CHAPTER 1

POSTERIOR TRIANGLE OF THE NECK

SUMMARY

Skeletal features
Temporal bone: mastoid process; *mandible*: angle, lower border, symphysis menti; *sternum*: jugular notch; *clavicle*: medial end, shaft, lateral end; *typical cervical vertebra*: anterior and posterior tubercles; *boundaries of the posterior triangle; anterior; posterior; inferior; roof; floor.*

Subcutaneous structures
Platysma muscle; external jugular vein; lesser occipital nerve; great auricular nerve; transverse cutaneous nerve of neck; supraclavicular nerves.

Fascia
Superficial; deep: superficial (investing) layer forming roof of posterior triangle; pretracheal fascia; carotid sheath; cprevertebral fascia; axillary sheath; fascial planes; pretracheal space; retrovisceral space.

Muscles
Platysma; sternocleidomastoid; trapezius; inferior belly of omohyoid; scalenus anterior; scalenus medius; scalenus posterior; levator scapulae; splenius capitis; semispinalis capitis.

Nerves
External branch of accessory nerve; *brachial plexus*: roots; trunks; nerves to four muscles: dorsal scapular (C5) to rhomboids; subclavian nerve (C5-6) to subclavius; suprascapular (C5-6) to dorsal scapular muscles; long thoracic (C5-7) to serratus anterior; *cervical plexus*; superficial (cutaneous); lesser occipital (C2,3); greater auricular (C2,3); transverse cervical (C2,3); suprascapular (C3,4); supraclavicular (C3,4); muscular (deep) branches; phrenic nerve.

Arteries
Occipital; transverse cervical; suprascapular; dorsal scapular; subclavian.

Veins
External jugular: posterior auricular; retromandibular; suprascapular; transverse cervical; anterior jugular; subclavian.

Lymph nodes
Superficial cervical nodes (along external jugular vein); occipital nodes; thoracic duct.

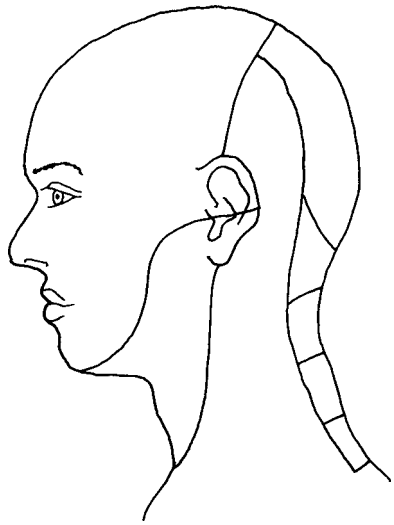
Surface anatomy
Accessory nerve (XI); external jugular vein.

Clinical anatomy
Injury to roots and trunks of brachial plexus; scalene syndrome.

DISSECTION

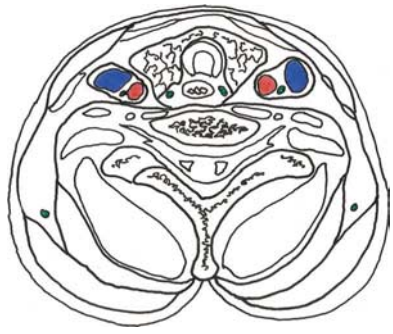
Before coming to the laboratory, you should read the account of the posterior triangle of the neck in your textbook. You will also need to begin your study of the skull (read the account in your textbook) to appreciate the skeletal features relevant to the posterior triangle of the neck and review the structure of the clavicle and sternum.

Label the diagram illustrating the cutaneous innervation of the neck.



What is the function of platysma and why is it important to preserve the cervical branch of the facial nerve in neck surgery?

Label the sketch of a horizontal section through the neck at C7 illustrating the major muscle blocks, major structures and particularly the superficial layer of deep cervical fascia, pretracheal and prevertebral fascial layers. Note the relationship of the thyroid to the layers of fascia.



Your dissection should expose the superficial structures of both anterior and posterior triangles. Note the external jugular vein and its tributaries. What manoeuvres or conditions make the external jugular vein prominent? What is a possible dangerous complication of a penetrating neck wound involving the external jugular vein?

What are the boundaries of the posterior triangle?

Identify the muscles forming the boundaries, floor and the major nerves and vessels lying within the posterior triangle. Note the brachial plexus, phrenic nerve and accessory nerve. What do these supply? Between which muscles does the brachial plexus emerge?

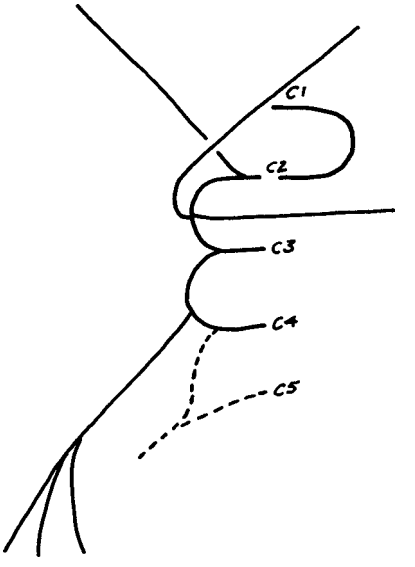
On the diagram of the posterior triangle, label the muscles and major nerves and vessels of the triangle.

What is the diagnostic significance of observing a prominent external jugular vein?

Make notes or diagrams based on your dissection to show the attachments, function and innervation of the sternocleidomastoid and trapezius muscles.

What are the clinical consequences of damage to the accessory nerve? How would you test for these? Practice on a colleague.

Illustrate on simple diagrams the origin and distribution of the sensory nerves of the cervical plexus of nerves. Why might knowledge of these be important clinically?



Where would you inject an anaesthetic agent to anaesthetise the cervical plexus for minor surgery of the neck?

Where in the neck could you inject an anaesthetic agent to anaesthetise the upper limb?

In a case involving severe haemorrhage from the upper limb, where in the neck can you apply pressure to control bleeding?

Describe the relationship of the superficial layer of deep cervical fascia to (a) the trapezius and sternocleidomastoid muscles; and (b) the accessory nerve.

Describe the relationship of the prevertebral fascia to the axillary sheath.

How would you test the integrity of the trapezius and sternocleidomastoid muscles?

How would you locate, on a living subject, the external jugular vein and the position of the superficial cervical lymph nodes?

CLINICAL QUESTIONS

1. What areas are drained by the superficial cervical lymph nodes?
2. The posterior triangle can be divided into a "carefree" portion above the accessory nerve and a "careful" portion below the accessory nerve. Why? What important structures may be damaged during surgery in the inferior portion of the posterior triangle?

   Note: In an adult, the accessory nerve is marked by a line joining the midpoint of the posterior border of sternocleidomastoid and the anterior border of trapezius at a point 5 cm above the clavicle.
3. What is *torticollis*?

CERVICAL FASCIA

Superficial Cervical Fascia

Superficial cervical fascia is a thin layer investing the platysma muscle and is hardly demonstrable as a separate layer. It may, however, contain considerable amounts of adipose tissue, and it usually does so to a greater extent in the female. It is a zone of loose connective tissue between dermis and deep fascia, to both of which it is connected.

Deep Cervical Fascia

The deep cervical fascia lies deep to the platysma muscle and invests the muscles of the neck from the base of the skull to the root of the neck. It consists of fibroareolar tissue which exists between the muscles, viscera, vessels and nerves of the neck. In certain situations, it forms well-defined fibrous sheets, elsewhere it is loosely arranged.

Superficial Layer of Deep Cervical Fascia

The superficial (investing) layer of deep cervical fascia is attached *posteriorly* to the external occipital protuberance, the nuchal ligament and the spine of the seventh cervical vertebra. It forms an investment for the trapezius muscle, and from the anterior border of this muscle it continues forwards, covering the posterior triangle of the neck (it forms part of the roof of this triangle), to the posterior border of the sternocleidomastoid muscle. Here, the layer divides to enclose the muscle, and at the anterior margin again forms a single lamina which covers the anterior triangle of the neck and reaches forwards to the median plane where it is continuous with the corresponding layer from the opposite side. In the *median plane*, it is adherent to the symphysis menti, the body of the hyoid bone and to the anterior and posterior surfaces of the manubrium sterni.

Above, the fascial layer is attached to the superior nuchal line, the mastoid process and the whole of the base of the mandible. Between the angle of the mandible and the mastoid process, the layer divides to ensheathe the parotid gland. The superficial layer, the *parotid fascia*, covers the gland and extends upwards to become fixed to the zygomatic arch. From here, it continues upwards as the temporal fascia to become attached to the superior temporal line. This layer covers the temporalis muscle which also originates in part from this fascia. The deeper layer of the superficial layer, known as the stylomandibular ligament, passes deep to the parotid gland and ascends to become attached to the styloid process and the tympanic bone.

From the body of the hyoid bone, a deep layer of the superficial layer passes upwards on the under surface of the mylohyoid muscle, to become attached to the mylohyoid line on the inner surface of the mandible. Between the two layers lies the submandibular gland.

Below, the superficial layer is attached posteriorly to the crest of the spine of the scapula, to the acromion laterally, and to the anterior and posterior surfaces of the clavicle in front. Below the clavicle, this layer continues as the clavipectoral fascia which ensheathes the subclavius and pectoralis minor muscles.

Prevertebral Layer of Deep Cervical Fascia

The prevertebral layer covers the prevertebral muscles and extends laterally over the scalene and levator scapulae muscles, thus forming a fascial floor for the posterior triangle of the neck. As the subclavian artery and the brachial nerves emerge from behind and the subclavian vein from in front of the scalenus anterior muscle, they carry the prevertebral fascia downwards and laterally behind the clavicle into the axilla to form the *axillary sheath*. Traced *laterally*, the prevertebral fascia fuses with that part of the superficial layer deep to the trapezius muscle.

Above, the prevertebral fascia is attached to the base of the skull, i.e. the basilar part of the occipital bone and the styloid process.

Below, the prevertebral fascia continues downwards in front of the vertebral column into the superior mediastinum where it fuses with the anterior longitudinal ligament.

Anteriorly, the prevertebral layer is separated from the pharynx and its covering of buccopharyngeal fascia by an interval which is termed the retropharyngeal space.

All the ventral rami of the cervical nerves lie at first behind the prevertebral fascia, but some retain this position throughout their course in the neck. e.g. long thoracic nerve and the phrenic nerve.

Pretracheal Layer

The pretracheal layer of deep cervical fascia provides a fine fascial sheath for the thyroid gland. It covers the front and sides of the trachea and divides laterally to enclose the thyroid gland.

Above, it is fixed to the cricoid and thyroid cartilages.

Below, it is continued into the superior mediastinum with the inferior thyroid veins.

Carotid Sheath

The carotid sheath is a tubal condensation of deep cervical fascia that encloses the common and internal carotid arteries, the internal jugular vein and the vagus nerve. A rather thin branching fascial tube, which comes off the carotid sheath, surrounds the external carotid artery.

Above, the carotid sheath is attached to the base of the skull.

Below, the carotid sheath continues downwards into the superior mediastinum.

The carotid sheath blends in front with the pretracheal and superficial layer and behind with the prevertebral layer of deep cervical fascia.

Buccopharyngeal Fascia

The buccopharyngeal fascia covers the external surfaces of the buccinator muscle and the constrictor muscles of the pharynx. It extends downwards from the base of the skull above, to the oesophagus in the superior mediastinum below.

The upper part of the buccopharyngeal fascia, between the superior border of the superior constrictor muscle of the pharynx and the base of the skull and under surface of the auditory tube, is thickened and is termed the *pharyngobasilar fascia*. This part is covered on its deep surface by the mucous layer of the pharynx.

Suprapleural Membrane

The *suprapleural membrane* is attached to the seventh cervical transverse process and fans out over the top and front of the dome of the pleura to be attached to the inner border of the first rib. This membrane separates the pleura from the muscles, vessels and nerves in the root of the neck.

CLINICAL ANATOMY

- The clinical importance of the fascial layers stems from the fact that they may determine the direction of the spread of pus, or may limit the spread or pus, in neck infections.
- The superficial layer of deep cervical fascia opposes the extension of abscesses towards the surface, and pus beneath it has a tendency to extend laterally. If the pus is in the anterior triangle, it may find its way into the mediastinum.
- Pus behind the prevertebral layer may extend towards the lateral part of the neck and point in the lower part of the posterior triangle or even descend in the axillary sheath and point in the axilla. The pus may perforate the prevertebral layer and the buccopharyngeal fascia to bulge into the pharynx as a *retropharyngeal abscess*.