

Core Messages

- At the start of the dissection exercise, we must take a panoramic look for orientation. We then establish the limits of the area of operation and the main landmarks.

2.1 Anatomic Layout

The neck is the part of the trunk that joins the head and the chest and constitutes its most mobile part. It is essentially cylindrical in shape; length is constant while diameter varies. The expression “long neck/short neck” is incorrect, because the length of the neck, understood to be the cervical portion of the vertebral column, does not present significant variations. Conversely, neck width, determined by the development of muscular and adipose masses is extremely variable [1].

Significant Anatomical Structures: nuchal region, trachelian region, superficial cervical fascia, middle cervical fascia, deep cervical fascia, superficial cervical lymph node system, deep lymph node system, Delphian lymph node.

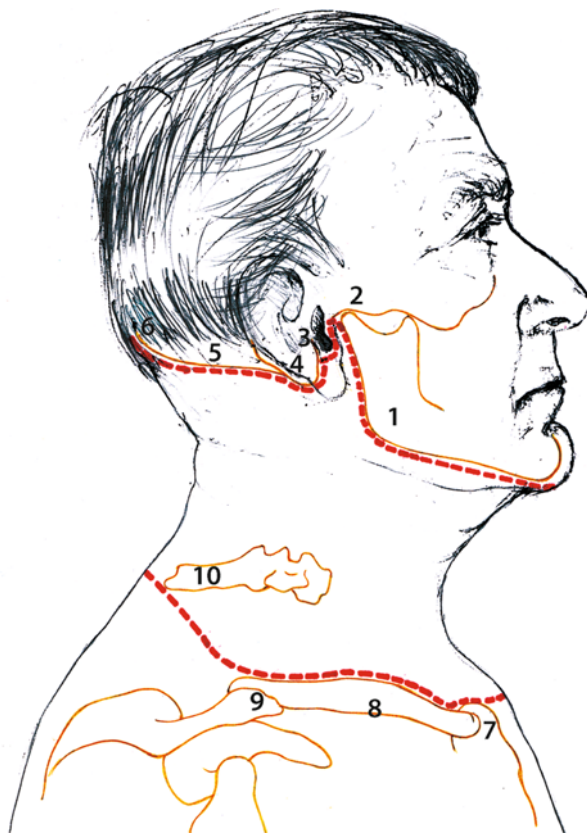
Landmarks: mandible, external auditory canal, mastoid apex, superior nuchal line, external occipital protuberance, clavicle, spinous process of the seventh cervical vertebra, linea alba.

2.2 Neck Boundaries

Its upper limits run along the inferior and posterior borders of the mandible, the extreme posterior of the zygomatic arches, the anteroinferior borders of the external auditory canals, the profiles of the mastoid apex, the superior nuchal line, and the external occipital protuberance. Its lower boundaries lie along the superior border of

Fig. 2.1 Neck boundaries.

1 Mandible, 2 zygomatic process of the temporal bone, 3 external auditory canal, 4 mastoid, 5 superior nuchal line, 6 external occipital protuberance, 7 manubrium sterni, 8 clavicle, 9 acromioclavicular joint, 10 spinous process of seventh cervical vertebra



the sternum and clavicles, the acromioclavicular joints, and an imaginary line joining the acromioclavicular joints to the spinous process of the seventh cervical vertebra (Fig. 2.1).

2.3 Structure

On transverse section, the neck appears to be roughly divided into two parts, a posterior or nuchal region (osteo-muscular) and an anterior or trachelian region (muscular–fascial). The conventional dividing line extends from the transverse vertebral processes to the anterior edges of the trapezius muscles (Fig. 2.2).

The function of the posterior region is essentially static and dynamic – powerful, articulated muscles support a bone framework with the head at the top. This structure functions as an articulated joint since the two interapophyseal joints between one vertebra and the next permit head movement; it also functions as a shock absorber for intravertebral disk compressibility in addition to being a fastening point for the muscles of mastication, swallowing, and speech. The cervical portion of the vertebral column is curved with anterior convexity (cervical lordosis). In contrast, the anterior region, which is the object of this dissection, holds the internal organs.

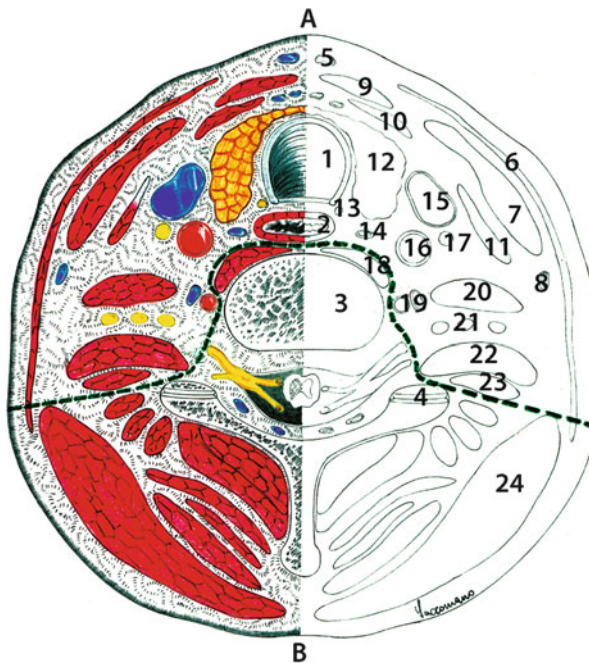


Fig. 2.2 Transverse cervical section: trachelian region and nuchal region. (a) Trachelian region. (b) Nuchal region. 1 Trachea, 2 oesophagus, 3 vertebral body of seventh cervical vertebra, 4 inter-apophyseal articulation, 5 anterior jugular vein, 6 platysma muscle, 7 sternocleidomastoid muscle, 8 external jugular vein, 9 sternohyoid muscle, 10 sternothyroid muscle, 11 omohyoid muscle, 12 thyroid gland, 13 recurrent nerve, 14 inferior thyroid vein, 15 internal jugular vein, 16 common carotid artery, 17 vagus nerve, 18 prevertebral muscles, 19 vertebral artery and vein, 20 anterior scalene muscle, 21 brachial plexus, 22 medial scalene muscle, 23 posterior scalene muscle, 24 trapezius muscle

It contains the parotid and submandibular glands, the thyroid gland, and several lymph nodes and is crossed by important blood and lymphatic vessels and nerves and by the respiratory and digestive tracts.

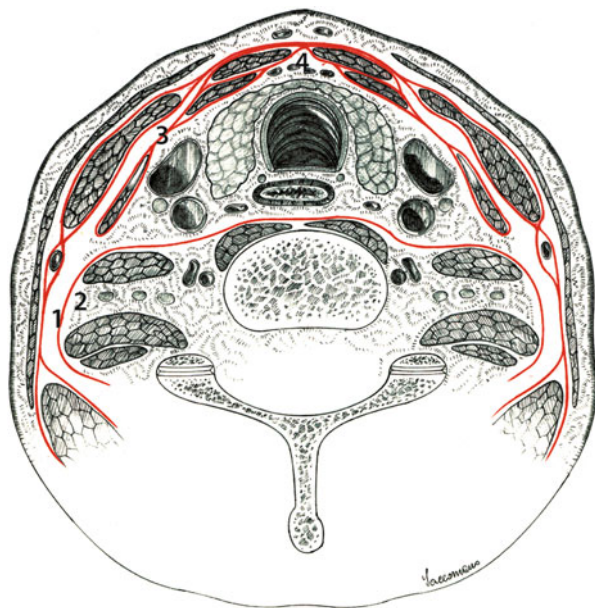
In addition to being prevalently a structure of transit and union, the neck is an important point of autonomous physiological activity, linked to the presence of exocrine glands (parotid and submandibular), endocrine glands (thyroid, parathyroid, and thymus), muscle and tendon neuroreceptors, visceral receptors, vascular chemoreceptors, and lymph nodes.

2.4 Cervical Fasciae

Almost all cervical viscera originate from or lead to the thorax or upper extremities; the loose connective tissue surrounding them is in direct, continuous contact with the loose connective tissue of the mediastinum and axillary regions. In some points, the loose connective tissue thickens to form fibrous sheaths (around neurovascular bundles,

Fig. 2.3 Transverse cervical section: cervical fasciae.

- 1 Superficial cervical fascia,
2 deep cervical fascia,
3 middle cervical fascia,
4 infrahyoid linea alba



the laryngotracheal canal, and the thyroid) and perimuscular aponeuroses. These latter define important dissection planes, particularly:

1. The superficial cervical fascia, extending from the anterior edge of the trapezius and splenius capitis muscles on both sides, which divides into two to enclose the sternocleidomastoid muscles, parotid gland, and submandibular gland; it fuses with the middle cervical fascia on the midline (linea alba).
2. The middle cervical fascia, lying between the omohyoid muscles on both sides; as a whole, it forms a triangle with the hyoid bone at its apex and the clavicles at the base; it divides in two to contain the infrahyoid muscles.
3. The deep (or prevertebral) cervical fascia, investing the prevertebral muscles and dividing laterally to contain the scalene and levator scapulae muscles (Fig. 2.3).

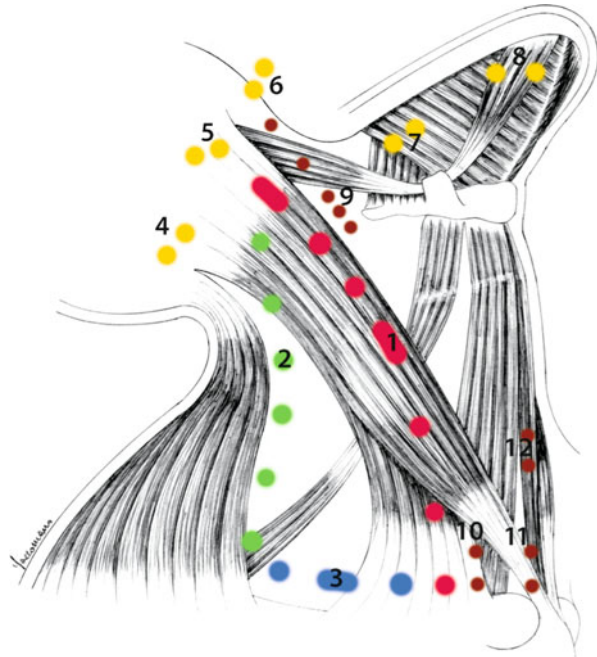
2.5 Lymph Node Stations

The cervical lymphatic system forms a three-dimensional network into whose nodal points the lymph nodes are intercalated. Although they vary in number and dimensions, they do keep a relatively constant position, and they can thus be considered topographically grouped into lymph gland stations (Fig. 2.4).

These are divided in the neck as follows:

1. A subfascial, superficial lymph node system with a circular arrangement between chin and occiput (occipital, mastoid, parotid, submandibular, and submental lymph nodes) and along the course of the external jugular vein

Fig. 2.4 Lymph node stations. 1 Jugular chain, 2 spinal chain, 3 supraclavicular chain, 4 occipital lymph nodes, 5 mastoid lymph nodes, 6 parotid lymph nodes, 7 submandibular lymph nodes, 8 submental lymph nodes, 9 retropharyngeal lymph nodes, 10 recurrent lymph nodes, 11 pretracheal lymph nodes, 12 prelaryngeal lymph nodes



2. A more consistent, deep lymph node system in a bilateral triangular arrangement, bounded anteriorly by lymph nodes adjacent to the internal jugular vein and posteriorly by the spinal lymph node chain, with a supraclavicular lymph node
3. A perivisceral lymph node system close to the median viscera (prethyroidean, pretracheal, retropharyngeal, recurrent, and finally prelaryngeal lymph nodes, the more defined of which, called Delphian lymph node, is situated between the cricothyroideal muscles)

Remarks: The relationships between the lymph nodes/lymphatic vessels and the muscles/vessels/nerves and glands in the neck are of a contiguous nature, always in normal conditions and nearly always in pathological ones. Thanks to the removal of the fascia, they may be separated from the contiguous structures and moved away easily. There may be an interruption of the fascia and colonisation of the contiguous structures only if the lymph node capsule gives way as a result of carcinomatous invasion [2].

2.6 Before Beginning the Dissection

Anatomists divide the neck into two major regions:

1. The anterior region, situated between the two sternocleidomastoid muscles, encompassing the suprahyoid, infrahyoid, and prevertebral regions
2. The lateral regions, comprising the parotid, sternocleidomastoid or carotid, and supraclavicular regions

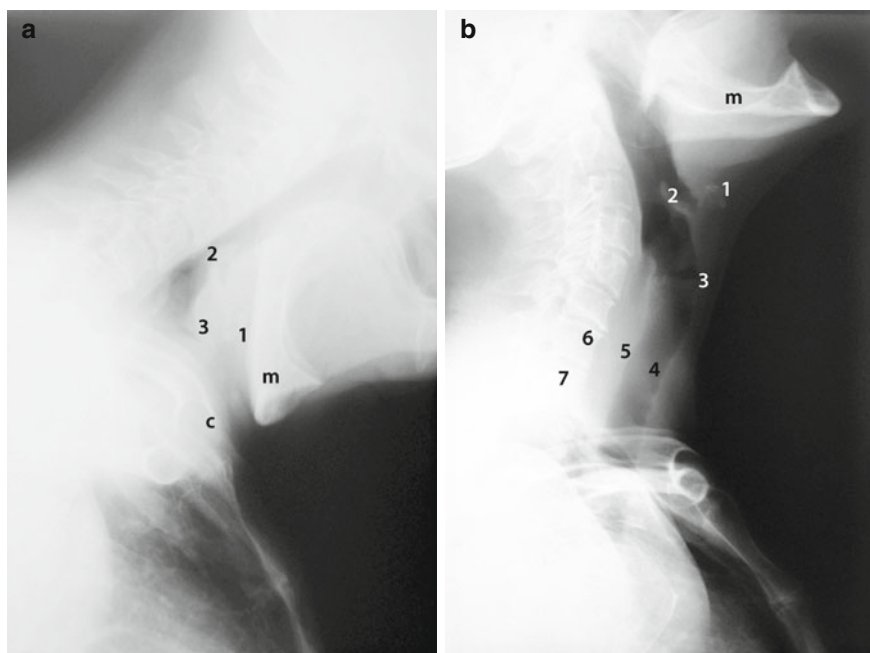


Fig. 2.5 Neck mobility. (a) Flexion, (b) Extension. *m* Mandible, *c* clavicle, *1* hyoid bone, *2* epiglottis, *3* Morgagni's ventricle, *4* trachea, *5* cervical oesophagus, *6* seventh cervical vertebra, *7* first thoracic vertebra

For the sake of simplicity and for dissection purposes, we instead divide the neck into three lateral regions (parotid, submandibular, and laterocervical) and three median regions (inferior median, superior median, and prevertebral).

The anatomic arrangement of the neck organs varies considerably with neck movements, especially flexing–extending movements. For example, at maximum flexion, the hyoid bone, one of the more cranial structures, can almost reach the thorax (Fig. 2.5a, b). Surgeons should bear this in mind since they can take advantage of great cervical mobility to achieve the widest possible dissection areas.

Remarks: We stress that the symmetrical posture of the neck is commonly defined the normal position. The surgical manoeuvres will be carried out on a neck which we shall try to hyperextend as much as possible. To obtain this position, a thickness of at least 10 cm must be placed under the scapulae. That is as far as the anterior regions are concerned. For the lateral regions, the head must be turned contralaterally with respect to the operator; this is defined the operating position. Instead, when the head is bent and slightly inclined towards the explored side, the structures relax and this allows deep exploration of the neck. This is defined as the clinical exploration position.

Take-Home Messages

- The correct position of the head (extended as far as possible) is crucial both in anatomic specimens and when operating in vivo.

References

1. Testut L, Jacob O (1977) *Trattato di Anatomia Topografica*. UTET, Torino
2. Bocca E (1972) Chirurgia dei linfonodi cervicali. In: Naumann HH (ed) *Chirurgia della testa e del collo*. Casa Editrice Ambrosiana, Milano, pp 153–187

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