

TRIANGLES OF THE NECK

Posterior triangle

1. Identify the boundaries of the posterior triangle and carefully reflect the skin from it down to the clavicle (be especially careful along the posterior border of sternocleidomastoid).
2. Detach platysma from the clavicle and reflect it upwards.
3. Find the 3 nerves (lesser occipital, great auricular and transverse cervical) and the external jugular vein which pierce the superficial fascia along the posterior border of sternocleidomastoid.
4. Find the supraclavicular nerve which emerges from beneath sternocleidomastoid and whose medial, intermediate and lateral branches pierce the deep fascia a little above the clavicle. The deep fascia splits inferiorly to enclose the clavicle and to produce a supra-clavicular space which contains the posterior belly of omohyoid and the transverse cervical and suprascapular veins.
5. Remove the fascia from the posterior triangle and clean the accessory nerve. Identify the muscles which comprise the floor of the triangle: Semispinalis, Splenius, Levator Scapulae and Scalenus Posterior and Medius. Lying in relation to these muscles are the occipital artery in the apex of the triangle and some motor nerves of the cervical plexus: phrenic nerve, dorsal scapular nerve, the roots of the long thoracic nerve and the nerves to levator scapulae.

Anterior triangle

1. The purpose of this dissection is to remove the skin, reflect platysma and clean the investing fascia from the region, to expose the subdivisions of the anterior triangle, and to identify the important superficial structures without dislodging or removing them. We will return to the neck and study deeper structures in more detail in a later session
2. Make a midline incision and reflect the skin laterally from the neck. Then reflect platysma up to the mandible. Identify: transverse cervical nerve, cervical branch of facial nerve, and the anterior jugular vein.
3. Clean the deep fascia, then cut through the first layer of it about 2 cm above the sternum and along the anterior border of sternocleidomastoid. This opens the suprasternal space. Follow the 2 fascial layers till they join superiorly and fuse in front of and behind the clavicle. Also trace the anterior jugular vein into the space behind the sternocleidomastoid (SCM).

4. Remove the fat and fascia from SCM, but retain the nerves of the cervical plexus. Lift SCM and find the accessory nerve and blood vessels entering it.
5. Remove the deep fascia from the area between the anterior bellies of digastric and clean the mylohyoid muscles, midline raphe and mylohyoid vessels. Note the attachments of the deep fascia - mandible, hyoid bone.
6. Remove the deep fascia from the muscular triangle. Identify and clean the infrahyoid muscles, the isthmus of the thyroid gland, inferior thyroid veins and look for the occasional thyroidea ima artery and the slender fibromuscular levator glandulae thyroideae.
7. Clean the pretracheal fascia from the laryngeal cartilages and the trachea and identify cricothyroid ligament and muscle and the median thyrohyoid ligament.
8. Cut the deep fascia from the mandible (avoiding injury to the facial artery and vein) and reflect it down to expose the digastric triangle. Note the facial vein superficial to the submandibular gland the digastric muscle. Trace the submental artery and vein in company with the mylohyoid nerve (remove lymph nodes).
9. Remove the investing fascia from the carotid triangle and identify: the carotid sheath, the lingual, facial and superior thyroid veins; and the hypoglossal nerve, and its branches (superior root of the ansa cervicalis and nerve to thyrohyoid). As you clean the carotid sheath define the inferior root of the ansa cervicalis, and the ansa cervicalis itself.

Superficial dissection of the face and scalp

Scalp

1. Make a midline incision through the skin from the root of the nose to the external occipital protuberance and a coronal incision from ear to ear, carry these around each side of the auricle. Reflect the skin flaps laterally and be sure to leave the dense superficial fascia which contains the nerves and blood vessels of the scalp.
2. Clean the frontal belly of occipitofrontalis and identify the supratrochlear and supraorbital nerves and vessels.
3. Continue cleaning backwards, noting that the epicranial aponeurosis is continuous with the temporal fascia. In the temporal region look for the Zygomaticotemporal nerve, temporal branches of the facial nerve and branches of the superficial temporal artery accompanied by the auriculotemporal nerve. Trace those vessels into the scalp and uncover the superior and anterior auricular muscles.

4. Behind the auricle find the greater auricular nerve, lesser occipital nerve and the posterior auricular nerve and vessels, clean these and you'll find the posterior auricular muscles. Further posteriorly find the 3rd occipital nerve, greater occipital nerve and the occipital vessels. These lie deep to the tough superficial fascia. Clean these structures and expose the occipital belly of occipitofrontalis above the superior nuchal line.
5. Cut a hole in the epicranial aponeurosis and verify the looseness of the connective tissue between it and the periosteum. Determine the attachments of the aponeurosis.

Face

6. Make a midline incision from the root of the nose to the point of the chin, and horizontal incisions from the corners of the mouth. Cut around the eyes, nostrils and lips and reflect the skin flaps laterally. Many facial muscles insert into the skin, so be sure to reflect only the skin. Clean the subcutaneous fat (Note: Buccal fat pad) from the face and identify the facial muscles: Orbicularis Oculi (orbital and palpebral parts), Procerus, Nasalis, Levator labii superioris, Levator labii superioris alaque nasi, Levator anguli oris, zygomaticus major and minor, Risorius, Platysma, Masseter, Orbicularis oris, Depressor anguli oris, Depressor labii inferioris and Buccinator. Also the parotid gland and duct.
7. As you clean the muscles of the face, look for the facial artery (and its branches to the lips), the angular artery and the transverse facial artery. Other small arteries emerge with sensory nerves: Infraorbital, Mental, Zygomatico-facial, Palpebral branch of lacrimal, infratrochlear, external nasal, buccal.
8. The motor nerves are all branches of the facial nerve. They fan out from the parotid gland to the muscles of the scalp and face: Temporal, Zygomatic, Buccal, Mandibular, Cervical and Posterior Auricular. Reflect the platysma muscle to see those on the lower face.

Deeper dissection of the neck

1. Identify the infrahyoid muscles again, then cut sternohyoid and turn it upwards noting its nerve supply, do the same to sternothyroid.
2. Carefully remove the fat from the front of the trachea, preserving the thyroid gland and all its arteries and veins.
3. Lift one lobe of the thyroid gland and expose the side of the trachea and oesophagus. Look for the recurrent laryngeal nerve, and on the left the thoracic duct inferiorly. Superiorly look

for the external branch of the superior laryngeal nerve passing to the cricothyroid muscle and the inferior constrictor (note its attachments).

4. Remove one half of the thyroid gland and look for; the anastomotic connection between superior and inferior thyroid arteries, the parathyroid glands and examine the cut surface with a hand lens.
5. Clean the trachea and oesophagus and note their relations.
6. Remove the fat, lymph nodes and carotid sheath from the common carotid artery and jugular vein. Find the vagus nerve and, on the right trace it into continuity with the recurrent laryngeal nerve.
7. Lift the submandibular gland and identify the intermediate tendon of digastric and the stylohyoid muscle. Trace this and the posterior belly of digastric as far as the angle of the mandible.
8. Pull the submandibular gland backwards and find the posterior border of mylohyoid with the hypoglossal nerve passing above the muscle above mylohyoid is hyoglossus.
9. Find the branches of the external carotid artery: 3 anterior; superior thyroid, lingual and facial: and 3 posterior; ascending pharyngeal, occipital and posterior auricular.
10. Clean the brachiocephalic and subclavian veins and identify their tributaries.
11. Behind the veins clean and identify the scalenus anterior and the phrenic nerve. And in the next deepest layer, the brachiocephalic, subclavian and common carotid arteries and their branches.
12. Find the sympathetic trunk and trace it up and down as far as possible. Identify the cervical sympathetic ganglia, the grey rami communicans, the ansa subclavia and branches to the thorax.
13. Clean and identify the prevertebral and intertransverse muscles in the neck.

Deeper dissection of the face

1. Remove platysma, risorius and the parotid fascia and look for the vessels and nerves emerging from the parotid gland; temporal nerves, transverse facial artery, zygomatic nerves, parotid duct, buccal nerves, mandibular nerve and cervical nerve. These nerves are branches of the facial nerve and should be traced into communication with branches of the trigeminal nerve; zygomaticofacial, intra orbital, buccal and mental.

2. Divide zygomaticus major, minor and the levator labii superioris and trace the facial artery and its branches across the face. Remove the buccal fat pad and identify the buccinator muscle and its covering (buccopharyngeal fascia).
3. Reflect the palpebral part of orbicularis oculi towards the palpebral fissure and identify the; medial palpebral ligament, palpebral fascia and tarsal plates.
4. Cut through the superolateral part of the palpebral fascia and identify the lacrimal gland and its ducts. In the medial corner of the eye identify the lacrimal puncta, canaliculi and sac, and try to pass a probe down through the nasolacrimal duct.
5. Remove the parotid gland piecemeal from around the branches of the facial nerve and thus find; the main trunk. Look for the nerve to digastric and the posterior auricular branch of the facial nerve. Clean the external carotid artery and the retromandibular vein.
6. Use the remaining time in the lab to make sure you have completed all the dissection instruction to date. In particular complete your study of the scalp, because next week the cranial vault will be removed and our study will move to the interior of the cranium.

Cranial cavity and removal of the brain

1. The cranium should already be cut 1cm above the supraciliary ridges. Only the outer table of bone may be cut. You will possibly have to break the inner table using a chisel.
2. Remove the cranial vault by levering it away from rest of the skull. Try to leave the dura with the cranial cavity.
3. Identify the arachnoid granulations and lacunae lateralis on either side of the superior sagittal sinus. Identify the point where the superior sagittal sinus meets the transverse sinuses deep to the occipital bone.
4. Cut the dura along the same line as the bone, sever the falx cerebri attachment to the crista galli and tentorium cerebelli and remove the dura with the falx attached.
5. Place a wooden block under the shoulders and allow the neck to extend so that the gravity is assisting in the freeing the brain.
6. Pull the frontal lobes out the anterior cranial fossa to expose the olfactory bulbs and tracts lying on the cribriform plate. Pull the bulbs off the plate thus severing the many tiny olfactory nerves.
7. Identify and divide the optic nerves close to the optic canals.

8. Divide the nearby internal carotid artery as it pierces the roof of the cavernous sinus.
9. Identify the infundibulum (pituitary stalk) before cutting it, leaving the pituitary gland in the small dural 'tent' above the body of the sphenoid (hypophysial fossa).
10. Divide the oculomotor nerves as they pierce the roof of the cavernous sinus.
11. Locate the trochlear nerves under the free edge of the tentorium cerebelli. These are easily snapped.
12. Use a scalpel to detach the tentorium cerebelli from the petrous temporal and posterior clinoid process. You will be opening the superior petrosal sinus with this incision.
13. Let the weight of the brain pull the brainstem away from the clivus. Shine a torch down the space. You should see the trigeminal nerve roots passing into, the cavum 'trigeminale' and the abducent nerves running up the clivus and piercing the dura. Sever both of these nerves close to the skull.
14. Identify the facial and vestibulocochlea nerve entering the internal acoustic meatus before cutting them.
15. Cut the rootlets of the glossopharyngeal, vagus and accessory nerves as they pierce the dura to enter jugular foramen.
16. Cut the hypoglossal nerves at the hypoglossal canals.
17. Cut the spinal medulla and the vertebral arteries, either as they enter through the foramen magnum, or by incising deeply with a scalpel between the occiput and the atlas vertebra.
19. Gently ease the brain out of the cranial cavity.

The eye and orbit

Orbit

1. Strip the periosteum from the floor of the anterior cranial fossa and use a chisel and bone forceps to remove the bony orbital roof. Try to leave the orbital periosteum intact. If the frontal sinus extends into the orbital roof, two layers of bone will have to be removed.
2. Remove the orbital periosteum, now the cranial nerves seen in the middle cranial fossa can be traced into the orbit. Those that pass through the lateral part of the supra-orbital fissure pass immediately below the orbital roof;
 - a) the lacrimal nerve (and artery) pass to the lacrimal gland and skin of the eyelid in the superolateral corner of the eye and receive a communication from the zygomatic nerve,

- b) the frontal nerve (and artery) pass forwards and divide into supra-orbital and supratrochlear nerves and vessels
 - c) the trochlear nerve passes to the superior oblique muscle in the superomedial part of the orbit.
3. Cut the levator palpebrae superioris and the frontal nerve (which lies upon it) and note its nerve supply from the superior branch of the oculomotor nerve (which pierces, and also supplies, the underlying superior rectus muscle).
 4. Reflect superior rectus and clean the loose fat from around the eyeball, identify and trace the nerves which pass through the tendinous ring (optic canal and medial part of the superior orbital fissure);
 - a) the large optic nerve passes straight to the eyeball with the ophthalmic artery.
 - b) the nasociliary nerve crosses the optic nerve and gives off; a branch to the ciliary ganglion, long ciliary branches, posterior ethmoidal nerve, anterior ethmoidal nerve and infra-trochlear nerve (the two ethmoidal nerves can be seen entering foramina in the medial orbital wall and reappearing in the roofs of the ethmoid air cells near the midline).
 - c) the abducent nerve running on the inside of the lateral rectus muscle, which it supplies.
 - d) the oculomotor nerve divides into two branches which supply all the remaining extraocular muscles, the inferior branch also communicates with the ciliary ganglion (from which short ciliary nerve pass to the eyeball).
 5. Examine and trace the superior ophthalmic vein. By now all the orbital muscles should be visible. Examine and identify them and their origins, remove the palpebral fascia and examine their insertions, noting their relations to the facial covering of the eyeball.

Cavernous sinus

1. Strip the dura from the trigeminal cave and follow the divisions of the trigeminal nerve to their foraminae of exit
2. Carefully strip the dura from the sides of the cavernous sinus and identify the nerves in its lateral wall; the oculomotor, the trochlear, the ophthalmic division of the trigeminal and a small portion of the maxillary division.
3. Note the abducent nerve in the sinus passing around the lateral aspect of the Internal carotid artery. How has this artery (ICA) gained access to the sinus? Describe its course in the sinus? How does it leave the sinus?
4. Identify the ophthalmic artery.
5. Clean all the nerves above and trace them into the orbit.

6. Identify some of the major connections of the cavernous sinus.
 - ophthalmic veins (and hence facial veins).
 - central retinal veins.
 - superior and inferior petrosal sinuses.
 - intercavernous sinuses (hence infections can spread from one side to the other)
 - middle meningeal veins (and hence diploe and even scalp wounds can lead to infections spreading to the cavernous sinus).

7. Study the 100 μ m thick coronal slices of the cavernous sinus and surrounding structures.

Bisection of heads and infratemporal fossa

1. Clean and identify the origin of the masseter to the zygomatic bone. Use the necropsy saw to cut through the bone in front of the masseter and also the zygomatic arch in front of the articular eminence of the temporal bone. Reflect masseter downwards, noting and cutting the nerve to masseter in the mandibular notch.
2. Cut through the coronoid process of the mandible. (be careful of the buccal branch of the mandibular nerve which passes close to the front of the coronoid process and is often tangled with the anterior part of the temporalis insertion). Reflect the temporal muscle upwards and identify the deep temporal vessels and the nerve to temporalis.
3. Try to find the zygomaticotemporal nerve. Then cut through the neck of the mandible
4. It is necessary to remove the ramus of the mandible, but its important not to damage the nearby nerves. Locate/estimate the position of the mandibular foramen on the inside of the ramus and use the necropsy saw to cut half way through the mandible just above the level of the mandibular foramen then use bone forceps or nibblers to carefully remove the ramus of the mandible avoiding damage to the underlying nerves.
5. Remove parts of the pterygoid venous plexus and clean the branches of the mandibular nerve: Inferior alveolar, lingual, and nerve to mylohyoid. You should also be able to see the sphenomandibular ligament, the medial and lateral pterygoid muscles and the maxillary artery (although sometimes the maxillary artery lies at a deeper level and this will have to await the reflection of lateral pterygoid). Follow the maxillary artery until it disappears into the pterygomaxillary fissure. You should be able to see posterior superior alveolar branch (and nerves – where from?)

6. Detach the two heads of the lateral pterygoid muscle from their attachments to the infratemporal crest and lateral pterygoid plate.
7. Clean the lateral part of the TMJ capsule, then disarticulate the head of the mandible from the articular disc. Avoid injury to the auriculotemporal nerve and the chorda tympani both of which pass close behind the TMJ.
8. Identify the middle meningeal artery entering foramen spinosum (is there an accessory meningeal artery?), and trace the auriculotemporal nerve back to where it splits around the artery (here it receives sympathetic fibres).
9. Find the chorda tympani joining the lingual nerve from behind and trace it back to the petrotympanic fissure.
10. Clean the mandibular nerve back where it emerges from the foramen ovale, revise its branches, and look for the otic ganglion just medial to the root of the nerve.

Mouth and pharynx

1. Clean the buccinator muscle and the pterygo-mandibular raphe, note the continuity of these with the superior constrictor. The medial pterygoid muscle should be removed and the full extent of the superior constrictor examined.
2. Turn the hyoglossus upwards and note the attachment of the middle constrictor. Also, identify the structures which enter the mouth by passing between the superior and middle constrictors.
3. Examine the inside of the mouth and pharynx and identify:
 - a) nasopharynx and its features (opening of the auditory tube, adenoid tonsils, levator palati, salpingopharyngeal fold, soft palate, uvula)
 - b) Oropharynx and its features (Palatoglossal folds, palatine tonsils, palatopharyngeal folds, posterior 1/3 of the tongue, medial and lateral glossoepiglottic folds, valleculae)
 - c) Laryngopharynx and its features (aryepiglottic folds, piriform recess, aditus of the larynx)
4. Strip the mucous membrane from the inside of the mouth and pharynx and identify: palatoglossus, palatopharygeus, stylopharygeus and palatine tonsil; levator and tensor palati; superior, middle and inferior constrictors; internal laryngeal nerve, glossopharyngeal nerve.
5. Finally, to observe the otic ganglion: detach the opening of the pharygotympanic tube from the medial pterygoid lamina, detach tensor palati from the base of skull and remove a layer of fascia to expose the mandibular nerve with the otic ganglion.

Submandibular region and tongue

Dissection

1. Detach the anterior belly of digastric from the mandible, divide the mandible in the midline, and turn the mandible upwards (the facial artery and vein may have to be cut where they cross the mandible). Clean the posterior belly of digastric and the stylohyoid muscle.
2. Displace the submandibular gland posteriorly. Expose and identify: the mylohyoid muscle, the deep part of the submandibular gland; the facial artery and its branches in the region (ascending palatine, tonsillar, glandular and submental arteries), and the mylohyoid nerve.
3. Displace the submandibular gland anteriorly and find: the hypoglossal and lingual nerves, the submandibular ganglion, hyoglossus muscle, and the submandibular duct. On the medial surface of the divided head, strip the mucous membrane from the area between the tongue and teeth and locate all of the above structures, as well as: the sublingual gland, lingual artery, deep lingual vein, styloglossus, genioglossus and geniohyoid.
4. On the lateral aspect, reconfirm the relations of the above structures and also, the muscles and ligaments attached to the styloid process, and the glossopharyngeal nerve.
5. Detach buccinator, and superior constrictor from the mandible and turn it down to expose the lateral side of the tongue; strip the remaining mucous membrane from this region and follow the extrinsic muscles into the substance of the tongue. Identify the muscles on the medial surface of the tongue.
6. On the dorsum of the tongue, identify fungiform, filiform and vallate papillae, and the foramen Caecum.

Nose and larynx

Nose

1. On the side where the nasal septum remains, strip the mucoperiosteum from it and identify the bones which contribute to it. Then remove the septum piecemeal, so as to leave the mucoperiosteum on its deep surface. Identify: the nasopalatine nerve and sphenopalatine

- artery, you may also find parts of the anterior ethmoidal nerve and posterosuperior nasal nerves.
2. On the lateral wall of the nasal cavity, identify the three nasal conchae and the four recesses which they separate.
 3. Remove the inferior concha and find the opening of the nasolacrimal duct in the inferior meatus. Remove the medial wall of it, thus tracing it to the orbit.
 4. Trace the nasopalatine nerve and sphenopalatine artery from the septum across the roof to the sphenopalatine foramen in the lateral wall. Careful removal of the mucous membrane from this area, and from the medial pterygoid plate will reveal nasal branches of the pterygopalatine ganglion and of the greater palatine nerve (which can be seen, with the descending palatine artery, through the very thin, vertical plate of the palatine bone).
 5. By breaking away pieces of bone, trace the greater palatine nerve down to the palate, strip the mucous membrane from the hard palate to follow it, the ascending palatine artery and the lesser palatine nerve, on the hard palate. Also, follow the greater palatine nerve up to the pterygopalatine ganglion in the pterygopalatine fossa.
 6. Remove the middle concha and identify: the opening of the infundibulum, the hiatus semilunaris, (containing the openings of the anterior ethmoidal and maxillary sinuses) and the bulla ethmoidalis with the openings of the middle ethmoidal air cells.
 7. Remove the superior concha and expose the openings of the posterior ethmoidal air cells into the superior meatus. In the sphenoidal recess, the opening of the sphenoidal sinus should be seen.
 8. On one side only, break away the lateral wall of the nasal cavity and identify the maxillary and ethmoidal air sinuses. Remove the ethmoidal air cells and identify the orbital plate of the ethmoid bone. Identify the infraorbital and anterior superior alveolar nerves in the roof and lateral wall of the maxillary air sinus.
 9. Behind the maxillary sinus remove as much bone as is necessary to fully expose the pterygopalatine ganglion and all of its associated nerves.

Larynx

10. Clean the outside of the larynx and identify: the cricothyroid muscle (partly covered by the inferior constrictor); the attachment of the inferior constrictor; the cricothyroid joint and ligament; the external, internal and recurrent laryngeal nerves; the oblique line of the thyroid cartilage, and its attached muscles; and the thyrohyoid membrane and ligament.
11. Examine the posterior and superior aspects of the larynx and identify: median and lateral glosso epiglottic folds; vallecula, superior and inferior horns of the thyroid; thyrohyoid

ligament and triticeal cartilage; the aryepiglottic fold; cuneiform, corniculate, arytenoid and cricoid cartilages.

12. Strip the mucous membrane from the piriform recess, aryepiglottic folds and from the posterior surface of the arytenoid and cricoid cartilages. Identify: the aryepiglottic, transverse and oblique arytenoid and posterior crico-arytenoid muscles. Also, on one side, disarticulate the cricothyroid joint and remove the inferior horn of the thyroid cartilage to expose the joint, the lateral crico-arytenoid muscle, the inferior laryngeal nerve; the thyro-arytenoid and thyro-epiglottic muscles.

13. Divide the posterior laryngeal wall in the midline and open the larynx. Note: vocal and vestibular folds; the ventricle and the saccule. Strip the mucous membrane from these parts and identify: the vocal ligament, vocal process of the arytenoid, conus elasticus; vocalis, thyro-arytenoid and thyro-epiglottic muscles.