co.uk

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Anatomy: Shoulder and Arm

Question 22 of 125

A 45 year old man presents to the ED after falling onto railings. One protruding railing punctured his right axilla, your consultant suspects a musculocutaneous nerve injury. Which of the following structures/areas would you least expect to be affected by this injury:

a. Coracobrachialis
b. Biceps brachii
c. Skin over the lateral surface of the forearm
d. Brachialis
e. Skin over lateral surface of the arm

< Previous  Next >  See Answer  Something wrong?  Clear Exam
**Anatomy: Shoulder and Arm**

**Question 22 of 125**

A 45 year old man presents to the ED after falling onto railings. One protruding railing punctured his right axilla, your consultant suspects a musculocutaneous nerve injury. Which of the following structures/areas would you least expect to be affected by this injury:

- a) Coracobrachialis
- b) Biceps brachii
- c) Skin over the lateral surface of the forearm
- d) Brachialis
- e) Skin over lateral surface of the arm

**Answer**

The musculocutaneous nerve innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

**Notes**

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 – C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
</tr>
</tbody>
</table>

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 – C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of Injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>

**Resources**

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (IPO)
- NorthEastMed
- Traumsung
- Radiopaedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinbelfastline
- InstantAnatomy
- Patient.co.uk

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Anatomy: Shoulder and Arm

Question 23 of 125

Following a road traffic accident, a patient has difficulty laterally rotating his arm. Which of the following muscles have most likely been affected:

- a. Teres major and teres minor
- b. Infraspinatus and teres minor
- c. Supraspinatus and infraspinatus
- d. Supraspinatus and teres major
- e. Supraspinatus and subscapularis

< Previous | Next > | See Answer | Something wrong? | Clear Exam

Question Navigator

6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered
13 Answered
14 Answered
15 Answered
16 Answered
17 Answered

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- Trauma.org
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- Emergency Medicine Journal
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**Anatomy: Shoulder and Arm**

**Question:** Following a road traffic accident, a patient has difficulty laterally rotating his arm. Which of the following muscles have most likely been affected:

a) Teres major and teres minor  
b) Infraspinatus and teres minor  
c) Supraspinatus and infraspinatus  
d) Supraspinatus and teres major  
e) Supraspinatus and subscapularis

**Answer**

The infraspinatus (supraspinal nerve) and the teres minor (axillary nerve) are the main lateral rotators of the arm.

**Notes**

<table>
<thead>
<tr>
<th>Rotator Cuff Muscle</th>
<th>Action</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supraspinatus (supraspinal nerve)</td>
<td>Initiation of abduction of arm to 15 degrees and then assists deltoid with further abduction</td>
<td>Empty can't test – position the patient in the empty position and ask the patient to forward flex the arm. If test abduction of the arm starts from complete abduction</td>
</tr>
<tr>
<td>Infraspinatus (supraspinal nerve)</td>
<td>Lateral rotation of arm</td>
<td>Tested with the teres minor – position the patient with their arm abducted with the elbow flexed to 90 degrees and ask them to laterally rotate the arm</td>
</tr>
<tr>
<td>Teres minor (axillary nerve)</td>
<td>Lateral rotation of arm</td>
<td>Tested with the infraspinatus as above</td>
</tr>
<tr>
<td>Subscapularis (subscapularis nerves)</td>
<td>Medial rotation of arm</td>
<td>Lift off test – Position the patient in full medial rotation with the dorsum of their hand on their lower back and ask them to lift their hand away from their back</td>
</tr>
</tbody>
</table>

---

**Resources**

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Enhanced Trauma Life Support
- Resuscitation Council (UK)
- EmergencyMedicine
- TraumaJourn
- Medscape
- Advanced Life Support Group
- Emergency Medicine Journal
- LifelinesForLife
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A 72 year old retired engineer presents to the Emergency Department complaining of pain and weakness in his left shoulder. On examination you note weakness in the initiation of abduction and suspect a supraspinatus pathology. The supraspinatus muscle is innervated by which of the following nerves:

- Lower subscapular nerve
- Upper subscapular nerve
- Axillary nerve
- Suprascapular nerve
- Long thoracic nerve
Anatomy: Shoulder and Arm

A 72-year-old retired engineer presents to the Emergency Department complaining of pain and weakness in his left shoulder. On examination you note weakness in the initiation of abduction and suspect a supraspinatus pathology. The supraspinatus muscle is innervated by which of the following nerves:

a) Lower subscapular nerve  

b) Upper subscapular nerve  

c) Axillary nerve  

d) Supraspinatus nerve ✓  

e) Long thoracic nerve

Answer

The supraspinatus is innervated by the supraspinatus nerve (C5 - C6).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Supraspinatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Initiation of abduction of shoulder to 15 degrees (and then assistance of deltoid with continued abduction)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Supraspinatus nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>‘Empty can’ test – position the patient in the empty can position and ask the patient to forward flex the arm OR test abduction of the arm starting from complete abduction</td>
</tr>
</tbody>
</table>

The supraspinatus is part of the rotator cuff group of muscles.

It is innervated by the supraspinatus nerve (C5 - C6).

It acts to initiate abduction of the arm to 15 degrees and then assists the deltoid with continued abduction to 90 degrees.

The two main disorders of the rotator cuff are impingement and tendonopathy. The supraspinatus muscle is the most commonly injured rotator cuff muscle as it passes beneath the acromion and the acromioclavicular ligament. This space is fixed, therefore any loading of the supraspinatus muscle, excessive fluid in the subacromial/subdeltoid bursa or subacromial bony spurs, may produce significant impingement when the arm is abducted. The blood supply to the supraspinatus tendon is relatively poor and the tendon is susceptible to degenerative change, which in turn, makes it more susceptible to trauma and partial or full-thickness tears may occur. This will result in painful or weak abstraction of the arm at the shoulder.

The supraspinatus muscle can be assessed by either testing abduction of the arm against resistance, starting from complete abduction, or using the ‘empty can’ test. The ‘empty can’ test can be performed by positioning the patient with the arm in 90 degrees of forward flexion, in the plane of the scapula (approximately 30 degrees of abduction), and in full internal rotation with the thumb pointing down as if emptying a can. The patient is asked to forward flex their arm against resistance, and the test is considered positive if there is significant pain and/or weakness.
Anatomy: Shoulder and Arm

You have been asked to give a tutorial on upper limb neurology to a group of final year medical students. As part of the session you discuss the sensory nerve supply to the arm. The skin over the posterior arm is supplied by which of the following nerves:

- The posterior cutaneous nerve of the arm, from the brachial plexus
- The posterior cutaneous nerve of the arm, branch of the radial nerve
- The posterior cutaneous nerve of the arm, branch of the axillary nerve
- The posterior cutaneous nerve of the arm, branch of the musculocutaneous nerve
- The posterior cutaneous nerve of the arm, from the cervical plexus

< Previous  Next  >  See Answer  Something wrong?

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- Emergency Medicine Journal
- Lifeinthefastlane
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Anatomy: Shoulder and Arm

**Question:** What are the functions of the pectoralis major muscle and the biceps brachii muscle?

**Answer:** The pectoralis major muscle and the biceps brachii muscle are two of the most commonly used muscles in the upper body, primarily for activities such as pushing, pulling, and grip strength.

**Notes:**
- **Nerves:**
  - **Median nerve:** Supplies the skin over the anterior arm.
  - **Ulnar nerve:** Supplies the skin over the posterior arm.

**Resources:**
- [FRCEM Success](https://www.frcemsuccess.com)
- [Anatomy of Shoulder and Arm](https://www.anatomynet.com)

---

**Diagram:**
- Diagram shows the anatomical structures of the shoulder and arm, including the pectoralis major, biceps brachii, and other muscles and nerves.

---

**Image:**
- Image of a diagram illustrating the anatomy of the shoulder and arm, highlighting the pectoralis major and biceps brachii muscles.

---

**Text:**
- Text explaining the functions and innervation of the pectoralis major and biceps brachii muscles in the context of shoulder and arm anatomy.

---

**Footnotes:**
- Footnotes providing additional information on the anatomy of the shoulder and arm, including references to specific muscles and nerves.

---

**References:**
- [Anatomy of the Shoulder and Arm](https://www.anatomyplace.com)
- [The Pectoralis Major and Biceps Brachii Muscles](https://www.anatomyofarm.com)
Anatomy: Shoulder and Arm

A 35 year old man presents to the ED after falling approximately 1 metre from a ladder, landing on his right shoulder. Your consultant examines the patient and notes he is unable to perform movements associated with the pectoralis minor. The pectoralis minor muscle acts to produce which of the following movements:

- a. Flexion and adduction of the shoulder
- b. Retraction of the scapula
- c. Protraction of the scapula
- d. Medial rotation of the humerus
- e. Extension and adduction of the shoulder
A 35-year-old man presents to the ED after falling approximately 1 metre from a ladder, landing on his right shoulder. Your consultant examines the patient and notes he is unable to perform movements associated with the pectoralis minor. The pectoralis minor muscle acts to produce which of the following movements:

a) Flexion and adduction of the shoulder
b) Retraction of the scapula
c) Protraction of the scapula
(d) Medial rotation of the humerus
e) Extension and adduction of the shoulder

Answer

The pectoralis minor acts to protract the scapula by pulling the scapula anteriorly on the thoracic wall and depresses the shoulder tip.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Pectoralis minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Ribs 3 – 5</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Coracoid process of scapula</td>
</tr>
<tr>
<td>Actions</td>
<td>Depresses tip of shoulder, protracts scapula</td>
</tr>
<tr>
<td>Innervation</td>
<td>Medial pectoral nerve</td>
</tr>
</tbody>
</table>

The pectoralis minor is a small triangular-shaped muscle that lies deep to the pectoralis major muscle. It is attached proximally to ribs 3 – 5 and distally to the coracoid process of the scapula.

It is innervated by the medial pectoral nerve (C8, T1), which originates from the brachial plexus.

It acts to protract the scapula by pulling the scapula anteriorly on the thoracic wall and depresses the shoulder tip.
Anatomy: Shoulder and Arm

Question 28 of 125

A 28 year old man involved in a road traffic collision, is unable to abduct his arm at the glenohumeral joint. Which of the following nerves have been affected:

a. Axillary and suprascapular nerve
b. Upper and lower subscapular nerves
c. Axillary and long thoracic nerve
d. Pectoral nerves
e. Axillary and thoracodorsal nerve

< Previous  Next >  See Answer  Something wrong?

Question Navigator

6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered
13. Answered
14. Answered
15. Answered
16. Answered
17. Answered

Clear Exam
Anatomy: Shoulder and Arm

A 20-year-old man involved in a motor vehicle collision is unable to abduct his left arm at the shoulder joint. Which of the following injury mechanisms has most likely occurred?

A. Achilles tendon rupture
B. Upper and lower quadriceps tears
C. Alpha and beta rotator cuffs
D. Paralysed long thoracic nerve
E. Muscular arm and haemorrhage

Answer

Abduction of the arm at the shoulder joint permits substantial displacement of the humeral head and capsule of the glenohumeral joint. Especially the upper arm and the capsule are prone to tearing.

Answer: A view of the important nerves affecting the shoulder joint is shown below.

Notes

Joint articulations
The glenohumeral joint is a synovial condylar joint or a compound joint comprising the head of the humerus and the bicipital groove of the capsule. The gleno-humeral joint is also considered an thermoplastic joint, which is characterized by the capsule, which is continuous with the tendons of the long head of the biceps brachii.

Joint movements
Movements at the joint include flexion, extension, abduction, adduction, medial rotation and lateral rotation.

Clinical implications
Elimination of the shoulder joint should occur in the arthroscopic endoscopy due to the bone of the suprascapular nerve and the posternum by an opening in the capsule, in which the capsule is ‘attached’ to the bone of the shoulder joint.

Common complications during shoulder elevation in the shoulder:
• Joint pain and swelling (due to the size and shape of the bone of the suprascapular nerve and the posternum)
• Posterior humeral head compression
• Posterior humeral head compression

Common complications during shoulder elevation in the shoulder:
• Joint pain and swelling (due to the size and shape of the bone of the suprascapular nerve and the posternum)
• Posterior humeral head compression
• Posterior humeral head compression

Original Image: [Image 0x0 to 2048x7094]
Anatomy: Shoulder and Arm

You are asked to review a 16 year old girl who presents with a right shoulder dislocation. This is her seventh right shoulder dislocation within a year. You suspect a hypermobility or ligament pathology. Regarding the ligaments of the shoulder joint, which of the following statements is INCORRECT:

- The glenohumeral ligaments reinforce the anterior aspect of the joint capsule.
- The coracohumeral ligament reinforces the joint capsule superiorly.
- The coracoacromial ligament holds the tendon of the biceps brachii in place during shoulder movements.
- The coracoacromial arch prevents superior displacement of the humerus.
- The transverse humeral ligament bridges over the intertubercular sulcus of the humerus.
Anatomy: Shoulder and Arm

You are asked to review a 35-year-old man who presented with a right shoulder dislocation. This is your seventh right shoulder dislocation within six years. You suspect a hypermobile or ligamentous pathology. Regarding the ligaments of the shoulder joint, which of the following statements is INCORRECT?

- The glenohumeral ligament is two-thirds of the anterior aspect of the joint capsule.
- The coracohumeral ligament is the tendon of the biceps brachii in place during shoulder movements.
- The contercostal ligament is the tendon of the biceps brachii in place during shoulder movements.
- The transverse humeral ligament over the teres minor is a stable portion of the humerus.

Answer

The transverse isometric ligament intervenes the gap between the greater tuberosity and the lesser tuberosity of the humerus, holding the tendon of the biceps brachii muscle in place. The coracohumeral ligament spans from the acromion to the coracoid process and helps prevent superior displacement of the humerus.

Notes

Joint articulations

The glenohumeral joint is a special ball and socket joint occurring between the head of the humerus and the glenoid cavity of the scapula. The articular cavity of the scapula is formed superiorly by the coracoid process, posteriorly by the periosteum, and inferiorly by the coracohumeral ligament.

Join movement

Movements at the joint include flexion, extension, adduction, abduction, medial rotation and lateral rotation.

Clinical implications

Dislocation of the shoulder joint usually occurs in the anteroinferior direction because of the lack of support by the capsule and rotator cuff. The patient may present with the affected arm supported by the scapula and arm, a nurse’s aid or a crutch. Care should be taken when lifting the arm and there should be a profound loss of shoulder abduction and a palpable gap inferior to the acromion and the humeral head palpable anteriorly or laterally to the glenoid.

Common structures damaged in shoulder dislocation include:
- Axillary nerve damage (posterior nerve involvement with analgesia of the scapular and anterior axillary fold and loss of sensation over the scapular region is "shoulder girdle" loss of sensation anterior to the clavicle and trapezius muscle or anterior shoulder sensation)
- Brachial plexus involvement of the clavicular and the posterior axillary nerve (involvement with analgesia of the triceps, posterior deltoid, posterior axillary fold, posterior shoulder and posterior arm)

Resources

- The Royal College of Surgeons
- The Royal College of Emergency Medicine
- British Orthopaedic Association
- Advanced Trauma Life Support
- The Royal College of Surgeons
- British Orthopaedic Association
- Advanced Life Support
- The Royal College of Surgeons
- British Orthopaedic Association
- The Royal College of Surgeons

Digital image of the humerus, from Henry van de Velde’s "Anatomy of the Humerus".
Anatomy: Shoulder and Arm

Question 30 of 125

A patient is involved in a road traffic accident and is left with weakness in his left arm. He has been told he has an Erb’s palsy due to damage of his brachial plexus. Which of the following muscles would you NOT expect to be affected:

a. Supraspinatus
b. Infraspinatus
c. Biceps brachii
d. Deltoid
e. Latissimus dorsi
Anatomy: Shoulder and Arm

A patient is involved in a road traffic accident and is left with weakness in his left upper limb.

He has been told he has an Erb's palsy due to damage of his brachial plexus. Which of the following muscles would you NOT expect to be affected?

- [ ] Supraspinatus
- [ ] Infraspinatus
- [ ] Teres minor
- [ ] Biceps brachii
- [ ] Deltoïd
- [ ] Latissimus dorsi

Notes

The brachial plexus is formed by the union of the anterior rami of spinal nerves C5-C8.

In the thoracic region, the roots of the brachial plexus are in contact with the trunks:

- A upper trunk (from the union of the C5 and C6 roots)
- A middle trunk (which is a continuation of the C7 root)
- A lower trunk (from the union of the C8 and T1 roots)

Within the posterior triangle of the neck, the trunks divide into anterior and posterior divisions.

In the axilla, the ulnar division then divides to form three cords (named after their relation to the axillary artery):

- The lateral cord (from the anterior division of the upper and middle trunks)
- The medial cord (which is a continuation of the anterior division of the lower trunk)
- The posterior cord (from the posterior division of all three trunks)

The cords give rise to the major branches of the brachial plexus.

By Brachial plexus (Atlas des nerfs et des vaisseaux du membre) by Wyburn. CC BY-SA 4.0 (https://creativecommons.org/licenses/by-sa/4.0).
Anatomy: Shoulder and Arm

Question 31 of 125

A 67 year old builder presents to the Emergency Department complaining of a 3 month history of a painful right shoulder. He has seen his GP who suggests a diagnosis of osteoarthritis however the patient would like a second opinion. On examination you note tenderness over the acromioclavicular joint. Which of the following synovial joint types best describes the acromioclavicular joint:

- a. Synovial plane joint
- b. Synovial hinge joint
- c. Synovial saddle joint
- d. Synovial condyloid joint
- e. Synovial pivot joint

< Previous  Next >  See Answer  Something wrong?

Question Navigator

6  Answered
7  Answered
8  Answered
9  Answered
10 Answered
11 Answered
12 Answered
13 Answered
14 Answered
15 Answered
16 Answered
17 Answered

Clear Exam
Anatomy: Shoulder and Arm

A 67 year old builder presents to the Emergency Department complaining of a 3 month history of a painful right shoulder. He has seen his GP who suggests a diagnosis of osteoarthritis however the patient would like a second opinion. On examination you note tenderness over the acromioclavicular joint. Which of the following synovial joint types best describes the acromioclavicular joint:

a) Synovial plane joint
b) Synovial hinge joint
c) Synovial saddle joint
d) Synovial condylar joint
e) Synovial pivot joint

Answer
The acromioclavicular joint is a plane type synovial joint.

Notes

<table>
<thead>
<tr>
<th>Joint</th>
<th>Acromioclavicular ligament</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Plane type synovial joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Lateral end of clavicle and acromion of scapula</td>
</tr>
<tr>
<td>Stabilising factors</td>
<td>Acromioclavicular ligament and coracoclavicular ligament</td>
</tr>
</tbody>
</table>

The acromioclavicular joint is a plane type synovial joint, occurring between the lateral end of the clavicle and the acromion of the scapula.

It is reinforced by two main ligaments; a small acromioclavicular ligament and a much larger coracoclavicular ligament. The strong coracoclavicular ligament (made up of two ligaments, the conoid and trapezoid ligament) is the main stabilising force, and essentially suspends the weight of the upper limb from the clavicle.

Dislocation of the acromioclavicular joint may result from a direct blow to the joint, a hard fall onto the shoulder or from a fall onto an outstretched upper limb. In acromioclavicular joint dislocation the acromion is forcibly pushed inferiorly and medially with respect to the clavicle, and becomes more prominent.
Anatomy: Shoulder and Arm

You are examining the left arm of a patient who presents after being stabbed in the axilla. You note loss of sensation over the lateral forearm and suspect a musculocutaneous nerve injury. The musculocutaneous nerve arises from which of the following cord(s) of the brachial plexus:

- **a** Medial cord
- **b** Lateral cord
- **c** Posterior cord
- **d** Medial and posterior cord
- **e** Lateral and posterior cord

See Answer
Anatomy: Shoulder and Arm

Question 32 of 125

You are examining the left arm of a patient who presents after being stabbed in the axilla. You note loss of sensation over the lateral forearm and suspect a musculocutaneous nerve injury. The musculocutaneous nerve arises from which of the following cord(s) of the brachial plexus:

a) Medial cord  
b) Lateral cord  ✔

c) Posterior cord  
d) Medial and posterior cord  
e) Lateral and posterior cord

Answer

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 – C7.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 – C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
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</tbody>
</table>

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 – C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>
Anatomy: Shoulder and Arm

A 74 year old man is brought into ED after falling down the stairs. He is complaining of pain in his left arm. X-ray shows fracture of the greater tubercle of the humerus. Which of the following structures would you least expect to be affected in this injury:

a) Supraspinatus
b) Infraspinatus
c) Subscapularis
d) Teres minor
e) Coracohumeral ligament

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 31 of 125

A 74-year-old man is brought into ED after falling down the stairs. He is complaining of pain in his left arm. X-ray shows fracture of the greater tubercle of the humerus. Which of the following structures would you least expect to be affected in this injury:

a) Supraspinatus
b) Infraspinatus
c) Subscapularis

d) Teres minor
e) Coracohumeral ligament

Answer

The supraspinatus, infraspinatus and teres minor muscles of the rotator cuff all insert into the greater tubercle of the humerus, so does the coracohumeral ligament. The subscapularis inserts into the lesser tubercle of the humerus and thus is least likely to be affected.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Subscapularis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Subscapular fossa of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Lesser tubercle of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Upper and lower subscapular nerves (CS - CT)</td>
</tr>
</tbody>
</table>

The subscapularis forms the largest component of the posterior wall of the axilla.

It originates from the subscapular fossa on the posterior surface of the scapula and inserts into the lesser tubercle of the humerus.

The subscapularis is innervated by the upper and lower subscapular nerves (CS - CT), branches of the brachial plexus.

Together with three muscles of the posterior scapula region (the supraspinatus, infraspinatus and teres minor muscles) the subscapularis is a member of the rotator cuff muscle group, which stabilizes the glenohumeral joint.

The subscapularis acts to medially rotate the arm at the glenohumeral joint. To isolate the subscapularis muscle in examination, place the dorsum of the patient’s hand in full medial rotation on the lower back and ask them to push their hand off the back (the 180° test). Loss of power suggests a tear while pain on focused medial rotation suggests tendinosis.
Anatomy: Shoulder and Arm

A 34 year old office worker presents to the Emergency Department complaining of pain in the left shoulder. You perform a full shoulder examination and note that she is tender when performing the “lift off” test, you suspect subscapularis tendonitis. The subscapularis muscle is attached to which of the following structures:

- The posterior surface of the scapula and the intertubercular sulcus of the humerus
- The anterior surface of the scapula and the lesser tubercle of the humerus
- The posterior surface of the scapula and the greater tubercle of the humerus
- The anterior surface of the scapula and the greater tubercle of the humerus
- The anterior surface of the scapula and the intertubercular sulcus of the humerus
Anatomy: Shoulder and Arm

A 34-year-old office worker presents to the Emergency Department complaining of pain in the left shoulder. You perform a full shoulder examination and note that she is tender when performing the “lift off” test, you suspect subscapularis tendinitis. The subscapularis muscle is attached to which of the following structures:

- a) The posterior surface of the scapula and the interspinal muscle of the humerus
- b) The anterior surface of the scapula and the lesser tubercle of the humerus
- c) The posterior surface of the scapula and the greater tubercle of the humerus
- d) The anterior surface of the scapula and the greater tubercle of the humerus
- e) The anterior surface of the scapula and the interspinal muscle of the humerus

Answer

The subscapularis originates from the subscapular fossa on the anterior surface of the scapula and inserts into the lesser tubercle of the humerus.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Subscapularis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Subscapular fossa of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Lesser tubercle of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Upper and lower subscapular nerves (CS - CT)</td>
</tr>
</tbody>
</table>

The subscapularis forms the largest component of the posterior wall of the axilla.

It originates from the subscapular fossa on the anterior surface of the scapula and inserts into the lesser tubercle of the humerus.

The subscapularis is innervated by the upper and lower subscapular nerves (CS - CT), branches of the brachial plexus.

Together with three other muscles of the posterior scapular region (the supraspinatus, infraspinatus, and teres minor muscles) the subscapularis is a member of the rotator cuff muscle group, which stabilizes the glenohumeral joint.

The subscapularis acts to medially rotate the arm at the glenohumeral joint. To isolate the subscapularis muscle in examination, place the dorsum of the patient’s hand in full medial rotation on the lower back and ask them to push their hand off the back (the 10th off test). Loss of power suggests a tear while pain on forced medial rotation suggests tendinitis.

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Resources

- The Royal College of Emergency Medicine
- Medranger for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- NorthWestAnatomy
- Transtech
- Wikipedia

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Anatomy: Shoulder and Arm

Question 35 of 125

A 32 year old motorcyclist has been brought in following a head on collision with a car. A CT scan of the C-spine shows a fracture of C3 with resulting compression of the C3 nerve root. The C3 dermatome is best tested at which of the following landmarks:

a. Over the acromioclavicular joint
b. In the suprACLavicular fossa at the midclavicular line
c. Over the coracoid process
d. In the jugular notch
e. At the apex of the axilla
Anatomy: Shoulder and Arm

Question 35 of 135

A 32 year old motorcyclist has been brought in following a head-on collision with a car. An X-ray of the C-spine shows a fracture of C3 with resulting compression of the C3 nerve root. The C3 dermatome is best tested at which of the following landmarks:

a) Over the acromioclavicular joint
b) In the suprascapular fossa at the midclavicular line

c) Over the transverse process
d) In the sulcal notch
e) At the apex of the scapula

Answer

The C3 dermatome is best tested in the suprascapular fossa at the midclavicular line.

Notes

<table>
<thead>
<tr>
<th>Dermatome</th>
<th>Landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Occipital Protuberence</td>
</tr>
<tr>
<td>C3</td>
<td>Suprascapular Fossa</td>
</tr>
<tr>
<td>C4</td>
<td>Acromioclavicular Joint</td>
</tr>
<tr>
<td>C5</td>
<td>Lateral Antecubital Fossa</td>
</tr>
<tr>
<td>C6</td>
<td>Thumb</td>
</tr>
<tr>
<td>C7</td>
<td>Middle Finger</td>
</tr>
<tr>
<td>C8</td>
<td>Little Finger</td>
</tr>
<tr>
<td>T1</td>
<td>Medial Antecubital Fossa</td>
</tr>
<tr>
<td>T2</td>
<td>Apex of Scapula</td>
</tr>
</tbody>
</table>

- The C2 dermatome is best tested at least one cm lateral to the occipital protuberance at the base of the skull. Alternatively, it can be located at least 3 cm inferior to the ear.
- The C3 dermatome is best tested in the suprascapular fossa, at the midclavicular line.
- The C4 dermatome is best tested over the acromioclavicular joint.
- The C5 dermatome is best tested on the lateral (radial) side of the antecubital fossa just proximal to the elbow.
- The C6 dermatome is best tested on the dorsal surface of the proximal phalanx of the thumb.
- The C7 dermatome is best tested on the dorsal surface of the proximal phalanx of the middle finger.
- The C8 dermatome is best tested on the dorsal surface of the proximal phalanx of the little finger.
- The T1 dermatome is best tested on the medial (ulnar) side of the antecubital fossa, just proximal to the medial epicondyle of the humerus.
- The T2 dermatome is best tested at the apex of the scapula.
Anatomy: Shoulder and Arm

Question 36 of 125

Whilst examining the shoulder of a 27 year old woman you note she has a weakness of certain movements. You suspect this is due to weakness of the latissimus dorsi. The latissimus dorsi muscle acts to produce which of the following movements:

a. Extension, abduction and medial rotation of the humerus
b. Flexion, adduction and medial rotation of the humerus
c. Extension, abduction and lateral rotation of the humerus
d. Extension, adduction and medial rotation of the humerus
e. Flexion, abduction and lateral rotation of the humerus

< Previous  Next >  See Answer

Question Navigator

6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered
13 Answered
14 Answered
15 Answered
16 Answered
17 Answered

Clear Exam
Anatomy: Shoulder and Arm

Question 8 of 125

While examining the shoulder of a 27-year-old woman you note she has a weakness of certain movements. You suspect this is due to weakness of the latissimus dorsi. The latissimus dorsi muscle acts to produce which of the following movements?

- a. Extension, abduction and medial rotation of the humerus
- b. Flexion, adduction and medial rotation of the humerus
- c. Extension, abduction and lateral rotation of the humerus
- d. Extension, abduction and medial rotation of the humerus
- e. Flexion, abduction and lateral rotation of the humerus

Answer

The latissimus dorsi acts to extend, adduct and medially rotate the humerus at the glenohumeral joint.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Latissimus dorsi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Spinae processes of lower 6 thoracic vertebrae, thoracolumbar fascia, iliac crest, lower 3–4 ribs</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Adduction, medial rotation and extension of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Thoracodorsal nerve (C6, C7, C8)</td>
</tr>
</tbody>
</table>

The latissimus dorsi muscle forms much of the muscle mass underlying the posterior axillary skinfold extending obliquely upwards from the trunk to the arm.

The latissimus dorsi is attached proximally to the spinae processes of the lower six thoracic vertebrae and related interspinous ligaments, via the thoracolumbar fascia to the spinae processes of the lumbar vertebrae and to the iliac crest and the inferior 3 or 4 ribs. Distally it is attached to the floor of the intertubercular sulcus of the humerus.

The latissimus dorsi is innervated by the thoracodorsal nerve (C6 – C8).

The latissimus dorsi acts to extend, adduct and medially rotate the humerus at the glenohumeral joint.
Anatomy: Shoulder and Arm

Question 37 of 125

An 18 year old man presents to the Emergency Department following a rugby match. He is complaining of pain over his left shoulder and is unable to depress the tip of his shoulder, you suspect an injury to his pectoralis minor or the nerve supplying it. The pectoralis minor muscle is innervated by which of the following nerves:

a. Medial pectoral nerves
b. Lateral pectoral nerves
c. Thoracodorsal nerve
d. Long thoracic nerve
e. Axillary nerve
Anatomy: Shoulder and Arm

An 18 year old man presents to the Emergency Department following a rugby match. He is complaining of pain over his left shoulder and is unable to depress the tip of his shoulder, you suspect an injury to his pectoralis minor or the nerve supplying it. The pectoralis minor muscle is innervated by which of the following nerves:

a) Medial pectoral nerves
b) Lateral pectoral nerves
c) Thoracodorsal nerve
d) Long thoracic nerve
e) Axillary nerve

Answer

The pectoralis minor is innervated by the medial pectoral nerve (C6 – C8), which originates from the brachial plexus.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Pectoralis minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Ribs 3 – 5</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Coracoid process of scapula</td>
</tr>
<tr>
<td>Actions</td>
<td>Depresses tip of shoulder, protracts scapula</td>
</tr>
<tr>
<td>Innervation</td>
<td>Medial pectoral nerve</td>
</tr>
</tbody>
</table>

The pectoralis minor is a small triangular-shaped muscle that lies deep to the pectoralis major muscle. It is attached proximally to ribs 3 – 5 and distally to the coracoid process of the scapula.

It is innervated by the medial pectoral nerve (C6, T1), which originates from the brachial plexus.

It acts to protract the scapula by pulling the scapula anteriorly on the thoracic wall and depresses the shoulder tip.

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- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Emergency Gowned (SA)
- BasicLife/Anatomy
- Trauma.org
- Resusmedia
- Almonds/Lips Support Group
- Emergency Medicine Journal
- Lifesafetyface
- InteractAnatomy
- Patient.co.uk

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Anatomy: Shoulder and Arm
Question 38 of 125

A 54 year old man is admitted to the ED having been involved in a road traffic collision. He has sustained multiple fractures of the humerus. Flexion and supination of the forearm is weak and he complains of loss of sensation over the lateral forearm. Which of the following nerves has most likely been injured:

- a. Median nerve
- b. Axillary nerve
- c. Ulnar nerve
- d. Musculocutaneous nerve
- e. Radial nerve

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 38 of 125

A 54 year old man is admitted to the ED having been involved in a road traffic collision. He has sustained multiple fractures of the humerus. Flexion and supination of the forearm is weak and he complains of loss of sensation over the lateral forearm. Which of the following nerves has most likely been injured:

a) Median nerve  
b) Axillary nerve  
c) Ulnar nerve  
d) Musculocutaneous nerve ✓

e) Radial nerve

Answer

The musculocutaneous nerve innervates the anterior forearm muscles and skin over the lateral forearm. Injury to the nerve results in weakness of flexion and supination of the forearm, and loss of sensation in this region.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 – C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
</tr>
</tbody>
</table>

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 – C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of Injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>
Anatomy: Shoulder and Arm

A 43 year old tree surgeon is brought to the ED after falling approximately 10 metres from a tree. During assessment of the C-spine he complains of pain on palpation of C4/5. The C4 dermatome is best tested at which of the following landmarks:

- a. Over the coracoid process
- b. Over the greater tuberosity of the humerus
- c. In the supraclavicular fossa at the midclavicular line
- d. Over the acromioclavicular joint
- e. At the apex of the axilla

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

Question 9 of 125

A 43-year-old nurse has been brought to the ED after falling approximately 10 metres from a ladder. During assessment of the C-spine, he complains of pain on palpation of C4/5. The C4 dermatome is best tested at which of the following landmarks?

- a) Over the occipital process
- b) Over the greater tuberosity of the humerus
- c) In the supravacular fossa at the midclavicular line
- d) Over the acromioclavicular joint ✓
- e) At the apex of the axilla

Answer

The C4 dermatome is best tested over the acromioclavicular joint.

Notes

<table>
<thead>
<tr>
<th>Dermatome</th>
<th>Landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Occipital Protuberance</td>
</tr>
<tr>
<td>C3</td>
<td>Supravacular Fossa</td>
</tr>
<tr>
<td>C4</td>
<td>Acromioclavicular Joint</td>
</tr>
<tr>
<td>C5</td>
<td>Lateral Antecubital Fossa</td>
</tr>
<tr>
<td>C6</td>
<td>Thumb</td>
</tr>
<tr>
<td>C7</td>
<td>Middle Finger</td>
</tr>
<tr>
<td>C8</td>
<td>Little Finger</td>
</tr>
<tr>
<td>T1</td>
<td>Medial Antecubital Fossa</td>
</tr>
<tr>
<td>T2</td>
<td>Apex of Axilla</td>
</tr>
</tbody>
</table>

- The C2 dermatome is best tested at least one cm lateral to the occipital protuberance at the base of the skull. Alternatively, it can be located at least 3 cm behind the ear.
- The C3 dermatome is best tested in the supravacular fossa, at the midclavicular line.
- The C4 dermatome is best tested over the acromioclavicular joint.
- The C5 dermatome is best tested on the lateral (radial) side of the antebrachial fossa just proximal to the elbow.
- The C6 dermatome is best tested on the dorsal surface of the proximal phalanx of the thumb.
- The C7 dermatome is best tested on the dorsal surface of the proximal phalanx of the middle finger.
- The C8 dermatome is best tested on the dorsal surface of the proximal phalanx of the little finger.
- The T1 dermatome is best tested on the medial (ulnar) side of the antebrachial fossa, just proximal to the medial epicondyle of the humerus.
- The T2 dermatome is best tested at the apex of the axilla.
Anatomy: Shoulder and Arm

Question 40 of 125

You are asked to review a 25 year old netball player who presents with pain in her right arm. You decide to test the strength of her right upper limb movements. The triceps brachii muscle primarily acts to perform which of the following movements:

a. Flexion of the forearm
b. Extension and pronation of the forearm
c. Extension of the forearm
d. Extension of the forearm and wrist
e. Extension and abduction of the arm

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

You are asked to review a 25 year old netball player who presents with pain in her right arm. You decide to test the strength of her right upper limb movements. The triceps brachii muscle primarily acts to perform which of the following movements:

a) Flexion of the forearm
b) Extension and pronation of the forearm

c) **Extension of the forearm**

d) Extension of the forearm and wrist
e) Extension and abduction of the arm

---

**Answer**

The triceps brachii is the chief extensor of the forearm at the elbow joint and acts as an accessory adductor and extensor of the arm at the glenohumeral joint via its long head.

**Notes**

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Triceps brachii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Extension of elbow, extension and adduction of shoulder (long head)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Radial nerve (C6 – C8)</td>
</tr>
</tbody>
</table>

The triceps muscle is innervated by the radial nerve (C6 – C8). The triceps tendon reflex tap predominantly tests spinal cord segment C7.

It is the chief extensor of the forearm at the elbow joint and acts as an accessory adductor and extensor of the arm at the glenohumeral joint via its long head.

---

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Anatomy: Shoulder and Arm

You form part of the trauma team caring for a 19 year old woman who was knocked from her moped by a car. A full primary survey has been completed. She complains of pain in her neck and left arm. You perform a brief neurological examination of the upper limbs and note loss of sensation over the lateral arm. The skin over the lateral surface of the arm below the deltoid muscle is supplied by which of the following nerves:

a. The inferior lateral cutaneous nerve of the arm, branch of the axillary nerve
b. The inferior lateral cutaneous nerve of the arm, branch of the radial nerve
c. The inferior lateral cutaneous nerve of the arm, branch of the musculocutaneous nerve
d. The lateral supraclavicular nerve
e. The intercostobrachial nerve
Anatomy: Shoulder and Arm

The deltoid, a large muscle found from the clavicle to the proximal humerus, is a muscle of primary function for shoulder flexion. The humeral head of the shoulder is the ball portion of the head of the humerus. The infraspinatus muscle is palpable as an area of muscle in the back of the arm. The teres major muscle is located on the back side of the arm. The biceps brachii muscle is palpable as a muscle on the back of the arm.

The infraspinatus muscle is an important muscle in the back of the arm. It originates in the scapula and inserts into the humerus. It is innervated by the suprascapular nerve.

The teres major muscle is a large muscle on the back side of the arm. It originates in the scapula and inserts into the humerus. It is innervated by the axillary nerve.

The biceps brachii muscle is a large muscle on the front side of the arm. It originates in the scapula and inserts into the radius. It is innervated by the musculocutaneous nerve.

The infraspinatus muscle is an important muscle in the back of the arm. It originates in the scapula and inserts into the humerus. It is innervated by the suprascapular nerve.

The teres major muscle is a large muscle on the back side of the arm. It originates in the scapula and inserts into the humerus. It is innervated by the axillary nerve.

The biceps brachii muscle is a large muscle on the front side of the arm. It originates in the scapula and inserts into the radius. It is innervated by the musculocutaneous nerve.
Anatomy: Shoulder and Arm

You have been asked by a consultant colleague to prepare a teaching session for a group of medical students. He would like you to focus on the muscles of the shoulder, particularly their surface anatomy and attachments. The serratus anterior muscle attaches to which of the following structures:

- a) The medial 1st - 8th ribs and the medial border of the scapula
- b) The lateral 1st - 5th ribs and the lateral border of the scapula
- c) The lateral 1st - 8th ribs and the intertubercular sulcus of the humerus
- d) The medial 1st - 5th ribs, acromion and spine of the scapula
- e) The lateral 1st - 8th ribs and the medial border of the scapula
Anatomy: Shoulder and Arm

Question 43 of 125

A 23 year old woman presents to the Emergency Department complaining of a painful swelling in her right axilla. On examination you note a tense, swollen abscess with fluctuance and a central punctum. You consider performing an incision and drainage in the department. The skin over the axilla is supplied by which of the following nerves:

- The musculocutaneous nerve
- The axillary nerve
- The radial nerve
- The medial supraclavicular nerve
- The intercostobrachial nerve
Anatomy: Shoulder and Arm

Selective Shoulder and Arm Exercises

Exercise

Lateral Raise

Pulleys

Triceps Extension

Triceps Press

Bicep Curl

Cable Hammer Curl

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Anatomy: Shoulder and Arm

A patient sustains an injury to the radial nerve at the axilla after sustaining a stab wound. Which of the following clinical findings would you least expect to see in this patient:

a. Loss of extension of the forearm
b. Loss of extension of the wrist
c. Loss of extension of the fingers
d. Loss of sensation over the posterior arm and forearm
e. Loss of extension of the arm

< Previous  Next >  See Answer  Something wrong? Clear Exam
# Anatomy: Shoulder and Arm

## Overview

The shoulder is a complex joint that allows for a wide range of motion and is composed of several bones, muscles, and ligaments. This section provides a detailed overview of the anatomy of the shoulder and arm, including the structures that make up these regions.

## Bones

<table>
<thead>
<tr>
<th>Bone</th>
<th>Shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scapula</td>
<td>Triangular</td>
</tr>
<tr>
<td>Humerus</td>
<td>Long, curved</td>
</tr>
<tr>
<td>Radius</td>
<td>C-shaped</td>
</tr>
<tr>
<td>Ulna</td>
<td>T-shaped</td>
</tr>
<tr>
<td>Forearm Bones</td>
<td>Cylindrical</td>
</tr>
</tbody>
</table>

## Muscles

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotator Cuff</td>
<td>Stabilizes the shoulder joint</td>
</tr>
<tr>
<td>Biceps Brachii</td>
<td>Flexes the elbow</td>
</tr>
<tr>
<td>Triceps Brachii</td>
<td>Extends the elbow</td>
</tr>
<tr>
<td>Pronator Teres</td>
<td>Pronates the forearm</td>
</tr>
</tbody>
</table>

## Ligaments

<table>
<thead>
<tr>
<th>Ligament</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coracohumeral</td>
<td>Stabilizes the shoulder joint</td>
</tr>
<tr>
<td>Subscapular</td>
<td>Stabilizes the shoulder joint</td>
</tr>
<tr>
<td>Glenohumeral</td>
<td>Stabilizes the shoulder joint</td>
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</table>

## Nerves

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>Innervates the forearm muscles</td>
</tr>
<tr>
<td>Ulnar</td>
<td>Innervates the hand muscles</td>
</tr>
<tr>
<td>Radial</td>
<td>Innervates the forearm muscles</td>
</tr>
</tbody>
</table>

## Arteries

<table>
<thead>
<tr>
<th>Artery</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axillary</td>
<td>Supplies the upper arm</td>
</tr>
<tr>
<td>Radial</td>
<td>Supplies the forearm</td>
</tr>
<tr>
<td>Ulnar</td>
<td>Supplies the hand</td>
</tr>
</tbody>
</table>

## Venous System

<table>
<thead>
<tr>
<th>Vein</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brachial</td>
<td>Supplies the upper arm</td>
</tr>
<tr>
<td>Axillary</td>
<td>Supplies the upper arm</td>
</tr>
<tr>
<td>Radial</td>
<td>Supplies the forearm</td>
</tr>
</tbody>
</table>

## Clinical Applications

- The shoulder joint is susceptible to dislocation, especially inferiorly.
- Shoulder injuries are common in athletes, particularly in contact sports.
- The rotator cuff is prone to degeneration, leading to rotator cuff tears.
- The biceps tendon can be ruptured or torn, requiring surgical intervention.

## Diagrams

- [Diagram of Shoulder Joint]
- [Diagram of Arm Muscles]
- [Diagram of Arm Bones]

---

*Note: This information is intended for educational purposes and should not replace professional medical advice.*
Anatomy: Shoulder and Arm

A 25 year old patient presents to the Emergency Department following a fall from a horse. She landed on her left shoulder and has since complained of pain and weakness at that shoulder. You are demonstrating shoulder and upper limb neurological examination to a medical student. The teres minor muscle is innervated by which of the following nerves:

- [ ] Lower subscapular nerve
- [ ] Upper subscapular nerve
- [ ] Axillary nerve
- [ ] Suprascapular nerve
- [ ] Long thoracic nerve

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

Question 45 of 125

A 25 year old patient presents to the Emergency Department following a fall from a horse. She landed on her left shoulder and has since complained of pain and weakness at that shoulder. You are demonstrating shoulder and upper limb neurological examination to a medical student. The teres minor muscle is innervated by which of the following nerves:

- a) Lower subscapular nerve
- b) Upper subscapular nerve
- c) Axillary nerve
- d) Suprascapular nerve
- e) Long thoracic nerve

Answer

The teres minor is innervated by the axillary nerve (C5, C6).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Teres minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Lateral rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Axillary nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Tested with the infraspinatus – position the patient with their arm adducted with the elbow flexed to 90 degrees and ask them to laterally rotate the arm</td>
</tr>
</tbody>
</table>

The teres minor is part of the rotator cuff.

It is innervated by the axillary nerve (C5, C6).

It acts to laterally rotate the arm at the glenohumeral joint, together with the infraspinatus.

The teres minor is assessed by testing lateral rotation against resistance, with the arm adducted and the elbow flexed to 90 degrees.
Anatomy: Shoulder and Arm

Question 46 of 125

Your consultant is telling you about a recent patient he saw. The patient had dislocated their shoulder during a tonic-clonic seizure and sustained an axillary nerve injury as a result. The consultant tells you that after reducing the dislocation the patient was unable to perform certain movements. The axillary nerve innervates which of the following muscles:

- The deltoid and the teres major
- The teres major and the teres minor
- The deltoid and the teres minor
- The deltoid and the supraspinatus
- The teres major and the subscapularis
Anatomy: Shoulder and Arm

Question 4 of 125

Your consultant is telling you about a recent patient he saw. The patient had dislocated their shoulder during a tonic-clonic seizure and sustained an axillary nerve injury as a result. The consultant tells you that after reducing the dislocation the patient was unable to perform certain movements. The axillary nerve innervates which of the following muscles:

a) The deltoid and the teres major
b) The teres major and the teres minor
c) The deltoid and the teres minor

Answer

The axillary nerve innervates the deltoid muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regimental badge area on the upper lateral arm.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Posterior cord</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Deltoid, teres minor</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>The regimental badge area on the upper lateral arm via the superior lateral cutaneous nerve of the arm</td>
</tr>
</tbody>
</table>

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

The axillary nerve innervates the deltoid muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regimental badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:

- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary crutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (teres minor) and loss of sensation over the regimental badge area. In longstanding cases, there may be atrophy of the deltoid giving the shoulder a flattened appearance.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of axillary crutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abduction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regimental badge area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoid – flattened shoulder appearance</td>
</tr>
</tbody>
</table>

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Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Association of Visual Anatomy
- TraumaBite
- Radiokids

- Advanced Life Support Group
- Emergency Medicine Journal
- LifesavingLaw
- Instant Analytics
- Patient.co.uk

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Anatomy: Shoulder and Arm

You have been asked to review a gentleman who has sustained a fracture to the surgical neck of the humerus. You are concerned about an axillary nerve injury and decide to test sensation. The axillary nerve supplies the skin over which of the following areas:

a. The axilla
b. The upper medial arm
c. The antecubital fossa
d. The supraclavicular fossa
e. The upper lateral arm

< Previous  Next >  See Answer  Something wrong?

Question Navigator
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered
13 Answered
14 Answered
15 Answered
16 Answered
17 Answered

Clear Exam
Anatomy: Shoulder and Arm

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The axillary nerve innervates the deltoid muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regional badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:
- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary crutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (teres minor) and loss of sensation over the regional badge area. In longstanding cases, there may be atrophy of the deltoid giving the shoulder a flattened appearance.

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Resources

- The Royal College of Emergency Medicine
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- Advanced Trauma Life Support
- Resuscitation Council UK
- TeachMeAnatomy
- Trauma.org
- Radiopaedia

- Advanced Life Support Group
- Emergency Medicine Journal
- Lifesaving Skills
- Instant Anatomy
- Patient.co.uk

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Anatomy: Shoulder and Arm

Question 48 of 125

A 28 year old man presents to ED having injured his right shoulder playing basketball. You position the patient as shown in the image below. He is unable to maintain this position with his right arm as you push downwards on both arms. Which of the following muscles is most likely to be injured:

A 28 year old man presents to ED having injured his right shoulder playing basketball. You position the patient as shown in the image below. He is unable to maintain this position with his right arm as you push downwards on both arms. Which of the following muscles is most likely to be injured:

- Deltoid
- Infraspinatus
- Subscapularis
- Supraspinatus
- Teres minor

Image by FRCEM Success.
Anatomy: Shoulder and Arm

Question 4 of 125

A 26 year old man presents to ED having injured his right shoulder playing basketball. You position the patient as shown in the image below. He is unable to maintain this position with his right arm as you push downwards on both arms. Which of the following muscles is most likely to be injured?

Image by FRCEM Success

a) Deltoid
b) Infraspinatus
c) Subscapularis
d) Supraspinatus

e) Teres minor

Answer

This is the 'empty can' test, which tests the power of the supraspinatus muscle.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Supraspinatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Infraspinatus</td>
</tr>
<tr>
<td></td>
<td>(and then assistance of deltoid with continued abduction)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Supraspinous nerve (C5-C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>'Empty can test' - position the patient in the empty can position and ask the patient to forward flex the arm. Observe abduction of the arm starting from complete abduction</td>
</tr>
</tbody>
</table>

The supraspinatus is part of the rotator cuff group of muscles.

It is innervated by the supraspinous nerve (C5 - C6).

It acts to initiate abduction of the arm to 15 degrees and then assists the deltoid with continued abduction to 90 degrees.

The two most disorders of the rotator cuff are impingement and tendinopathy. The supraspinatus muscle is the most commonly injured rotator cuff muscle in patients beneath the acromion and the acromioclavicular ligament. This space is fixed, therefore any swelling of the supraspinatus muscle, excessive fluid in the subacromial/subdeltoid bursa or subacromial bony spurs, may produce significant impingement when the arm is abducted. The blood supply to the supraspinatus tendon is relatively poor and the tendon is susceptible to degenerative change, which in turn, makes it more susceptible to trauma especially if full-thickness tears may occur. This will result in painful or weak abduction of the arm at the shoulder.

The supraspinatus muscle can be assessed by either testing abduction of the arm against resistance, starting from complete abduction, or using the 'empty can' test. The 'empty can' test can be performed by positioning the patient with the arm in 90 degrees of forward flexion, in the plane of the scapula (approximately 30 degrees of abduction) and in full internal rotation with the thumb pointing down (as if emptying a can). The patient is asked to forward flex their arm against resistance, and the test is considered positive if there is significant pain and/or weakness.

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Anatomical Knowledge and Assessment, 2020

Resources

- University of Michigan
- Online Learning Initiative
- Advanced Trauma Life Support for Healthcare Providers
- Advanced Trauma Life Support for Physician Assistants
- Advanced Trauma Life Support for Registered Nurses
- Emergency Medicine News Journal
- Emergency Medicine Fellowship
- Pediatric Emergency Care Assessment Tool
- EMT-Paramedic
- Emergency Care Assistant

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Anatomy: Shoulder and Arm

A 16 year old hockey player presents to the ED after colliding with another player during training. She is tender over the right clavicle and you note a deformity at the sternoclavicular joint, you suspect a sternoclavicular joint dislocation. Which of the following ligaments is the most important in stabilising the sternoclavicular joint:

- a Anterior sternoclavicular ligament
- b Posterior sternoclavicular ligament
- c Interclavicular ligament
- d Costoclavicular ligament
- e Coracoclavicular ligament

Question Navigator

1 Answered
2 Answered
3 Answered
4 Answered
5 Answered
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam

< Previous Next > See Answer

Something wrong?
A 16 year old hockey player presents to the ED after colliding with another player during training. She is tender over the right clavicle and you note a deformity at the sternoclavicular joint, you suspect a sternoclavicular joint dislocation. Which of the following ligaments is the most important in stabilising the sternoclavicular joint:

- Anterior sternoclavicular ligament
- Posterior sternoclavicular ligament
- Intercostoclavicular ligament
- Costoclavicular ligament
- Coracoclavicular ligament

**Answer**

The strong costoclavicular ligament joins the proximal end of the clavicle to the first rib and costal cartilage and is the main stabilising force for the joint.

**Notes**

<table>
<thead>
<tr>
<th>Joint</th>
<th>Sternocostoclavicular joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Synovial saddle-shaped joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Proximal end of the clavicle, manubrium of sternum and first costal cartilage</td>
</tr>
<tr>
<td>Stabilisation</td>
<td>Joint capsule, anterior and posterior sternoclavicular ligaments, interclavicular ligament and costoclavicular ligament</td>
</tr>
</tbody>
</table>

The sternoclavicular joint is a synovial saddle-shaped joint, occurring between the proximal end of the clavicle and the manubrium of the sternum and first costal cartilage.

The sternoclavicular joint is surrounded by a joint capsule and reinforced by four ligaments; the anterior and posterior sternoclavicular ligaments, the interclavicular ligament and the costoclavicular ligament.

The strong costoclavicular ligament joins the proximal end of the clavicle to the first rib and costal cartilage and is the main stabilising force for the joint. Sternocostoclavicular joint dislocation is rare and requires significant force.

---

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Anatomy: Shoulder and Arm

Question 50 of 125

You are asked to review a 76 year old man who presents with pain and tenderness over the right sternoclavicular joint. You note the sternoclavicular joint is warm and there is marked erythema to the overlying skin. You suspect sternoclavicular joint septic arthritis. Which of the following synovial joint types best describes the sternoclavicular joint:

- a) Synovial hinge joint
- b) Synovial pivot joint
- c) Synovial saddle joint
- d) Synovial plane joint
- e) Synovial condyloid joint
You are asked to review a 76 year old man who presents with pain and tenderness over the right sternoclavicular joint. You note the sternoclavicular joint is warm and there is marked erythema to the overlying skin. You suspect sternoclavicular joint septic arthritis. Which of the following synovial joint types best describes the sternoclavicular joint:

- a) Synovial hinge joint
- b) Synovial pivot joint
- c) Synovial saddle joint
- d) Synovial plane joint
- e) Synovial condyloid joint

Answer

The sternoclavicular joint is a synovial saddle-shaped joint.

Notes

<table>
<thead>
<tr>
<th>Joint</th>
<th>Sternoclavicular joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
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<td>Proximal end of the clavicle, manubrium of sternum and first costal cartilage</td>
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The sternoclavicular joint is surrounded by a joint capsule and reinforced by four ligaments; the anterior and posterior sternoclavicular ligaments, the interclavicular ligament and the costoclavicular ligament.

The strong costoclavicular ligament joins the proximal end of the clavicle to the first rib and costal cartilage and is the main stabilising force for the joint. Sternoclavicular joint dislocation is rare and requires significant force.
Anatomy: Shoulder and Arm

A 48 year old man presents to the ED complaining of pain in his right arm. He has a history of intravenous drug use. He has marked erythema to the anterior arm and you note an underlying fluctuance, you suspect an abscess in the anterior compartment of the arm. Regarding the anterior compartment of the arm, which of the following statement is CORRECT:

- a. The muscles all act as flexors of the forearm.
- b. The muscles are all innervated by the musculocutaneous nerve.
- c. The brachialis muscle assists with supination of the forearm.
- d. The muscles all assist with flexion of the arm at the glenohumeral joint.
- e. The coracobrachialis muscle assists with supination of the forearm.
Anatomy: Shoulder and Arm

Question 52 of 125

Your consultant has reviewed an 82 year old gentleman complaining of weakness in the right shoulder, she suspects an infraspinatus injury. The infraspinatus muscle acts to produce which of the following movements:

- a. Adduction of the arm
- b. Flexion of the arm
- c. Abduction of the arm
- d. Medial rotation of the arm
- e. Lateral rotation of the arm
Anatomy: Shoulder and Arm

Question 53 of 125

A 46 year old tennis player has presented to the Emergency Department complaining of pain in his left shoulder. After a thorough examination you suspect a rotator cuff injury. The patient finds a particular group of movements most painful and as a result you suspect the subscapularis is the most likely cause of the symptoms. The subscapularis muscle acts to produce which of the following movements:

- a. Lateral rotation of the arm
- b. Medial rotation of the arm
- c. Flexion of the arm
- d. Adduction of the arm
- e. Abduction of the arm
Anatomy: Shoulder and Arm

Question 5.1 of 12

A 46-year-old tennis player has presented to the Emergency Department complaining of pain in his left shoulder. After a thorough examination you suspect a rotator cuff injury. The patient finds a particular group of movements most painful and as a result you suspect the subscapularis is the most likely cause of the symptoms. The subscapularis muscle acts to produce which of the following movements:

a) Lateral rotation of the arm
b) Medial rotation of the arm ✓
c) Flexion of the arm
d) Abduction of the arm
e) Adduction of the arm

Answer

The subscapularis acts to medially rotate the arm at the glenohumeral joint.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Subscapularis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Subscapular fossa of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Lesser tubercle of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Upper and lower subscapular nerves (CS - CT)</td>
</tr>
</tbody>
</table>

The subscapularis forms the largest component of the posterior wall of the axilla.

It originates from the subscapular fossa on the anterior surface of the scapula and inserts into the lesser tubercle of the humerus.

The subscapularis is innervated by the upper and lower subscapular nerves (CS - CT), branches of the brachial plexus.

Together with three muscles of the posterior scapula region (the supraspinatus, infraspinatus and teres minor muscles) the subscapularis is a member of the rotator cuff muscle group, which stabilises the glenohumeral joint.

The subscapularis acts to medially rotate the arm at the glenohumeral joint. To isolate the subscapularis muscle in examination, place the dorsum of the patient’s hand in full medial rotation on the lower back and ask them to push their hand off the back (the 10th off test). Loss of power suggests a tear while pain on forced medial rotation suggests tendinosis.

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Resources

- The Royal College of Emergency Medicine
- Virtual Simulation for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- StudyHive
- Trauma.org
- Radiopaedia
- Advanced Uro Support Group
- Emergency Medicine Journal
- Urolifeonline
- Instant Anatomy
- Froniusbook
Anatomy: Shoulder and Arm

A 49 year old man presents to the Emergency Department after an alleged assault by multiple assailants. During examination he displays signs of serratus anterior weakness. The serratus anterior muscle acts to produce which of the following movements:

a. Rotation and protraction of the scapula
b. Elevation and depression of the scapula
c. Elevation of the scapula and medial rotation of the humerus
d. Depression of the scapula and extension of the humerus
e. Retraction of the scapula
Anatomy: Shoulder and Arm

Question 14 of 22

A 49-year-old man presents to the Emergency Department after an alleged assault by multiple assailants. During examination he displays signs of serratus anterior weakness. The serratus anterior muscle acts to produce which of the following movements?

- Rotation and protraction of the scapula
- Elevation and depression of the scapula
- Depression of the scapula and medial rotation of the humerus
- Retraction of the scapula

Answer

The serratus anterior’s acts to retract the scapula, allowing the arm to be raised over 90 degrees, and also to lower the scapula and hold it against the thoracic wall.

Notes

Muscle

Serratus anterior

Proximal Attachment

Upper 6 – 8 ribs

Distal Attachment

Medial border of scapula

Actions

Protraction and retraction of scapula

Innervation

Long thoracic nerve (C5, C6, C7)

The serratus anterior arises from the lateral parts of the upper 6 – 8 ribs and distally inserts into the medial border of the scapula.

It acts to rotate the scapula, allowing the arm to be raised over 90 degrees, and also protracts the scapula and holds it against the thoracic wall.

It is innervated by the long thoracic nerve (C5 – C7).

The long thoracic nerve is prone to injury due to its exposed location, injury to this nerve may occur due to trauma or surgery, direct blow to the ribcage, overstretching or strenuous repetitive movements of the arm, and sustained bearing of excessive weight over the shoulder. Damage to the long thoracic nerve results in weakness/paralysis of the serratus anterior muscle causing difficulty abducting the upper arm above 90 degrees and giving a “winged” scapula appearance where the costal border of the scapula moves laterally and posteriorly away from the thoracic wall (this becomes more pronounced if the patient pushes the upper arm against a wall). An image of a winged scapula (left side) is shown below.
Anatomy: Shoulder and Arm

An 85 year old man presents to the ED following a fall at home. On examination you note he is tender over the distal attachment of the latissimus dorsi and you suspect an underlying bony injury. The latissimus dorsi muscle is attached distally to which of the following structures:

- a. Lateral clavicle and coracoid process
- b. Lateral inferior six ribs
- c. Intertubercular sulcus of the humerus
- d. Coracoid process and spine of the scapula
- e. Lateral clavicle and acromion

Question Navigator

<table>
<thead>
<tr>
<th>Question</th>
<th>Answered</th>
<th>Unanswered</th>
</tr>
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<tbody>
<tr>
<td>47</td>
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Clear Exam
Anatomy: Shoulder and Arm

An 85 year old man presents to the ED following a fall at home. On examination you note he is tender over the distal attachment of the latissimus dorsi and you suspect an underlying bony injury. The latissimus dorsi muscle is attached distally to which of the following structures:

a) Lateral clavicle and coracoid process  
b) Lateral inferior costal  
c) Intertubercular sulcus of the humerus  
d) Coracoid process and spine of the scapula  
e) Lateral clavicle and acromion

Answer

The latissimus dorsi is attached proximally to the spinous processes of the lower six thoracic vertebrae and related intertransverse ligaments, via the thoracolumbar fascia to the spinous processes of the lumbar vertebrae and to the fascia lata and the inferior 3 or 4 ribs. Distally it is attached to the floor of the intertubercular sulcus of the humerus.

Notes

Muscles | Latissimus dorsi
--- | ---
Proximal Attachment | Spinous processes of lower six thoracic vertebrae, thoracolumbar fascia, iliac crest, lower 3 or 4 ribs
Distal Attachment | Intertubercular sulcus
Actions | Adduction, medial rotation and extension of shoulder
Innervation | Thoracolumbar nerve (L1, T1, L2)

The latissimus dorsi muscle forms much of the back mass underlying the posterior axillary skin fold extending obliquely upwards from the trunk to the arm.

The latissimus dorsi is attached proximally to the spinous processes of the lower six thoracic vertebrae and related intertransverse ligaments, via the thoracolumbar fascia to the spinous processes of the lumbar vertebrae and to the fascia lata and the inferior 3 or 4 ribs. Distally it is attached to the floor of the intertubercular sulcus of the humerus.

The latissimus dorsi is innervated by the thoracolumbar nerve (L1 – L2).

The latissimus dorsi acts to extend, adduct and medially rotate the humerus at the glenohumeral joint.

![Image](image-url)
Anatomy: Shoulder and Arm

Question 56 of 125

You have been asked to perform the secondary survey of a patient following a fall from a horse. She describes her neck being forcibly flexed laterally. You are concerned she may have sustained a brachial plexus injury as a result. Regarding the divisions of the brachial plexus, which of the following statements is CORRECT:

a) The posterior cord is formed from the posterior divisions of all three trunks.
b) The medial cord is formed from the anterior divisions of the superior and middle trunk.
c) The inferior trunk is formed from the union of the C7 and C8 nerve roots.
d) The lateral cord is formed from the anterior division of the superior trunk and the posterior division of the inferior trunk.
e) The superior trunk is formed from the union of the C5, C6 and C7 nerve roots.

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 20

You have been asked to perform the secondary survey of a patient following a fall from her horse. She describes her neck being forcibly flexed laterally. You are concerned she may have sustained a spinal cord injury as an extension. Regarding the division of the brachial plexus, which of the following statements is CORRECT?

- a. The posterior cord is formed from the posterior divisions of all three roots.
- b. The medial cord is a continuation of the posterior division of the superior root trunk.
- c. The lateral cord is formed from the anterior division of the C5 and C6 nerve roots.
- d. The lateral cord is formed from the anterior division of the superior root trunk and the posterior division of the lateral root trunk.
- e. The anterior root trunk is formed from the union of the C5, C6, C7 nerve roots.

Answer

The brachial plexus is formed from the anterior root of the spinal nerves C5 – T1. In the brachial plexus, the roots of the brachial plexus are formed into three trunks:

- a. The superior trunk (which unites the C5 and C6 roots)
- b. A middle trunk (which is a continuation of the C7 root)
- c. A lateral trunk (which is the anterior division of the C8 root)

Within the posterior triangle of this root, the brachial plexus is divided into anterior and posterior divisions.

Within the axilla, the division of the trunks into three roots depends on their relation to the axillary artery:

- d. The lateral cord is formed from the posterior divisions of the anterior and middle trunks.
- e. The medial cord (which is formed from the anterior division of the lateral root trunk).
- f. The posterior cord (formed by the posterior divisions of all three roots).

The cords give rise to the major branches of the brachial plexus.

Brachial plexus

Roots

Cervical nerves

Injury

Brachial plexus injury

Brachial plexus injury

Mechanisms of injury

Excessive traction, direct pressure, or combinations of the two. These can be caused by a fall or by pulling on a limb forcefully.

Nerve root affected

C5, C6, C7

Tendinitis

Mechanical

Motion of the affected nerve root.

Muscles affected

Serratus anterior, pectoralis major, biceps, brachialis, and brachioradialis.

Motor loss

Atrophy of the muscles in the affected area. If the nerve doesn’t recover, permanent muscle weakness may result.

Sensory loss

Loss of sensation in the affected area.

Dermatome

Thoracic 5

Kleinsasser’s palsy

Kleinsasser’s palsy affects nerves derived from the C4 and C5 roots. It is less common than the other palsies.

Typically presents as an upper motor neuron lesion, with the affected arm being stuck in the shoulder joint. The arm is also weak and flaccid.

Resources

- FRCCEM Success
- www.bibliofunc.com
- Medscape.com
- Google Scholar
- PubMed
Anatomy: Shoulder and Arm

You have been asked to assess a patient who nursing staff are concerned about. The 26 year old patient fell whilst intoxicated, landing awkwardly on some railings. He is unable to abduct his left shoulder and you suspect deltoid muscle weakness. The deltoid muscle is innervated by which of the following nerves:

- a. Subscapular nerve
- b. Thoracodorsal nerve
- c. Axillary nerve
- d. Suprascapular nerve
- e. Long thoracic nerve

< Previous  Next >  See Answer

Something wrong?

Question Navigator

<table>
<thead>
<tr>
<th>Question</th>
<th>Answered</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>Answered</td>
</tr>
<tr>
<td>48</td>
<td>Answered</td>
</tr>
<tr>
<td>49</td>
<td>Answered</td>
</tr>
<tr>
<td>50</td>
<td>Answered</td>
</tr>
<tr>
<td>51</td>
<td>Answered</td>
</tr>
<tr>
<td>52</td>
<td>Answered</td>
</tr>
<tr>
<td>53</td>
<td>Answered</td>
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<tr>
<td>54</td>
<td>Answered</td>
</tr>
<tr>
<td>55</td>
<td>Answered</td>
</tr>
<tr>
<td>56</td>
<td>Answered</td>
</tr>
<tr>
<td>57</td>
<td>Current Question</td>
</tr>
<tr>
<td>58</td>
<td>Unanswered</td>
</tr>
</tbody>
</table>

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- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TeachMeAnatomy
- Trauma.org
- Radiopaedia
- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Instant Anatomy
- Patient.co.uk

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Anatomy: Shoulder and Arm

You have been asked to assess a patient who nursing staff are concerned about. The 26 year old patient fell whilst intoxicated, landing awkwardly on some railings. He is unable to abduct his left shoulder and you suspect deltoid muscle weakness. The deltoid muscle is innervated by which of the following nerves:

- a) Subscapular nerve
- b) Thoracodorsal nerve
- c) Axillary nerve
- d) Suprascapular nerve
- e) Long thoracic nerve

**Answer**

The deltoid is innervated by the axillary nerve (C5, C6).

**Notes**

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Deltoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Major abductor of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Axillary nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Position the patient with the arm adducted to 90 degrees and ask them to abduct their arm further</td>
</tr>
</tbody>
</table>

The deltoid muscle forms the muscular eminence inferior to the acromion and around the glenohumeral joint. The axillary nerve passes posteriorly around the surgical neck of the humerus deep to the deltoid muscle.

The deltoid is innervated by the axillary nerve (C5, C6).

The deltoid muscle is the major abductor of the arm (beyond the initial 15 degrees achieved by the supraspinatus). Although it receives some assistance from the supraspinatus, anterior fibres assist in flexion of the arm. Posterior fibres assist in extension of the arm.

The deltoid can be assessed by testing abduction of the arm started from 90 degrees of abduction.

Modified by FRCEMSuccess. Original by Henry Vastlye-Carter (Public domain), via Wikimedia Commons

The axillary nerve may be damaged by a fracture of the surgical neck of the humerus or by intracapsular dislocation of the humerus. It results in weakness of lateral rotation (due to paralysis of the teres minor muscle) and abduction (due to paralysis of the deltoid muscle) of the arm and loss of sensation in the distribution of the lateral brachial cutaneous nerve, the ‘regimental shoulder’ area on the lateral arm.
Anatomy: Shoulder and Arm

You are reviewing a patient following a fall from a horse. You suspect they may have an Erb’s palsy as a result of a brachial plexus injury. Regarding Erb’s palsy, which one of the following statements is CORRECT:

- a. Erb’s palsy classically results from sudden excessive abduction of the arm.
- b. Erb’s palsy affects nerves derived from the C7 and C8 nerve roots.
- c. Erb’s palsy characteristically results in Warten’s tip deformity where the arm is held in lateral rotation.
- d. Erb’s palsy affects the small muscles of the hand.
- e. Erb’s palsy may result in loss of sensation of the regimental badge area.
Anatomy: Shoulder and Arm

**Question:**

You are reviewing a patient following a fall at home. You suspect they may have an ER joint injury as a result of a brachial plexus injury. Regarding ER injury, which of the following statements is correct?

**Options:**

- a) It's likely to result from severe trauma to the arm.  
- b) It's likely to occur from severe trauma to the shoulder.  
- c) It's likely to occur from severe trauma to the elbow.  
- d) It's likely to occur from severe trauma to the hand.  
- e) It's likely to result from tearing of the shoulder ligament area.

**Answer:**

a) ER joint injuries result from severe trauma to the arm. It is a result of severe trauma to the arm.

**Details:**

The brachial plexus is formed by the union of the posterior cord of spinal nerves C5–T1. In its anterior triangle, the brachial plexus is formed by three branches:

- A suprascapular nerve (the upper part of the C5–T1 cords)
- A middle trunk (which connects the C7 and T1 cords)
- A posterolateral trunk (from the C6–T1 cords)

Within the posterior triangle of the arm, the brachial plexus divides into the upper and posterior divisions.

Within the axilla, the brachial plexus further divides into three branches known as the axillary nerves:

- The lateral cord (from the anterior division of the upper arm and middle trunk)
- The medial cord (which corresponds to the anterior division of the posterior cord)
- The posterior cord (from the posterior division of all three nerve cords)

The cords give rise to the branches that innervate the brachial plexus.

**Brachial plexus anatomy:**

- The brachial plexus is located at the back of the arm, just below the shoulder joint.
- It is composed of five major nerves:
  - C5 nerve: Supplies the deltoid muscle and part of the upper arm.
  - C6 nerve: Supplies the triceps muscle and part of the lower arm.
  - C7 nerve: Supplies the brachialis muscle and part of the forearm.
  - C8 nerve: Supplies the biceps and brachioradialis muscles of the forearm.
  - T1 nerve: Supplies the pronator teres muscle of the forearm.

The brachial plexus can be affected by various conditions, leading to muscle weakness, numbness, and decreased movement. In some cases, the brachial plexus injury can result in permanent muscle damage and decreased range of motion. Therefore, it is crucial to seek medical attention if you suspect a brachial plexus injury to ensure proper diagnosis and treatment.
Anatomy: Shoulder and Arm

You have been asked to give a tutorial regarding the muscles of the shoulder region to a group of medical students. One of the students asks, “What is the latissimus dorsi attached to proximally?”:

a. The ligamentum nuchae and the spinous processes of C7 - T12
b. The lower six thoracic vertebrae, thoracolumbar fascia and the iliac crest
c. The posterior sternum and thoracolumbar fascia
d. The spine of the scapula and the spinous processes of C7 - T12.
e. The lumbar vertebra and sacrum
Anatomy: Shoulder and Arm

You have been asked to give a tutorial regarding the muscles of the shoulder region to a group of medical students. One of the students asks, "What is the latissimus dorsi attached to proximally?"

Answer

The latissimus dorsi is attached proximally to the spinous processes of the lower six thoracic vertebrae and related interspinous ligaments, via the thoracolumbar fascia to the spinous processes of the lumbar vertebrae and to the ischial crest and inferior 3-4 ribs. Distally it is attached to the floor of the intertubercular sulcus of the humerus.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Latissimus dorsi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Spinous processes of lower 6 thoracic vertebrae, thoracolumbar fascia, iliac crest, lower 3-4 ribs</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Adduction, medial rotation and extension of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Thoracodorsal nerve (C7, C8)</td>
</tr>
</tbody>
</table>

The latissimus dorsi muscle forms much of the muscle mass underlying the posterior axillary skin fold extending obliquely upwards from the trunk to the arm.

The latissimus dorsi is attached proximally to the spinous processes of the lower six thoracic vertebrae and related interspinous ligaments, via the thoracolumbar fascia to the spinous processes of the lumbar vertebrae and to the ischial crest and inferior 3-4 ribs. Distally it is attached to the floor of the intertubercular sulcus of the humerus.

The latissimus dorsi is innervated by the thoracodorsal nerve (C6 – C8).

The latissimus dorsi acts to extend, adduct and medially rotate the humerus at the glenohumeral joint.
Anatomy: Shoulder and Arm

Question 60 of 125

A 23 year old woman is brought into ED having been thrown off horseback during a competition. She has no major injuries but is complaining of weakness of her left arm. Imaging shows damage to the upper trunk of the brachial plexus. Which of the following clinical findings would you most expect to see:

- a. Inability to laterally rotate the arm
- b. Loss of sensation to the medial arm
- c. Inability to abduct the thumb
- d. Inability to pronate the forearm
- e. Inability to shrug the shoulders

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

A 25 year old woman is brought into ED having been thrown off her motorcycle in a road crash. She has no major injuries but is complaining of weakness of her left arm. Imaging shows damage to the upper trunk of the brachial plexus. Which of the following clinical findings would you expect to see:

- a) Inability to laterally rotate the arm
- b) Loss of sensation in the axilla
- c) Inability to adduct the thumb
- d) Inability to pronate the forearm
- e) Inability to raise the shoulders

Answer

The upper trunk is formed from the union of the C5 and C6 nerve roots. In 4-6% of cases there is less or weakness of the deltoid, lateral rotators of the arm and flexors and supinators of the forearm and absence of sensation on the lateral aspect. A characteristic Wartenburg's tip dermatome is present where the first three branches supplying the skin are mostly related to the axillary artery (C8-T1). The deltoid, biceps, and brachialis muscles are supplied by the fourth branch of the plexus (C5). The muscular receptors are usually the first to be examined in assessing nerve axonotomies and neurapraxias.

<table>
<thead>
<tr>
<th>Branches of plexus</th>
<th>Erb's palsy</th>
<th>Klumpke's palsy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musculocutaneous</td>
<td>Extrinsic muscle in neck with brisk reflex and shoulder drop by day 3.</td>
<td>Severe weakness of all the arm muscles.</td>
</tr>
<tr>
<td>Median nerve</td>
<td>Median sensory loss in forearm and hand</td>
<td>Median sensory loss in forearm and hand</td>
</tr>
<tr>
<td>Radial nerve</td>
<td>Radial sensory loss in forearm and hand</td>
<td>Radial sensory loss in forearm and hand</td>
</tr>
<tr>
<td>Ulnar nerve</td>
<td>Ulnar sensory loss in forearm and hand</td>
<td>Ulnar sensory loss in forearm and hand</td>
</tr>
<tr>
<td>Tibial nerve</td>
<td>Tibial sensory loss in leg</td>
<td>Tibial sensory loss in leg</td>
</tr>
<tr>
<td>Sural nerve</td>
<td>Sural sensory loss in leg</td>
<td>Sural sensory loss in leg</td>
</tr>
<tr>
<td>Femoral nerve</td>
<td>Femoral sensory loss in leg</td>
<td>Femoral sensory loss in leg</td>
</tr>
</tbody>
</table>

Klumpke's palsy affects nerves derived from the C8 to T1 roots. It is much less common than Erb's palsy. It usually occurs from sudden axonotmesis of the arm or a specific injury that affects the cervical roots. If the roots are damaged, the muscles of the hand will be affected. A characteristic Wartenburg's tip dermatome is present where the first three branches supplying the skin are mostly related to the axillary artery (C8-T1). A characteristic Wartenburg's tip dermatome is present where the first three branches supplying the skin are mostly related to the axillary artery (C8-T1). The deltoid, biceps, and brachialis muscles are supplied by the fourth branch of the plexus (C5). The muscular receptors are usually the first to be examined in assessing nerve axonotomies and neurapraxias.

Erb's palsy affects nerves derived from the C5 or C6 roots. It is commonly related to an axonotmesis in the upper part of the plexus. Brachial plexopathy is a term used to describe a painful condition of the brachial plexus, which may happen in different conditions. There is less or weakness of abduction, lateral rotation, flexion and extension of the arm and loss of sensation in the lateral aspect. A characteristic Wartenburg's tip dermatome is present where the first three branches supplying the skin are mostly related to the axillary artery (C8-T1). A characteristic Wartenburg's tip dermatome is present where the first three branches supplying the skin are mostly related to the axillary artery (C8-T1). The deltoid, biceps, and brachialis muscles are supplied by the fourth branch of the plexus (C5). The muscular receptors are usually the first to be examined in assessing nerve axonotomies and neurapraxias.
Anatomy: Shoulder and Arm

Question 61 of 125

A 54 year old man presents to the ED after falling onto his right arm. On examination he is unable to flex at the elbow and you suspect weakness of the anterior arm muscles. The muscles of the anterior compartment of the arm are all innervated by which of the following nerves:

- a. Radial nerve
- b. Axillary nerve
- c. Musculocutaneous nerve
- d. Median nerve
- e. Ulnar nerve

< Previous  Next >  See Answer  Something wrong?

Clear Exam
Anatomy: Shoulder and Arm

Question 6.1 of 123

A 54 year old man presents to the ED after falling onto his right arm. On examination he is unable to flex at the elbow and you suspect weakness of the anterior arm muscles. The muscles of the anterior compartment of the arm are all innervated by which of the following nerves?

a) Radial nerve
b) Axillary nerve
c) Musculocutaneous nerve
(d) Median nerve
e) Ulnar nerve

Answer

The muscles of the anterior compartment of the arm are all innervated by the musculocutaneous nerve.

Notes

The anterior compartment of the arm consists of three muscles.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Actions</th>
<th>Innervation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coracobrachialis</td>
<td>Flexion of arm</td>
<td>Musculocutaneous nerve (C5 – C7)</td>
</tr>
<tr>
<td>Biceps brachii</td>
<td>Flexion and supination of forearm, flexion of arm</td>
<td>Musculocutaneous nerve (C5, C6)</td>
</tr>
<tr>
<td>Brachialis</td>
<td>Flexion of forearm</td>
<td>Musculocutaneous nerve (C5, C6), small contribution by radial nerve (C7) to lateral muscle</td>
</tr>
</tbody>
</table>

The coracobrachialis (green) is innervated by the musculocutaneous nerve (C5 – C7). It acts to flex the arm at the glenohumeral joint.

The biceps brachii (red) is innervated by the musculocutaneous nerve (C5 – C6). The biceps is primarily a powerful flexor and supinator of the forearm at the elbow joint. It also assists with flexion of the arm at the shoulder joint (with the coracobrachialis muscle). The biceps reflex tap predominantly tests spinal cord segment C6.

The brachialis (blue) is innervated primarily by the musculocutaneous nerve (C5, C6) with a small contribution from the radial nerve (C7). The brachialis flexes the forearm at the elbow joint.
Anatomy: Shoulder and Arm

You are asked to review a 21 year old woman who presents with right elbow pain. She has fallen from a table whilst intoxicated. On examination there is a clear deformity of the elbow, x-ray confirms a dislocation. The elbow joint is formed by the articulations between which of the following structures:

- **a** Trochlea of the humerus with the ulna and capitulum of the humerus with the radius
- **b** Greater trochanter of the humerus with the radius and lesser trochanter of the humerus with the ulna
- **c** Lateral epicondyle of the humerus with the ulna and medial epicondyle of the humerus with the radius
- **d** Trochlea of the humerus with the radius and capitulum of the humerus with the ulna
- **e** Capitulum of the humerus with the ulna and coronoid fossa of the humerus with the radius

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

You are asked to review a 23-year-old woman who presents with right elbow pain. She has fallen from a table while intoxicated. On examination there is a clear deformity of the elbow, a may confirm a dislocation. The elbow joint is formed by the articulations between which of the following structures: a) Trochlea of the humerus with the ulna and capitulum of the humerus with the radius b) Greater trochanter of the humerus with the radius and lesser trochanter of the humerus with the ulna c) Lateral epicondyle of the humerus with the ulna and medial epicondyle of the humerus with the radius d) Trochlea of the humerus with the radius and capitulum of the humerus with the radius e) Capitulum of the humerus with the ulna and condylar fossa of the humerus with the radius

Answer

The elbow joint is formed by the articulations between the trochlea of the humerus and the trochlear notch of the ulna and between the capitulum of the humerus and the head of the radius.

Notes

Joint: Elbow joint
Type: Special hinge joint
Articulations: Trochlea of humerus with trochlear notch of ulna and capitulum of humerus with head of radius
Stabilizing factors: Joint capsule, radial and ulnar collateral ligaments
Movements: Flexion and Extension

The elbow is a special hinge joint. It is formed by the articulations between the trochlea of the humerus and the trochlear notch of the ulna and between the capitulum of the humerus and the head of the radius. The movements of the elbow joint are extension and flexion.

Movement: Muscles Involved
Flexion: Bisaeus brachii, brachialis, brachioradialis
Extension: Triceps brachii, anconeus

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Resources

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- Medical Icons
- Radiology

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Anatomy: Shoulder and Arm

You are reviewing a 32 year old builder who has fallen on site and sustained a midshaft fracture of the humerus. Your consultant is concerned about an injury to the circumflex humeral artery. The circumflex humeral arteries arise from which of the following arteries:

- a Brachial artery
- b Axillary artery
- c Subclavian artery
- d Subscapular artery
- e Profunda brachii artery

< Previous  Next >  See Answer  Something wrong?  

Question Navigator

47 Answered
48 Answered
49 Answered
50 Answered
51 Answered
52 Answered
53 Answered
54 Answered
55 Answered
56 Answered
57 Answered
58 Answered

Clear Exam
Anatomy: Shoulder and Arm

Question 63 of 123

You are reviewing a 32 year old builder who has fallen on site and sustained a midshaft fracture of the humerus. Your consultant is concerned about an injury to the circumflex humeral artery. The circumflex humeral arteries arise from which of the following arteries:

- a) Brachial artery
- b) **Axillary artery**
- c) Subclavian artery
- d) Subscapular artery
- e) Profunda brachii artery

Notes

The circumflex humeral arteries arise from the axillary artery, encircle the surgical neck of the humerus and give off branches supplying the shoulder. The humeral circumflex arteries may be damaged by fracture of the surgical neck of the humerus or by shoulder dislocation.

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Anatomy: Shoulder and Arm

Question 64 of 125

Your consultant asks you to examine the shoulder of a patient he suspects to have teres major weakness. The teres major muscle acts to produce which of the following movements:

a. Abduction and medial rotation of the arm
b. Extension and lateral rotation of the arm
c. Abduction and lateral rotation of the arm
d. Extension and medial rotation of the arm
e. Adduction and flexion of the arm
Your consultant asks you to examine the shoulder of a patient he suspects to have teres major weakness. The teres major muscle acts to produce which of the following movements:

- Abduction and medial rotation of the arm
- Extension and lateral rotation of the arm
- Abduction and lateral rotation of the arm
- Extension and medial rotation of the arm
- Adduction and flexion of the arm

The teres major acts to extend and medially rotate the arm at the glenohumeral joint.

**Notes**

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Teres major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Posterior surface of inferior angle of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation and extension of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Lower subscapular nerve [C5 – C7]</td>
</tr>
</tbody>
</table>

The teres major muscle passes from the inferior angle of the scapula to the upper humerus and contributes to the posterior axillary skin fold laterally.

The teres major originates from the posterior surface of the inferior angle of the scapula and inserts into the medial lip of the intertubercular sulcus of the humerus.

It is innervated by the lower subscapular nerve [C5, C6].

It acts to extend and medially rotate the arm at the glenohumeral joint.
Anatomy: Shoulder and Arm

You have been asked to make a quick assessment of a patient’s upper limb neurology as part of a secondary survey. You test each dermatome and note the patient has no sensation at the medial antecubital fossa. The medial antecubital fossa tests which dermatome:

- a) C5
- b) C6
- c) C7
- d) C8
- e) T1

Question 65 of 125
Anatomy: Shoulder and Arm

Question 64 of 125

Your consultant asks you to examine the shoulder of a patient he suspects have teres major weakness. The teres major muscle acts to produce which of the following movements:

- a) Abduction and medial rotation of the arm
- b) Extension and lateral rotation of the arm
- c) Abduction and lateral rotation of the arm
- d) Extension and medial rotation of the arm
- e) Adduction and flexion of the arm

Answer

The teres major acts to extend and medially rotate the arm at the glenohumeral joint.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Teres major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Posterior surface of inferior angle of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation and extension of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Lower subscapular nerve (C5 – C7)</td>
</tr>
</tbody>
</table>

The teres major muscle passes from the inferior angle of the scapula to the upper humerus and contributes to the posterior axillary skin fold laterally.

The teres major originates from the posterior surface of the inferior angle of the scapula and inserts into the medial lip of the intertubercular sulcus of the humerus.

It is innervated by the lower subscapular nerve (C5, C6).

It acts to extend and medially rotate the arm at the glenohumeral joint.

Modified by FRCEM Success. Original by Henry Vandyke Carter (Public domain), via Wikimedia Commons
Anatomy: Shoulder and Arm

You have been asked to make a quick assessment of a patient’s upper limb neurology as part of a secondary survey. You test each dermatome and note the patient has no sensation at the medial antecubital fossa. The medial antecubital fossa tests which dermatome:

a. C5  
b. C6  
c. C7  
d. C8  
e. T1  

< Previous  Next  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

Question: You have been asked to make a quick assessment of a patient’s upper limb neurology as part of a secondary survey. You test each dermatome and note the patient has no sensation at the medial antebrachial fossa. The medial antebrachial fossa tests which dermatome:

- C5
- C6
- C7
- C8
- T1

Answer:
The T1 dermatome is best tested on the medial (ulnar) side of the antecubital fossa, just proximal to the medial epicondyle of the humerus.

Notes:

<table>
<thead>
<tr>
<th>Dermatome</th>
<th>Landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Occipital Protuberance</td>
</tr>
<tr>
<td>C3</td>
<td>Supraclavicular Fossa</td>
</tr>
<tr>
<td>C4</td>
<td>Acromio-clavicular Joint</td>
</tr>
<tr>
<td>C5</td>
<td>Lateral Antebrachial Fossa</td>
</tr>
<tr>
<td>C6</td>
<td>Thumb</td>
</tr>
<tr>
<td>C7</td>
<td>Middle Finger</td>
</tr>
<tr>
<td>C8</td>
<td>Little Finger</td>
</tr>
<tr>
<td>T1</td>
<td>Medial Antebrachial Fossa</td>
</tr>
<tr>
<td>T2</td>
<td>Apex of Anula</td>
</tr>
</tbody>
</table>

- The C2 dermatome is best tested at least one cm laterally to the occipital protuberance at the base of the skull. Alternatively, it can be located at least 3 cm behind the ear.
- The C3 dermatome is best tested in the supraclavicular fossa, at the midclavicular line.
- The C4 dermatome is best tested over the acromio-clavicular joint.
- The C5 dermatome is best tested on the lateral (radial) side of the antecubital fossa just proximal to the elbow.
- The C6 dermatome is best tested on the dorsal surface of the proximal phalanx of the thumb.
- The C7 dermatome is best tested on the dorsal surface of the proximal phalanx of the middle finger.
- The C8 dermatome is best tested on the dorsal surface of the proximal phalanx of the little finger.
- The T1 dermatome is best tested on the medial (ulnar) side of the antecubital fossa, just proximal to the medial epicondyle of the humerus.
- The T2 dermatome is best tested at the apex of the axilla.

By Grant, John Charles Bolles; An atlas of anatomy; / by regions. TRG2 (Public domain); via Wikipedia Commons
Anatomy: Shoulder and Arm

You are examining the shoulder of a 35 year old woman who presents to the ED after slipping on ice. She describes falling backward and landing on her back. On examination you note tenderness over an area of the distal trapezius and you suspect an underlying bony injury. The trapezius muscle is attached distally to which of the following structures:

a. Medial clavicle and coracoid
b. Lateral clavicle and coracoid
c. Lateral clavicle, acromion and spine of scapula
d. Medial clavicle and spine of scapula
e. Sternum, acromion and spine of scapula

< Previous  Next  >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

You are examining the shoulder of a 35 year old woman who presents to the ED after slipping on ice. She describes falling backward and landing on her back. On examination you note tenderness over an area of the distal trapezius and you suspect an underlying bony injury. The trapezius muscle is attached distally to which of the following structures:

a) Medial clavicle and coracoid
b) Lateral clavicle and coracoid
c) Lateral clavicle, acromion and spine of scapula

d) Medial clavicle and spine of scapula
e) Sternum, acromion and spine of scapula

Answer

The trapezius muscle has an extensive origin, originating from the occipital bone, the ligamentum nuchae and the spinous processes of the C7 - T12 vertebrae. Distally, it attaches to the posterior border of the latissimus dorsi, the scapula, and the spine of the scapula.

Notes

Muscle | Trapezius
--- | ---
Proximal Attachment | Superior nuchal line, external occipital protuberance, ligamentum nuchae, spinous processes of C7 - T12
Distal Attachment | Spine of the scapula, acromion and lateral third of clavicle
Actions | Elevator of scapula, rotation of scapula during shoulder abduction, retraction and depression of scapula
Indication | Spinal accessory nerve

The trapezius muscle is responsible for the smooth contour of the Lateral side of the neck and over the superior aspect of the shoulder.

The trapezius muscle has an extensive origin, originating from the skull, the ligamentum nuchae and the spinous processes of the C7 - T12 vertebrae. Distally, it attaches to the posterior border of the lateral third of the clavicle, the acromion, and the spine of the scapula.

The trapezius is innervated by the spinal cord of the accessory nerve (motor supply) and the anterior ramus of C3 and C4 (sensory supply). The accessory nerve can be damaged by tearing the function of the trapezius muscle, most easily performed by asking the patient to shrug against resistance.

The trapezius is a powerful elevator of the scapula. The upper fibers of the trapezius muscle elevate the scapula and rotate it during abstraction of the arm above horizontal. The middle fibers rotate the scapula and the lower fibers depress the scapula.

Resources

- The Royal College of Emergency Medicine
- NHS England National Emergency Medicine
- Advanced Trauma Life Support
- Level 1 Trauma Centre
- Quick Reference Guide
- Fractures

By Michael Heggelund, used with permission. Image: CR0469.jpg (Public domain or Public license), via Wikimedia Commons
Anatomy: Shoulder and Arm

A 64 year old man presents to the ED following a road traffic collision. His primary survey is normal and you proceed to complete a secondary survey. You note he is tender over the proximal pectoralis major. The pectoralis major muscle is attached proximally to which of the following structures:

- The upper seven costal cartilages, the anterior sternum and the medial half of the clavicle
- The 3rd – 5th ribs
- The lateral half of the clavicle and the posterior surface of the sternum
- The lateral parts of the 1st – 8th ribs
- The lateral clavicle and the intertubercular sulcus of the humerus
A 64-year-old man presents to the ED following a road traffic collision. His primary survey is normal and you proceed to complete a secondary survey. You note he is tender over the proximal pectoralis major. The pectoral major muscle is attached proximally to which of the following structures:

- The upper seven costal cartilages, the anterior sternum and the medial half of the clavicle
- The 3rd–5th ribs
- The lateral half of the clavicle and the posterior surface of the sternum
- The lateral parts of the 1st–4th ribs
- The lateral clavicle and the intertubercular sulcus of the humerus

Answer:

The pectoral major has two heads: the clavicular head attaching to the medial half of the clavicle and the sternocostal head attaching to the upper seven costal cartilages and to the anterior surface of the sternum. Distally, fibres from both heads attach to the lateral lip of the intertubercular sulcus of the humerus.

Muscle | Pectoralis major
--- | ---
Proximal Attachment | Medial half of clavicle (bicipital head), upper seven costal cartilages and anterior sternum (sternocostal head)
Distal Attachment | Intertubercular sulcus of humerus
Actions | Flexes, adducts and medial rotation of shoulder
Innervation | Medial and lateral pectoral nerves (CS–T1)

The pectoral major is the largest and most superficial muscle of the anterior wall. Its inferior margin underlies the anterior axillary fold, which marks the anteroinferior border of the axilla.

It has two heads: the clavicular head attaching to the medial half of the clavicle and the sternocostal head attaching to the upper seven costal cartilages and to the anterior surface of the sternum. Distally, fibres from both heads attach to the lateral lip of the intertubercular sulcus of the humerus.

The pectoral major is innervated by the medial and lateral pectoral nerves (CS–T1) which originate from the brachial plexus in the axilla.

The pectoral major acts to flex, adduct and medially rotate the arm at the glenohumeral joint.
Anatomy: Shoulder and Arm

A 39 year old man presents to ED complaining of pain over the lateral epicondyle of the right arm. You suspect lateral epicondylitis, which of the following findings would you most likely see on examination:

- a) Pain on flexing the wrist against resistance
- b) Pain on extending the wrist against resistance
- c) Pain on flexing the elbow against resistance
- d) Pain on extending the elbow against resistance
- e) Pain on supination of the forearm

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

**Definitions**: The shoulder joint is a ball-and-socket joint formed by the head of the humerus and the glenoid fossa of the scapula.

**Muscles**: Several muscles are associated with the shoulder and arm, including the deltoid, rotator cuff, and biceps.

**Joints**: The shoulder joint has three major components: the glenohumeral joint, the acromioclavicular joint, and the sternoclavicular joint.

**Nerves**: The main nerves associated with the shoulder and arm are the suprascapular nerve, axillary nerve, and median nerve.

**Bones**: The bones of the shoulder and arm include the scapula, clavicle, humerus, and radius.

**Blood Vessels**: The blood vessels of the shoulder include the subclavian, axillary, and radial arteries.

**Ligaments**: The ligaments of the shoulder include the glenohumeral ligaments and the coracohumeral ligament.

**Answer**: The biceps brachii is a two-joint muscle located at the anterior aspect of the arm and forearm. It has two heads: long and short, which originate from the scapula and coracoid process, respectively. The long head of the biceps brachii is a posterior muscle that is inserted into the radius at the radial tuberosity. The short head of the biceps brachii is an anterior muscle that is inserted into the ulna at the olecranon process. The biceps brachii plays a role in elbow flexion and supination of the forearm.

**Resources**: 
- **Textbooks**: Current Diagnosis & Treatment of Shoulder & Elbow Disorders by J. G. Resch and E. T. Gartsman
- **Websites**: Mayo Clinic, American Academy of Orthopaedic Surgeons
- **Online Courses**: Khan Academy, Coursera

**References**: 
A 23 year old woman presents to the ED complaining of pain in the left shoulder. Examination of the pectoralis major is unremarkable, you suspect the pectoralis minor may be contributing towards her symptoms. The pectoralis minor muscle is attached to which of the following structures:

- **a** To ribs 3 – 5 and the coracoid process
- **b** To the upper six ribs and the acromion
- **c** To the medial clavicle and the sternum
- **d** To the upper six ribs and the coracoid process
- **e** To the medial clavicle and the intertubercular sulcus of the humerus
Anatomy: Shoulder and Arm

Question 6/12

A 23 year old woman presents to the ED complaining of pain in the left shoulder. Examination of the pectoralis major is unremarkable, you suspect the pectoralis minor may be contributing towards her symptoms. The pectoralis minor muscle is attached to which of the following structures:

a) To ribs 3 – 5 and the coracoid process ✅
b) To the upper six ribs and the acromion
c) To the medial clavicle and the sternum
d) To the upper six ribs and the coracoid process
e) To the medial clavicle and the intertubercular sulcus of the humerus

Answer

The pectoralis minor is attached proximally to ribs 3 – 5 and distally to the coracoid process of the scapula.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Pectoralis minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Ribs 3 – 5</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Coracoid process of scapula</td>
</tr>
<tr>
<td>Actions</td>
<td>Depresses tip of shoulder, protracts scapula</td>
</tr>
<tr>
<td>Innervation</td>
<td>Medial pectoral nerve</td>
</tr>
</tbody>
</table>

The pectoralis minor is a small triangular-shaped muscle that lies deep to the pectoralis major muscle. It is attached proximally to ribs 3 – 5 and distally to the coracoid process of the scapula. It is innervated by the medial pectoral nerve (C8, T1), which originates from the brachial plexus. It acts to protract the scapula by pulling the scapula anteriorly on the thoracic wall and depresses the shoulder tip.

Modified by FRCEM Success. Original by Henry Vandyke Carter (Public domain), via Wikimedia Commons
Anatomy: Shoulder and Arm

A 28 year old man presents to ED followed an alleged assault whilst out drinking. He received blunt trauma to his right axilla. He is complaining of difficulty abducting his left arm above the level of his shoulder, and on inspection, the inferior angle of his right scapula protrudes more than that of his left scapula. Which of the following nerves has most likely been affected:

a. Axillary nerve
b. Long thoracic nerve
c. Thoracodorsal nerve
d. Suprascapular nerve
e. Dorsal scapular nerve
Anatomy: Shoulder and Arm

Question 1 of 15

A 20 year old man presents to ED followed an alleged assault whilst out drinking. He received blunt trauma to the right elbow. He is complaining of difficulty abducting his right arm above the level of his shoulder, and on inspection, the inferior angle of the right scapula protrudes more than that of his left scapula. Which of the following nerves has most likely been affected:

a) Axillary nerve
b) Long thoracic nerve
c) Thoracodorsal nerve
d) Suprascapular nerve
e) Dorsal scapular nerve

Answer

Damage to the long thoracic nerve results in weakness or paralysis of the serratus anterior muscle causing difficulty abducting the upper limb above 90 degrees and gapping a “winged” scapula appearing where the medial border particularly the inferior angle of the scapula moves laterally and posteriorly away from the thoracic wall (this becomes more pronounced if the patient attempts to raise the upper limb against a wall).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axillary nerve</td>
<td>Brachial plexus anterior</td>
</tr>
<tr>
<td>Proximal Attachment</td>
<td>Upper 3–4 ribs</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Medial border of scapula</td>
</tr>
<tr>
<td>Acromion</td>
<td>Protection and retraction of scapula</td>
</tr>
<tr>
<td>Intercostal</td>
<td>Long thoracic nerve (C5, C6, C7)</td>
</tr>
</tbody>
</table>

The serratus anterior arises from the lateral parts of the upper 8–10 ribs and obliquely inserts into the medial border of the scapula.

It acts to rotate the scapula, allowing the arm to be raised over 90 degrees, and also protects the scapula and holds it against the thoracic wall.

It is innervated by the long thoracic nerve (C5–C7).

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The long thoracic nerve is prone to injury due to its excessive length. Injury to the nerve may occur due to trauma or surgery. Direct forces to the 8th, 9th, or 10th ribs overstretching or straining the movement of the arm, and sustained bearing of excessive weight over the shoulder. Damage to the long thoracic nerve results in weakness/paralysis of the serratus anterior muscle causing difficulty abducting the upper limb above 90 degrees and gapping a “winged” scapula appearance where the medial border of the scapula moves laterally and posteriorly away from the thoracic wall (this becomes more pronounced if the patient attempts to raise the upper limb against a wall). A range of a winged scapula (left photo) is shown below.

Modified by FRCEM Success. Original by Home Schooling Center [Public domain] via Wikimedia Commons

Resources

- [The Royal College of Emergency Medicine](https://www.eme society.org/)
- [American Academy for Emergency Medicine](https://www.aamemd.org/)
- [Spine Society of the UK](https://www.spinesociety.org.uk/)
- [American Academy of Orthopaedic Surgeons](https://www.aaos.org/)
- [American Academy of Orthopaedic Surgeons](https://www.aaos.org/)
- [American Academy of Orthopaedic Surgeons](https://www.aaos.org/)
- [American Academy of Orthopaedic Surgeons](https://www.aaos.org/)
- [American Academy of Orthopaedic Surgeons](https://www.aaos.org/)
Anatomy: Shoulder and Arm

Question 71 of 125

A 32 year old man presents to the ED with a 4 day history of fever and malaise. He has recently moved to the UK from South Africa to study. On examination you note non-tender lymphadenopathy to the infraclavicular lymph nodes. Regarding the infraclavicular lymph nodes, which one of the following statements is INCORRECT:

a. The infraclavicular lymph nodes lie superiorly and posteriorly to the axillary artery.
b. Infraclavicular lymphadenopathy is highly suspicious of non-Hodgkin's lymphoma.
c. The infraclavicular lymph nodes primarily drain the neck and upper thorax.
d. The infraclavicular lymph nodes are located between the pectoralis major and the deltoid muscles.
e. The infraclavicular lymph nodes consist of two or three lymph nodes.

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 71 of 125

A 32 year old man presents to the ED with a 4 day history of fever and malaise. He has recently moved to the UK from South Africa to study. On examination you note non-tender lymphadenopathy to the infracavicular lymph nodes. Regarding the infracavicular lymph nodes, which one of the following statements is INCORRECT:

a) The infracavicular lymph nodes lie superiorly and posteriorly to the axillary artery.
b) Infracavicular lymphadenopathy is highly suspicious of non-Hodgkin’s lymphoma.
c) The infracavicular lymph nodes primarily drain the neck and upper thorax. ✗
d) The infracavicular lymph nodes are located between the pectoralis major and the deltoid muscles.
e) The infracavicular lymph nodes consist of two or three lymph nodes.

Notes

The 2 – 3 infracavicular (deltopectoral) lymph nodes lie in the deltopectoral groove inferior to the clavicle, located superiorly and posteriorly to the axillary artery. They primarily drain the radial side of the upper limb. Lymphadenopathy here is highly suspicious for non-Hodgkin’s lymphoma specifically, and for malignancy in general.

The supratrochlear lymph nodes lie subcutaneously above the medial epicondyle, medial to the basilic vein. They drain the ulnar side of the forearm and the medial hand. Differential diagnosis for enlarged lymph nodes includes skin infections, skin malignancies and lymphoma.
Anatomy: Shoulder and Arm

Question 72 of 125

You are asked to review a 34 year old rugby player who has presented with shoulder pain following a tackle. X-ray reveals an acromioclavicular dislocation. Which of the following ligaments is the most important in stabilising the acromioclavicular joint:

- a. Acromioclavicular ligament
- b. Costoclavicular ligament
- c. Interclavicular ligament
- d. Coracoclavicular ligament
- e. Glenohumeral ligament

< Previous  Next >  See Answer  Something wrong?

Clear Exam
Anatomy: Shoulder and Arm

You are asked to review a 34 year old rugby player who has presented with shoulder pain following a tackle. X-ray reveals a acromioclavicular dislocation. Which of the following ligaments is the most important in stabilising the acromioclavicular joint:

a) Acromioclavicular ligament
b) Costoclavicular ligament
c) Intercostal ligament
d) Coracoclavicular ligament

e) Glenohumeral ligament

Answer

The strong coracoclavicular ligament (made up of two ligaments, the conoid and trapezoid ligament) is the main stopping force at the acromioclavicular joint.

Notes

<table>
<thead>
<tr>
<th>Joint</th>
<th>Acromioclavicular ligament</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Plane type synovial joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Lateral end of clavicle and acromion of scapula</td>
</tr>
<tr>
<td>Stabilising factors</td>
<td>Acromioclavicular ligament and coracoclavicular ligament</td>
</tr>
</tbody>
</table>

The acromioclavicular joint is a plane type synovial joint, occurring between the lateral end of the clavicle and the acromion of the scapula.

It is reinforced by two main ligaments; a small acromioclavicular ligament and a much larger coracoclavicular ligament. The strong coracoclavicular ligament (made up of two ligaments, the conoid and trapezoid ligament) is the main stabilising force, and essentially suspends the weight of the upper limb from the clavicle.

Dislocation of the acromioclavicular joint may result from a direct blow to the joint, a fall onto the shoulder or from a fall onto an outstretched upper limb. Acromioclavicular joint dislocation the acromion is forcibly pushed inferiorly and medially with respect to the clavicle, and becomes more prominent.
Anatomy: Shoulder and Arm

You are performing the secondary survey of a patient following a road traffic collision. The patient was riding a motorcycle when he lost control and fell to the ground. You note a weakness in the upper limb muscles and you suspect a brachial plexus injury. Regarding the divisions of the brachial plexus, which of the following statements is INCORRECT:

- The middle trunk is formed from the union of the C6 and C7 nerve roots.
- The inferior trunk is formed from the union of the C8 and T1 nerve roots.
- The lateral cord is formed from the anterior divisions of the superior and middle trunk.
- The medial cord is a continuation of the anterior division of the inferior trunk.
- The posterior cord is formed from the posterior divisions of all three trunks.
Anatomy: Shoulder and Arm

Question Title: Gr5

You are performing the secondary survey of a patient following a road traffic collision. The patient was riding a motorcycle when he lost control and fell to the ground. You note a weakness in the upper limb muscles and you suspect a bilateral pelvic injury. Regarding the divisions of the brachial plexus, which of the following statements is INCORRECT?

a) The middle trunk is formed from the union of the C6 and C7 nerve roots.

b) The posterior trunk is formed from the union of the C5 and T1 nerve roots.

c) The lateral cords is formed from the anterior division of the subscapular and anterior cutaneous nerves.

d) The medial cord is a continuation of the anterior division of the ulnar nerve.

The posterior cord is formed from the posterior division of all three trunks.

Answer:

The posterior trunk is a continuation of the C8 root.

Notes:

The brachial plexus is formed by the union of the anterior rami of spinal nerves C5 - T1.

In the neck region, the roots of the brachial plexus can be formed into three trunks:

- A posterior branch (from the union of C8 and T1 nerve)
- A dorsal scapular nerve (to continuation of the C7 nerve)
- An anterior trunk (from the union of the C5 and T1 nerve)

While the posterior triangle of the neck, the trunks divide into anterior and posterior divisions.

Within the axilla, the divisions three trunks to form three cords (seeded by their division to the axillary artery):

- The lateral cord (from the anterior divisions of the superior and middle trunks)
- The medial cord (which is a continuation of the anterior division of the inferior trunk)
- The posterior cord (from the posterior division of all three trunks)

The cords give rise to the major branches of the brachial plexus.

Brachial plexus injuries are usually the result of blunt trauma producing nerve avulsion and disruption.

- Brachial plexus injury
  - Erich's palsy
    - Mechanism of injury: Excessive traction on the brachial plexus during birth or when a large object is dropped on the neck or arm.
    - Nerve roots affected: C5, C6, C7, T1
    - Muscles affected: All small muscles of the hand (flavo muscles in forearm innervated by brachial plexus nerve roots)
    - Treatment: None, may recover
  - Klumpke's palsy
    - Mechanism of injury: Excessive traction on the axillary plexus during birth or when a large object is dropped on the neck or arm.
    - Nerve roots affected: C8, T1
    - Muscles affected: All small muscles of the hand (flavo muscles in forearm innervated by brachial plexus nerve roots)
    - Treatment: Physical therapy, surgery

Klumpke's palsy affects nerves derived from the C8 or T1 nerve. It's much less common than Erich's palsy. It usually occurs from a sudden injury, usually an excessive traction on the arm or body, e.g., catching something overhead when falling, or during a childbirth. All small muscles of the hand are affected (flavo muscles) of the fingers. The flavo muscles are used to pick up and carry objects. The brachial plexus injury affects the elbow and fingers, but the arm is not paralyzed. In Erich's palsy, the elbow and fingers are paralyzed, but the arm is not paralyzed. The brachial plexus injury is more common in newborns and premature babies. The brachial plexus injury is usually caused by traction on the neck or shoulder during childbirth. The brachial plexus injury is more common in newborns and premature babies. The brachial plexus injury is more common in newborns and premature babies.

Resources:
- The First Vascular Surgery Fellowship
- The First Craniotomy Fellowship
- The First Endovascular Surgery Fellowship
- The First Neurosurgery Fellowship
- The First Orthopedic Surgery Fellowship
- The First Plastic Surgery Fellowship
- The First Thoracic Surgery Fellowship
- The First Urology Fellowship

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Anatomy: Shoulder and Arm

Question 74 of 125

A 20 year old patient attends ED having received a gunshot wound to his right arm. Following initial resuscitative measures, it is established that the patient has weakness of flexion and supination of his forearm. Which of the following clinical features is also likely to be seen on further examination:

- **Loss of opposition of the thumb**
- **Loss of flexion of the wrist**
- **Loss of flexion of the fingers**
- **Loss of sensation to the lateral arm**
- **Loss of sensation to the lateral forearm**

See Answer
Anatomy: Shoulder and Arm

Question 74 of 125

A 20 year old patient attends ED having received a gunshot wound to his right arm. Following initial resuscitative measures, it is established that the patient has weakness of flexion and supination of his forearm. Which of the following clinical features is also likely to be seen on further examination:

- a) Loss of opposition of the thumb
- b) Loss of flexion of the wrist
- c) Loss of flexion of the fingers
- d) Loss of sensation to the lateral arm
- e) Loss of sensation to the lateral forearm ✔

Answer

Weakness of flexion and supination of the forearm is likely due to injury of the musculocutaneous nerve which innervates the muscles of the anterior arm. Paralysis of the biceps brachii results in weakness of forearm flexion and supination and paralysis of the brachialis results in weakness of forearm flexion. The musculocutaneous nerve is not involved with movement of the wrist and fingers, but does supply cutaneous innervation to the lateral forearm.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 - C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
</tr>
</tbody>
</table>

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 - C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>

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- Emergency Medicine Journal
- LifeAfterAsthma
- Hazard Academy
- Patient.co.uk
Anatomy: Shoulder and Arm

A 45 year old woman is brought to ED having fallen down the stairs and injured her right arm. On examination she is unable to abduct her arm normally, and has weakness of lateral rotation. She has sensory loss over the lateral aspect of her upper arm. Which of the following injuries is most likely to produce this pattern of injury:

- **a** Midshaft humerus fracture
- **b** Surgical neck of humerus fracture
- **c** Fracture of the glenoid fossa
- **d** Fracture of the medial epicondyle
- **e** Fracture of the lateral border of the scapula
Anatomy: Shoulder and Arm

A 45 year old woman is brought to ED having fallen down the stairs and injured her right arm. On examination she is unable to abduct her arm normally, and has weakness of lateral rotation. She has sensory loss over the lateral aspect of her upper arm. Which of the following injuries is most likely to produce this pattern of injury?

a) Midshaft humerus fracture
b) Surgical neck of humerus fracture ✓
c) Fracture of the glenoid fossa
d) Fracture of the medial epicondyle
e) Fracture of the lateral border of the scapula

Answer

Damage to the axillary nerve will result in loss of abduction past about 15 degrees and weakness of lateral rotation due to paralysis of the deltoid and teres minor and loss of sensation over the regimensal badge area on the upper lateral arm. The axillary nerve is most likely injured in fracture of the surgical neck of the humerus due to its course where it winds around this region together with the posterior humeral circumflex vessels.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Posterior cord</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Deltoid, teres minor</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>The regimensal/badge area on the upper lateral arm via the superior lateral cutaneous nerve of the arm</td>
</tr>
</tbody>
</table>

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

The axillary nerve innervates the deltoid muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regimensal badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:

- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary crutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (teres minor) and loss of sensation over the regimensal badge area. In longstanding cases, there may be atrophy of the deltoid giving the shoulder a flattened appearance.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of axillary crutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abduction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regimensal badge area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoid - flattened shoulder appearance</td>
</tr>
</tbody>
</table>

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TraumaInfo
- Traumaburg
- Medlibrary
- Advanced Life Support Group
- Emergency Medicine Journal
- UKIrishtrauma
- Initial Anatomy
- Patient.co.uk
Anatomy: Shoulder and Arm

Question 76 of 125

A 64 year old woman presents to the ED following a motorcycle accident. Your consultant has diagnosed a brachial plexus injury with features of a radial nerve injury. The radial nerve contains nerve fibres from which of the following nerve roots:

a. C5 – T1  
b. C5 – C8  
c. C5, C6  
d. C8, T1  
e. C7 – T1

< Previous  Next >  See Answer  Something wrong?
A 35 year old woman was involved in a road traffic accident 8 weeks ago, where she suffered a fracture of the lateral border of the scapula. She presents to ED with weakness of medial rotation and adduction of her arm. Which of the following nerves is most likely to have been injured:

- a. Radial nerve
- b. Lower subscapular nerve
- c. Suprascapular nerve
- d. Musculocutaneous nerve
- e. Axillary nerve
Anatomy: Shoulder and Arm

Question 77 of 122

A 35-year-old woman was involved in a road traffic accident 8 weeks ago, where she suffered a fracture of the lateral border of the scapula. She presents to ED with weakness of medial rotation and adduction of her arm. Which of the following nerves is most likely to have been injured?

- a) Radial nerve
- b) Lower subcapsular nerve
- c) Suprascapular nerve
- d) Musculocutaneous nerve
- e) Axillary nerve

Answer

The lower subcapsular nerve innervates the teres major and the subscapularis muscles, which both act primarily to produce medial rotation of the arm (the teres major muscle also assists with abduction of the arm) at the glenohumeral joint. The musculocutaneous nerve innervates the muscles of the anterior arm (location of the arm and flexion and supination of the forearm). The radial nerve innervates the muscles of the posterior arm and forearm (extension of the forearm, wrist and fingers). The axillary nerve innervates the deltoid and the teres minor muscles (abduction and lateral rotation of the arm). The suprascapular nerve innervates the supraspinatus and infraspinatus muscles (abduction and lateral rotation of the arm).

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Teres major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Posterior surface of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation and adduction of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Lower subcapsular nerve (C5 – C7)</td>
</tr>
</tbody>
</table>

Muscle

Subscapularis

Proximal Attachment Subscapular fossa of scapula
Distal Attachment Lesser tubercle of scapula
Actions Medial rotation of shoulder
Innervation Upper and lower subcapsular nerves (C5 – C7)
Anatomy: Shoulder and Arm

Question 78 of 125

A 24 year old man presents following a seizure. He has severe epilepsy and regularly dislocates his left shoulder. He has dislocated his shoulder as a result of today’s seizure. On examination he reports loss of sensation over the regimental badge area, you therefore suspect an axillary nerve injury. The axillary nerve arises from which of the following cords of the brachial plexus:

1. Medial cord
2. Lateral cord
3. Posterior cord
4. Medial and lateral cord
5. Medial and posterior cord

< Previous  Next >  See Answer  Something wrong?

Question Navigator
1 Answered
2 Answered
3 Answered
4 Answered
5 Answered
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Shoulder and Arm

A 24 year old man presents following a seizure. He has severe epilepsy and regularly dislocates his left shoulder. He has dislocated his shoulder as a result of today’s seizure. On examination he reports loss of sensation over the regmental badge area, you therefore suspect an axillary nerve injury. The axillary nerve arises from which of the following cords of the brachial plexus:

a) Medial cord  
b) Lateral cord  
c) Posterior cord  ✔
d) Medial and lateral cord  
e) Medial and posterior cord

Answer

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Posterior cord</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Deltoit, teres minor</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>The regmental badge area on the upper lateral arm via the superior lateral cutaneous nerve of the arm</td>
</tr>
</tbody>
</table>

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

The axillary nerve innervates the deltoit muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regmental badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:

- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary crutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (teres minor) and loss of sensation over the regmental badge area. In longstanding cases, there may be atrophy of the deltoit giving the shoulder a flattened appearance.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of axillary crutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abduction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regmental badge area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoit – flattened shoulder appearance</td>
</tr>
</tbody>
</table>

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Resources

- The Royal College of Emergency Medicine
- Medipedia
- Advanced Trauma Life Support
- British Association for Emergency Medicine
- TroteMeAnatomy
- Traumaking
- Radiopaedia
- Emergency Medicine Journal
- Emergency Medicine Journal
- AdvanceLifeline
- Instant Anatomy
- Patients.co.uk
Anatomy: Shoulder and Arm

Question 79 of 125

You are asked to assess a 32 year old woman who presents with a five day history of fever and right arm swelling following a cat scratch. On examination you note she has supratrochlear lymphadenopathy. Regarding the supratrochlear lymph nodes, which one of the following statements is INCORRECT:

- a. The supratrochlear lymph nodes lie subcutaneously.
- b. The supratrochlear lymph nodes are located above the medial epicondyle.
- c. The supratrochlear lymph nodes lie medial to the basilic vein.
- d. The supratrochlear nodes may be enlarged in lymphoma.
- e. The supratrochlear lymph nodes drain the radial side of the forearm.

< Previous  Next  See Answer  Something wrong?  Clear Exam >
You are asked to assess a 32 year old woman who presents with a five day history of fever and right arm swelling following a cat scratch. On examination you note she has supraventricular lymphadenopathy. Regarding the supraventricular lymph nodes, which one of the following statements is INCORRECT:

a) The supraventricular lymph nodes lie subcutaneously.
b) The supraventricular lymph nodes are located above the medial epicondyle.
c) The supraventricular lymph nodes lie medial to the basilic vein.
d) The supraventricular nodes may be enlarged in lymphoma.
e) The supraventricular lymph nodes drain the radial side of the forearm.

Notes

The supraventricular lymph nodes lie subcutaneously above the medial epicondyle, medial to the basilic vein. They drain the ulnar side of the forearm and the medial hand. Differential diagnosis for enlarged lymph nodes includes skin infections, skin malignancies and lymphoma.

The 2 – 3 infraventricular (deltoidal) lymph nodes lie in the deltoidal groove inferior to the clavicle, located superiorly and posteriorly to the axillary artery. They primarily drain the radial side of the upper limb. Lymphadenopathy here is highly suspicious for non-Hodgkin’s lymphoma specifically, and for malignancy in general.

By Henry Vanderlei Carter (Public domain), via Wikimedia Commons
Anatomy: Shoulder and Arm

A 75 year old lady presents to ED complaining of pain in her shoulder following a fall onto an outstretched hand. Imaging shows dislocation of the acromioclavicular joint. Which of the following ligaments were most likely damaged in this injury:

- a. Coracoacromial and transverse scapular ligaments
- b. Coracoacromial and sternoclavicular ligaments
- c. Acromioclavicular and coracoacromial ligaments
- d. Acromioclavicular and coracoclavicular ligaments
- e. Coracoclavicular and coracoacromial ligaments

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 125

A 75 year old lady presents to ED complaining of pain in her shoulder following a fall onto an outstretched hand. Imaging shows dislocation of the acromioclavicular joint. Which of the following ligaments were most likely damaged in this injury:

a) Coracoclavicular and transverse scapulohumeral ligaments
b) Coracoclavicular and sternoclavicular ligaments

c) Coracoclavicular and coracoclavicular ligaments

d) Coracoclavicular and coracoclavicular ligaments

e) Coracoclavicular and coracoclavicular ligaments

Answer

The acromioclavicular joint is reinforced by two main ligaments: a small acromioclavicular ligament and a much larger coracoclavicular ligament.

Notes

<table>
<thead>
<tr>
<th>Joint</th>
<th>Acromioclavicular ligament</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Plane type synovial joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Lateral end of clavicle and acromion of scapula</td>
</tr>
<tr>
<td>Stabilising factors</td>
<td>Acromioclavicular ligament and coracoclavicular ligament</td>
</tr>
</tbody>
</table>

The acromioclavicular joint is a plane type synovial joint, occurring between the lateral end of the clavicle and the acromion of the scapula.

It is reinforced by two main ligaments: a small acromioclavicular ligament and a much larger coracoclavicular ligament. The strong coracoclavicular ligament (made up of two ligaments, the conoid and trapezoid ligament) is the main stabilising force, and essentially suspends the weight of the upper limb from the clavicle.

Dislocation of the acromioclavicular joint may result from a direct blow to the joint, a hand fall onto the shoulder or from a fall onto an outstretched upper limb. In acromioclavicular joint dislocation the acromion is forcibly pushed inferiorly and medially with respect to the clavicle, and becomes more prominent.

By Henry Vonlyde Carter (Public domain), via Wikimedia Commons

> Previous  Next >
Anatomy: Shoulder and Arm

Question 81 of 125

You are part of the trauma team caring for a 23 year old tree surgeon who has fallen approximately 7 metres from a tree. He tells you that as he fell he tried to grab a branch and his right arm was hyperextended. He now has a weakness to the hand muscles on this side. The trauma team leader suspects a brachial plexus injury. The brachial plexus is formed by the union of which spinal nerves:

a. Anterior rami of spinal nerves C4 - C8
b. Anterior rami of spinal nerves C7 - T3
c. Posterior rami of spinal nerves C5 - T1
d. Posterior rami of spinal nerves C4 - C8
e. Anterior rami of spinal nerves C5 - T1
Anatomy: Shoulder and Arm

Question 3 of 5

You are part of the trauma team caring for a 25 year old woman who has fallen approximately 7 meters from a tree. It is felt she has died on the fall and right now she is hypotensive. You must have an overview of the head and trunk injuries on this side. The trauma team leader suspects a brachial plexus injury. The brachial plexus is formed by the union of the roots of the spinal nerves:

- Anterior root of spinal nerves C4 - C6
- Anterior root of spinal nerves C7 - T1
- Posterior root of spinal nerves C5 - T1
- Posterior root of spinal nerves C6 - T6
- Anterior root of spinal nerves C5 - T5

Answer

The brachial plexus is formed by the union of the anterior root of spinal nerves C5 - T5.

Notes

The brachial plexus is formed by the union of the anterior root of spinal nerves C5 - T5.

In the thoracic area, the roots of the brachial plexus are as follows:

- A posterior trunk (from the union of C5, C6 and C7 roots)
- A lateral trunk (which is a continuation of the C5, C6 and C7 roots)
- An anterior trunk (from the union of C8 and T1 roots)

Within the posterior triangle of the neck, the trunk divides into anterior and posterior divisions.

Within the axilla, the divisions receive two major or three branches (named by their relations to the axillary artery):

- The lateral cord (lies in the anterior divisions of the posterior scapular nerves)
- The medial cord (branch of the posterior division of the posterior trunk)
- The posterior cord (from the posterior divisions of all three trunks)

These cords give rise to the major branches of the brachial plexus.

Brachial plexus injuries are usually the result of blunt trauma to the neck or shoulder, nerve avulsion and disruption.

Klumpke's palsy affects nerves derived from the C8 or T1 roots. It is much less common than Erb's palsy. It usually occurs from sudden excessive abduction or a pulling of the shoulder and arm backward, often from weight lifting or during efforts to free oneself from a fallen, heavy object. The result of this movement is that the brachial plexus is placed in traction. The pain is usually severe and may be accompanied by numbness, weakness, and loss of sensation in the arm and hand. The muscles supplied by the affected nerves are paralyzed, and the arm is held down at the side. These muscles include the deltoid, biceps, brachialis, and brachioradialis, as well as some of the muscles of the forearm and hand.

Erb's palsy afflicts nerves derived from the C5 to T1 roots. It is even rarer than Klumpke's palsy and occurs in children. It usually results from excessive movement of the shoulders or arm during childbirth, often due to the pressure of the head and shoulder against the perineum during delivery. The result is a decrease in the range of motion of the shoulder and arm, as well as weakness and atrophy of the muscles supplied by the affected nerves. The arm is usually held at the side, and the hand is clenched.
Anatomy: Shoulder and Arm

Question 82 of 125

You have been asked to give a tutorial on C-spine injuries to a group of final year medical students. You decide to run through the anatomical landmarks that are best used to test each dermatome. The C5 dermatome is best tested at which of the following landmarks:

- On the lateral antecubital fossa
- On the medial antecubital fossa
- On the thumb
- On the little finger
- At the apex of the axilla

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 61 of 125

You have been asked to give a tutorial on C-spine injuries to a group of final year medical students. You decide to run through the anatomical landmarks that are best used to test each dermome. The C5 dermome is best tested at which of the following landmarks:

1. On the lateral scapular fossa
2. On the medial scapular fossa
3. On the thumb
4. On the little finger
5. At the apex of the auricle

Answer

The C5 dermome is best tested on the lateral (radial) side of the scapular fossa just proximal to the elbow.

Notes

<table>
<thead>
<tr>
<th>Dermome</th>
<th>Landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Occipital Protuberence</td>
</tr>
<tr>
<td>C3</td>
<td>Supravacuicular Fossa</td>
</tr>
<tr>
<td>C4</td>
<td>Acromioacicale Joint</td>
</tr>
<tr>
<td>C5</td>
<td>Lateral Antebrachial Fossa</td>
</tr>
<tr>
<td>C6</td>
<td>Thumb</td>
</tr>
<tr>
<td>C7</td>
<td>Middle Finger</td>
</tr>
<tr>
<td>C8</td>
<td>Little Finger</td>
</tr>
<tr>
<td>T1</td>
<td>Medial Antebrachial Fossa</td>
</tr>
<tr>
<td>T2</td>
<td>Apex of Auricle</td>
</tr>
</tbody>
</table>

- The C2 dermome is best tested at least one cm lateral to the occipital protuberance at the base of the skull. Alternately, it can be located at least 3 cm behind the ear.
- The C3 dermome is best tested in the supravacular fossa, at the mid-scalene line.
- The C4 dermome is best tested over the acromioacicale joint.
- The C5 dermome is best tested on the lateral (radial) side of the scapular fossa just proximal to the elbow.
- The C6 dermome is best tested on the dorsal surface of the proximal phalanx of the thumb.
- The C7 dermome is best tested on the dorsal surface of the proximal phalanx of the middle finger.
- The C8 dermome is best tested on the dorsal surface of the proximal phalanx of the little finger.
- The T1 dermome is best tested on the medial (ulnar) side of the scapular fossa, just proximal to the medial epicondyle of the humerus.
- The T2 dermome is best tested at the apex of the auricle.

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Anatomy: Shoulder and Arm

A 67 year old man is brought into the ED following a road traffic collision. His primary survey is normal and you proceed to complete a secondary survey. You note he is tender over the distal left pectoralis muscle. The pectoralis major muscle is attached distally to which of the following structures:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Intertubercular sulcus of the humerus</td>
</tr>
<tr>
<td>b</td>
<td>Coracoid process</td>
</tr>
<tr>
<td>c</td>
<td>Acromion process</td>
</tr>
<tr>
<td>d</td>
<td>Greater tubercle of the humerus</td>
</tr>
<tr>
<td>e</td>
<td>Lesser tubercle of the humerus</td>
</tr>
</tbody>
</table>

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm
Question 8 of 135

A 67 year old man is brought into the ED following a road traffic collision. His primary survey is normal and you proceed to complete a secondary survey. You note he is tender over the distal lateral pectoralis muscle. The pectoralis major muscle is attached distally to which of the following structures:

a) Intertubercular sulcus of the humerus
b) Coneal process
c) Acromion process
d) Greater tubercle of the humerus
e) Lesser tubercle of the humerus

Answer
The pectoralis major has two heads: the clavicular head attaching to the medial half of the clavicle and the sternocostal head attaching to the upper seven costal cartilages and to the anterior surface of the sternum. Distally, fibres from both heads attach to the lateral lip of the intertubercular sulcus of the humerus.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Pectoralis major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Medial half of clavicle (clavicular head), upper seven costal cartilages and anterior surface of sternum (sternocostal head)</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Flexion, adduction and medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Medial and lateral pectoral nerves (CS – T1)</td>
</tr>
</tbody>
</table>

The pectoralis major is the largest and most superficial muscle of the anterior wall. Its inferior margin underlies the anterior axillary fold, which marks the anteroinferior border of the axilla.

It has two heads: the clavicular head attaching to the medial half of the clavicle and the sternocostal head attaching to the upper seven costal cartilages and to the anterior surface of the sternum. Distally, fibres from both heads attach to the lateral lip of the intertubercular sulcus of the humerus.

The pectoralis major is innervated by the medial and lateral pectoral nerves (CS – T1) which originate from the brachial plexus in the axilla.

The pectoralis major acts to flex, adduct and medially rotate the arm at the glenohumeral joint.
Anatomy: Shoulder and Arm

You are examining the left shoulder of a woman who complains of progressive weakness in the left arm. On examination you detect a weakness in the trapezius muscle. The trapezius muscle predominantly acts to produce which of the following movements:

a. Elevation of the scapula
b. Elevation and protraction of the scapula
c. Depression of the scapula and extension of the humerus
d. Depression and protraction of the scapula
e. Depression of the scapula and flexion of the humerus
Anatomy: Shoulder and Arm

Question 01 of 23

You are examining the left shoulder of a woman who complains of progressive weakness in the left arm. On examination you detect a weakness in the trapezius muscle. The trapezius muscle predominantly acts to produce which of the following movements:

a) Elevation of the scapula
b) Elevation and protraction of the scapula
c) Depression of the scapula and extension of the humerus
d) Depression and retraction of the scapula
e) Depression of the scapula and rotation of the humerus

Answer

The trapezius is a powerful elevator of the scapula. The upper fibres of the trapezius muscle elevate the scapula and rotate it during abduction of the arm above horizontal. The middle fibres retract the scapula and the lower fibres depress the scapula.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Trapezius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal</td>
<td>Superior nuchal line, external occipital protuberance, ligamentum nuchae, spinous process of C7–T12</td>
</tr>
<tr>
<td>Attachment</td>
<td>Superior nuchal line, external occipital protuberance, ligamentum nuchae, spinous process of C7–T12</td>
</tr>
<tr>
<td>Distal</td>
<td>Spine of the scapula, acromion and lateral third of clavicle</td>
</tr>
<tr>
<td>Attachment</td>
<td>Spine of the scapula, acromion and lateral third of clavicle</td>
</tr>
<tr>
<td>Actions</td>
<td>Elevation of scapula, rotation of scapula during shoulder abduction, retraction and depression of scapula</td>
</tr>
<tr>
<td>Innervation</td>
<td>Scapular nerve</td>
</tr>
</tbody>
</table>

The trapezius muscle is responsible for the smooth contour of the lateral side of the neck and over the superior aspect of the shoulder.

The trapezius muscle has an extensive origin, originating from the skull, the ligamentum nuchae and the spinous processes of the C7–T12 vertebrae. Distally, it attaches to the anterior border of the lateral third of the clavicle, the acromion and the spine of the scapula.

The trapezius is innervated by the spinal part of the accessory nerve (motor supply) and the anterior rami of C3 and C4 (sensory supply). The accessory nerve can be evaluated by testing the function of the trapezius muscle, most easily performed by asking the patient to shrug against resistance.

The trapezius is a powerful elevator of the scapula. The upper fibres of the trapezius muscle elevate the scapula and rotate it during abduction of the arm above horizontal. The middle fibres retract the scapula and the lower fibres depress the scapula.
Anatomy: Shoulder and Arm

A 68 year old lady was involved in a road traffic accident and describes a whiplash type injury. She has pain and tenderness in the cervical region and imaging shows a herniated disc in this region. The patient is complaining of weakness of elbow extension and loss of sensation over the middle finger. Which of the following spinal nerves is most likely affected:

a) C5
b) C6
c) C7
d) C8
e) C9

Question Navigator

1 Answered
2 Answered
3 Answered
4 Answered
5 Answered
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Clear Exam
Anatomy: Shoulder and Arm

Question 1 of 10

A 68-year-old lady was involved in a road traffic accident and describes a whipping type injury. She has pain and tenderness in the cervical region and imaging shows a herniated disc in this region. The patient is complaining of weakness of elbow extension and loss of sensation over the middle finger. Which of the following spinal nerves is most likely affected?

a) C5
b) C6
c) C7

d) C8
e) T1

Answer

Elbow extension is a predominant function of the C7 spinal nerve root, which also supplies sensation to the skin over the middle of the hand. The important Anatomies are shown below.

Notes

<table>
<thead>
<tr>
<th>Dermatome</th>
<th>Landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Occipital Protubrence</td>
</tr>
<tr>
<td>C3</td>
<td>Supraclavicular Fossa</td>
</tr>
<tr>
<td>C4</td>
<td>Axillary/Bicuspid Joint</td>
</tr>
<tr>
<td>C5</td>
<td>Lateral Axillary Fossa</td>
</tr>
<tr>
<td>C6</td>
<td>Thumb</td>
</tr>
<tr>
<td>C7</td>
<td>Middle Finger</td>
</tr>
<tr>
<td>C8</td>
<td>Little Finger</td>
</tr>
<tr>
<td>T1</td>
<td>Medial Antecubital Fossa</td>
</tr>
<tr>
<td>T2</td>
<td>Apex of Axilla</td>
</tr>
</tbody>
</table>

- The C2 dermatome is best tested at least one cm lateral to the occipital protubrence at the base of the skull. Alternatively, it can be located at least 3 cm behind the ear.
- The C3 dermatome is best tested in the supraclavicular fossa, at the midscapular line.
- The C4 dermatome is best tested over the axillary/bicuspid joint.
- The C5 dermatome is best tested on the lateral (radial) side of the antebrachial fossa just proximal to the elbow.
- The C6 dermatome is best tested on the dorsal surface of the proximal phalanges of the thumb.
- The C7 dermatome is best tested on the dorsal surface of the proximal phalanges of the middle finger.
- The C8 dermatome is best tested on the dorsal surface of the proximal phalanges of the little finger.
- The T1 dermatome is best tested on the medial (ulnar) side of the antebrachial fossa, just proximal to the medial epicondyle of the humerus.
- The T2 dermatome is best tested at the apex of the axilla.

By Grant, J. Charles Belisle (Art of anatomy / by regions. 1962) [Public domain], via Wikimedia Commons
Anatomy: Shoulder and Arm

A 43 year old woman has presented to the ED in distress. She tells you she has found a new lump in her left breast. She is new to the area and has not registered with a GP, she is concerned about breast cancer and is seeking advice. As part of your examination you decide to check for lymphadenopathy. Which of the following groups of lymph nodes receive the majority of lymph from breast tissue:

- a. Axillary nodes
- b. Parasternal nodes
- c. Posterior intercostal nodes
- d. Subdiaphragmatic nodes
- e. Infracavicular nodes

< Previous  Next >  See Answer
Anatomy: Shoulder and Arm

Question 86 of 135

A 43 year old woman has presented to the ED in distress. She tells you she has found a new lump in her left breast. She is new to the area and has not registered with a GP; she is concerned about breast cancer and is seeking advice. As part of your examination you decide to check for lymphadenopathy. Which of the following groups of lymph nodes receive the majority of lymph from breast tissue:

a) Axillary nodes
b) Parasternal nodes
c) Posterior intercostal nodes
d) Subdiaphragmatic nodes
e) Infractacuicular nodes

Answer

Approximately 75% of lymph drainage from the breast is via lymphatic vessels that drain laterally and superiorly into axillary nodes.

Notes

The lymphatic drainage of the breast is of great clinical importance due to its role in the metastasis of breast cancer cells.

There are three main groups of lymph nodes that receive lymph from breast tissue: the axillary nodes (75%), parasternal nodes (20%) and posterior intercostal nodes (5%).

- Approximately 75% is via lymphatic vessels that drain laterally and superiorly into axillary nodes.
- Most of the remainder is into medial parasternal lymph nodes, which lie deep to the anterior thoracic wall associated with the internal thoracic artery.
- Some drainage may follow the lateral branches of posterior intercostal arteries and connect with intercostal nodes situated near the heads and necks of ribs.

Axillary nodes drain into the subclavian trunks, parasternal nodes drain into the brachiocephalic trunks and intercostal nodes drain either into the thoracic duct or into the brachiocephalic trunks.

By Henry Vandyke Carter [Public domain], via Wikimedia Commons
Anatomy: Shoulder and Arm

Question 87 of 125

A 79 year old lady tripped on a curb and landed on her outstretched hand. Imaging shows a fracture of the surgical neck of the humerus. Which of the following structures are most likely injured in this type of injury:

a. Radial nerve and axillary nerve
b. Axillary nerve and posterior humeral circumflex artery
c. Axillary nerve and deep brachial artery
d. Axillary nerve and cephalic vein
e. Radial nerve and ulnar nerve

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

Question 87 of 125

A 79 year old lady tripped on a curb and landed on her outstretched hand. Imaging shows a fracture of the surgical neck of the humerus. Which of the following structures are most likely injured in this type of injury:

a) Radial nerve and axillary nerve
b) Axillary nerve and posterior humeral circumflex artery
  ✔
c) Axillary nerve and deep brachial artery
d) Axillary nerve and cephalic vein
e) Radial nerve and ulnar nerve

Answer

The axillary nerve and the posterior humeral circumflex artery are most susceptible in this type of injury.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
</tr>
<tr>
<td>Plexus cords</td>
<td></td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Detoid, teres minor</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>The regemental badge area on the upper lateral cutaneous nerve of the arm</td>
</tr>
</tbody>
</table>

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

The axillary nerve innervates the deltoid muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regemental badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:

- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary crutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (teres minor) and loss of sensation over the regemental badge area. In longstanding cases, there may be atrophy of the deltoid giving the shoulder a flattened appearance.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of axillary crutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abduction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regemental badge area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoid – flattened shoulder appearance</td>
</tr>
</tbody>
</table>

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Emergency Medicine Journal
LifelineUK
Instant Anatomy
Patient.co.uk

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Anatomy: Shoulder and Arm

Question 88 of 125

A 21 year old gymnast fell from overhead bars during a competition but managed to grab hold of the bar with her left arm, breaking her fall. She is complaining of pain and weakness in her arm, and imaging demonstrates injury to the C8 and T1 spinal nerve roots. Sensory loss would be expected in part of the limb supplied by which of the following nerves:

- a) Lateral supraclavicular nerve
- b) Superior lateral cutaneous nerve of the arm
- c) Medial antebrachial nerve
- d) Posterior cutaneous nerve of the arm
- e) Intercostobrachial nerve

< Previous  Next >  See Answer  Something wrong?  Clear Exam
A patient presents following a road traffic collision. MRI imaging shows C7 – T1 disc herniation with C8 nerve root impingement. Where would the patient most likely complain of loss of sensation:

- Thumb
- Middle finger
- Little finger
- Lateral forearm
- Apex of axilla
Anatomy: Shoulder and Arm

Question 8 of 125
A patient presenting with a road traffic collision. MRI imaging shows C7 - T1 disc herniations with C8 nerve root impingement. Where would the patient most likely complain of loss of sensation?

a) Thumb
b) Middle finger
c) Little finger

d) Lateral thumb

e) Apex of axilla

Answer
The C8 dermatome extends over the medial arm, forearm and hand area. It is best tested on the little finger. The C8 nerve root is also responsible for sensation of the fingers.

Notes

- The C2 dermatome is best tested at least one cm lateral to the occipital protuberance at the base of the skull. Alternatively, it can be located at least 3 cm behind the ear.
- The C3 dermatome is best tested in the supraclavicular fossa, on the midsagittal line.
- The C4 dermatome is best tested over the acromio-clavicular joint.
- The C5 dermatome is best tested on the lateral (radial) side of the antecubital fossa just proximal to the elbow.
- The C6 dermatome is best tested on the dorsal surface of the proximal phalanges of the thumb.
- The C7 dermatome is best tested on the dorsal surface of the proximal phalanges of the middle finger.
- The C8 dermatome is best tested on the dorsal surface of the proximal phalanges of the little finger.
- The T1 dermatome is best tested on the medial (ulnar) side of the antecubital fossa just proximal to the medial epicondyle of the humerus.
- The T2 dermatome is best tested at the apex of the axilla.

By Grant, John Charles Bulloch (via atlas of anatomy; 1942) (Public domain), via Wikimedia Commons

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Anatomy: Shoulder and Arm

A 59 year old man presents to the ED complaining of pain and weakness in his left shoulder. You note his medial rotation and extension of the shoulder is weak, you suspect this is due to weakness of the teres major. The teres major muscle is attached to which of the following structures:

- a. Inferior aspect of the scapula and the intertubercular sulcus of the humerus
- b. Spine of the scapula and the intertubercular sulcus of the humerus
- c. Anterior surface of the scapula and the greater tubercle of the humerus
- d. Posterior surface of the scapula and the lesser tubercle of the humerus
- e. Inferior aspect of the scapula and the greater tubercle of the humerus

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

Question 90 of 135

A 59 year old man presents to the ED complaining of pain and weakness in his left shoulder. You note his medial rotation and extension of the shoulder is weak, you suspect this is due to weakness of the teres major. The teres major muscle is attached to which of the following structures:

- a) Inferior aspect of the scapula and the intertubercular sulcus of the humerus
- b) Spine of the scapula and the intertubercular sulcus of the humerus
- c) Anterior surface of the scapula and the greater tubercle of the humerus
- d) Posterior surface of the scapula and the lesser tubercle of the humerus
- e) Inferior aspect of the scapula and the greater tubercle of the humerus

Answer

The teres major originates from the posterior surface of the inferior angle of the scapula and inserts into the medial lip of the intertubercular sulcus of the humerus.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Teres major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Posterior surface of Inferior angle of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation and extension of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Lower subscapular nerve (C5 - C7)</td>
</tr>
</tbody>
</table>

The teres major muscle passes from the inferior angle of the scapula to the upper humerus and contributes to the posterior axillary skin fold laterally.

The teres major originates from the posterior surface of the inferior angle of the scapula and inserts into the medial lip of the intertubercular sulcus of the humerus.

It is innervated by the lower subscapular nerve (C5, C6).

It acts to extend and medially rotate the arm at the glenohumeral joint.
Anatomy: Shoulder and Arm

A 38 year old man is brought into the ED following an altercation with another male, during which he has suffered a laceration to the right pectoral region. He is complaining of difficulty moving his shoulder and you suspect a nerve injury. The pectoralis major muscle is innervated by which of the following nerves:

a. Axillary nerve
b. Spinal accessory nerve
c. Thoracodorsal nerve
d. Long thoracic nerve
e. Pectoral nerves
Anatomy: Shoulder and Arm

Question 95 of 135

A 38 year old man is brought into the ED following an altercation with another male, during which he has suffered a laceration to the right pectoral region. He is complaining of difficulty moving his shoulder and you suspect a nerve injury. The pectoralis major muscle is innervated by which of the following nerves:

- Axillary nerve
- Spinal accessory nerve
- Thoracodorsal nerve
- Long thoracic nerve
- Pectoral nerve

Answer

The pectoralis major is innervated by the medial and lateral pectoral nerves (CS - TI) which originate from the brachial plexus in the axilla.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Pectoralis major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Medial half of clavicle (clavicular head), upper seven costal cartilages and anterior sternum (sternocostal head)</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Flexion, abduction and medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Medial and lateral pectoral nerves (CS - TI)</td>
</tr>
</tbody>
</table>

The pectoralis major is the largest and most superficial muscle of the anterior wall. Its inferior margin underlies the anterior axillary fold, which marks the anterolateral border of the axilla.

It has two heads: the clavicular head attaching to the medial half of the clavicle and the sternocostal head attaching to the upper seven costal cartilages and to the anterior surface of the sternum. Distally, fibres from both heads attach to the lateral lip of the intertubercular sulcus of the humerus.

The pectoralis major is innervated by the medial and lateral pectoral nerves (CS - TI) which originate from the brachial plexus in the axilla.

The pectoralis major acts to flex, adduct and medially rotate the arm at the glenohumeral joint.

Modified by FRCEM Success. Original by Henry Vandyke Carter (Public domain), via Wikimedia Commons.
Anatomy: Shoulder and Arm

A 36 year old builder is brought into the ED after falling through a roof on a construction site. He landed flat on his back from a height of 3 metres. Full ATLS protocol has been followed. He complains of pain in his thoracic back and CT scan reveals a fracture of the T2 vertebra. The T2 dermatome is best tested at which of the following landmarks:

- a. In the supraclavicular fossa, at the midclavicular line
- b. At the apex of the axilla
- c. At the level of the nipples in the midclavicular line
- d. Over the acromioclavicular joint
- e. Over the little finger
Anatomy: Shoulder and Arm

A 36 year old builder is brought into the ED after falling through a roof on a construction site. He landed flat on his back from a height of 3 metres. Full ATLS protocol has been followed. He complains of pain in his thoracic back and CT scan reveals a fracture of the T2 vertebrae. The T2 dermatome is best tested at which of the following landmarks:

a) In the supravacular fossa, at the midclavicular line
b) At the apex of the axilla

c) At the level of the nipples in the midclavicular line

d) Over the acromioclavicular joint

e) Over the little finger

Answer

The T2 dermatome is best tested at the apex of the axilla.

Notes

<table>
<thead>
<tr>
<th>Dermatome</th>
<th>Landmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Occipital Protuberance</td>
</tr>
<tr>
<td>C3</td>
<td>Supravacular Fossa</td>
</tr>
<tr>
<td>C4</td>
<td>Acromioclavicular Joint</td>
</tr>
<tr>
<td>C5</td>
<td>Lateral Antecubital Fossa</td>
</tr>
<tr>
<td>C6</td>
<td>Thumb</td>
</tr>
<tr>
<td>C7</td>
<td>Middle Finger</td>
</tr>
<tr>
<td>C8</td>
<td>Little Finger</td>
</tr>
<tr>
<td>T1</td>
<td>Medial Antecubital Fossa</td>
</tr>
<tr>
<td>T2</td>
<td>Apex of Axilla</td>
</tr>
</tbody>
</table>

- The C2 dermatome is best tested at least one cm lateral to the occipital protuberance at the base of the skull. Alternatively, it can be located at least 3 cm behind the ear.
- The C3 dermatome is best tested in the supravacular fossa, at the midclavicular line.
- The C4 dermatome is best tested over the acromioclavicular joint.
- The C5 dermatome is best tested on the lateral (valid) side of the antecubital fossa just proximal to the elbow.
- The C6 dermatome is best tested on the dorsal surface of the proximal phalanges of the thumb.
- The C7 dermatome is best tested on the dorsal surface of the proximal phalanges of the middle finger.
- The C8 dermatome is best tested on the dorsal surface of the proximal phalanges of the little finger.
- The T1 dermatome is best tested on the rib head 3 cm lateral to the antecubital fossa, just proximal to the medial epicondyle of the humerus.
- The T2 dermatome is best tested at the apex of the axilla.
Anatomy: Shoulder and Arm

A patient attends ED following a fall off a mountain bike during a trail ride onto his shoulder and arm. He is complaining of weakness of his left arm. On examination he has weakness of lateral rotation of his arm at his shoulder joint. Which of the following muscles is most likely to be affected:

- a) Supraspinatus
- b) Teres major
- c) Infraspinatus
- d) Subscapularis
- e) Coracobrachialis
Anatomy: Shoulder and Arm

Question 93 of 125

A patient attends ED following a fall off a mountain bike during a trail ride onto his shoulder and arm. He is complaining of weakness of his left arm. On examination he has weakness of lateral rotation of his arm at his shoulder joint. Which of the following muscles is most likely to be affected:

a) Supraspinatus
b) Teres major
c) **Infraspinatus**
d) Subscapularis
e) Coracobrachialis

Answer

The infraspinatus (innervated by the suprascapular nerve) acts to laterally rotate the arm at the shoulder joint together with the teres minor (innervated by the axillary nerve). The subscapularis and the teres major act to medially rotate the arm. The supraspinatus acts to abduct the arm to about 55 degrees. The infraspinatus acts to flex the arm.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Infraspinatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Lateral rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Suprascapular nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Tested with the teres minor – position the patient with their arm adducted with the elbow flexed to 90 degrees and ask them to laterally rotate the arm</td>
</tr>
</tbody>
</table>

The infraspinatus is part of the rotator cuff group.

It is innervated by the suprascapular nerve (C5, C6).

It acts to laterally rotate the arm at the glenohumeral joint, together with the teres minor.

The infraspinatus is assessed by testing lateral rotation against resistance, with the arm adducted and the elbow flexed to 90 degrees.
Anatomy: Shoulder and Arm

Question 94 of 125

You are part of the trauma team caring for a 23 year old female who was extracted from a car following a head on collision with another vehicle. She is complaining of pain in her neck. You perform a brief assessment of the neurology in her upper limbs and note loss of sensation to the lateral palm. The median nerve contains nerve fibres from which of the following nerve roots:

a. C5 - C7
b. C5 - T1
c. C7 - T1
d. C5 - C8
e. C6, C7

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 95 of 125

A patient presents to ED with an anterior shoulder dislocation sustained while playing rugby. Following successful reduction, he is unable to abduct his arm from his side. Which of the following muscles has most likely been affected:

- a) Infraspinatus
- b) Subscapularis
- c) Supraspinatus
- d) Teres major
- e) Teres minor

Answer

The supraspinatus is the most commonly injured rotator cuff muscle. The supraspinatus muscle acts to initiate abduction from 0 degrees, and then assists the deltoid with continued abduction.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Supraspinatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Initiation of abduction of shoulder to 15 degrees (and then assistance of deltoid with continued abduction)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Suprascapular nerve (C5, C6)</td>
</tr>
<tr>
<td>Examination</td>
<td>Empty can test - position the patient in the empty can position and ask the patient to forward flex the arm OR test abduction of the arm starting from complete adduction</td>
</tr>
</tbody>
</table>

The supraspinatus is part of the rotator cuff group of muscles.

It is innervated by the suprascapular nerve (C5 - C6).

It acts to initiate abduction of the arm to 15 degrees and then assists the deltoid with continued abduction to 90 degrees.

The two main disorders of the rotator cuff are impingement and tendinopathy. The supraspinatus muscle is the most commonly injured rotator cuff muscle as it passes beneath the acromion and the acromioclavicular ligament. This space is fixed, therefore any swelling of the supraspinatus muscle, excessive fluid in the subacromial/subdeltoid bursa or subacromial bony spurs, may produce significant impingement when the arm is abducted. The blood supply to the supraspinatus tendon is relatively poor and the tendon is susceptible to degenerative change, which in turn, makes it more susceptible to trauma and partial or full thickness tears may occur. This will result in painful or weak abduction of the arm at the shoulder.

The supraspinatus muscle can be assessed by either testing abduction of the arm against resistance, starting from complete adduction, or using the ‘empty can’ test. The ‘empty can’ test can be performed by positioning the patient with the arm in 90 degrees of forward flexion, in the plane of the scapula (approximately 30 degrees of abduction) and in full internal rotation with the thumb pointing down (as if emptying a can). The patient is asked to forward flex their arm against resistance, and the test is considered positive if there is significant pain and/or weakness.

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- Trauma Care Europe
- TraumaCare
- Rotator cuff

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Anatomy: Shoulder and Arm

Question 96 of 125

You are asked to review a 23 year old woman who presents to ED after a road traffic collision a few hours earlier. She describes crashing head on into a wall at a low speed. She self extricated and aside from some pain in her neck felt well. The pain in her neck has increased over the last few hours. On examination you note weakness in her right hand and loss of sensation to the medial half of the palm. You suspect an ulnar nerve injury. The ulnar nerve receives fibres from which of the following nerve roots:

a) C5 - T1
b) C7, C8
c) C5 - C7
d) C8 - T1
e) C5, C6
Anatomy: Shoulder and Arm

Question 97 of 125

A 72 year old man presents to the Emergency Department complaining of pain in his legs on exertion. The pain is eased with rest, you suspect intermittent claudication. You plan to perform a vascular examination. The brachial pulse can be best palpated at which of the following sites:

- (a) In the antecubital fossa, medial to the tendon of the biceps brachii
- (b) In the antecubital fossa, lateral to the tendon of the biceps brachii
- (c) In the anterior arm, medial to the brachialis muscle
- (d) In the posterior arm, superior to the medial epicondyle
- (e) In the posterior arm, superior to the lateral epicondyle
A 72 year old man presents to the Emergency Department complaining of pain in his leg on exertion. The pain is eased with rest, you suspect intermittent claudication. You plan to perform a vascular examination. The brachial pulse can be best palpated at which of the following sites:

a) In the antecubital fossa, medial to the tendon of the biceps brachii
b) In the antecubital fossa, lateral to the tendon of the biceps brachii
c) In the anterior arm, medial to the brachial artery
d) In the posterior arm, superior to the medial epicondyle
e) In the posterior arm, superior to the lateral epicondyle

Answer
In the antecubital fossa, the brachial artery can be palpated immediately medial to the tendon of the biceps brachii muscle.

Notes
The brachial artery is a continuation of the axillary artery, beginning at the lower border of the teres major muscle and ending just distal to the elbow joint where it bifurcates into the radial and ulnar arteries. In the proximal arm, the brachial artery lies on the medial side. In the distal arm, it lies laterally to assume a position midway between the lateral and medial epicondyle of the humerus, before crossing anteriorly to the elbow joint.

The brachial artery is palpable along its length in the proximal arm. It can be compressed against the medial humerus and in the antecubital fossa it may be palpated immediately medial to the tendon of the biceps brachii muscle.

The brachial artery gives rise to numerous branches including:
- the profunda brachii (deep brachial) artery
- muscular branches
- nutrient branches
- axillary collateral branches
- terminal branches (radial and ulnar arteries)

The brachial artery is accompanied by venous companions.
Anatomy: Shoulder and Arm

A 19 year old student fell asleep after a night of drinking with his arm hanging over the back of a chair. He presents to ED complaining of an inability to extend his wrist or fingers. Which of the following structures has most likely been injured:

- a. Musculocutaneous nerve
- b. Axillary nerve
- c. Radial nerve
- d. Lateral cord of the brachial plexus
- e. Medial cord of the brachial plexus
Anatomy: Shoulder and Arm

Question 99 of 125

Your consultant asks you to examine a patient he has seen. He suspects he may have a traumatic musculocutaneous nerve injury. The musculocutaneous nerve supplies which of the following groups of muscles:

- a. Anterior compartment of arm
- b. Posterior compartment of arm
- c. Anterior compartment of forearm
- d. Posterior compartment of forearm
- e. Rotator cuff muscles
Anatomy: Shoulder and Arm

Your consultant asks you to examine a patient he has seen. He suspects he may have a traumatic musculocutaneous nerve injury. The musculocutaneous nerve supplies which of the following groups of muscles:

a) Anterior compartment of arm ✓
b) Posterior compartment of arm
c) Anterior compartment of forearm
d) Posterior compartment of forearm
e) Rotator cuff muscles

Answer

The musculocutaneous nerve innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis).

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 - C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
</tr>
</tbody>
</table>

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 - C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the biceps brachii and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>
Anatomy: Shoulder and Arm

Question 100 of 125

You have been asked to give a teaching session regarding the brachial plexus to a group of final year medical students. Regarding Klumpke's palsy, which one of the following statements is CORRECT:

a. Klumpke's palsy affects nerves derived from the C7 or C8 nerve roots.

b. Klumpke's palsy is much more common than Erb's palsy.

c. Klumpke's palsy commonly results from a sudden excessive increase in the angle between the neck and the shoulder.

d. Klumpke's palsy may result in the characteristic 'claw hand' appearance.

e. Klumpke's palsy results in loss or weakness of wrist flexion.

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question: 1.3.10

You have been asked to give a teaching session regarding the brachial plexus. You have a group of five medical students. Regarding Klumpke’s palsy, which of the following statement(s) is/are correct?

a) Klumpke’s palsy affects exclusively the roots of the C7-T1 nerves.
   - Correct
   - Incorrect

b) Klumpke’s palsy is much more common than Erb’s palsy.
   - Correct
   - Incorrect

2. Klumpke’s palsy commonly results from an sudden excessive increase in the angle between the neck and the shoulder.
3. Klumpke’s palsy may result in the characteristic ‘claw hand’ appearance.
4. Klumpke’s nerve roots lack a weakness of wrist function.

Answer

Klumpke’s palsy affects exclusively the roots of the C8-T1 nerves. It is much less common than Erb’s palsy. It usually results from sudden excessive abduction of the arm, which is something unexpected when falling, or during a difficult birth. All the medial roots of the arm are affected if the nerve roots of the brachial plexus are operated in the arm as a result of their root to the spinal cord. The characteristic ‘claw hand’ appearance, where the musculocutaneous nerve is hypotheonded, and the radial and ulnar (shingles) roots are intact.

Notes

The brachial plexus is formed by the union of the anterior roots of spinal nerves C5 – T1.

In the internal neck, the roots of the brachial plexus form three trunks:

- A lateral trunk (from the anterior rami of C5 and C6 nerves)
- A ventral trunk (situated in the posterior of the C7 nerves)
- An anterior trunk (located the chest and T1 nerves)

Within the posterior triangle of the neck, the trunks divide into anterior and posterior divisions.

In the axilla, the divisions then merge to form three cords (labeled in relation to the anterior arm):

- The lateral cord (from the anterior divisions of the spine and the radial trunk)
- The medial cord (a combination of anterior division of the lateral trunk)
- The posterior cord (from the posterior divisions of all three trunks)

The cords give rise to the major branches of the brachial plexus.

Brachial plexus injury

Fibrous palsy

Klumpke’s palsy

Mechanisms of injury

Excessive increase in angle between neck and shoulder e.g. during birth or when the arm is unexpectedly raised.

Sudden excessive abduction i.e. pulling on the arm, sometimes when falling or during a difficult birth.

Nerves affected

C8-T1

Muscles affected

Abductor pollicis, flexor pollicis, opponens pollicis, and abductor digiti.

Muscles affected

Suprascapular, infraspinatus, subscapular, teres minor, infraspinatus, biceps, brachialis, brachioradialis, and flexor muscles as their nerve is exposed and compressed.

Motor loss

Abduction, flexion, and lateral rotation of arm, flexion and supination of forearm.

Sensory loss

Lateral arm

Dermatome

Medial arm

Abduction, flexion, and lateral rotation of arm, flexion and supination of the forearm, loss of sensation on the lateral side of the arm. A characteristic ‘claw hand’ appearance, where the musculocutaneous nerve is hypotethonded, and the radial and ulnar (shingles) roots are intact.

Klumpke’s palsy affects exclusively the roots of the C8-T1 nerves. It is much less common than Erb’s palsy, which usually occurs from sudden excessive abduction of the arm, which is something unexpected when falling, or during a difficult birth. All the medial roots of the arm are affected if the nerve roots of the brachial plexus are operated in the arm as a result of their root to the spinal cord. The characteristic ‘claw hand’ appearance, where the musculocutaneous nerve is hypotheonded, and the radial and ulnar (shingles) roots are intact.

Fibrous palsy affects exclusively the roots of the C8-T1 nerves. It is much less common than Erb’s palsy, which usually occurs from sudden excessive abduction of the arm, which is something unexpected when falling, or during a difficult birth. All the medial roots of the arm are affected if the nerve roots of the brachial plexus are operated in the arm as a result of their root to the spinal cord. The characteristic ‘claw hand’ appearance, where the musculocutaneous nerve is hypotheonded, and the radial and ulnar (shingles) roots are intact.

Resources

- 1. The Royal College of Surgeons
- 2. U.S. Association for Emergency Medicine
- 3. American Academy of Orthopaedic Surgeons
- 4. American Association of Orthopedic Surgeons
- 5. American Medical Association

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Anatomy: Shoulder and Arm

A 74 year old lady slipped on a pavement and as she fell managed to grab hold off a tree branch hanging overhead before falling to the floor. She is complaining of weakness of hand movements and loss of sensation over the medial arm. MRI imaging shows injury to the medial cord of the brachial plexus. Which of the following nerve spinal nerve levels have most likely been affected:

- C5, C6
- C5 - C7
- C7, C8
- C8, T1
- C7, C8, T1

< Previous Next > See Answer

Question Navigator

1 Answered
2 Answered
3 Answered
4 Answered
5 Answered
6 Answered
7 Answered
8 Answered
9 Answered
10 Answered
11 Answered
12 Answered

Something wrong?

Clear Exam
Anatomy: Shoulder and Arm

A 47 year old lady slipped on a pavement, and as she fell she caught a tree branch hanging overhead before falling to the floor. She complained of weakness of hand movement and loss of sensation over the outer arm. MRI imaging showed injury to the innervated cord of the brachial plexus. Which of the following nerves spinal nerve levels have most likely been affected:

a) C5, C6
b) C6, C7
c) C5, C6

d) C6, C7, T1

Answer

The result could be a continuation of the anterior division of the posterior cord involves nerves from the C5 and T1 spinal nerve levels. The downward pattern is resulted from injury to the innervated cord of the brachial plexus. Which of the following nerves spinal nerve levels have most likely been affected:

- A sensory nerve from the C5 cord
- A motor nerve from the C6 and T1 cords

Notes

The brachial plexus is formed by the nerves of the anterior part of the spinal nerves C5-T1.

- The posterior branches of the spinal nerves C5-T1 pass through the scapula muscle. They form the posterior cord.
- The posterior cord is a branch of the anterior divisions of the spinal nerves C5-T1.

The posterior division of the spinal cord forms the posterior cord. The posterior cord supplies the upper limb muscles, the upper limb nerves, and the spinal nerves C5-T1.

By Brachial Plexus (Atlas of the Human Body, 1911, p. 214) [Public domain], from Wikimedia Commons.

Brachial plexus injuries are usually the result of blunt trauma producing nerve avulsion and disruption.

Brachial plexus injury:

- Entrapment of the nerve at the site of injury
- Entrapment of the nerve at the site of injury

Klumpke's paralysis:

- Entrapment of the nerve at the site of injury
- Entrapment of the nerve at the site of injury

Klumpke's paralysis often results from damage to the C5, C6, or both. It is less common than Erb's paralysis. Klumpke's paralysis is usually caused by accidental abduction of the arm, eg. catching something overhead when falling. Klumpke's paralysis can result in paralysis of the shoulder, elbow, and wrist muscles. Klumpke's paralysis is more common than Erb's paralysis and is usually caused by accidental abduction of the arm or shoulder muscle.
Anatomy: Shoulder and Arm

Question 102 of 125

A 40 year old woman is found to have a suspicious breast lump just superior and lateral to the areolar region of her left breast. She undergoes a sentinel lymph node biopsy. Which of the following lymph nodes will most likely first encounter lymph from the tumour:

a. Parasternal lymph nodes
b. Intercostal nodes
c. Infracavicular nodes
d. Anterior axillary nodes
e. Subclavian lymph trunk

< Previous  |  Next >  |  See Answer  |  Something wrong?  |  Clear Exam
Anatomy: Shoulder and Arm

Question 502 of 125

A 40 year old woman is found to have a suspicious breast lump just superior and lateral to the areolar region of her left breast. She undergoes a sentinel lymph node biopsy. Which of the following lymph nodes will most likely first encounter lymph from the tumour:

a) Parasternal lymph nodes
b) Intercostal nodes
c) Infraclavicular nodes  X
d) Anterior axillary nodes

Answer

Approximately 75% of lymph drainage from the breast is via lymphatic vessels that drain laterally and superiorly into axillary nodes. The lymph usually first drains to anterior axillary nodes, and from here, through central axillary, apical, and supravacular nodes in sequence. Axillary nodes primarily drain to the subclavian lymph trunk.

Notes

The lymphatic drainage of the breast is of great clinical importance due to its role in the metastasis of breast cancer cells.

There are three main groups of lymph nodes that receive lymph from breast tissue – the axillary nodes (75%), parasternal nodes (20%) and posterior intercostal nodes (15%).

- Approximately 75% is via lymphatic vessels that drain laterally and superiorly into axillary nodes.
- Most of the remainder is into medial parasternal lymph nodes, which lie deep to the anterior thoracic wall associated with the internal thoracic artery.
- Some drainage may follow the lateral branches of posterior intercostal arteries and connect with intercostal nodes situated near the heads and necks of ribs.

Axillary nodes drain into the subclavian trunks, parasternal nodes drain into the bronchomediastinal trunks and intercostal nodes drain either into the thoracic duct or into the bronchomediastinal trunks.

By Henry Vandyke Carter (Public domain), via Wikimedia Commons

< Previous  Next >
Anatomy: Shoulder and Arm

Question 103 of 125

Following a road traffic collision, a patient sustains damage to the long thoracic nerve. Which of the following clinical findings would you most expect to see on examination:

a. Complete loss of abduction of the arm
b. Loss of adduction of the arm
c. Winged scapula deformity
d. Loss of initial abduction of the arm to 15 degrees
e. Sprengel's deformity of the scapula

< Previous  Next  See Answer  Something wrong? >

Question Navigator

1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

Clear Exam
Anatomy: Shoulder and Arm

Following a road traffic collision, a patient sustains damage to the long thoracic nerve. Which of the following clinical findings would you most expect to see on examination:

- a) Complete loss of abduction of the arm
- b) Loss of abduction of the arm
- c) Winging scapula diffusely
- d) Loss of initial abduction of the arm 15 degrees
- e) Sprengel's deformity of the scapula

**Answer**

Damage to the long thoracic nerve results in weakness/paralysis of the serratus anterior muscle causing difficulty in lifting the upper limbs above 90 degrees and giving a 'winging' scapula appearance where the medial border of the scapula may move laterally and posteriorly away from the thoracic wall (this becomes more pronounced if the patient attempts the super-ski lift against a wall).

**Notes**

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Serratus anterior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Upper 8 – 9 ribs</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Medial border of scapula</td>
</tr>
<tr>
<td>Actions</td>
<td>Protection and retraction of scapula</td>
</tr>
<tr>
<td>Internohals</td>
<td>Long thoracic nerve (C5–C7)</td>
</tr>
</tbody>
</table>

The serratus anterior acts from the lateral part of the upper 8 – 9 ribs and obliquely inserts into the medial border of the scapula.

It acts to rotate the scapula, allowing the arm to be raised over 90 degrees, and also protects the scapula and holds it against the thoracic wall.

It is innervated by the long thoracic nerve (C5–C7).

The long thoracic nerve pass's its injury due to its excessive length. Injury to this nerve may occur due to trauma and surgery, direct blow to the rib area, or even stretching on strenuous repetititve movements of the arm, and sustained bearing of excessive weight over the shoulder. Damage to the long thoracic nerve results in weakness/paralysis of the serratus anterior muscle causing difficulty in lifting the upper limbs above 90 degrees and giving a 'winging' scapula appearance where the medial border of the scapula may move laterally and posteriorly away from the thoracic wall (this becomes more pronounced if the patient attempts the super-ski lift against a wall).

**Resources**

- The Royal College of Emergency Medicine
- Emergency Medicine E-Learning
- Advanced Emergencies 
- Online Resident Emergency

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Anatomy: Shoulder and Arm

Question 104 of 125

A patient sustains an injury to the proximal radial nerve as a result of a stab wound. Which of the following areas of skin would you least expect to be affected in this type of injury:

- a) Posterior arm
- b) Lateral arm
- c) Posterior forearm
- d) Dorsum of hand
- e) Lateral forearm

< Previous  Next >  See Answer  Something wrong?
You are performing the secondary survey of a 32 year old tree surgeon who has fallen approximately 10 metres. You note a weakness to the right forearm muscles, you suspect a median nerve or brachial plexus injury. The median nerve is formed from which of the following brachial plexus cord(s):

- a Medial cord
- b Lateral cord
- c Posterior cord
- d Medial and lateral cord
- e Medial and posterior cord
**Diagram:** Anatomy Shoulder and Arm

**Diagram Description:**
This diagram illustrates the anatomical structures of the shoulder and arm, including bones, muscles, and nerves. The diagram shows the shoulder joint, humerus, muscles like biceps, triceps, and deltoids, nerves, and blood vessels.

### Table: Basic Information

<table>
<thead>
<tr>
<th>Structure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder Joint</td>
<td>Joints between the clavicle, scapula, and humerus.</td>
</tr>
<tr>
<td>Humerus</td>
<td>The long bone of the arm, extending from the shoulder to the elbow.</td>
</tr>
<tr>
<td>Biceps</td>
<td>Muscles that bend the arm at the elbow.</td>
</tr>
<tr>
<td>Triceps</td>
<td>Muscles that extend the arm at the elbow.</td>
</tr>
<tr>
<td>Acromion</td>
<td>The prominence on the outer side of the shoulder.</td>
</tr>
<tr>
<td>Axillary Nerve</td>
<td>Nerve that supplies the arm with motor and sensory functions.</td>
</tr>
</tbody>
</table>

### Diagram Notes:
- The diagram highlights the relationship between the shoulder joint, bones, muscles, and nerves.
- The axillary nerve is a significant nerve that supplies motor and sensory functions to the arm.
- The diagram is a useful tool for understanding the anatomy of the shoulder and arm, which is crucial for medical professionals.

---

**Reference:**
For more detailed information, refer to standard anatomy textbooks or online resources dedicated to human anatomy.
Anatomy: Shoulder and Arm

A 32 year old construction worker presents to ED after an accident on the job. The tendon of the biceps brachii at the elbow has been severed by a laceration that extends 2 cm medially from the tendon. Which of the following structures is most likely to have also been injured:

- Musculocutaneous nerve
- Brachial artery
- Profunda brachii artery
- Radial nerve
- Ulnar nerve

Question 106 of 125

1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

< Previous  Next >  See Answer

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Resources

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- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- TeachMeAnatomy
- Trauma.org
- Radiopaedia

- Advanced Life Support Group
- Emergency Medicine Journal
- Lifeinthefastlane
- Instant Anatomy
- Patient.co.uk
Anatomy: Shoulder and Arm

A 32 year old construction worker presents to ED after an accident on the job. The tendon of the biceps brachii at the elbow has been severed by a siren that extends 2 cm medially from the tendon. Which of the following structures is most likely to have also been injured:

a) Musculocutaneous nerve  
b) Brachial artery  ✔️
c) Profunda brachii artery  
d) Radial nerve  
e) Ulnar nerve  ❌

Answer

The brachial artery lies immediately medial to the tendon of the biceps brachii at the elbow. The musculocutaneous nerve does not cross the elbow (its terminal branch crosses the elbow lateral to the tendon of the biceps). The profunda brachii artery arises from the brachial artery in the proximal part of the arm. The radial nerve passes the elbow lateral to the tendon of the biceps. The ulnar nerve crosses the elbow posterior to the medial epicondyle of the humerus.

Notes

The brachial artery is a continuation of the axillary artery, beginning at the lower border of the teres major muscle and ending just distal to the elbow joint where it bifurcates into the radial and ulnar arteries. In the proximal arm, the brachial artery lies on the medial side of the distal arm, it moves laterally to assume a position on the lateral humerus before crossing anteriorly to the elbow joint. The brachial artery is palpable along its length in the proximal arm. It can be compressed against the medial humerus and in the antecubital fossa it may be palpated immediately medial to the tendon of the biceps brachii muscle.

The brachial artery gives rise to numerous branches including:

- the profunda brachii (deep brachial) artery
- musculocutaneous branches
- nutrient branches
- anterior collateral branches
- terminal branches (radial and ulnar arteries)

The brachial artery is accompanied by venous branches.

By Henry Vincent Carter (Public domain), via Wikimedia Commons

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Anatomy: Shoulder and Arm

You are examining the shoulder of a 43 year old woman who complains of progressive weakness in her left arm. You note wasting of the left trapezius muscle in comparison with the right. The trapezius muscle is innervated by which of the following nerves:

- a. Pectoral nerves
- b. Spinal accessory nerve
- c. Thoracodorsal nerve
- d. Long thoracic nerve
- e. Axillary nerve

< Previous  Next >  See Answer  Something wrong?  Clear Exam
Anatomy: Shoulder and Arm

You are examining the shoulder of a 43-year-old woman who complains of progressive weakness in her left arm. You note wasting of the left trapezius muscle in comparison with the right. The trapezius muscle is innervated by which of the following nerves?

a) Posterior nerve
b) Spinal accessory nerve

c) Thoracodorsal nerve
d) Long thoracic nerve
e) Axillary nerve

Answer

The trapezius is innervated by the spinal part of the accessory nerve (motor supply) and the anterior branch of C5 and C6 (sensory supply). The accessory nerve can be evaluated by testing the function of the trapezius muscle, most easily performed by asking the patient to shrug against resistance.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Trapezius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Superior nuchal line, external occipital protuberance, ligamentum nuchae, spinous processes of C7 – T12</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Spine of the scapula, acromion and lateral third of clavicle</td>
</tr>
<tr>
<td>Actions</td>
<td>Elevate of scapula, rotation of scapula during shoulder abduction, retraction and depression of scapula</td>
</tr>
<tr>
<td>Innervation</td>
<td>Spinal accessory nerve</td>
</tr>
</tbody>
</table>

The trapezius muscle is responsible for the smooth contour of the lateral side of the neck and over the superior aspect of the shoulder.

The trapezius muscle has an extensive origin, originating from the skull, the ligamentum nuchae and the spinous processes of the C7 – T12 vertebral. Distally, it attaches to the posterior border of the lateral third of the clavicle, the acromion and the spine of the scapula.

The trapezius is innervated by the spinal part of the accessory nerve (motor supply) and the anterior branch of C5 and C6 (sensory supply). The accessory nerve can be evaluated by testing the function of the trapezius muscle, most easily performed by asking the patient to shrug against resistance.

The trapezius is a powerful elevator of the scapula. The upper fibres of the trapezius muscle elevate the scapula and rotate it during abduction of the arm above horizontal. The middle fibres retract the scapula and the lower fibres depress the scapula.
Anatomy: Shoulder and Arm

A 23 year old man present to the ED complaining of difficulty moving his left arm. On examination you note weakness of abduction of the shoulder. The patient fractured their tibia 3 weeks ago in Spain and has been using axillary crutches since. You suspect he may have injured his axillary nerve as a result. The axillary nerve contains nerve fibres from which of the following nerve roots:

- a) C5, C6
- b) C5 – C7
- c) C5 – C8
- d) C5 – T1
- e) C8 – T1
Anatomy: Shoulder and Arm

A 23 year old man present to the ED complaining of difficulty moving his left arm. On examination you note weakness of abduction of the shoulder. The patient fractured their clavicle 2 weeks ago in Spain and has been using auxiliary crutches since. You suspect he may have injured his axillary nerve as a result. The axillary nerve contains nerve fibres from which of the following nerve roots:

a) C5, C6 ✓
b) C5 - C7
c) C5 - C8
d) C5 - T1 ✗
e) C8 - T1

Answer

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Posterior cord</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Deltoid, teres minor</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>The regimensal badge area on the upper lateral arm via the superior lateral cutaneous nerve of the arm</td>
</tr>
</tbody>
</table>

The axillary nerve innervates the deltoid muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regimensal badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:
- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of auxiliary crutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (teres minor) and loss of sensation over the regimensal badge area. In longstanding cases, there may be atrophy of the deltoid giving the shoulder a flattened appearance.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of auxiliary crutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abstraction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regimensal badge area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoid – flattened shoulder appearance</td>
</tr>
</tbody>
</table>

Resources
- The Royal College of Emergency Medicine
- ASPEM - Association for Emergency Medicine
- Advanced Trauma Life Support
- UKCC - United Kingdom Council for {Medical} Education
- UCLan {Medical} Anatomy
- Atkins Imaging
- Radiopaedia
- AdvanceLife Support Group
- Emergency Medicine Journal
- Lichtenstein Society
- Instant Anatomy
- Patient.co.uk

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Anatomy: Shoulder and Arm

A 32 year old presents to the ED after falling from a table and sustaining trauma to the left arm. Which of the following injuries is least likely to cause damage to the axillary nerve:

- a. Dislocation of the glenohumeral joint
- b. Fracture of the surgical neck of the humerus
- c. Incorrect use of axillary crutches
- d. Blunt trauma to the anterolateral aspect of the shoulder
- e. Fracture of the midshaft of the humerus

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

Question 109 of 125

A 32 year old presents to the ED after falling from a table and sustaining trauma to the left arm. Which of the following injuries is least likely to cause damage to the axillary nerve:

a) Dislocation of the glenohumeral joint
b) Fracture of the surgical neck of the humerus ✗
c) Incorrect use of axillary crutches
d) Blunt trauma to the anterolateral aspect of the shoulder
e) Fracture of the midshaft of the humerus ✅

Injury to the axillary nerve may be caused by: dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, or incorrect use of axillary crutches.
Anatomy: Shoulder and Arm

Question 110 of 125

You are examining the shoulder of a 20 year old football player who complains of pain following a collision during an aerial challenge for the ball. You note he is tender over a focal area of his proximal trapezius muscle. The trapezius muscle is attached proximally to which of the following structures:

- a. The occipital bone and the spinous processes of C2 – C7
- b. The occipital bone, ligamentum nuchae and the spinous processes of C7 – T12
- c. The parietal bone and the spinous processes of C5 – T5
- d. The spinous process of processes of C1 – T12
- e. The ligamentum nuchae and the spinous process of C2 – C7.
Anatomy: Shoulder and Arm

Question 13 of 135

You are examining the shoulder of a 20 year old football player who complained of pain following a collision during an aerial challenge for the ball. You note he is tender over a focal area of the proximal trapezius muscle. The trapezius muscle is attached proximally to which of the following structures:

a) The scapular bone and the spinae processes of C2 - C7
b) The scapular bone, ligamentum nuchae and the spinae processes of C7 - T12
c) The scapular bone and the scapula spinae process of C2 - C7
d) The scapula processes of C1 - T12
e) The ligamentum nuchae and the spinae process of C2 - C7.

Answer:
The trapezius muscle has an extensive origin, originating from the scapular bone, the ligamentum nuchae and the spinae processes of the C7 - T12 vertebrae. It attaches to the posterior border of the lateral third of the clavicle, the scapulae and the spine of the scapula.

Notes:

Muscle | Trapezius
---|---
Proximal Attachment | Superior nuchal line, external occipital protuberance, ligamentum nuchae, spinae process of C7 - T12
Distal Attachment | Spine of the scapula, acromion and lateral third of clavicle
Actions | Elevator of scapula, rotation of scapula during shoulder abduction, retraction and depression of scapula
Innervation | Spinal accessory nerve

The trapezius muscle is responsible for the smooth contour of the Lateral side of the neck and over the superior aspect of the shoulder.

The trapezius muscle has an extensive origin, originating from the skull, the ligamentum nuchae and the spinae processes of the C7 - T12 vertebrae. It attaches to the posterior border of the lateral third of the clavicle, the scapulae and the spine of the scapula.

The trapezius is innervated by the spinal cord at the accessory nerve (motor supply) and the anterior ramus of C3 and C4 branches supply. The accessory nerve can be evaluated by testing the function of the trapezius muscle, most easily performed by asking the patient to shrug against resistance.

The trapezius is a powerful elevator of the scapula. The upper fibres of the trapezius muscle elevate the scapula and rotate it during abduction of the arm above horizontal. The middle fibres retract the scapula and the lower fibres depress the scapula.

Diagram image by Michael Kögler, used with permission. Image Copyright (c) Public domain or Public domain, via Wikimedia Commons.
Anatomy: Shoulder and Arm

Question 111 of 125

A basketball player presents to ED having fallen heavily onto his right arm during a game. X-ray shows a fracture of the surgical neck of the humerus. You wish to assess the neurovascular status of his arm, and particularly of the nerve most commonly damaged in this type of injury. Which of the following tests would be most helpful to assess this nerve:

- Test the strength of shrugging the shoulders
- Test sensation over the medial arm
- Test the strength of medial rotation of the arm
- Test sensation over the upper lateral arm.
- Have the patient push against a wall and assess the position of the scapula

< Previous  Next >  See Answer
Anatomy: Shoulder and Arm

Question 11 of 125

A basketball player presents to ED having fallen heavily onto his right arm during a game. X-ray shows a fracture of the surgical neck of the humerus. You wish to assess the neurovascular status of his arm, and particularly of the nerve most commonly damaged in this type of injury. Which of the following tests would be most helpful to assess this nerve:

a) Test the strength of shrugging the shoulders
b) Test sensation over the medial arm
c) Test the strength of medial rotation of the arm
d) Test sensation over the upper lateral arm.
e) Have the patient push against a wall and assess the position of the scapula

Answer

The axillary nerve is the most commonly injured nerve in a fracture of the surgical neck of the humerus as it passes dorsally around this region accompanied by the posterior humeral circumflex artery. The axillary nerve innervates the deltoid (abduction) and teres minor (lateral rotation) muscles and supplies an area of skin over the upper lateral arm (regional badge area). Shrugging of the shoulders is a function of the spinal accessory nerve, and assessing for winging of the scapula is useful for damage to the long thoracic nerve.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 and C6</td>
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<tr>
<td>Plexus cords</td>
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<td>Motor Supply</td>
<td>Deltoid, teres minor</td>
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<tr>
<td>Sensory supply</td>
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</table>

The axillary nerve arises from the posterior cord containing fibres from nerve roots C5 and C6.

The axillary nerve innervates the deltoid muscle and the teres minor. It gives rise to the superior lateral cutaneous nerve of the arm which supplies the regimensnal badge area on the upper lateral arm.

Injury to the axillary nerve may be caused by:

- dislocation of the glenohumeral joint
- fracture of the surgical neck of the humerus
- trauma to the shoulder
- incorrect use of axillary crutches

There is weakness of shoulder abduction (deltoid) and lateral rotation (teres minor) and loss of sensation over the regimensnal badge area. In longstanding cases, there may be atrophy of the deltoid giving the shoulder a flattened appearance.

<table>
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<tr>
<th>Nerve</th>
<th>Axillary nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Dislocation of the glenohumeral joint, fracture of the surgical neck of the humerus, trauma to the shoulder, incorrect use of axillary crutches</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of shoulder abduction and lateral rotation</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Upper lateral arm (regional badge area)</td>
</tr>
<tr>
<td>Signs</td>
<td>Atrophy of deltoid – flattened shoulder appearance</td>
</tr>
</tbody>
</table>

← Previous  Next →  Something wrong
Anatomy: Shoulder and Arm

A 23 year old gymnast presents to the ED following a fall in training. She is complaining of pain over the left pectoralis muscle. During examination you note her shoulder movements are abnormally weak. The pectoralis major muscle acts to produce which of the following movements:

a. Depression of the shoulder
b. Extension, adduction and medial rotation of the humerus
c. Flexion, adduction and medial rotation of the humerus
d. Elevation and rotation of the scapula
e. Extension, abduction and medial rotation of the humerus
Anatomy: Shoulder and Arm

A 23 year old gymnast presents to the ED following a fall in training. She is complaining of pain over the left pectoralis muscle. During examination you note her shoulder movements are abnormally weak. The pectoralis major muscle acts to produce which of the following movements:

- Depression of the shoulder
- Extension, adduction and medial rotation of the humerus
- Flexion, adduction and medial rotation of the humerus
- Elevation and rotation of the scapula
- Extension, abduction and medial rotation of the humerus

Answer

The pectoralis major acts to flex, adduct and medially rotate the arm at the glenohumeral joint.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Pectoralis major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Medial half of clavicle (clavicular head), upper seven costal cartilages and anterior sternum (sternocostal head)</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Intertubercular sulcus of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Flexion, adduction and medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Medial and lateral pectoral nerves (CS - T1)</td>
</tr>
</tbody>
</table>

The pectoralis major is the largest and most superficial muscle of the anterior wall. Its inferior margin underlies the anterior axillary fold, which marks the anterior border of the axilla.

It has two heads; the clavicular head attaching to the medial half of the clavicle and the sternocostal head attaching to the upper seven costal cartilages and to the anterior surface of the sternum. Distally, fibres from both heads attach to the lateral lip of the intertubercular sulcus of the humerus.

The pectoralis major is innervated by the medial and lateral pectoral nerves (CS - T1) which originate from the brachial plexus in the axilla.

The pectoralis major acts to flex, adduct and medially rotate the arm at the glenohumeral joint.
Anatomy: Shoulder and Arm

A 65 year old man presents to the ED complaining of right elbow pain. He describes a 3 day history of increasing swelling and pain at the right elbow. On examination you note he is febrile and the elbow is hot and erythematous, you suspect a septic arthritis. Which of the following synovial joint types best describes the elbow joint:

a) Synovial plane joint
b) Synovial hinge joint
c) Synovial saddle joint
d) Synovial condyloid joint
e) Synovial ball and socket joint
Anatomy: Shoulder and Arm

A 65 year old man presents to the ED complaining of right elbow pain. He also has a 3 day history of increasing swelling and pain at the right elbow. On examination you note he is febrile and the elbow is hot and erythematous. You suspect a septic arthritis. Which of the following synovial joint types best describes the elbow joint?

a) Synovial plane joint
b) Synovial hinge joint 
✓
c) Synovial saddle joint
d) Synovial condylar joint
e) Synovial ball and socket joint

Answer
The elbow is a synovial hinge joint.

Notes

<table>
<thead>
<tr>
<th>Joint</th>
<th>Elbow joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Synovial hinge joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Triceps of humerus with triceps retinaculum and capitulum of humerus with head of radius</td>
</tr>
<tr>
<td>Stabilizing Factors</td>
<td>Joint capsule, radial and ulnar collateral ligaments</td>
</tr>
<tr>
<td>Movements</td>
<td>Flexion and Extension</td>
</tr>
</tbody>
</table>

The elbow is a synovial hinge joint. It is formed by the articulations between the triceps of the humerus and the triceps retinaculum of the ulna and between the capitulum of the humerus and the head of the radius. The movements of the elbow joint are extension and flexion.

<table>
<thead>
<tr>
<th>Movement</th>
<th>Muscles Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>Biceps brachii, brachialis, brachioradialis</td>
</tr>
<tr>
<td>Extension</td>
<td>Triceps brachii, anconeus</td>
</tr>
</tbody>
</table>

The collateral ligaments of the elbow are medial and lateral, the former of the joint capsule.

The radial collateral ligament arises from the lateral epicondyle of the humerus and is inserted distally with the annular ligament of the radius.

The ulnar collateral ligament arises from the medial epicondyle and distally attaches to the olecranon and coronoid processes of the ulna.

The proximal radio-ulnar joint is a diarthrodial joint located within the same joint capsule. It is formed by the articulation of the head of the radius and the radial notch of the ulna, and is involved with pronation and supination of the forearm.

The annular ligament is a strong band of fibres that encircles the head of the radius, and relates it to contact with the radial notch of the ulna. The annular ligament is attached by its ends to the anterior and posterior margins of the radial notch of the ulna.

By Henry Vandyke Carter (Public domain), via Wikimedia Commons

By Henry Vandyke Carter (Public domain), via Wikimedia Commons
Anatomy: Shoulder and Arm

Question 114 of 125

You have been asked to give a tutorial on common upper limb neurology to a group of medical students. You use the example of a man falling from a balcony onto spiked fencing, sustaining a puncture wound to the axilla. This results in an injury to the musculocutaneous nerve. Which of the following clinical features would you least expect to see in this patient:

- [ ] a. Weakness of arm flexion
- [ ] b. Weakness of forearm flexion
- [ ] c. Weakness of forearm supination
- [ ] d. Loss of sensation to skin over the lateral forearm
- [ ] e. Weakness of forearm pronation
Anatomy: Shoulder and Arm

Question 14 of 125

You have been asked to give a tutorial on common upper limb neurology to a group of medical students. You use the example of a man falling from a balcony onto spiked fencing, sustaining a puncture wound to the axilla. This results in an injury to the musculocutaneous nerve. Which of the following clinical features would you least expect to see in this patient:

a) Weakness of arm flexion
b) Weakness of forearm flexion
d) Loss of sensation to skin over the lateral forearm
d) Weakness of forearm pronation

Answer

Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm. Forearm pronation would not be affected as this is primarily produced by the pronator quadratus and pronator teres muscles, innervated by the median nerve.

Notes

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 - C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
</tr>
</tbody>
</table>

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 - C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>

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Anatomy: Shoulder and Arm

Question 115 of 125

You are asked to review a 54 year old man who presents with isolated weakness of the right shoulder. On examination you note the patient is unable to perform the “lift-off” test. You suspect a weakness to the subscapularis muscle. The subscapularis muscle is innervated by which of the following nerves:

a Suprascapular nerve
b Subscapular nerves
c Axillary nerve
d Long thoracic nerve
e Thoracodorsal nerve

< Previous  Next >  See Answer  Something wrong?
Anatomy: Shoulder and Arm

You are asked to review a 54 year old man who presents with isolated weakness of the right shoulder. On examination you note the patient is unable to perform the "10/8-off" test. You suspect a weakness to the subscapularis muscle. The subscapularis muscle is innervated by which of the following nerves:

a) Suprascapular nerve
b) Subscapular nerves
  
  ✔
d) Axillary nerve
e) Long thoracic nerve
   
e) Thoracodorsal nerve

Answer

The subscapularis is innervated by the upper and lower subscapular nerves (C5 - C7), branches of the brachial plexus.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Subscapularis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal Attachment</td>
<td>Subscapular fossa of scapula</td>
</tr>
<tr>
<td>Distal Attachment</td>
<td>Lesser tubercle of humerus</td>
</tr>
<tr>
<td>Actions</td>
<td>Medial rotation of shoulder</td>
</tr>
<tr>
<td>Innervation</td>
<td>Upper and lower subscapular nerves (C5 - C7)</td>
</tr>
</tbody>
</table>

The subscapularis forms the largest component of the posterior wall of the axilla.

It originates from the subscapular fossa on the anterior surface of the scapula and inserts into the lesser tubercle of the humerus.

The subscapularis is innervated by the upper and lower subscapular nerves (C5 - C7), branches of the brachial plexus.

Together with three muscles of the posterior scapula region (the supraspinatus, infraspinatus and teres minor muscles) the subscapularis is a member of the rotator cuff muscle group, which stabilizes the glenohumeral joint.

The subscapularis acts to medially rotate the arm at the glenohumeral joint. To isolate the subscapularis muscle in examination, place the dorsal of the patient's hand in full medial rotation on the lower back and ask them to push their hand off the back (the 10/8-off test). Loss of power suggests a tear while pain on forced medial rotation suggests tendinitis.
Anatomy: Shoulder and Arm

You are performing a full neurological examination on a patient who has presented to the ED department with generalised weakness. You note she has a unilateral absence of her triceps reflex. Which spinal nerve is primarily responsible for this reflex:

a) C5
b) C6
c) C7
d) C8
e) T1
Anatomy: Shoulder and Arm

You are performing a full neurological examination on a patient who has presented to the ED department with generalised weakness. You note she has a unilateral absence of her triceps reflex. Which spinal nerve is primarily responsible for this reflex:

a) C5
b) C6 √
c) C7

d) C8
e) T1

Answer

The triceps tendon reflex tap predominantly tests spinal cord segment C7.

Notes

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Triceps brachii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions</td>
<td>Extension of elbow, extension and adduction of shoulder (long head)</td>
</tr>
<tr>
<td>Innervation</td>
<td>Radial nerve (C6 – C8)</td>
</tr>
</tbody>
</table>

The triceps muscle is innervated by the radial nerve (C6 – C8). The triceps tendon reflex tap predominantly tests spinal cord segment C7.

It is the chief extensor of the forearm at the elbow joint and acts as an accessory adductor and extensor of the arm at the glenohumeral joint via its long head.

Modified by FRCEM Success. Original By Henry Vandyke Carter [Public domain] via Wikimedia Commons
Anatomy: Shoulder and Arm

A patient is involved in a road traffic accident and is left with weakness in his left arm. He has been told he has an Erb’s palsy due to damage of his brachial plexus. Which of the following clinical features are you least likely to see:

- Weakness of supination of the forearm
- Weakness of abduction of the arm
- Weakness of medial rotation of the arm
- Weakness of lateral rotation of the arm
- Loss of sensation over the lateral arm

< Previous  Next >  See Answer  Something wrong?
**Anatomy: Shoulder and Arm**

A patient is involved in a road traffic accident and is left with weakness in his left upper limb. He has been told that he has an Erb's palsy due to damage to his brachial plexus. Which of the following clinical features are you least likely to see:

- a) Weakness of all the rotators
- b) Weakness of abduction of the arm
- c) Weakness of medial rotator of the arm
- d) Weakness of lateral rotator of the arm
- e) Loss of sensation over the lateral arm

**Answer**

An Erb's palsy is caused by damage to the C5 and C6 nerve roots and thus primarily involves the upper and middle trunk. There is loss of weakness of abduction, lateral rotation and flexion of the arm and shoulder and loss of abduction of the forearm and loss of sensation on the lateral arm. Medial rotation is not typically affected.

**Notes**

The brachial plexus is formed by the union of the anterior rami of spinal nerves C5 - T1.

In the anterior neck, the roots of the brachial plexus arise to form three trunks:

- a) A superior trunk (from the union of the C5 and C6 roots)
- b) A middle trunk (which is a continuation of the C7 root)
- c) An inferior trunk (from the union of the C8 and T1 roots)

Within the posterior triangle of the neck, the trunks divide into anterior and posterior divisions.

Within the axilla, the divisions then descend to form three cords (channelled by their relation to the axillary artery):

- d) The lateral cord contains the anterior divisions of the superior and middle trunks
- e) The medial cord contains a combination of the anterior divisions of the inferior and middle trunks
- f) The posterior cord (from the posterior divisions of all three trunks)

The cords give rise to the main branches of the brachial plexus.

**Brachial plexus injuries are usually the result of force trauma producing nerve avulsion and disruption.**

**Brachial plexus injury**

- Erb's palsy
  - Mechanism of injury: Excessive force in angle between neck and shoulder e.g. during vehicle delivery or fall from a height or on acceleration
  - Clinical features: Abduction and extension, loss of sensation and pain over the lateral arm
  - Nerve roots affected: C5 and C6

- Klumpke's palsy
  - Mechanism of injury: Significant force in angle between neck and shoulder e.g. during vehicle delivery or fall from a height or on acceleration
  - Clinical features: Abduction and extension, loss of sensation and pain over the medial arm
  - Nerve roots affected: C8 and T1

**Klumpke's palsy affects nerves derived from the C8 or T1 roots.**

**Resources**

- The Royal College of Physicians
- Local Health Board
- The British Institute of Radiology
Anatomy: Shoulder and Arm

Your are asked to review a 37 year old rugby player who has torn his biceps brachii tendon. The biceps brachii muscle acts to primarily perform which of the following movements:

a. Flexion and pronation of the forearm
b. Flexion and supination of the forearm
c. Extension of the forearm
d. Flexion of the forearm and wrist
e. Flexion of the forearm and extension of the arm
Anatomy: Shoulder and Arm

Question 130 of 123

You are asked to review a 37 year old rugby player who has torn his biceps brachii tendon. The biceps brachii muscle acts to primarily perform which of the following movements:

a) Flexion and pronation of the forearm
b) Flexion and supination of the forearm

c) Extension of the forearm
d) Flexion of the forearm and wrist
e) Flexion of the forearm and extension of the arm

Answer

The biceps brachii is primarily a powerful flexor and supinator of the forearm at the elbow joint. It also assists with flexion of the arm at the shoulder joint (with the coracobrachialis muscle).

Notes

The anterior compartment of the arm consists of three muscles.

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Actions</th>
<th>Innervation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coracobrachii</td>
<td>Flexion of arm</td>
<td>Musculocutaneous nerve (C5 – C7)</td>
</tr>
<tr>
<td>Biceps brachii</td>
<td>Flexion and supination of forearm, flexion of arm</td>
<td>Musculocutaneous nerve (C5, C6)</td>
</tr>
<tr>
<td>Brachialis</td>
<td>Flexion of forearm</td>
<td>Musculocutaneous nerve (C5, C6), small contribution by radial nerve (C7) to lateral muscle</td>
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</table>

The coracobrachii (green) is innervated by the musculocutaneous nerve (C5 – C7). It acts to flex the arm at the glenohumeral joint.

The biceps brachii (red) is innervated by the musculocutaneous nerve (C5 – C6). The biceps is primarily a powerful flexor and supinator of the forearm at the elbow joint. It also assists with flexion of the arm at the shoulder joint (with the coracobrachii's muscle). The biceps reflex tap predominantly tests spinal cord segment C6.

The brachialis (blue) is innervated primarily by the musculocutaneous nerve (C5, C6) with a small contribution from the radial nerve (C7). The brachialis flexes the forearm at the elbow joint.

Modified by FRCEMSuccess. Original by Henry Vandyke Carter (Public domain), via Wikimedia Commons.
Anatomy: Shoulder and Arm

A 32 year old karate instructor presents to the ED following a training session. They describe falling onto their abducted left arm. The patient is unable to move their left arm and there is a clear loss of the deltoid curve. Which of the following synovial joint types best describes the glenohumeral joint:

- a. Synovial plane joint
- b. Synovial modified hinge joint
- c. Synovial saddle joint
- d. Synovial condyloid joint
- e. Synovial ball and socket joint

< Previous   Next >   See Answer   Something wrong?
**Anatomy: Shoulder and Arm**

**Questions**

[1] A 32 year old female instructor presents to the ED following a training session. They describe feeling like their abducted left arm. The patient is unable to move their left arm and there is a clear loss of the biceps flexors. Which of the following cranial nerve palsy best describes the thenar mass deficit?

- a) VII cranial nerve
- b) IX cranial nerve
- c) V1 cranial nerve
- d) V2 cranial nerve
- e) IX cranial nerve

**Answer**

The biceps brachii muscle is supplied by the brachial plexus, which is derived from the anterior rami of the C5 to T1 nerves. The biceps brachii muscle is innervated by the C5 and C6 nerves through the musculocutaneous nerve, which arises from the lateral cord of the brachial plexus. Therefore, the neuropathy of the C5 and C6 nerves results in a weakness of the biceps brachii muscle, which is characterized by a loss of ability to flex the elbow and supinate the forearm. This is a common presentation in patients with radial neuropathy, which is typically caused by compression of the radial nerve at the elbow, such as in cases of elbow dislocation or fracture. This compression leads to weakness of the biceps brachii muscle and the inability to flex the elbow. Therefore, the correct answer is (d) V2 cranial nerve.

**Notes**

**Joint articulations**

The shoulder joint is a glenohumeral joint, which is formed by the articulation of the head of the humerus with the glenoid cavity of the scapula. The joint is a large, ball-and-socket joint that allows for a wide range of motion. The joint is stabilized by the rotator cuff muscles, which include the supraspinatus, infraspinatus, subscapularis, and teres minor muscles. These muscles act to stabilize the humerus during movement of the joint and prevent dislocation.

**Movements of the joint**

 Movements of the shoulder joint include flexion (forward bending), abduction (lifting the arm away from the body), and rotation (turning the arm in different directions). The glenohumeral joint is a ball-and-socket joint, allowing for a wide range of motion. The joint is stabilized by the rotator cuff muscles, which include the supraspinatus, infraspinatus, subscapularis, and teres minor muscles. These muscles act to stabilize the humerus during movement of the joint and prevent dislocation.

**Extracapsular ligaments**

The glenohumeral ligament is a strong, fibrous band that connects the humerus to the glenoid labrum. It helps to reinforce the shoulder joint and prevent dislocation. This ligament is reinforced by the coracohumeral ligament, which is a strong, fibrous band that connects the coracoid process of the scapula to the greater tuberosity of the humerus. The coracohumeral ligament provides additional support to the shoulder joint and helps to prevent dislocation. The capsule is reinforced by the coracohumeral ligament and the coracoid process of the scapula. This structure provides additional support to the shoulder joint and helps to prevent dislocation.

**Clinical implications**

Dislocation of the shoulder joint occurs when the anterior capsule comes loose because of the lack of support by the tendons of the rotator cuff. The patient may present with the affected arm supported by their contralateral arm or with their arm held in an adducted position. They may also have a palpable gap anteriorly to the arm. The patient may not have complete loss of elbow flexion, but they may have difficulty with activities that require the arm to be lifted above the head.

Common complications of shoulder dislocation include:

- **Axillary nerve damage**: This can result in sensory and motor deficits of the shoulder, particularly in the distribution of the axillary nerve.
- **Rotator cuff tears**: These tears can occur as a result of trauma or overuse, leading to weakness and pain in the shoulder.

**Resources**

- **American Academy of Orthopaedic Surgeons**
- **Orthopaedic Trauma Association**
- **American Academy of Family Physicians**
- **American Academy of Pediatrics**
- **American College of Emergency Physicians**
- **American Society for Surgery of the Hand**
- **American Osteopathic Association**
- **American Physical Therapy Association**
- **American Society for Breast Surgery**
Anatomy: Shoulder and Arm

You are asked to review a 45 year old carpenter who presents with weakness and pain in his left arm. You decide to test the strength of his left arm movements. The brachialis muscle acts to perform which of the following movements:

a) Supination of the forearm
b) Flexion of the forearm
c) Flexion of the forearm and arm
d) Flexion and supination of the forearm
e) Flexion of the arm
Anatomy: Shoulder and Arm

Question 120 of 125

You are asked to review a 45 year old carpenter who presents with weakness and pain in his left arm. You decide to test the strength of his left arm movements. The brachialis muscle acts to perform which of the following movements:

a) Supination of the forearm
b) Flexion of the forearm ✓
c) Flexion of the humerus and arm
d) Flexion and supination of the forearm
e) Flexion of the arm

Answer

The brachialis flexes the forearm at the elbow joint.

Notes

The anterior compartment of the arm consists of three muscles.

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<tr>
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The coracobrachialis (green) is innervated by the musculocutaneous nerve (C5 – C7). It acts to flex the arm at the glenohumeral joint.

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Modified by FRCEMSuccess. Original by Henry Vanbrugh Carter [Public domain], via Wikimedia Commons
Anatomy: Shoulder and Arm

A 26 year old builder presents to ED with an injury to his left upper limb whilst at work. He is unable to supinate his forearm. Which of the following nerves are most likely injured:

- a. Median and ulnar nerve
- b. Median and radial nerve
- c. Musculocutaneous and radial nerve
- d. Axillary and radial nerve
- e. Musculocutaneous and median nerve
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b) Median and radial nerve
c) Musculocutaneous and radial nerve
d) Median and ulnar nerve

e) Musculocutaneous and median nerve

Answer

Supination of the forearm is primarily produced by the biceps brachii in the anterior forearm innervated by the musculocutaneous nerve and the supinator in the posterior forearm innervated by the radial nerve.

Notes

The radioulnar joint allows pronation and supination of the forearm.

Movement | Muscles Involved
--- | ---
Pronation | Pronator quadratus, pronator teres
Supination | Supinator, biceps brachii

The proximal radioulnar joint is a pivot type synovial joint occurring between the head of the radius and the radial notch of the ulna. The radial head is held in position by the annular ligament of the radius.

<table>
<thead>
<tr>
<th>Joint</th>
<th>Proximal radioulnar joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Synovial joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Head of radius with radial notch of ulna</td>
</tr>
<tr>
<td>Stabilising factors</td>
<td>Annular ligament</td>
</tr>
<tr>
<td>Movements</td>
<td>Pronation and supination</td>
</tr>
</tbody>
</table>

The distal radioulnar joint is a pivot type synovial joint occurring between the head of the ulna and the ulnar notch on the radius.

<table>
<thead>
<tr>
<th>Joint</th>
<th>Distal radioulnar joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Synovial joint</td>
</tr>
<tr>
<td>Articulations</td>
<td>Head of ulna with ulnar notch of radius</td>
</tr>
<tr>
<td>Movements</td>
<td>Pronation and supination</td>
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</table>

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Anatomy: Shoulder and Arm

You are reviewing a 38 year old woman who presents to the Emergency Department following a supracondylar fracture. You are concerned she may have damaged the median nerve. The median nerve supplies which of the following areas of skin:

- **A** Medial palm and palmar surface of medial three and a half digits
- **B** Lateral palm and palmar surface of lateral three and a half digits
- **C** Medial forearm
- **D** Dorsal surface of lateral three and a half digits
- **E** Lateral forearm

*Question Navigator*

1. Answered
2. Answered
3. Answered
4. Answered
5. Answered
6. Answered
7. Answered
8. Answered
9. Answered
10. Answered
11. Answered
12. Answered

*Clear Exam*
Anatomy: Shoulder and Arm

Question 123 of 125

A 56 year old man presents to ED complaining of a 4 week history of pain and weakness in his left shoulder. You review the patient alongside your consultant who suspects the patient may have a rotator cuff disorder. Your consultant performs a thorough shoulder examination. Which of the following muscles is paired INCORRECTLY with a technique used to assess its function:

- **a** Supraspinatus – ‘Empty can’ test
- **b** Teres minor – Arm medially rotated against resistance with forearm flexed
- **c** Supraspinatus – Arm abducted against resistance starting from fully adducted position
- **d** Infraspinatus – Arm laterally rotated against resistance with forearm flexed
- **e** Subscapularis – Dorsum of hand placed on low back and hand lifted off back against resistance
Anatomy: Shoulder and Arm

A 56-year-old man presents to ED complaining of a 4-week history of pain and weakness in his left shoulder. You review the patient alongside your consultant who suspects the patient may have a rotator cuff disorder. Your consultant performs a thorough shoulder examination. Which of the following muscles is paired INCORRECTLY with a technique used to assess its function:

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d) Infraspinatus – Arm laterally rotated against resistance with forearm flexed

e) Subscapularis – Dorsum of hand placed on low back and hand lifted off back against resistance

Answer

The teres minor is tested by positioning the patient with their arm adducted with the elbow flexed to 90 degrees and asking them to laterally rotate the arm.

Notes

<table>
<thead>
<tr>
<th>Rotator Cuff Muscle</th>
<th>Action</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supraspinatus (supracapular nerve)</td>
<td>Initiation of abduction of arm to 15 degrees (and then assesses deltoid with further abduction)</td>
<td>Empty can’ test – position the patient in the empty can position and ask the patient to forward flex the arm OR test abduction of the arm starting from complete adduction</td>
</tr>
<tr>
<td>Infraspinatus (supracapular nerve)</td>
<td>Lateral rotation of arm</td>
<td>Tested with the teres minor – position the patient with their arm adducted with the elbow flexed to 90 degrees and ask them to laterally rotate the arm</td>
</tr>
<tr>
<td>Teres minor (axillary nerve)</td>
<td>Lateral rotation of arm</td>
<td>Tested with the infraspinatus as above</td>
</tr>
<tr>
<td>Subscapularis (subcapular nerve)</td>
<td>Medial rotation of arm</td>
<td>Lift off’ test – Position the patient in full medial rotation with the dorsum of their hand on their lower back and ask them to lift their hand away from their back</td>
</tr>
</tbody>
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Anatomy: Shoulder and Arm

A 32 year old man presents to the ED following an altercation during which he received a stab wound to the right axilla. On examination you note reduced flexion of the forearm and suspect a musculocutaneous nerve injury may be responsible. The musculocutaneous nerve receives fibres from which of the following nerve roots:

a. C5, C6
b. C5 – C7
c. C5 – C8
d. C5 – T1
e. C8 – T1
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a) C5, C6  
b) C5 – C7  ✔  
c) C5 – C8  
d) C5 – T1  
e) C8 – T1

Answer

The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 – C7.

Notes

<table>
<thead>
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<th>Nerve</th>
<th>Musculocutaneous nerve</th>
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<tbody>
<tr>
<td>Nerve roots</td>
<td>C5 – C7</td>
</tr>
<tr>
<td>Plexus cords</td>
<td>Lateral</td>
</tr>
<tr>
<td>Motor Supply</td>
<td>Anterior compartment of arm (coracobrachialis, biceps brachii, brachialis)</td>
</tr>
<tr>
<td>Sensory supply</td>
<td>Lateral forearm (via the lateral cutaneous nerve of the forearm)</td>
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The musculocutaneous nerve originates from the lateral cord, receiving fibres from C5 – C7.

It innervates all the muscles in the anterior compartment of the arm (the coracobrachialis, the biceps brachii and the brachialis) and gives rise to the lateral cutaneous nerve of the forearm, which supplies the skin on the lateral surface of the forearm.

Injury to the musculocutaneous nerve is rare, as it is relatively protected in the axilla. The most common cause of injury is a stab wound in the axilla. Flexion of the arm and flexion and supination of the forearm are weakened but not lost entirely due to the actions of the pectoralis major and deltoid, the brachioradialis and the supinator muscles respectively. There is loss of sensation over the lateral aspect of the forearm.

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Musculocutaneous nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanism of injury</td>
<td>Stab wound in axilla</td>
</tr>
<tr>
<td>Motor loss</td>
<td>Weakness of flexion and supination of the forearm, weakness of arm flexion</td>
</tr>
<tr>
<td>Sensory loss</td>
<td>Lateral aspect of forearm</td>
</tr>
</tbody>
</table>

Resources

- The Royal College of Emergency Medicine
- Irish Association for Emergency Medicine
- Advanced Trauma Life Support
- Resuscitation Council (UK)
- Trauma.org
- RGHspares

Advanced Life Support Group
Emergency Medicine Journal
Lifeinthetrack
Instruct Anatomy
Patient.co.uk

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Anatomy: Shoulder and Arm

A patient sustains an injury to the radial nerve as a result of a glenohumeral joint dislocation. Which of the following muscles would you not expect to be affected:

- a. Triceps brachii
- b. Supinator
- c. Brachioradialis
- d. Abductor pollicis longus
- e. Coracobrachialis

< Previous  See Answer  Submit  Something wrong?  Clear Exam