Laterocervical Region (Sternocleidomastoid Region: Robbins Levels II, III, and IV)

7

Core Messages

- The surgery of this region has a specific oncological significance for the treatment of lymph node metastases of tumours of the upper respiratory and digestive tracts. The surgical exploration of this region will concern mainly the jugulocarotid axis and its adnexa. It is the area that the oncological surgeon of the head and neck explores most frequently.

7.1 Anatomic Layout

The sternocleidomastoid region as defined by anatomists corresponds approximately to Robbins levels II, III, and IV. It comprises roughly the sternocleidomastoid muscle and all that lies below it, considering the head in a normal position.

Robbins's classification [1] gives its precise limits, which are the base of the skull and the stylohyoid muscle at the top, the clavicle at the bottom, the posterior margin of the sternocleidomastoid muscle at the side, and anteriorly, the lateral edge of the sternocleidomastoid muscle.

The three levels are divided in the craniocaudal direction by the inferior edge of the hyoid bone and the inferior edge of the cricoid cartilage.

The significant lymph node groups are above all those of level II and III, which represent the principal stations of lymphatic drainage of the neck.

Significant Anatomical Structures: splenio capitis muscle, elevator scapulae muscle, scalene muscles, spinal accessory nerve, internal jugular vein, occipital artery, sternocleidomastoid muscle, omohyoid muscle, cervical plexus, hypoglossal loop, phrenic nerve, thyrolinguofacial trunk, perijugular lymph nodes, common carotid artery, carotid glomus, external carotid artery, superior laryngeal artery, hyoglossal muscle, facial artery, ascending pharyngeal artery, posterior auricular artery, hypoglossal nerve, greater cornu of hyoid bone, Farabeuf's triangle, vagus nerve, thoracic duct, thyrocervical trunk, transverse scapular artery, transverse cervical

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artery, ascending cervical artery, inferior thyroid artery, internal thoracic artery, thoracoacromial artery, subclavian artery, recurrent nerve

Landmarks: transverse process of atlas, digastric muscle, carotid tubercle

7.2 Spinal Nerve and Robbins Level IIB

We begin the dissection of this region from the most cranial part. We identify the deep musculofascial plane, which is formed, latero-medially, by the splenius capitis, levator scapulae, and scalene muscles. After having applied traction medially on the sternocleidomastoid muscle with a Farabeuf, we seek by palpation the transverse process of the atlas, which is an important landmark and the upper limit of lymph node drainage of the neck, close by running the occipital artery or some of its branches. The overlying loose cellular connective tissue is stretched medially, and the lesser occipital nerve, a cutaneous branch of the cervical plexus, can be demonstrated in the deep muscle plane (Fig. 7.1).

It is important at this point to find the common trunk of the spinal accessory nerve, which runs anteriorly to the internal jugular vein in a mediolateral direction and penetrates the sternocleidomastoid muscle. A reliable method of identifying it amid the celluloadipose tissue is to grasp the muscle with the hand, after isolating it from bottom to top, and to palpate with the index finger the stretched nerve within this soft tissue setting (Fig. 7.2).

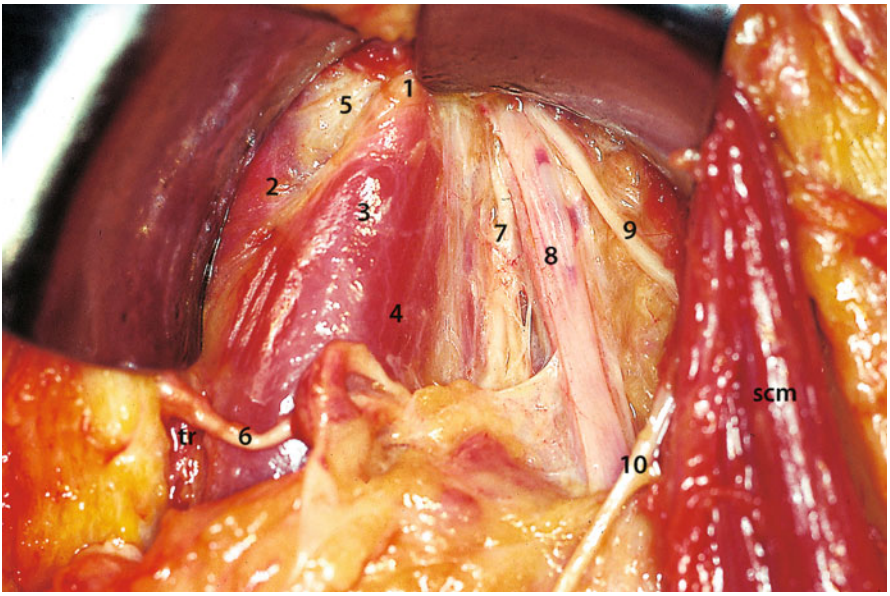

Fig. 7.1 Cervical deep plane and atlas. *scm* Sternocleidomastoid muscle, *tr* trapezius muscle, *1* transverse process of atlas, *2* splenius capitis muscle, *3* levator scapulae muscle, *4* medial scalene muscle, *5* occipital artery, *6* lesser occipital nerve, *7* cervical plexus, *8* internal jugular vein, *9* spinal accessory nerve (common trunk), *10* spinal accessory nerve (peripheral branch)

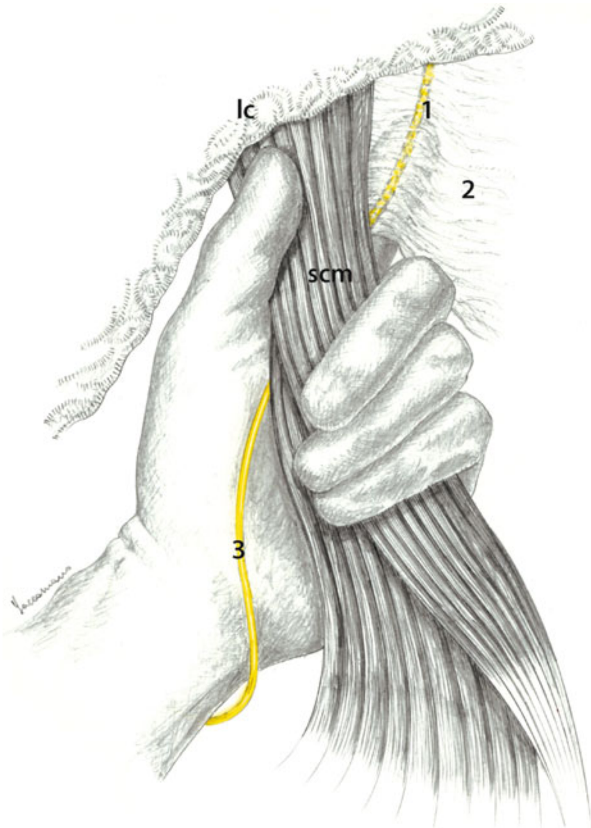

Fig. 7.2 Common trunk of the spinal accessory nerve. *lc* Cutaneous flap, *scm* sternocleidomastoid muscle, *1* spinal accessory nerve (common trunk), *2* loose and fascial connective tissue, *3* spinal accessory nerve (peripheral branch)

Instead, the most practical method is direct access from level II. The anterior margin of the sternocleidomastoid muscle and the posterior belly of the digastric muscle are freed; the latter is another important landmark, on the surface of which there are no dangerous structures for dissection. Divaricating these two muscles allows access to Robbins level II. The common trunk of the spinal accessory nerve, which normally (though not always) runs above the internal jugular vein, divides into an anterior sector (level IIA) and a posterior one (level IIB) (Fig. 7.3).

Remarks: In tumours of the larynx, the presence of metastases at level IIB when level IIA is intact is a negligible occurrence. So, once the intraoperative histological examination has ascertained that level IIA is free from metastases, level IIB is not removed.

Exercise 5: Robbins Level IIB (Fig. 7.4)

It may be interesting to proceed with the surgical technique of approach to level IIB as used in modified radical and selective dissections. Once the common trunk of the spinal accessory nerve has been identified and the sternocleidomastoid and digastric muscles have been well divaricated, we first identify the internal jugular vein, which must be left medially. The nerve is delicately raised and separated from the adipose tissue below. We dissect the adipose tissue along an arched line with upper convexity until we reach the deep muscle plane (levator scapulae and splenius

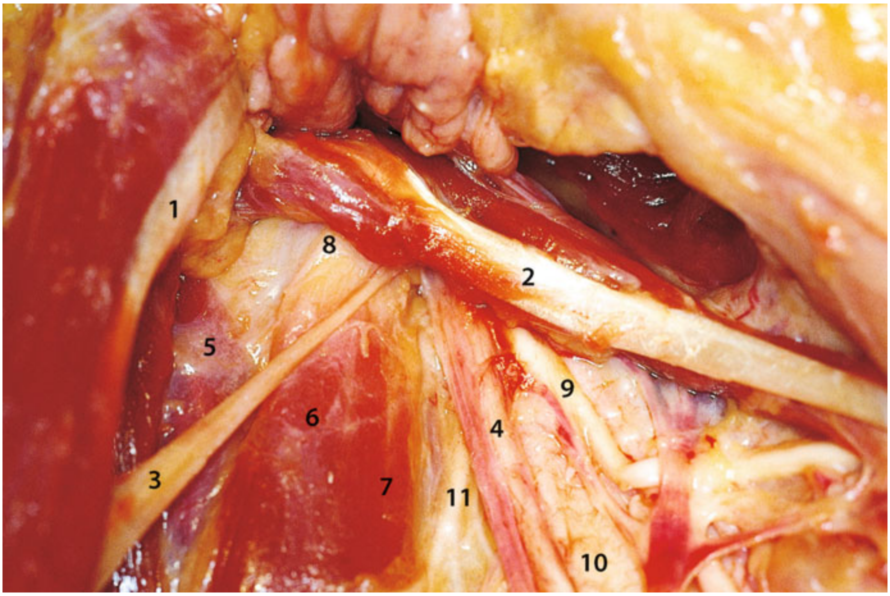

Fig. 7.3 Robbins level II. *1* Sternocleidomastoid muscle, *2* posterior belly of digastric muscle, *3* spinal accessory nerve (common trunk), *4* internal jugular vein, *5* splenius capitis muscle, *6* levator scapulae muscle, *7* anterior scalene muscle, *8* transverse process of atlas, *9* hypoglossal nerve, *10* carotid bifurcation, *11* branches of cervical plexus

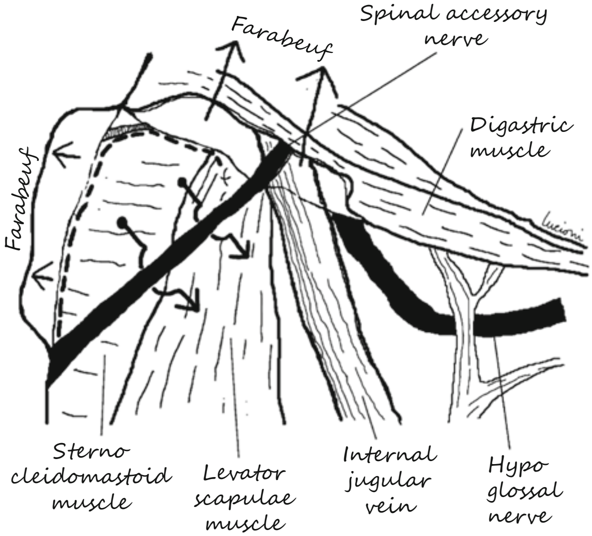

Fig. 7.4 Exercise 5: Robbins level IIB

capitis muscles). The upper limit of the dissection is the transverse process of the atlas, which is always easy to identify by palpation. In this area, we may encounter the occipital artery or one of the external carotid artery collateral branches. The adipose tissue is then elevated from the muscular plane from top to bottom and passed below the spinal nerve as a "bridge".

7.3 Sternocleidomastoid Muscle

The inferior insertions of the sternocleidomastoid muscle are now dissected, that is:

1. The head of the clavicle, corresponding to the deepest muscular portion, more wide and thin, which inserts on the medial quarter of the clavicle
2. The sternal head, corresponding to the most superficial and most consistent portion, which inserts on the anterior face of the sternal manubrium with a conoid tendon

The two components of the sternocleidomastoid muscle have different functions. The contraction of the head of the clavicle induces the flexion of the head onto the clavicle; the contraction of the sternal head induces the rotation and the contralateral extension of the head. The two muscle heads mark off a small triangular space with the base at the bottom (fossa supraclavicularis minor), which corresponds in depth to a length of the common carotid artery.

The sternocleidomastoid muscle is dissected and everted up to the exit point of the spinal accessory nerve, and the omohyoid muscle is entirely isolated (Fig. 7.5).

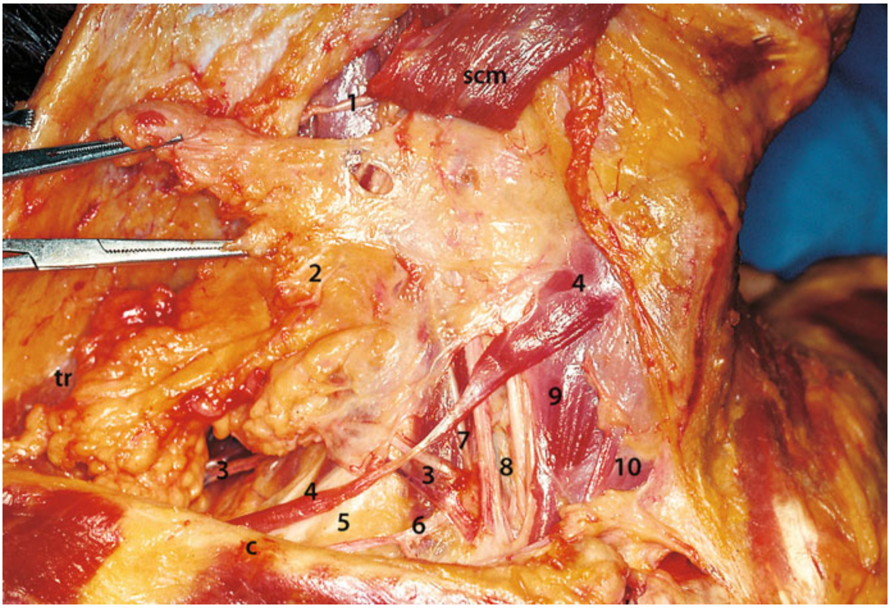

Fig. 7.5 Lateral deep plane. *scm* Sternocleidomastoid muscle, *tr* trapezius muscle, *c* clavicle, *1* lesser occipital nerve, *2* cervical plexus nerves (dissected), *3* transverse cervical artery and vein, *4* omohyoid muscle, *5* brachial plexus, *6* transverse scapular artery and vein, *7* phrenic nerve, *8* cervical vasculonervous bundle, *9* sternothyroid muscle, *10* sternohyoid muscle

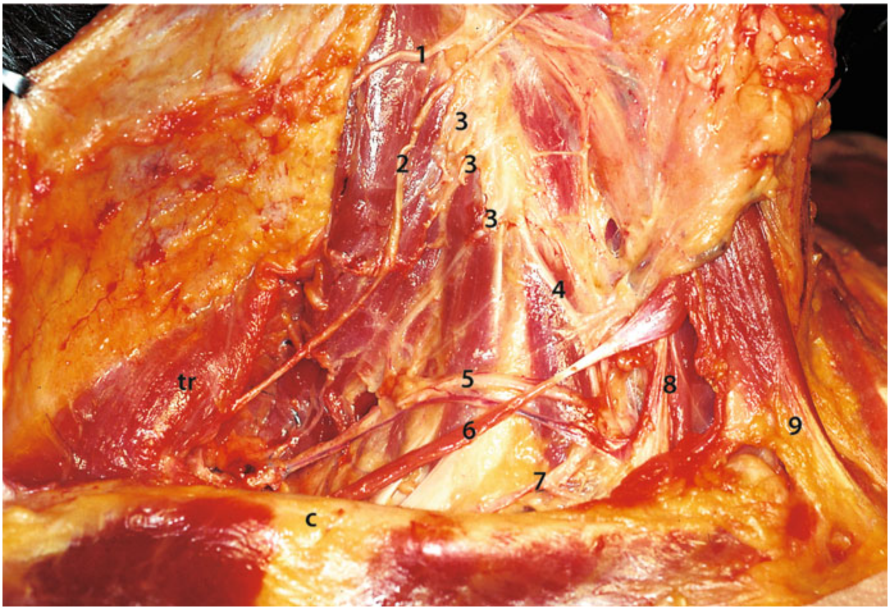

Fig. 7.6 Cervical plexus. *tr* Trapezius muscle, *c* clavicle, *1* lesser occipital nerve, *2* spinal accessory nerve, *3* cervical plexus nerve, *4* phrenic nerve, *5* transverse cervical artery and vein, *6* omohyoid muscle, *7* transverse scapular artery and vein, *8* cervical vasculonervous bundle, *9* sternal head of sternocleidomastoid muscle

7.4 Cervical Plexus

The dissection from the deep plane and the latero-medial shifting of the loose and fascial cellular tissues isolated so far allows the cervical plexus to be revealed.

It is composed of three anastomosing loops formed by the anterior branches of the upper four cervical nerves (C1–C4). It gives rise to cutaneous, superficial, and sensory nerves (lesser occipital, great auricular, supraclavicular, and cutaneous nerves of the neck) and to muscular, deep, and motor nerves (nerves serving the sternocleidomastoid and trapezius muscles, phrenic, and descending cervical nerves). The descending cervical nerve, lying laterally to the cervical vasculonervous bundle, joins the descending branch of the hypoglossal nerve and forms the hypoglossal loop. It distributes branches serving the infrahyoid muscles, except for the thyrohyoid muscle, which is directly innervated by the hypoglossal nerve. The cervical plexus emerges between the anterior and medial scalene muscles; the cutaneous branches are dissected while the phrenic nerve and descending cervical nerve are identified and preserved (Fig. 7.6).

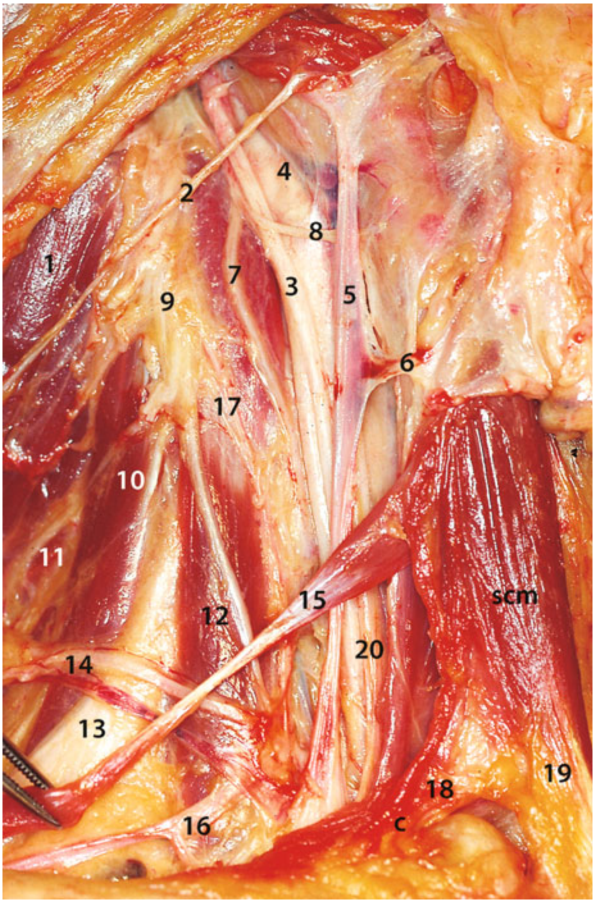

Fig. 7.7 Prescalene plane. *scm* Sternocleidomastoid muscle, *c* clavicle, *1* levator scapulae muscle, *2* spinal accessory nerve, *3* vagus nerve, *4* internal carotid artery, *5* internal jugular vein, *6* thyrolinguofacial trunk, *7* descending branch of hypoglossal nerve, *8* hypoglossal nerve, *9* cervical plexus, *10* medial scalene muscle, *11* posterior scalene muscle, *12* anterior scalene muscle, *13* brachial plexus, *14* transverse cervical artery and vein, *15* omohyoid muscle, *16* transverse scapular artery and vein, *17* descending cervical nerve, *18* clavicular head of sternocleidomastoid muscle, *19* sternal head of sternocleidomastoid muscle, *20* common carotid artery

7.5 Cervical Vasculonervous Bundle (Upper Part)

Dissection in a latero-medial direction takes us to the cervical vasculonervous bundle, formed laterally by the internal jugular vein, medially by the common carotid artery, and posteriorly, in the dihedral angle formed by the two vessels, by the vagus nerve. It should be remembered that the omohyoid muscle is a good guide in this phase, as it is invariably situated above the internal jugular vein. The only significant item on the surface of the omohyoid muscle is the external jugular vein.

The vessels are freed, as in routine surgical practice, from the tunica externa and consequently separated from the celluloadipose tissue and perijugular lymph nodes immerged therein. The specimen is pulled gently upwards, and the perivasal fasciae are cut with scissors. When working on the right side of the neck, right-handed operators proceed more easily from right to left (Fig. 7.7).

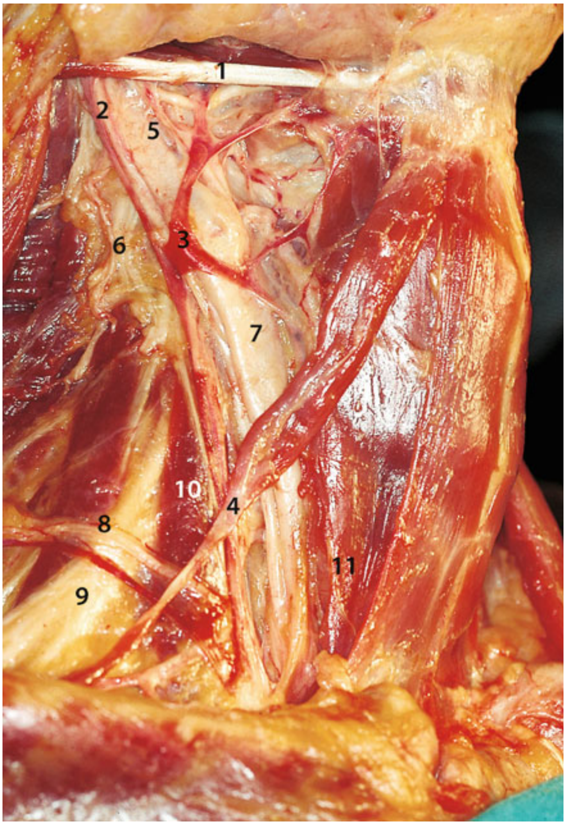

Fig. 7.8 Robbins levels II, III, and IV (I). *1* Posterior belly of digastric muscle, *2* internal jugular vein, *3* thyrolinguofacial trunk, *4* superior belly of omohyoid muscle, *5* internal carotid artery, *6* cervical plexus, *7* common carotid artery, *8* transverse cervical artery, *9* brachial plexus, *10* anterior scalene muscle, *11* sternothyroid muscle

As a rule, the internal jugular vein does not present lateral tributaries. Medially, we seek and isolate the main tributary, the thyrolinguofacial trunk, which enters it with a superior acute angle. Our exercise will isolate each of the major trunk components, that is, the superior thyroid, lingual, and facial veins.

The specimen, composed of adipose tissue and of the cervical fascia, generally contains numerous lymph nodes. The perijugular lymph nodes are the most important group in the cervical lymphatic system. Most superior respiratory–digestive tract lymphatics empty into them and lie subfascially between the sternocleidomastoid muscle and lateral surface of the internal jugular vein. They extend from the stylohyoid process to the point where the internal jugular empties into the brachiocephalic vein and are habitually divided by anatomists into three groups: (1) superior jugular (or jugular–digastric) lymph nodes, lying between the posterior belly of the digastric muscle and the thyrolinguofacial trunk; (2) middle jugular lymph nodes, lying between the thyrolinguofacial trunk and the superior belly of the omohyoid muscle; and (3) inferior jugular lymph nodes, situated below the omohyoid muscle. In the clinical practice, they are much better defined by the Robbins level system (Fig. 7.8).

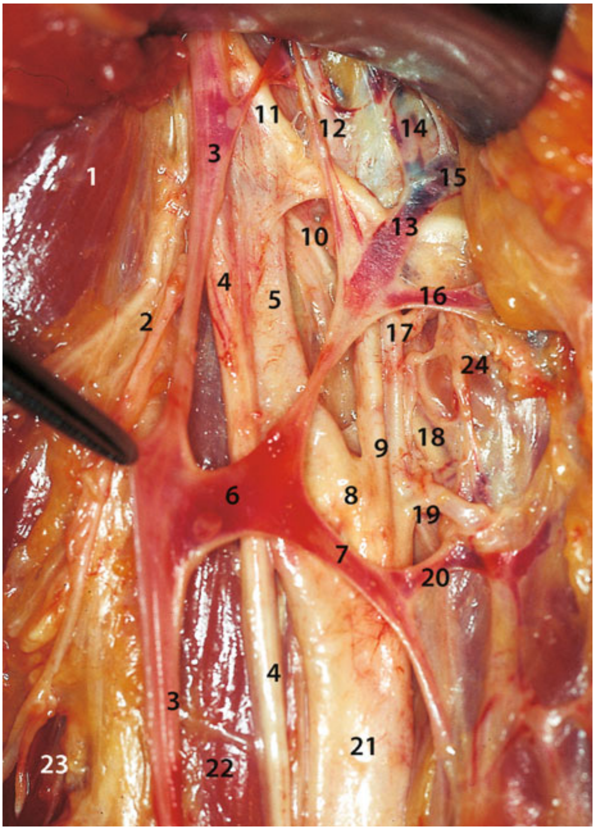

Fig. 7.9 Carotid bifurcation (I). *1* Levator scapulae muscle, *2* cervical plexus nerves, *3* internal jugular vein, *4* vagus nerve, *5* internal carotid artery, *6* thyrolinguofacial trunk, *7* superior thyroid vein, *8* carotid bifurcation, *9* external carotid artery, *10* superior laryngeal nerve, *11* hypoglossal nerve, *12* occipital artery, *13* facial vein (common trunk), *14* retromandibular vein, *15* facial vein, *16* lingual vein, *17* lingual artery, *18* cervical sympathetic chain, *19* superior thyroid artery, *20* superior laryngeal vein, *21* common carotid artery, *22* anterior scalene muscle, *23* medial scalene muscle, *24* greater cornu of hyoid bone

Dissection of the cervical vasculonervous bundle continues in a superior direction. From the sternoclavicular joint to the ipsilateral parotid cavity, it has variable relations with the sternocleidomastoid muscle, according to the position of the head. In the anatomic position, or with limited rotation, the carotid axis tends to protrude from the anterior margin of the sternocleidomastoid muscle and occupies the so-called carotid triangle.

At the superior margin of the thyroid cartilage, the common carotid artery divides into the internal and external carotid. The former runs laterally and is recognisable by the absence of collateral branches, while the latter runs medially. Higher up, the two vessels rotate and invert their position.

We may try to show the carotid glomus at the posterior wall of the carotid bifurcation. Its appearance is that of a reddish corpuscle as large as a grain of wheat, invested in a perivascular fibrous sheath, lying adjacent to the posterior surface of the bifurcation. It is innervated by the glossopharyngeal, cervical sympathetic, and vagus nerves. It functions as a chemoreceptor because it transmits variations in blood oxygen and carbon dioxide content to the nerve centres, thanks to extensive vascularisation and innervation (Fig. 7.9).

7.6 External Carotid Artery and Hypoglossal Nerve

Dissection proceeds by isolating, again from top to bottom and back to front, the external carotid artery and, one by one, its anterior collateral branches:

1. The superior thyroid artery, which arises immediately after the carotid artery, describes a descending curve of about 100° and medially branches into the superior laryngeal artery. The latter artery accompanied by the homonymous vein and superior laryngeal nerve together form the superior laryngeal pedicle.
2. The lingual artery, situated above the superior laryngeal nerve, is accompanied by the homonymous vein and runs superomedially, embedding itself just above the apex of the greater cornu of the hyoid bone and passing inferiorly to the posterior border of the hyoglossal muscle. Although parallel to the lingual artery, the lingual vein takes a more superficial course, running anteriorly to the hyoglossal muscle. It thus accompanies the hypoglossal nerve in the direction of the submandibular region.
3. The facial artery, which in close proximity to its origin, runs behind the posterior belly of the digastric muscle and heads towards the submandibular region.
4. The posterior collateral branches of the external carotid artery are also sought and their course followed:
   (a) The ascending pharyngeal artery, arising just above the origin of the superior thyroid artery; it rests on the middle constrictor of the pharynx and reascends.
   (b) The occipital artery, originating just below the junction between the hypoglossal nerve and the external carotid artery; it ascends laterally, passing behind the hypoglossal nerve and heading towards the mastoid.
   (c) The posterior auricular artery, going upwards beneath the external meatus acusticus (Fig. 7.10).

We now look for the hypoglossal nerve, which arches anteriorly, passing between the internal jugular vein and the two carotid arteries. At this point, it gives rise to a descending branch, which accompanies the anterior scalene muscle. This branch is anastomosed inferiorly with the descending cervical branch of the cervical plexus, forming the hypoglossal loop. On medially reaching the extreme posterior of the greater cornu of the hyoid bone, the hypoglossal nerve gives rise to a branch serving the thyrohyoid muscle, which passes anteriorly to the greater cornu of the hyoid bone.

Remarks: The hypoglossal nerve is the most important structure in this region from the functional point of view, of course excluding the internal carotid artery. Any surgical manoeuvre in this site should identify the hypoglossal nerve beforehand so as not to damage it.

Complications: The hypoglossal nerve conducts motor nerves to the tongue. Its paralysis deviates the protruded tongue towards the side of the lesion and the resting tongue towards the unimpaired side. Iatrogenic injury to the hypoglossal nerve is a very serious event in view of the importance of tongue movement in speech,

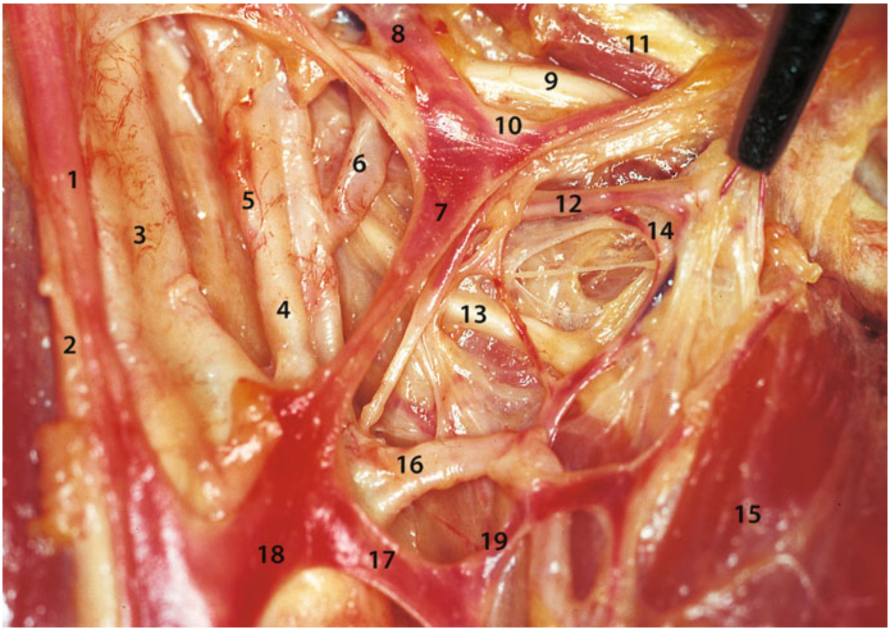

Fig. 7.10 Carotid bifurcation (II). *1* Internal jugular vein, *2* vagus nerve, *3* internal carotid artery, *4* external carotid artery, *5* ascending pharyngeal artery, *6* lingual artery, *7* common facial trunk, *8* retromandibular vein, *9* hypoglossal nerve, *10* facial vein, *11* hypoglossal muscle, *12* lingual vein, *13* superior laryngeal nerve, *14* greater cornu of hyoid bone, *15* sternohyoid muscle, *16* superior thyroid artery, *17* superior thyroid vein, *18* thyrolinguofacial trunk, *19* superior laryngeal vein

mastication, and deglutition; the lack of backward movement by the base of the tongue to project ingested food towards the hypopharynx causes dysphagia, which is more severe after partial supraglottic surgery. There is a risk of injuring the hypoglossal nerve particularly (1) in submandibular surgery, when periglandular scarring processes or excessive bleeding make it difficult to identify the nerve; (2) in functional laryngeal surgery, during isolation of the greater cornu of the hyoid bone, where dissection is not performed in very close contact to the bone; and (3) in functional supraglottic surgery, during suturing of the supra-infrahyoid muscles when the hyoid bone has been resected, as the nerve runs in the immediate vicinity.

The greater cornu of the hyoid bone, treated separately in view of its importance as a major landmark within this region, is above all a landmark in identifying the lingual artery and hypoglossal nerve. It is also an important landmark in seeking and ligating the superior laryngeal pedicle and, in surgical practice, in accessing the piriform recess. Finally, it is a precious indicator of the starting point for external carotid artery ligature (Fig. 7.11).

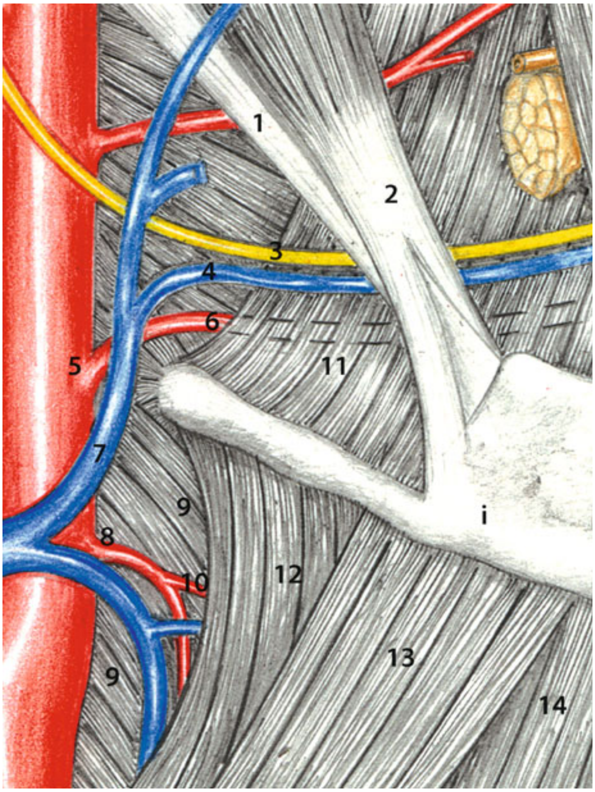

Fig. 7.11 Greater cornu of the hyoid bone. *i* Hyoid bone, *1* posterior belly of digastric muscle, *2* stylohyoid muscle, *3* hypoglossal nerve, *4* lingual vein, *5* external carotid artery, *6* lingual artery, *7* linguofacial trunk, *8* superior thyroid artery, *9* inferior constrictor muscle of pharynx, *10* superior laryngeal artery, *11* hyoglossal muscle, *12* thyrohyoid muscle, *13* omohyoid muscle, *14* sternohyoid muscle

7.7 Farabeuf's Triangle

The external carotid artery or its branches may be ligated to arrest otherwise uncontrollable cervicofacial haemorrhaging or for preventive purposes in ablative oncological surgery of the upper respiratory and digestive tracts. The entire external carotid system may be sacrificed when englobed by neoplasms or tumorous metastases with rupture of the lymph node capsule. Ligation or excision of one side of the external carotid does not lead to functional impairment, given the extensive anastomotic network with the contralateral arterial system.

Normally, the external carotid artery is bound between the origin of the superior thyroid artery and the origin of the lingual artery. One very precious landmark is the lateral extremity of the greater cornu of the hyoid bone, lying immediately medially. In order to identify the external carotid artery at its origin, anatomists describe a “triangular window” bounded by the medial wall of the internal jugular vein, the lateral wall of the thyrolinguofacial trunk, and, at the

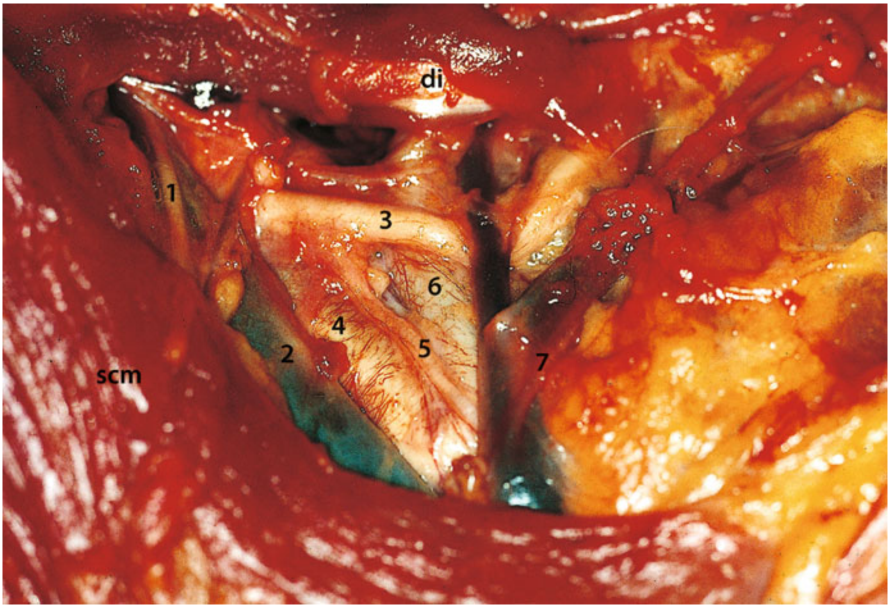

Fig. 7.12 Farabeuf's triangle. *scm* Sternocleidomastoid muscle, *di* digastric muscle, *1* spinal accessory nerve, *2* internal jugular vein, *3* hypoglossal nerve, *4* internal carotid artery, *5* descending branch of hypoglossal nerve, *6* external carotid artery, *7* thyrolinguofacial trunk

top, the hypoglossal nerve; this space is referred to as Farabeuf's triangle (Fig. 7.12).

It is certainly a useful exercise, to be carried out when the sternocleidomastoid muscle is still intact, to find and ligate the external carotid in Farabeuf's triangle. It is a typical emergency surgical procedure carried out in cases of haemorrhage of the pharynx or of the oral cavity that cannot be controlled in any other way.

The first thing is to find the anterior margin of the sternocleidomastoid muscle which, in its medial portion, will be isolated at top and bottom for about 10 cm. Following the muscle medially, we arrive at the internal jugular vein. This too must be well exposed. On the anterior margin of the vein, we look for the thyrolinguofacial venous trunk. At the top, transversely and under the vein, we look for and isolate the hypoglossal nerve. In this triangle, formed by the anterior margin of the internal jugular vein, the lateral margin of the thyrolinguofacial venous trunk, and the hypoglossal nerve, we look in depth for the carotid arteries. The external carotid artery is the one with collateral branches.

Exercise 6: Farabeuf's Triangle (Fig. 7.13)

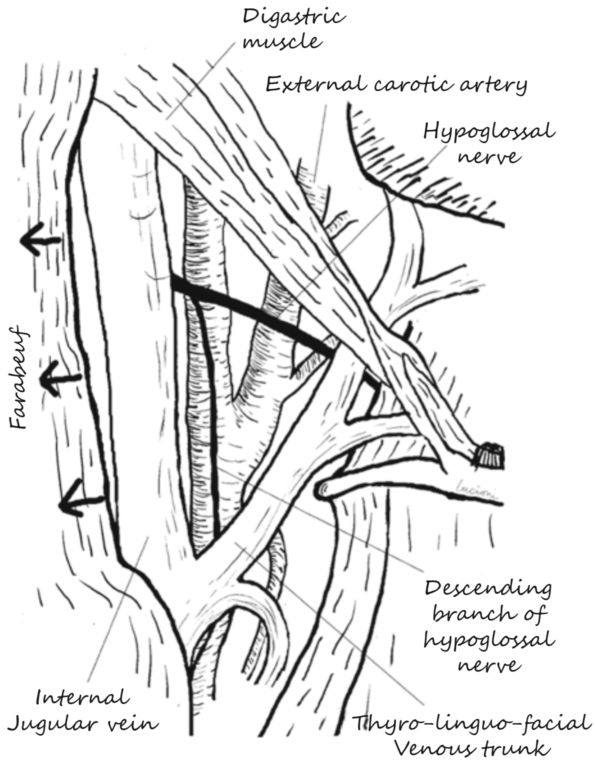

Fig. 7.13 Exercise 6: Farabeuf's triangle

7.8 Cervical Vasculonervous Bundle (Lower Part)

At this point, most of the sternocleidomastoid region is revealed. Medially, dissection reaches the subhyoid muscles and stops here because this is the medial limit of the region. Dissection continues in a downward direction, following the vasculonervous axis of the neck. We distinguish and skeletalise its three components. The fragility of the wall of the internal jugular vein, which is exposed with a subadventitious approach, can be clearly seen.

Complications: The limited laceration of the wall of the internal jugular vein may be recomposed with a vascular suture, followed by the application of gauzes soaked in very hot water, which induces the formation of a vascular thrombus. The complete interruption of an internal jugular vein normally occurs in radical neck dissection, and this does not involve severe functional consequences. The problem may arise when both internal jugular veins are infiltrated by metastases and therefore have to be sacrificed; in this case, the neck dissection operations are carried out at an interval of at least 1 month to allow time for the establishment of sufficient lymphatic drainage.

The dissection of the common carotid artery is extended down as far as the confluence with the subclavian artery. Its wall is robust and does not tear easily. It lies very close to the prevertebral plane, particularly the transverse processes of the cervical vertebrae. It may be easily compressed against these for temporary hemostatic purposes in the event of haemorrhage. In particular, the artery lies close to the transverse process of the sixth cervical vertebra, which is more prominent on palpation. It is located two transverse fingers above the junction between the carotid and inferior thyroid artery. This bony prominence takes the name of carotid tubercle and is the landmark for ligating the common carotid artery.

Complications: Internal carotid artery ligation is an exceptional clinical requirement. It is only required in the event of cataclysmic haemorrhage secondary to irreparable, spontaneous, or provoked wall rupture. Rupture of the common or of the internal carotid generally occurs in ablative neck operations in patients irradiated at maximum dosages or in neck cancer-related wall consumption. In these cases, ligation of the carotid axis is performed up- and downstream from the lesion. In the majority of cases, carotid englobement by neoplasia or tumorous metastases does not involve the arterial wall, and the vessel may be isolated subadventitiously. In cases where the tumour has infiltrated the carotid wall, preventing isolation, the arterial segment concerned must be excised and replaced by a vascular prosthesis or the reversed saphenous vein, autotransplanted after temporarily clamping the carotid axis. This surgical procedure, not devoid of danger from potential cerebral ischemia-related functional injury, does not produce long-term satisfactory oncological results.

Temporary or permanent interruption of blood flow in the internal carotid artery, in the absence of sufficient contralateral compensatory circulation through the arterial circle of the cerebrum, causes homolateral cerebral ischemia, with alteration in the state of consciousness and contralateral hemiparesis. Sometimes, common carotid artery ligation does not produce neurological deficits, because it is already appreciably excluded by arteriosclerotic plaques or by neoplastic thrombi (Fig. 7.14).

As has already been seen in the vasculonervous bundle, the internal jugular vein is laterally positioned and the common carotid artery medially. The vagus nerve lies in the dihedral angle behind the two vessels. It can be easily isolated from the posterior foramen lacerum (where it exits from the cranium together with the glossopharyngeal and accessory nerves) to its entrance to the thorax.

The vagus is a mixed nerve. It contains motor fibres (muscles of the velum palatinum, middle and inferior constrictors of the pharynx, muscles of the larynx, and cervical oesophagus), parasympathetic fibres (extensive splanchnic innervation: heart, respiratory, and digestive tracts, involuntary muscles, and glandular secretion), and sensory fibres (general sensitivity of part of the external auditory meatus, velum palatinum, pharynx, larynx, and trachea; chemopressor reflex arcs). Its most important cervical branch is the superior laryngeal nerve, which separates posteriorly very high up, accompanies the pharyngeal muscles, and running posteriorly to the carotid arteries, converges towards the larynx to form the superior laryngeal pedicle.

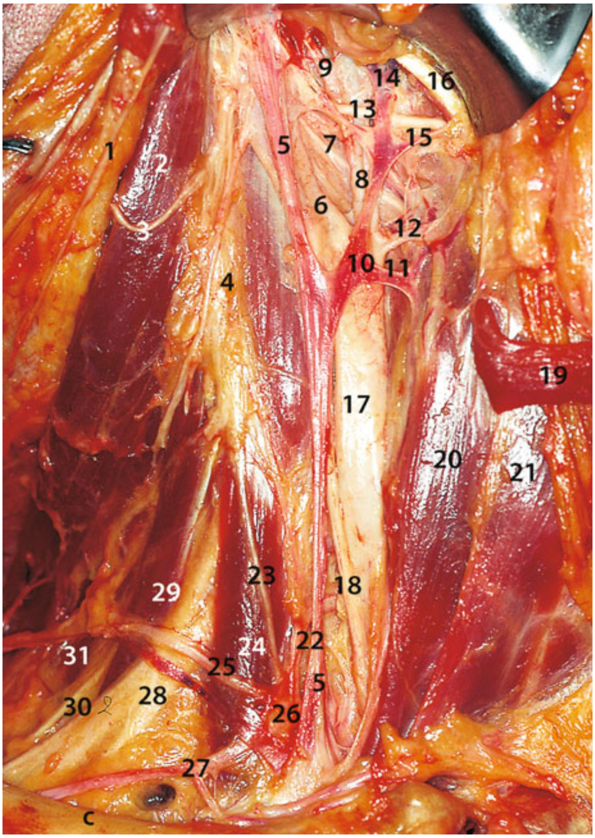

Fig. 7.14 Robbins levels II, III, and IV (II). *c* Clavicle, *1* spinal accessory nerve, *2* levator scapulae muscle, *3* lesser occipital nerve, *4* cervical plexus, *5* internal jugular vein, *6* internal carotid artery, *7* superior laryngeal nerve, *8* external carotid artery, *9* occipital artery, *10* thyrolinguofacial trunk, *11* superior thyroid vein, *12* superior thyroid artery, *13* hypoglossal nerve, *14* facial vein, *15* lingual vein, *16* intermediate tendon of digastric muscle, *17* common carotid artery, *18* vagus nerve, *19* omohyoid muscle, *20* sternothyroid muscle, *21* sternohyoid muscle, *22* inferior thyroid artery, *23* phrenic nerve, *24* anterior scalene muscle, *25* transverse cervical artery, *26* thyrocervical trunk, *27* transverse scapular artery, *28* brachial plexus, *29* anterior scalene muscle, *30* dorsal scapulae nerve, *31* posterior scalene muscle

The nerve filaments for the striated pharyngeal muscles are hard to isolate; together with the terminal branches of the glossopharyngeal nerve, they govern the deglutition mechanism and receive pharyngolaryngeal sensitivity.

Complications: Sectioning the vagus is fully compatible with life since numerous anastomoses between the two vagal hemi-systems permit any necessary compensatory action, thus avoiding the appearance of clinical symptoms, except obviously for paralysis of the hemilarynx and corresponding hemivelum palatinum or hemipharyngolaryngeal anaesthesia. Conversely, dissecting both vagus nerves is not compatible with life (Fig. 7.15).

7.9 Subclavian Artery Region

We now come to the lower portion of the sternocleidomastoid region where some important anatomic structures are identified and followed.

In the left laterocervical region, the thoracic duct is located in the laterally open dihedral angle formed by the internal jugular and subclavian veins. This is much

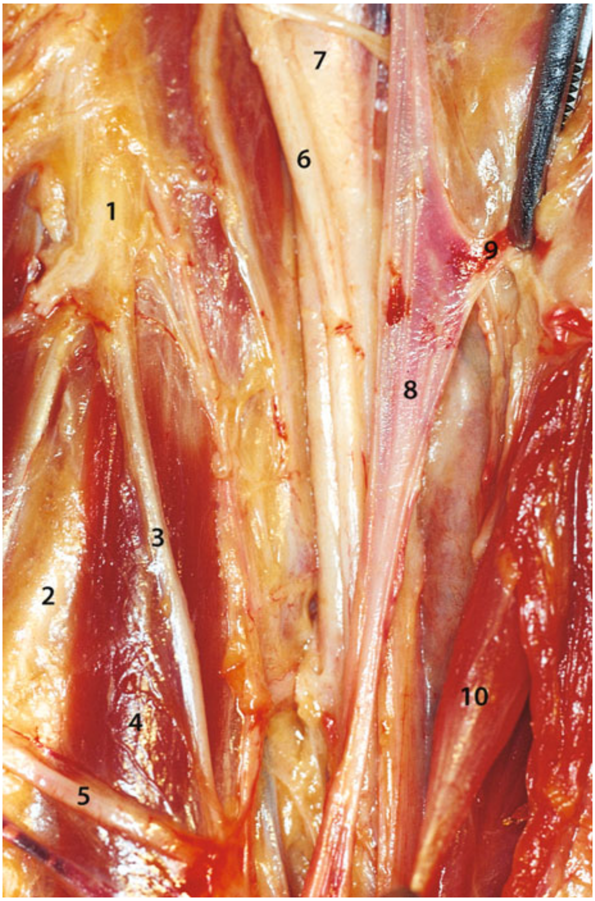

Fig. 7.15 Cervical vasculonervous bundle. *1* Cervical plexus, *2* brachial plexus, *3* phrenic nerve, *4* anterior scalene muscle, *5* transverse cervical artery, *6* vagus nerve, *7* common carotid artery, *8* internal jugular vein, *9* thyrolinguofacial trunk, *10* superior belly of omohyoid muscle

larger than the right great lymphatic vein since it collects lymph from the entire subdiaphragmatic area and from the left half of the supradiaphragmatic region. The duct posteriorly surrounds the subclavian vein and, making a 180° reverse turn in direction, empties into it.

Complications: Lymphorrhage may be favoured by anatomic anomalies (high outlet of the thoracic duct, up to 5 cm from the clavicle) or by surgical manoeuvres on metastases at level IV.

Usually, it is autolimited with compressive medications and gravity drainage. If it exceeds 600 ml per day and persists for more than a week, surgical revision is indicated to avoid general complications and granulations and scars in the surgical bed of neck dissection. The latter occurrence would pose problems for subsequent re-exploration [2].

In relation to the medial margin of the anterior scalene muscle, it is easy to find the thyrocervical trunk, which arises in the subclavian artery and branches out at this point into secondary arteries, namely:

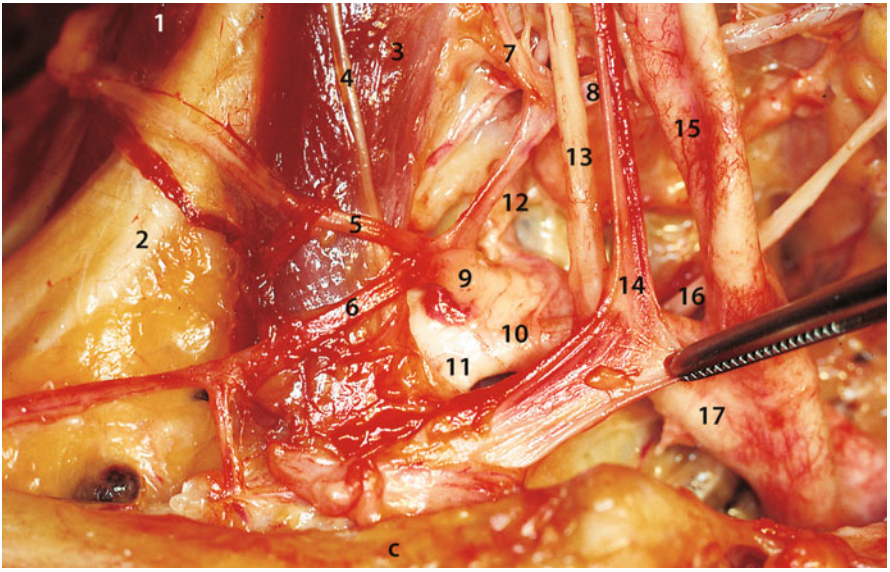

Fig. 7.16 Thyrocervical trunk. *c* Clavicle, *1* medial scalene muscle, *2* brachial plexus, *3* anterior scalene muscle, *4* phrenic nerve, *5* transverse cervical artery, *6* transverse scapular artery, *7* ascending cervical artery, *8* inferior thyroid artery, *9* thyrocervical trunk, *10* subclavian artery, *11* internal thoracic artery, *12* vertebral artery, *13* vagus nerve, *14* internal jugular vein, *15* common carotid artery, *16* recurrent nerve, *17* innominate artery (brachiocephalic trunk)

1. The transverse scapular artery, which becomes intrathoracic at the junction with the brachial plexus.
2. The transverse cervical artery, which laterally traverses the phrenic nerve, scalene muscles, and brachial plexus
3. The ascending cervical artery
4. The inferior thyroid artery, which arches medially, passing the common carotid artery posteriorly, and heads towards the recurrent region

Often, as appears in the anatomic specimen in the figure, the ascending cervical and inferior thyroid arteries have a common origin (Fig. 7.16).

We also consider that at this level, the largest lower branch of the subclavian artery is the internal thoracic artery (or internal mammary artery), which gives rise to the perforating branches that feed the deltopectoral reconstructive flap. The myocutaneous flap of the major pectoral is instead fed by the thoracoacromial artery, a branch of the axillary artery.

In the triangular space bounded by the clavicular and sternal head tendons of the sternocleidomastoid muscle, which anatomists refer to as the fossa supraclavicularis minor, the common carotid artery is separated from the skin solely by interposition of subcutaneous tissue, superficial cervical fascia, and middle cervical fascia.

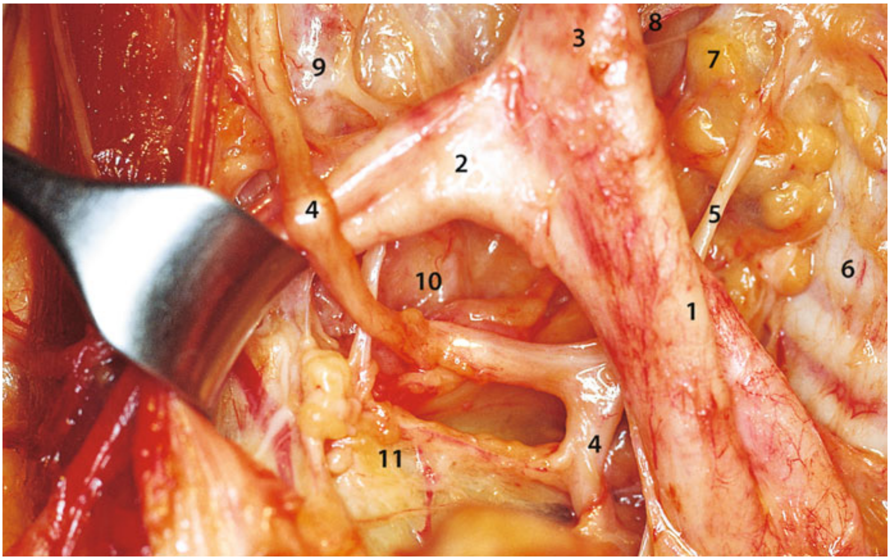

Fig. 7.17 Vagus nerve and recurrent nerve. *1* Innominate artery (brachiocephalic trunk), *2* subclavian artery, *3* common carotid artery, *4* vagus nerve, *5* recurrent nerve, *6* trachea, *7* recurrent region, *8* inferior thyroid artery, *9* middle cervical ganglion (cervical sympathetic chain), *10* stellate ganglion (sympathetic chain), *11* apex of the lung

We conclude the dissection of this region by assessing below the origins of the common carotid artery and of the subclavian artery from the anonymous artery. We observe the course of the vagus nerve, which passes the subclavian artery anteriorly (on the right and the aortic arch on the left). Last, we seek the origin of the inferior laryngeal nerve or recurrent nerve, which, passing behind the artery, reascends towards the larynx (Fig. 7.17).

Take-Home Messages

- In the dissection of the carotid axis above the bifurcation, the vessel encountered laterally is the internal carotid artery. One must always consider the possibility of anomalies of the arteries, known as “kinking”, especially in elderly patients. Though they are rare, the failure to recognise them promptly in this site may be very dangerous.
- The ligation of the internal jugular vein must be tightened only after having ensured that the vagus nerve is outside the tie.
- The sternocleidomastoid muscle and the trapezius have a double innervation (C3 and C4 of the cervical plexus and spinal accessory nerve). This explains how shoulders without functional deficits may be observed after ascertained resections of the spinal accessory nerve.

References

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