

## 17

## Scapular region

The scapular region is on the superior posterior surface of the trunk and is defined by the muscles that attach to the **scapula** (shoulder blade). These muscles can be divided into:

- extrinsic muscles, which join the axial to the appendicular skeleton (trapezius, latissimus dorsi, levator scapulae, rhomboid minor, and rhomboid major);
- intrinsic muscles, which join the scapula to the humerus (deltoid, supraspinatus, infraspinatus, teres minor, teres major, and subscapularis).

The principal structural support is from the scapula, a flat triangular bone. The **costal (anterior) surface** of the scapula overlies ribs II to VII, and its three borders are **superior**, **medial** (vertebral), and **lateral** (axillary). The lowest point is the **inferior angle**, and the lateral point is the **lateral angle**. A transverse **spine of scapula** divides the posterior surface of the scapula into a smaller **supraspinous fossa** above and a larger **infraspinous fossa** below. As it continues laterally, this spine forms the **acromion** (the bony high point of the shoulder). The **subscapular fossa** is on the anterior surface of the scapula. At the lateral angle of the scapula the shallow, oval-shaped **glenoid cavity** articulates with the head of the humerus at the glenohumeral joint.

### MUSCLES

The muscles of the scapular region (Figs 17.1 and 17.2) join the upper limb to the posterior trunk and facilitate many movements at the shoulder. They can be divided into three groups (Table 17.1).

- The superficial extrinsic muscles join the axial skeleton (chest wall and rib cage) to the appendicular skeleton (bones of the upper limb). The two muscles in this group are the trapezius and latissimus dorsi. The large, triangular **trapezius** muscle slightly overlies the broad **latissimus dorsi** muscle. Together, these muscles originate from the entire length of the thoracic vertebral column (CVII, TI to TXII) and insert laterally onto the clavicle, scapula, and humerus.
- The deep extrinsic muscles (levator scapulae, rhomboid major, and rhomboid minor) elevate and retract the scapula. The strap-like **levator scapulae** muscle is deep to the sternocleidomastoid muscle (see Chapter 13) and trapezius muscles and joins the upper medial border of the scapula to the transverse processes of the upper cervical vertebrae. The rhomboids also originate on the medial border of the scapula, with the **rhomboid minor** being more superior than the **rhomboid major** muscle. These muscles attach to the spinous processes of the upper thoracic vertebrae.
- The deep 'intrinsic' or true scapular muscles are the deltoid, supraspinatus, infraspinatus, teres minor, teres major, and subscapularis muscle. The **deltoid** muscle, which has three parts (clavicular, acromial, and spinal), is superior and forms the roundness of the shoulder over the glenohumeral joint. Inferior to deltoid are four scapular muscles – the **supraspinatus**, **infraspinatus**, **teres minor**, and **subscapularis** – which originate from the scapula and insert laterally on the humerus, forming a protective covering (rotator cuff) over the glenohumeral joint.

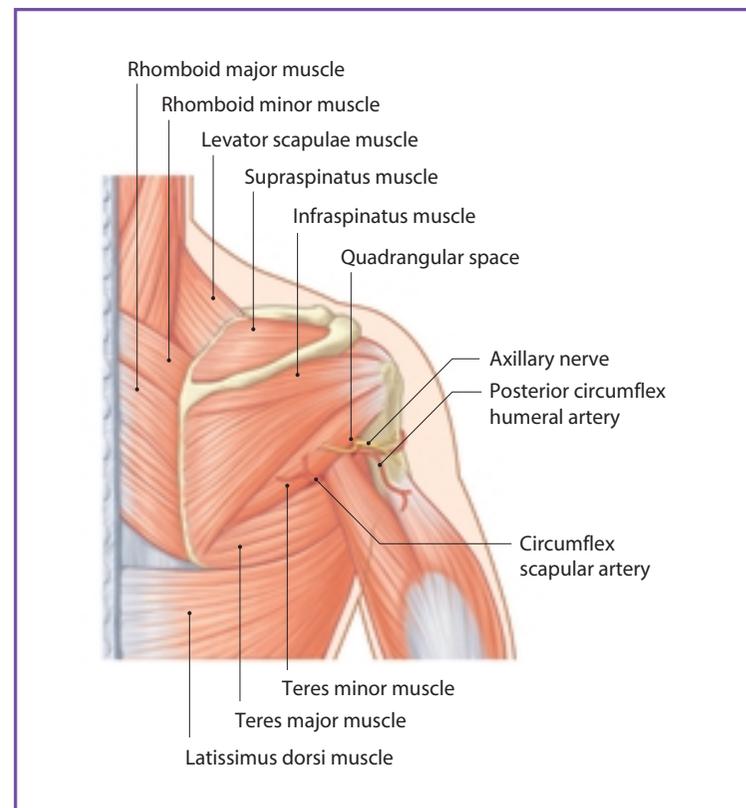


Figure 17.1 Scapular muscles (posterior view)

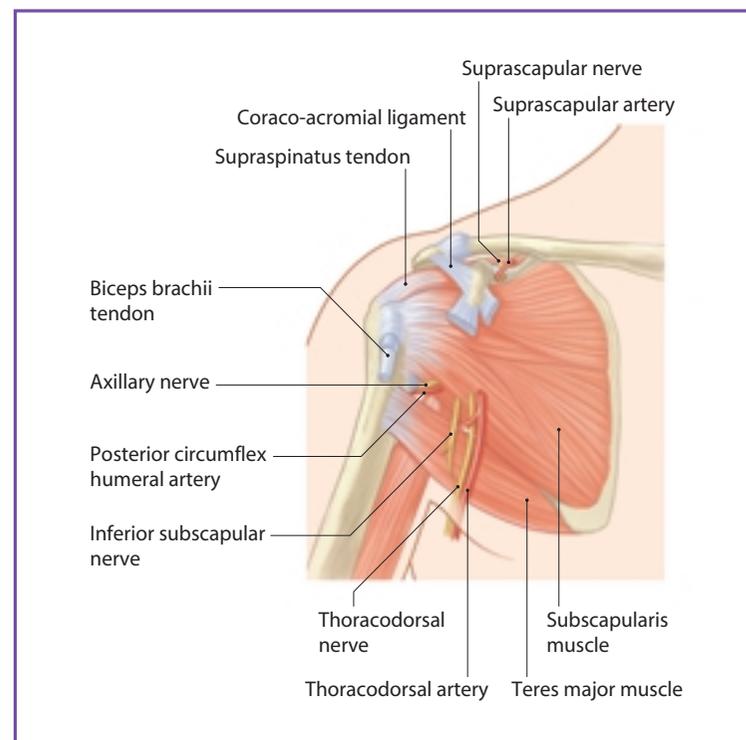


Figure 17.2 Scapular region (anterior view)

The rotator cuff muscles rotate the humerus to enable actions such as throwing a baseball. In conjunction with the latissimus dorsi muscle, the **teres major** muscle, which is just inferior to the rotator cuff muscles, helps form the posterior axillary fold. The anterior axillary fold is formed by the pectoralis muscles; the axilla lies between these folds.

## NERVES

The skin of the scapular region receives sensory information from the medial branches of the **posterior rami of cervical nerves C4 to C8** and **thoracic nerves T1 to T6** (see Chapter 26). The skin over the lateral scapular area overlying the deltoid muscle is innervated by branches of the **superior lateral cutaneous nerve of arm**, which is a branch of the **axillary nerve**. Motor innervation to the muscles of the scapular region is almost entirely by branches of the brachial plexus (see Chapter 16):

- the **dorsal scapular nerve** (levator and rhomboid muscles) is from the anterior ramus of C5;
- the **suprascapular nerve** (supraspinatus and infraspinatus muscles) is from the superior trunk;
- the four other nerves to this region (the **superior** and **inferior subscapular**, **thoracodorsal**, and **axillary**) are branches of the posterior cord and supply the subscapularis, teres major, latissimus dorsi, deltoid, and teres minor muscles. Only the spinal root of accessory nerve [XI], which innervates trapezius, does not originate from the brachial plexus.

## ARTERIES

Blood is brought to the scapular region by a network of arteries, which form the scapular anastomosis:

- muscles medial and superior to the scapula receive blood from the **dorsal scapular**, **transverse cervical**, and **suprascapular arteries**, which are branches of the subclavian artery, and also from the **acromial artery**, which is a branch of the axillary artery;
- muscles anterior and lateral to the scapula are supplied by the **subscapular**, **circumflex scapular**, and **posterior circumflex humeral arteries**, which are derived from the axillary artery.

The extensive arterial anastomosis at the scapular region provides a collateral circulation, so if one vessel is blocked or damaged, many others can provide blood to the region. This anastomosis helps preserve the upper limb during injury.

## VEINS AND LYMPHATICS

Venous drainage of the scapular region is by veins that correspond to the arteries. Each of these veins drains – directly or indirectly – into the **axillary** or **subclavian veins**. Lymphatic drainage of the scapular region is to the **axillary** and **supraclavicular lymph nodes**.

## ANATOMICAL SPACES

Three openings in the scapular region – the triangular space, the quadrangular space, and the triangle of auscultation – contain important neurovascular structures or are of clinical relevance.

The three-sided **triangular space** contains the circumflex scapular artery and is bordered laterally by the long head of the triceps brachii, inferiorly by the teres major, and superiorly by the teres minor muscle.

The **quadrangular space** contains the axillary nerve and posterior circumflex humeral artery and is bordered superiorly by the inferior border of the teres minor, inferiorly by the teres major, and medially by the long head of triceps brachii muscle, and laterally by the shaft of humerus.

The **triangular of auscultation** is a small triangular gap in the musculature, a good place to listen to posterior lungs with a stethoscope when the shoulder is protracted. The triangle is between the horizontal border of latissimus dorsi, the medial border of the scapula, and the inferolateral border of the trapezius.

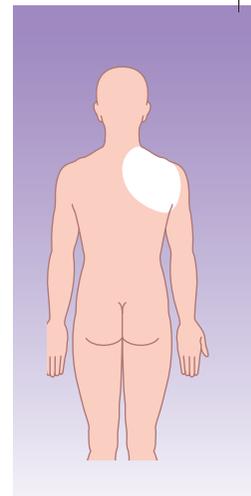
## CLINICAL CORRELATIONS

### Scapular fracture

Injuries to the scapula are not common because of the triangular structure and its supporting spine. The scapula is also protected by the large number of muscles that cover, surround, and insert onto it. A scapular fracture is a highly significant injury clinically because only high-velocity injuries or great force can fracture the scapula (Fig. 17.3). A patient with a scapular fracture therefore has a high risk of other potentially life-threatening injury (e.g. pneumothorax, hemothorax, pulmonary contusion), so particular attention must be paid to the A, B, C of trauma:

- Airway,
- Breathing,
- Circulation.

In the emergency setting all patients should first be assessed to determine whether their airway is patent (without obstruction). The quality of breathing is then carefully evaluated. After this, the circulatory system of the patient (e.g. pulses, capillary refill) is examined. The entire initial survey of the patient takes a few



UPPER LIMB  
Scapular region

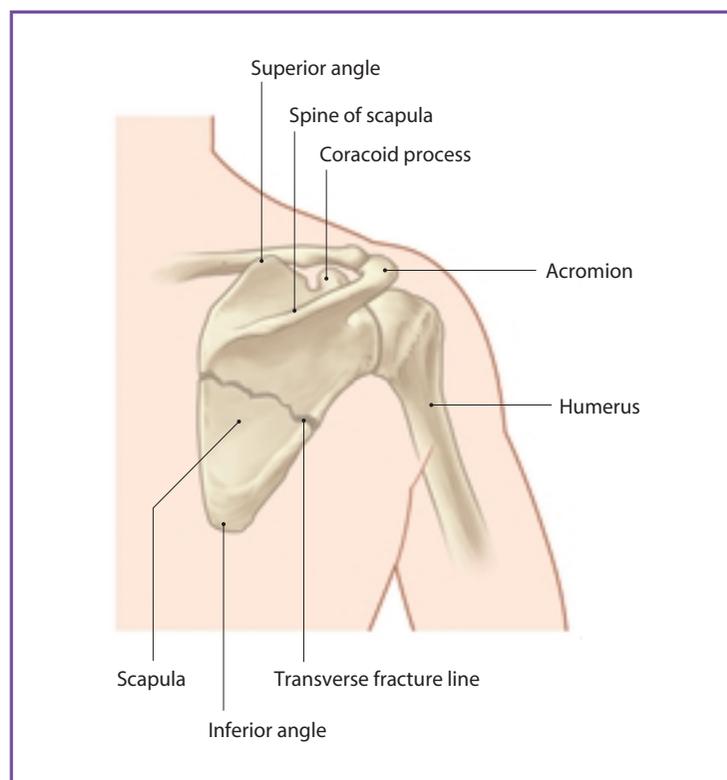
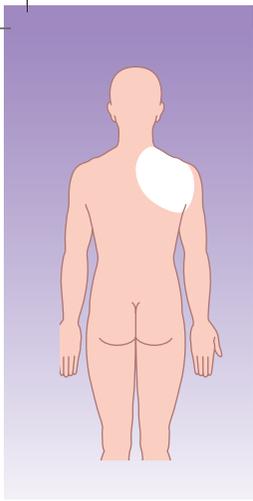


Figure 17.3 Common site of scapular fracture



Scapular region UPPER LIMB

seconds. Once vital functions are confirmed, a full examination, including a complete neurovascular examination, is carried out. Any problem discovered during the initial ABC survey warrants emergency treatment before the next step can be performed.

Most patients with scapular fracture experience extreme upper back pain and cannot lie comfortably; they hold the injured limb in adduction against the chest wall. In addition, because of the high likelihood of associated pulmonary injury, they might have respiratory symptoms (shortness of breath, inability to breathe, pain on deep inspiration). Tenderness on palpation is invariable, as are ecchymoses (bruises) or abrasions. Sometimes, crepitation, and

the sensation of a crunching feeling beneath the surface of the skin, is indicative of a pneumothorax. On completion of the trauma survey, and if there are no other life-threatening injuries, the clinician can carefully examine the upper lateral back. Radiographs of the scapula in two views will show the fracture line.

Treatment of most scapular fractures is conservative and consists of immobilization of the affected limb and pain control, and follow-up by an orthopedist. Fractures that damage the nerve and blood supply of the affected limb, open fractures, and fractures involving the glenohumeral joint space should be referred to a specialist for treatment, which in many cases is surgical.

**MNEMONICS**

Rotator cuff muscles and their insertion on humerus:

**SITS**

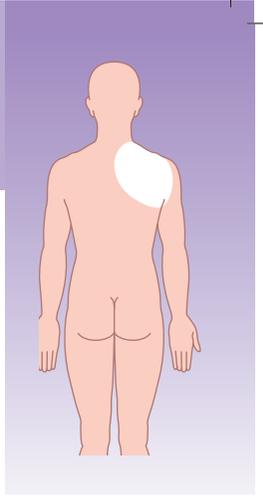
(**S**upraspinatus, **I**nfraspinatus, **T**eres major, **S**ubscapularis)  
(Greater tubercle) (Lesser tubercle)

Transverse scapular ligament:

**Army goes over the 'bridge', Navy goes under the 'bridge'**

(Suprascapular **A**rtery over the ligament, suprascapular **N**erve under the ligament)

# SCAPULAR REGION – SURFACE ANATOMY



UPPER LIMB  
Scapular region

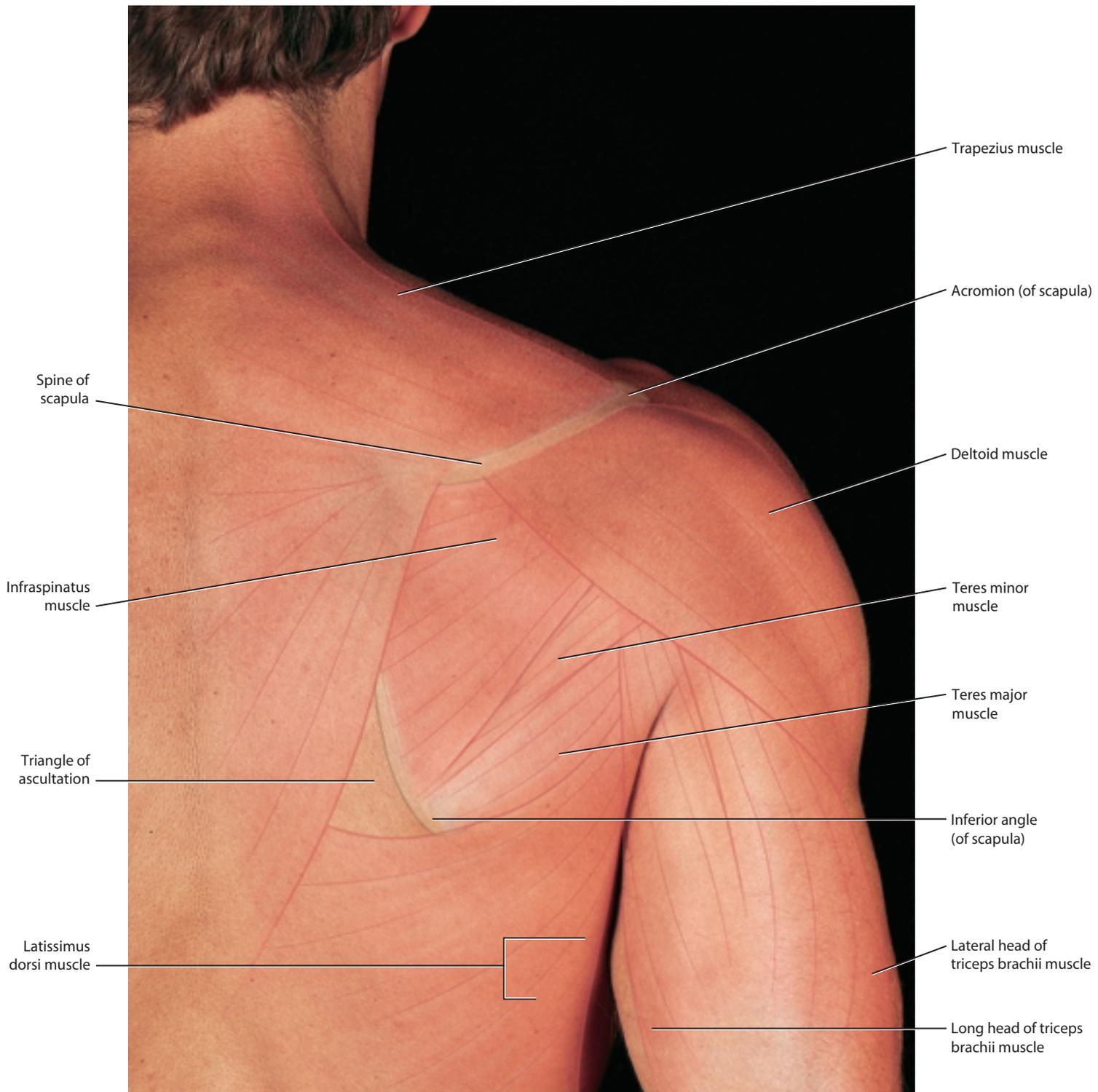
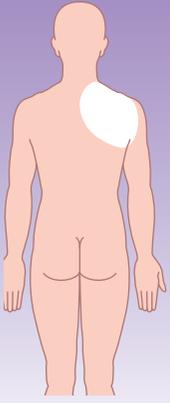
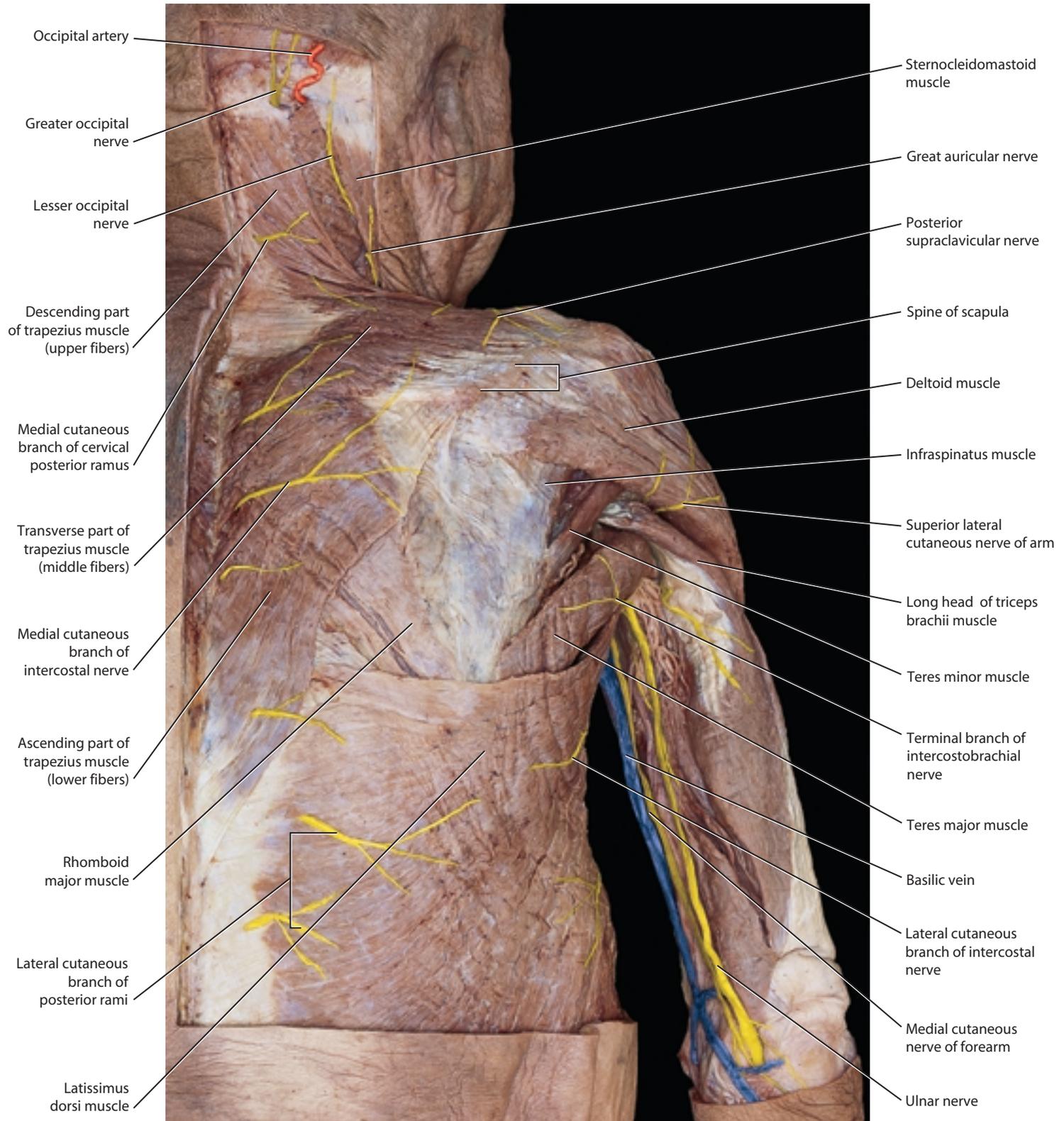
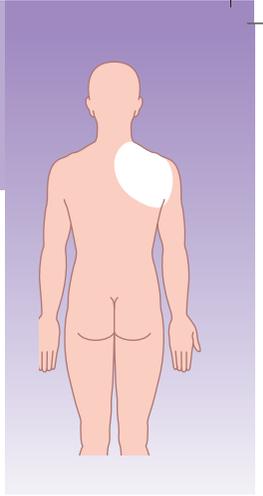


Figure 17.4 Scapular region – surface anatomy. Right posterior view of the scapular region of a young male. Observe the muscles that are visible

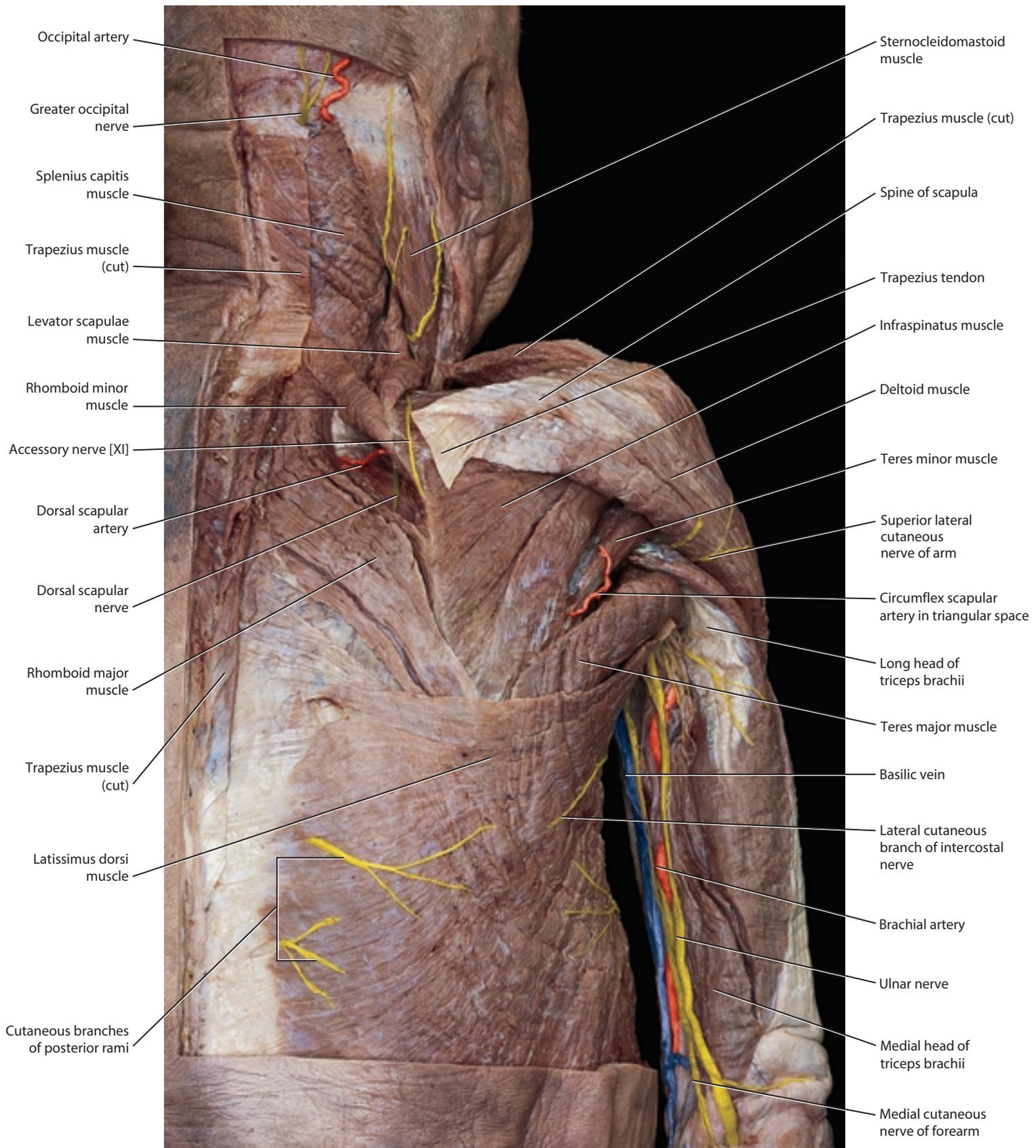
## SCAPULAR REGION – SUPERFICIAL DISSECTION

UPPER LIMB  
Scapular region

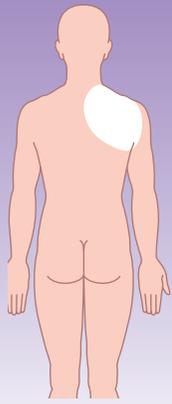
SCAPULAR REGION – INTERMEDIATE DISSECTION



UPPER LIMB  
Scapular region



**Figure 17.6 Scapular region – intermediate dissection.** Right posterior shoulder with the trapezius cut and removed to show the muscles deep to it in the scapular region. The underlying levator scapulae and rhomboid muscles are seen converging on the medial border of the scapula



## SCAPULAR REGION

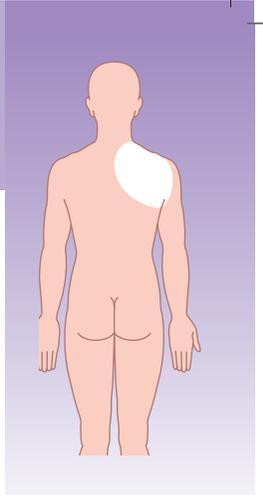
UPPER LIMB  
Scapular region

TABLE 17.1 SCAPULAR MUSCLES\*

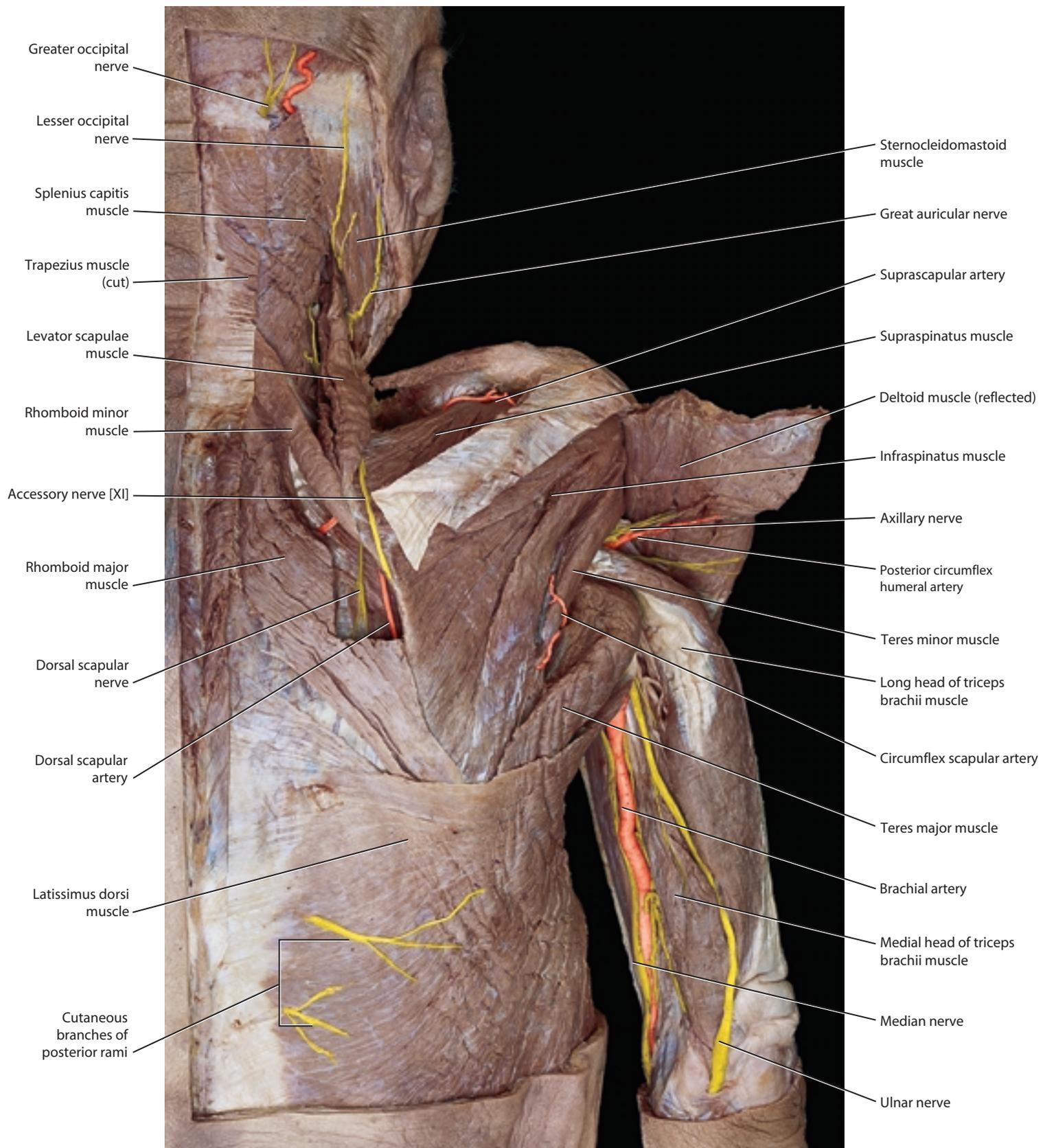
Muscle	Origin	Insertion	Innervation	Action	Blood supply
<b>Superficial extrinsic muscles</b>					
Trapezius	Medial third of superior nuchal line, external occipital protuberance, ligamentum nuchae, spinous processes of CVII to TXII	Lateral third of posterior clavicle, medial acromion, superior edge of spine of scapula	Spinal root of accessory nerve [XI] and C3, C4	Elevates scapula (descending part), retracts scapula (transverse part), depresses scapula (ascending part); rotates scapula (descending & ascending parts acting together)	Transverse cervical artery, dorsal scapular artery
Latissimus dorsi	Spinous processes of TVII to TXII, thoracolumbar fascia, iliac crest, lower three to four ribs	Floor of intertubercular sulcus of humerus	Thoracodorsal nerve (C6, C7, C8)	Extends, adducts and medially rotates arm, draws shoulder downward and backward	Thoracodorsal artery
<b>Deep extrinsic muscles</b>					
Levator scapulae	Posterior tubercles of transverse processes C1 to CIV	Medial border of scapula above base of spine of scapula	Dorsal scapular nerve (C5) and C3, C4	Elevates the scapula medially, inferiorly rotates glenoid cavity	Dorsal scapular artery, transverse cervical artery
Rhomboid minor	Ligamentum nuchae, spinous processes of CVII, T1	Medial border of scapula at base of spine of scapula	Dorsal scapular nerve (C4, C5)	Retracts and stabilizes the scapula	Dorsal scapular artery
Rhomboid major	Spinous processes of TII–TV	Medial border of scapula below base of spine of scapula	Dorsal scapular nerve (C4, C5)	Retracts and rotates scapula to depress the glenoid cavity	Dorsal scapular artery
<b>Intrinsic muscles</b>					
Deltoid	Lateral third of anterior clavicle, lateral acromion, inferior edge of spine of scapula	Deltoid tuberosity of humerus	Anterior and posterior branches of axillary nerve (C5, C6)	Clavicular part – flexes and medially rotates arm; acromial part – abducts arm; spinal part – extends and laterally rotates arm	Posterior circumflex humeral artery, deltoid branch of thoracoacromial artery
Supraspinatus	Supraspinous fossa of scapula	Superior facet of greater tubercle of humerus	Suprascapular nerve (C4, C5, C6)	Initiates arm abduction, acts with rotator cuff muscles	Suprascapular artery
Infraspinatus	Infraspinous fossa of scapula	Middle facet of greater tubercle of humerus	Suprascapular nerve (C5, C6)	Lateral rotation of arm, (with teres minor)	Suprascapular artery
Teres minor	Upper two-thirds of posterior surface of lateral border of scapula	Inferior facet of greater tubercle of humerus	Posterior branch of axillary nerve (C5, C6)	Lateral rotation of arm, adduction	Circumflex scapular artery
Teres major	Posterior surface of inferior angle of scapula	Medial lip of intertubercular sulcus	Inferior subscapular nerve (C6, C7)	Adducts and medially rotates arm	Circumflex scapular artery
Subscapularis	Subscapular fossa	Lesser tubercle of humerus	Superior and inferior subscapular nerves (C5, C6, C7)	Medially rotates arm and adducts it	Subscapular artery, lateral thoracic artery

\*Main nerve root is indicated in bold

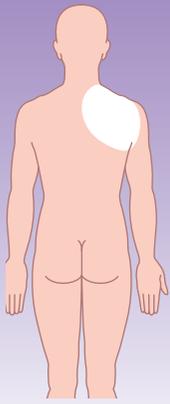
SCAPULAR REGION – DEEP DISSECTION 1



UPPER LIMB  
Scapular region

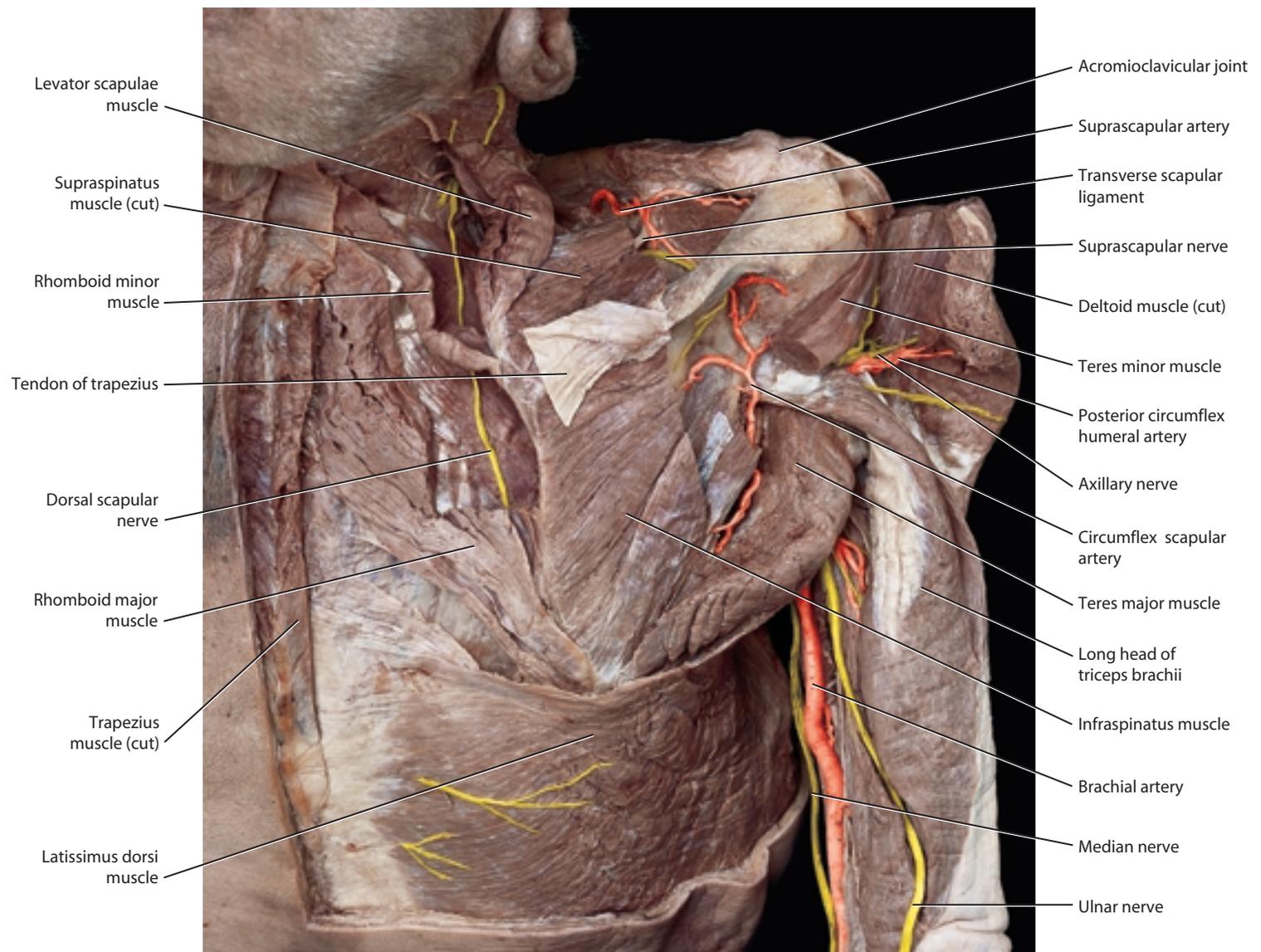


**Figure 17.7 Scapular region – deep dissection 1.** Right posterior shoulder with the trapezius muscle removed and the posterior deltoid muscle cut and reflected laterally to show the muscles immediately attached to the scapula (supraspinatus, infraspinatus). Note the window in the rhomboid major muscle showing the dorsal scapular artery and nerve. The axillary nerve, with the posterior circumflex humeral artery is visible under the relected deltoid



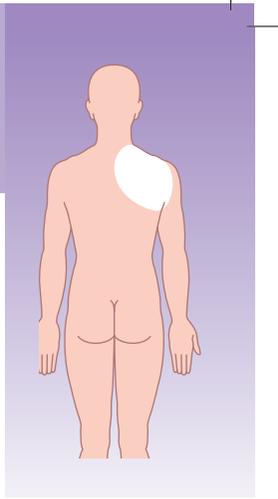
## SCAPULAR REGION – DEEP DISSECTION 2

### UPPER LIMB Scapular region

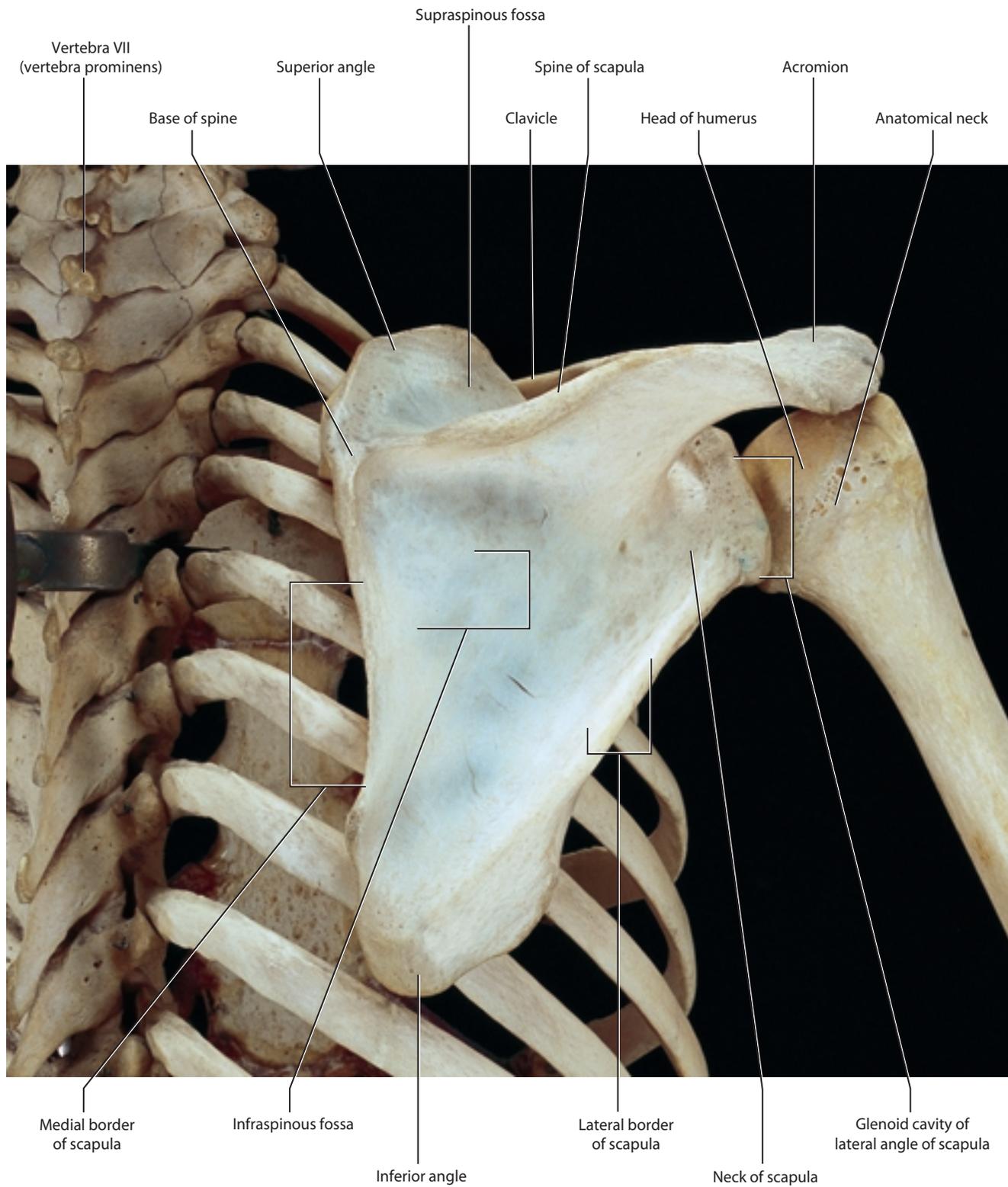


**Figure 17.8 Scapular region – deep dissection 2.** Right shoulder with the trapezius muscle removed and posterior half of the deltoid muscle reflected laterally. Note that the central parts of the supraspinatus and infraspinatus and teres minor muscles have been removed to show the anastomosis between the suprascapular artery and the circumflex scapular branch of the subscapular artery. Part of the rhomboid major muscle has been removed to show the dorsal scapular nerve

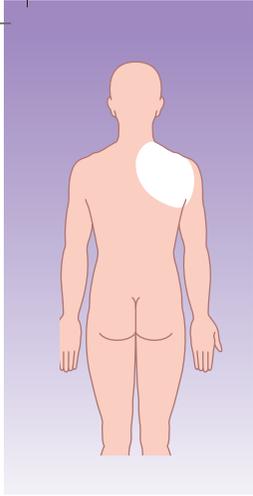
# SCAPULAR REGION – OSTEOLOGY



UPPER LIMB  
Scapular region

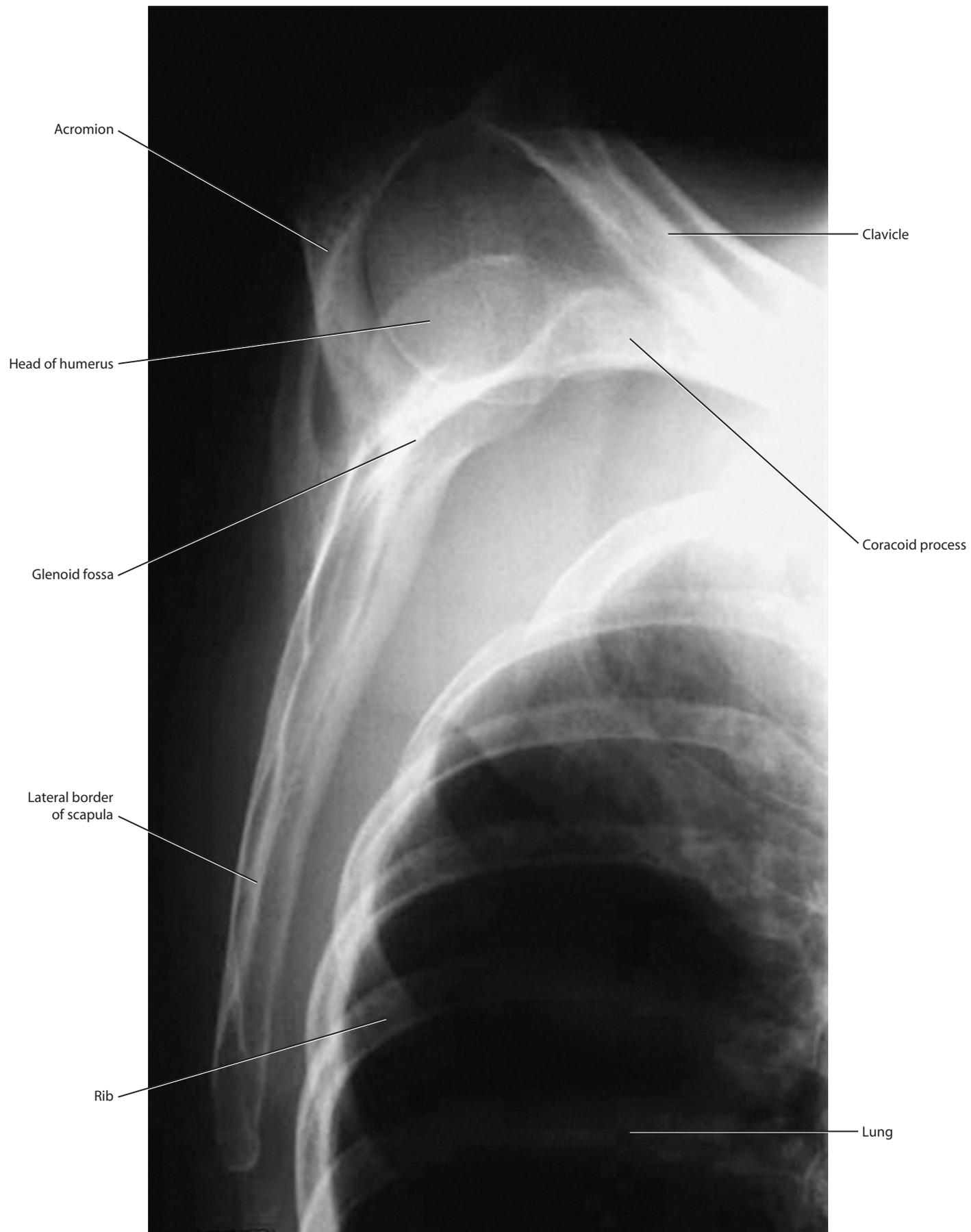


**Figure 17.9 Scapular region – osteology.** Posterior view of the articulated right scapula showing its position on the upper posterior rib cage, along with the proximal humerus

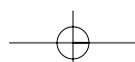


### SCAPULAR REGION – PLAIN FILM RADIOGRAPH (LATERAL OR ‘Y’ VIEW)

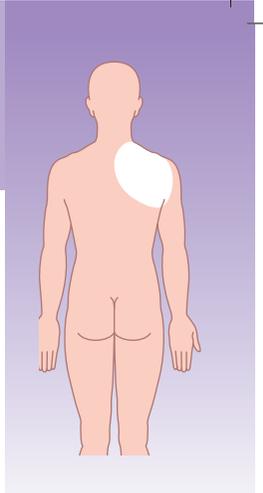
UPPER LIMB  
Scapular region



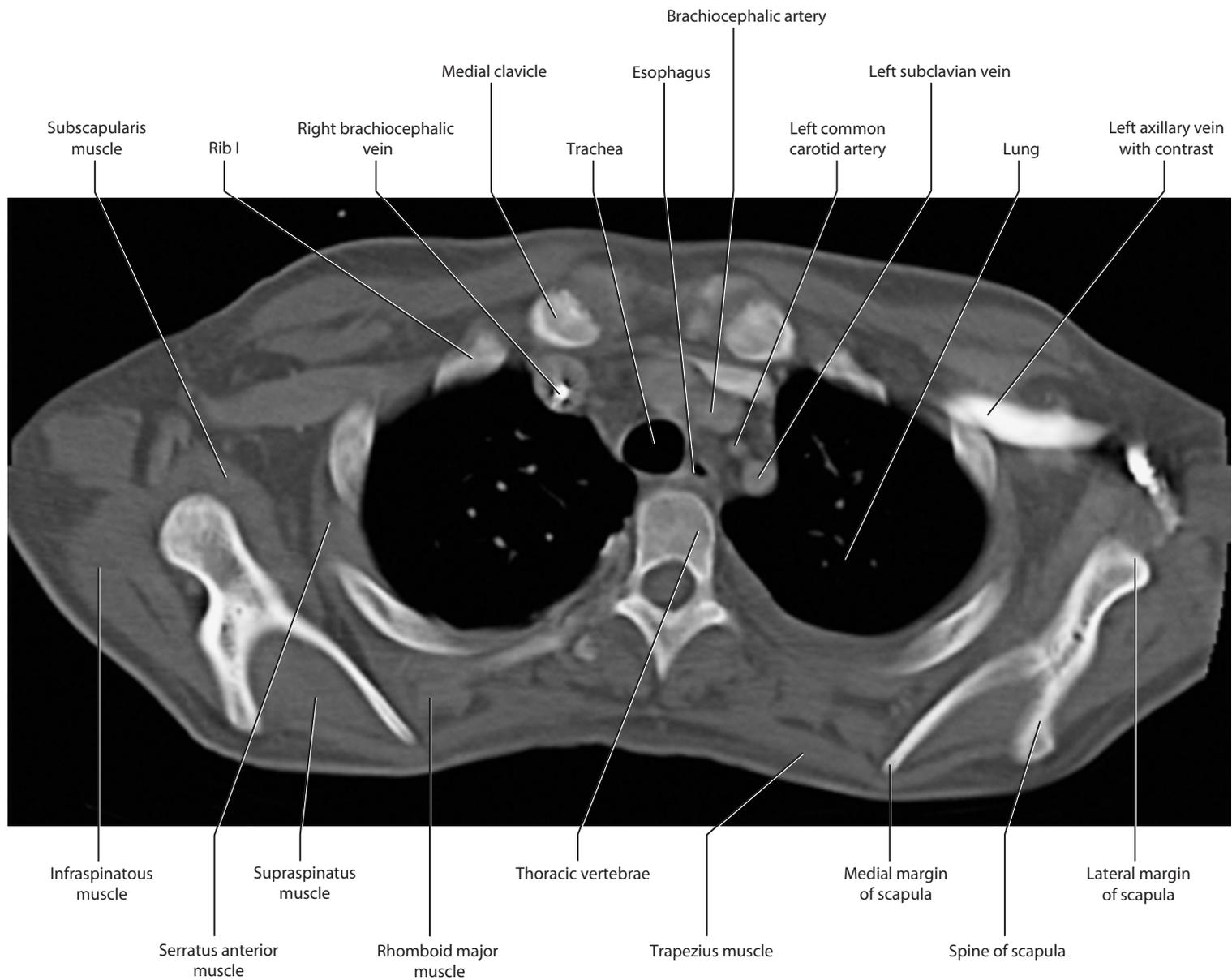
**Figure 17.10** Scapular region – plain film radiograph (lateral or ‘Y’ view). The humeral head sits centrally in the glenoid fossa with respect to the coracoid process (anterior) and acromion process (posterior). When there is displacement of the head of humerus towards the coracoid or acromion process, this suggests anterior or posterior dislocation, respectively.



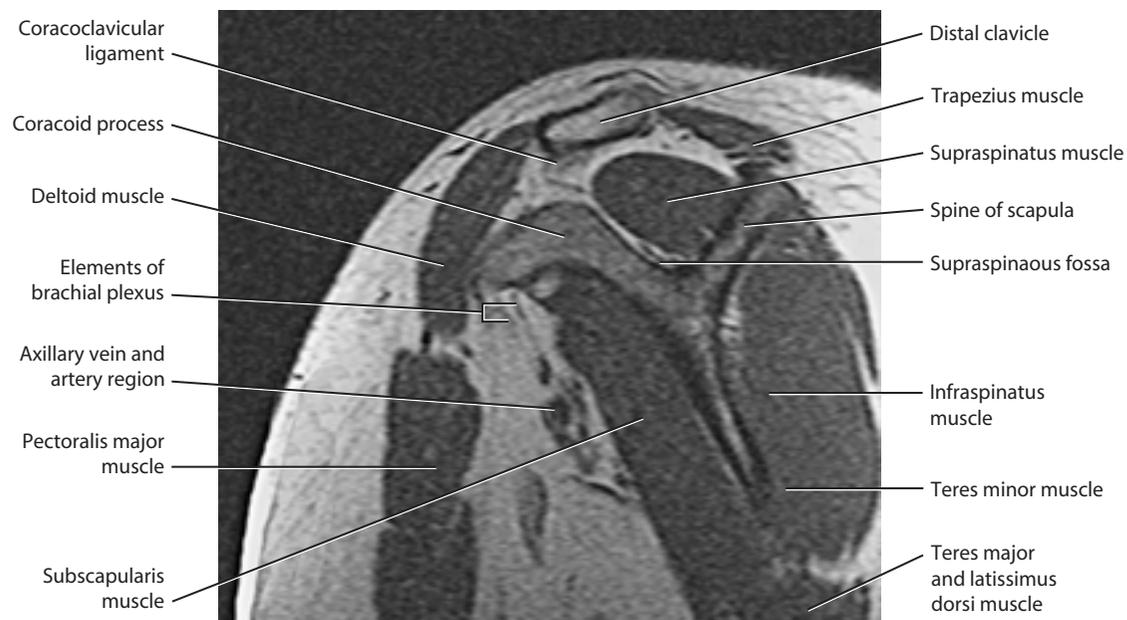
SCAPULAR REGION – CT SCAN (AXIAL VIEW) AND MRI SCAN (CORONAL OBLIQUE VIEW)



UPPER LIMB  
Scapular region



**Figure 17.11 Scapular region – CT scan (axial view).** The scapula is completely surrounded by muscles. This provides extensive protection to the scapula and also enables its mobility in supplementing the movements of the upper limb



**Figure 17.12 Scapular region – MRI scan (coronal oblique view).** In the view here, note how the appearance of the scapula is similar to that in the 'Y' view plain film radiograph