Neck pins

General: bones, cartilages and superficial neck 35

Mandible (neck boundary) B **Angle of the mandible** inf V **External jugular vein** lat superf. ★ N **Cervical plexus** lat deep B **Mylohyoid line** med B **Digastric fossa** med B **Superior mental spine** med B **Inferior mental spine** med B **Mental foramen** lat ★ *Mylohyoid line: sublingual fossa superior to it, submandibular fossa inferior to it; mental foramen at the second premolar*

↳ **Posterior auricular vein** post superf. **Retromandibular vein** ant

↳ **Lesser occipital nerve** post superf. **Great auricular nerve** sup superf. **Transverse cervical nerve** ant superf. **Supraclavicular nerves** inf superf.

Mastoid and styloid processes B **Mastoid process** inf M **Sternocleidomastoid** lat superf. ★ B **Jugular foramen** inf B **Styloid process** inf B **Stylohyoid ligament** inf *Three styloid muscles, three nerves: stylohyoid (VII), styloglossus (XII), stylopharyngeus (IX); jugular foramen transmits IX, X, XI and the internal jugular vein*

Hyoid bone (stylohyoid ligament to lesser horn) **Hyoid bone** ★ **Body of the hyoid bone** ant **Greater horn of the hyoid bone** lat **Lesser horn of the hyoid bone** sup *Vertebral levels: hyoid C3, thyroid cartilage C4 to C5, cricoid C6*

Cervical transverse processes, first rib and manubrium (superior to inferior) B **Anterior tubercle of the transverse process** ant B **Carotid tubercle (C6)** ant B **Scalene tubercle** sup B **Sternoclavicular joint** inf M **Sternal head of the sternocleidomastoid** med B **Jugular notch** sup V **Anterior jugular vein** ant superf. *Carotid tubercle (Chassaignac) on C6: the common carotid can be compressed against it*

↳ **Jugular venous arch** inf superf.

Platysma, its nerve and the anterior jugular veins M **Platysma** ant superf. ★ Or **Investing layer of the deep cervical fascia** superf. *Platysma is a facial-expression muscle: cervical branch of the facial nerve (VII). Deep cervical fascia: investing, pretracheal, prevertebral, carotid sheath*

Sternocleidomastoid and the external jugular vein on it **Superficial cervical lymph nodes** lat superf. *External jugular vein = posterior auricular + posterior division of the retromandibular vein at the angle of the mandible, crossing SCM superficially; SCM divides the neck into anterior and posterior triangles*

Nerve point of the neck: cutaneous nerves (superior to inferior) **Nerve point of the neck** post *Erb's point (midpoint of the posterior border of SCM), superior to inferior: lesser occipital (C2), great auricular (C2, C3), transverse cervical (C2, C3), supraclavicular (C3, C4)*

Superior: submental triangle 6

Submental triangle Or **Submental triangle** med M **Anterior belly of the digastric** lat superf. ★ M **Mylohyoid** inf ★ V **Submental lymph nodes** med superf. A **Submental artery** inf *Submental triangle: both anterior bellies of the digastric and the body of the hyoid; floor = mylohyoid*

Mylohyoid floor: nerve to mylohyoid and submental artery **Geniohyoid** sup deep ★ *Suprahyoid nerves 2-2-1: mylohyoid and anterior digastric (V3, nerve to mylohyoid); posterior digastric and stylohyoid (VII); geniohyoid (C1 via XII)*

Superior: submandibular triangle 23

Submandibular triangle: posterior belly of the digastric and stylohyoid Or **Submandibular triangle** lat A **Facial artery** med deep V **Facial vein** lat superf. V **Submandibular lymph nodes** sup superf. N **Hypoglossal nerve** lat superf. ★ N **Nerve to mylohyoid** inf M **Posterior belly of the digastric** post ★ M **Stylohyoid** sup ★ M **Intermediate tendon of the digastric** inf Or **Tail of the parotid gland** inf N **Cervical branch of the facial nerve** inf deep *Two bellies, two nerves: anterior digastric V3, posterior digastric VII (with stylohyoid)*

Submandibular gland: facial vein superficial, facial artery deep Or **Submandibular gland** ★ Or **Superficial part of the submandibular gland** lat superf. N **Marginal mandibular branch of the facial nerve** sup superf. *Facial artery grooves the gland deeply, facial vein passes superficial to it; marginal mandibular branch of VII superficial to both*

Lateral surface of the hyoglossus (superior to inferior) M **Styloglossus** sup Or **Deep part of the submandibular gland** med deep M **Hyoglossus** med deep N **Lingual nerve** sup superf. Or **Submandibular duct** med M **Genioglossus** med deep ★ V **Lingual vein** inf *Superior to inferior on hyoglossus: lingual nerve, submandibular duct, hypoglossal nerve; the lingual nerve double-crosses the duct (lateral, then inferior, then medial); the lingual artery runs deep to hyoglossus*

↳ **Submandibular ganglion** sup

Sublingual gland on the genioglossus **Sublingual gland** sup *Parotid is serous, submandibular mixed (mainly serous), sublingual mixed (mainly mucous); the sublingual gland opens by many small ducts on the sublingual fold*

Anterior: carotid triangle 22

Carotid sheath: common carotid artery, vagus nerve, internal jugular vein Or **Carotid triangle** sup ★ A **Common carotid artery** med ★ V **Internal jugular vein** lat deep ★ N **Vagus nerve** post ★ A **Superior thyroid artery** sup ★ Or **Carotid sheath** lat deep ★ N **Ansa cervicalis** ant superf. ★ V **Deep cervical lymph nodes** lat deep *I See 10 CCs in the IV (internal jugular vein lateral, vagus (X) posterior between, common and internal carotid medial)*

↳ **Carotid bifurcation** sup ★

↳ Carotid bifurcation: **Carotid body** post

↳ **Internal carotid artery** lat ★

↳ Internal carotid: **Carotid sinus** sup

↳ **Common facial vein** ant

↳ **Cervical cardiac branches of the vagus nerve** inf

↳ **Superior root of the ansa cervicalis** med **Inferior root of the ansa cervicalis** lat

↳ **Jugulodigastric lymph node** sup deep **Jugulo-omohyoid lymph node** inf deep

Carotid bifurcation **Carotid sinus branch** sup *Bifurcation at the superior border of the thyroid cartilage (C3/C4); carotid sinus senses pressure, carotid body senses chemistry (both IX); the internal carotid has no branches in the neck*

Nerves crossing the internal carotid artery (superior to inferior) **Inferior ganglion of the vagus nerve** sup *Between internal and external carotids: styloglossus, stylopharyngeus, glossopharyngeal nerve, pharyngeal branch of the vagus; the superior laryngeal nerve passes deep (medial) to both carotids*

↳ **Pharyngeal branch of the vagus nerve** med **Superior laryngeal nerve** med deep ★

Anterior: muscular triangle 9

Muscular triangle: sternohyoid and superior belly of the omohyoid Or **Anterior triangle of the neck** ant ★ Or **Muscular triangle** med M **Sternohyoid** med superf. ★ M **Superior belly of the omohyoid** lat superf. ★ M **Sternothyroid** inf deep M **Thyrohyoid** sup deep M **Intermediate tendon of the omohyoid** inf deep *Anterior triangle splits into 4: submental, submandibular, carotid, muscular. Strap muscles: superficial sternohyoid and omohyoid, deep sternothyroid and thyrohyoid*

Sternothyroid, thyrohyoid and the pretracheal fascia N **Nerve to thyrohyoid** sup Or **Pretracheal layer of the deep cervical fascia** ant *Ansa cervicalis (C1 to C3) supplies sternohyoid, sternothyroid, omohyoid; thyrohyoid (and geniohyoid) get C1 via the hypoglossal nerve*

Medial: larynx 47

Thyroid cartilage Or **Thyroid cartilage** ★ M **Cricothyroid** ant superf. M **Inferior pharyngeal constrictor** inf superf. Or **Laryngeal prominence** ant ★ Or **Superior thyroid notch** sup Or **Lamina of the thyroid cartilage** lat M **Thyropharyngeal part of the inferior constrictor** sup Or **Oblique line of the thyroid cartilage** lat Or **Superior horn of the thyroid cartilage** sup N **Internal laryngeal nerve** sup ★ Or **Inferior horn of the thyroid cartilage** inf N **Recurrent laryngeal nerve** med ★ *Thyroid cartilage at C4 to C5; carotid bifurcation at its superior border (C3/C4)*

↳ **Right recurrent laryngeal nerve** med ★ **Left recurrent laryngeal nerve** med

Cricoid cartilage and the arytenoids on its lamina Or **Cricoid cartilage** ★ M **Cricopharyngeus** inf ★ M **Posterior cricoarytenoid** post ★ M **Lateral cricoarytenoid** lat deep Or **Arch of the cricoid cartilage** ant Or **Lamina of the cricoid cartilage** post Or **Arytenoid cartilage** post M **Transverse arytenoid** post deep M **Oblique arytenoid** post superf. M **Thyroarytenoid** lat deep Or **Muscular process** lat Or **Vocal process** ant M **Vocalis** med deep Or **Corniculate cartilage** sup Or **Cuneiform cartilage** ant *C6 rule at the cricoid: larynx becomes trachea, pharynx becomes oesophagus. Laryngeal cartilages: 3 unpaired (thyroid, cricoid, epiglottis), 3 paired (arytenoid, corniculate, cuneiform)*

Epiglottis **Epiglottis** ★ **Stalk of the epiglottis** inf *Elastic cartilages: epiglottis, corniculate, cuneiform and the apex of the arytenoid; thyroid, cricoid and most of the arytenoid are hyaline and calcify with age*

Thyrohyoid membrane: internal laryngeal nerve and superior laryngeal artery Or **Thyrohyoid membrane** sup ★ A **Superior laryngeal artery** inf Or **Median thyrohyoid ligament** med *Internal laryngeal nerve and superior laryngeal artery pierce the thyrohyoid membrane; sensation superior to the vocal folds = internal laryngeal, inferior = recurrent laryngeal*

Laryngeal vestibule and ventricle **Laryngeal vestibule** **Quadrangular membrane** lat **Vestibular fold** sup **Laryngeal ventricle** lat *Superior to inferior: vestibular folds (false cords), laryngeal ventricle, vocal folds*

Vocal fold and rima glottidis **Vocal fold** inf ★ **Vocal ligament** med **Rima glottidis** med ★ *Vocal ligament = free superior edge of the conus elasticus; rima glottidis lies between the vocal folds*

Conus elasticus and infraglottic cavity **Conus elasticus** lat **Median cricothyroid ligament** ant ★ **Infraglottic cavity** inf **Cricotracheal ligament** inf *Median cricothyroid ligament is the emergency airway (cricothyrotomy)*

Cricothyroid and the external laryngeal nerve **Cricothyroid joint** lat *Cricothyroid is the only intrinsic laryngeal muscle supplied by the external laryngeal nerve (all others: recurrent laryngeal); the nerve runs with the superior thyroid artery*

Cricoarytenoid joint and its muscles **Cricoarytenoid joint** post *Posterior cricoarytenoid is the only abductor of the vocal folds*

Medial: pharynx 59

Nasal cavity: lateral wall (superior to inferior) **Superior nasal concha** lat **Middle nasal concha** lat **Ethmoidal bulla** lat ★ **Semilunar hiatus** lat **Inferior nasal concha** lat *Drainage: sphenoethmoidal recess = sphenoid; superior meatus = posterior ethmoidal; middle meatus (semilunar hiatus) = frontal, maxillary, anterior ethmoidal; inferior meatus = nasolacrimal duct*

Nasopharynx: opening of the auditory tube Or **Nasopharynx** Or **Choanae** ant Or **Pharyngeal opening of the auditory tube** lat ★ M **Levator veli palatini** med Or **Torus tubarius** lat ★ M **Salpingopharyngeus** lat Or **Salpingopharyngeal fold** lat Or **Pharyngeal recess** post Or **Pharyngeal tonsil** sup *Pharyngeal tonsil (adenoids) on the roof and posterior wall; salpingopharyngeus runs from the torus tubarius inside the salpingopharyngeal fold*

Oropharynx and soft palate Or **Oropharynx** Or **Oropharyngeal isthmus** ant M **Palatoglossus** ant Or **Soft palate** sup M **Tensor veli palatini** lat M **Palatopharyngeus** post A **Ascending palatine artery** sup Or **Uvula** sup *All palate muscles are vagus (pharyngeal plexus) except tensor veli palatini (V3)*

Tonsillar bed between the palatine arches Or **Palatoglossal arch** ant Or **Palatine tonsil** lat ★ A **Tonsillar branch** lat M **Superior pharyngeal constrictor** sup deep N **Glossopharyngeal nerve** ant ★ Or **Palatopharyngeal arch** post *Palatoglossal arch anterior, palatopharyngeal arch posterior; palatoglossus is the only tongue muscle supplied by the vagus*

↳ **Branch to stylopharyngeus** post

Base of the tongue and valleculae Or **Root of the tongue** inf A **External carotid artery** med ★ Or **Terminal sulcus** sup Or **Foramen caecum of the tongue** sup Or **Lingual tonsil** ant Or **Median glossoepiglottic fold** med ★ Or **Epiglottic vallecula** ant Or **Lateral glossoepiglottic fold** lat ★ *Terminal sulcus divides anterior two-thirds from posterior third; posterior third: IX for taste and touch; foramen caecum = origin of the thyroid*

↳ **Ascending pharyngeal artery** med deep **Lingual artery** ant deep **Occipital artery** post **Posterior auricular artery** post **Maxillary artery** med deep **Superficial temporal artery** sup superf.

Laryngeal inlet and laryngopharynx **Laryngeal inlet** sup **Aryepiglottic fold** lat ★ **Laryngopharynx** post **Piriform recess** lat ★ **Fold of the superior laryngeal nerve** lat *Internal laryngeal nerve runs in the mucosa of the piriform recess (fish bones lodge there)*

Superior and middle constrictors Or **Pharyngobasilar fascia** sup M **Pterygomandibular raphe** ant M **Stylopharyngeus** lat Or **Pharyngeal raphe** post M **Middle pharyngeal constrictor** inf N **Pharyngeal plexus** lat Or **Retropharyngeal space**

post M **Longus colli** med deep M **Longus capitis** lat deep *All pharyngeal muscles are vagus (pharyngeal plexus) except stylopharyngeus (IX); stylopharyngeus and IX enter between the superior and middle constrictors*

Inferior constrictor and the Killian dehiscence **Inferior pharyngeal dehiscence (Killian)** post **Pharyngo-oesophageal junction** inf *Killian's dehiscence between thyropharyngeus and cricopharyngeus: site of the Zenker diverticulum*

Medial: thyroid and parathyroid glands 15

Thyroid gland: lobes and isthmus Or **Thyroid gland** ★ A **Inferior thyroid artery** post deep ★ Or **Lobes of the thyroid gland** lat V **Middle thyroid vein** lat Or **Isthmus of the thyroid gland** ant V **Inferior thyroid veins** ant A **Thyroid ima artery** inf Or **Pyramidal lobe of the thyroid gland** sup ★ Or **Suspensory ligament of the thyroid gland** med deep *Isthmus lies on tracheal rings 2 to 4; pyramidal lobe = thyroglossal duct remnant*

Superior pole: superior thyroid vessels Or **Superior pole of the thyroid gland** sup V **Superior thyroid vein** sup N **External laryngeal nerve** med deep ★ *Superior thyroid artery: first branch of the external carotid, with the external laryngeal nerve; ligate it close to the gland*

Posterior border of the lobe: parathyroid glands and middle thyroid vein **Superior parathyroid gland** post ★ **Inferior parathyroid gland** post ★ *Inferior parathyroids come from the 3rd pouch (with the thymus) and migrate further; superior from the 4th. Superior and middle thyroid veins to the internal jugular, inferior to the brachiocephalic*

Inferior pole: inferior thyroid vessels **Inferior pole of the thyroid gland** inf *Inferior thyroid artery from the thyrocervical trunk, close to the recurrent laryngeal nerve: ligate it away from the gland; thyroid ima artery (about 10%) from the brachiocephalic trunk or arch*

Medial: cervical trachea and oesophagus 14

Tracheo-oesophageal groove and the recurrent laryngeal nerves Or **Cervical part of the trachea** ant A **Brachiocephalic trunk** med ★ Or **Tracheal cartilages** ant Or **Tracheo-oesophageal groove** lat Or **Cervical part of the oesophagus** post V **Venous angle** post *Right recurrent laryngeal hooks the right subclavian, left hooks the aortic arch (posterior to the ligamentum arteriosum); both ascend in the tracheo-oesophageal groove*

↳ **Subclavian artery** lat ★

↳ Subclavian: **First part of the subclavian artery** med

↳ First part of the subclavian: **Vertebral artery** sup ★ **Internal thoracic artery** inf ★

↳ **Jugular lymphatic trunk** sup **Subclavian lymphatic trunk** lat **Thoracic duct (cervical part)** post **Right lymphatic duct** med

Lateral: posterior triangle 26

Occipital triangle: accessory nerve on the levator scapulae Or **Posterior triangle of the neck** lat ★ M **Descending part of trapezius** post superf. N **Accessory nerve** sup superf. ★ M **Inferior belly of the omohyoid** inf ★ N **Roots of the brachial plexus** med A **Transverse cervical artery** sup Or **Occipital triangle** sup M **Levator scapulae** post deep M **Scalenus medius** post deep *Accessory nerve lies superficially on levator scapulae: enters at the junction of the superior and middle thirds of the posterior border of SCM, reaches trapezius at the junction of its middle and inferior thirds*

↳ **Superior trunk** sup

↳ Superior trunk: **Suprascapular nerve** lat

↳ **Middle trunk** lat **Inferior trunk** inf **Divisions of the brachial plexus** inf

Scalenus medius: dorsal scapular and long thoracic nerves N **Dorsal scapular nerve** post A **Dorsal scapular artery** post N **Long thoracic nerve** post ★ M **Scalenus posterior** post deep *C5, 6, 7 - wings of heaven (long thoracic nerve, winged scapula); dorsal scapular (C5) and long thoracic pierce scalenus medius*

Omoclavicular triangle Or **Omoclavicular triangle** inf A **Third part of the subclavian artery** lat V **Subclavian vein** ant ★ A **Thyrocervical trunk** med ★ V **Supraclavicular lymph nodes** inf V **Transverse cervical vein** sup V **Suprascapular vein** inf *Inferior belly of the omohyoid divides the posterior triangle into occipital (superior) and omoclavicular (inferior) triangles*

↳ **Suprascapular artery** ant

Inferior and posterior: root of the neck, prevertebral region, sympathetic trunk 16

First part of the subclavian artery: vertebral and internal thoracic branches **Vertebral vein** ant *VIT C and D (vertebral, internal thoracic, thyrocervical trunk, costocervical trunk, dorsal scapular); first part medial to scalenus anterior gives the first three*

Thyrocervical trunk at the medial border of scalenus anterior **Ascending cervical artery** med *Thyrocervical trunk: inferior thyroid (gives ascending cervical), transverse cervical, suprascapular; SIT on the thyrocervical trunk (suprascapular, inferior thyroid, transverse cervical)*

Scalenus anterior: phrenic nerve and the scalene interval Or **Scalene interval** post M **Scalenus anterior** ant ★ A **Second part of the subclavian artery** post *C3, 4, 5 keeps the diaphragm alive: phrenic descends on the anterior surface of scalenus anterior. Subclavian vein anterior to scalenus anterior, subclavian artery and plexus posterior to it (scalene interval); artery parts 1, 2, 3 = medial, posterior, lateral to the muscle*

↳ **Costocervical trunk** post

Venous angle: veins and lymphatic ducts Or **Lesser supraclavicular fossa** ant superf. M **Clavicular head of the sternocleidomastoid** lat *Thoracic duct ends at the left venous angle (internal jugular + subclavian); right lymphatic duct drains only the right upper quadrant*

Prevertebral fascia and muscles Or **Prevertebral layer of the deep cervical fascia** post deep N **Phrenic nerve** ant deep ★ N **Cervical sympathetic trunk** ant *Deep cervical fascia: investing, pretracheal, prevertebral, carotid sheath; the danger space (anterior to the prevertebral layer) runs from skull base to diaphragm*

↳ **Superior cervical ganglion** sup ★ **Middle cervical ganglion** ant **Ansa subclavia** ant **Cervicothoracic ganglion** inf ★ **Cervical cardiac nerves (sympathetic)** inf

Back pins

Superior: suboccipital triangle 25

Occiput: protuberance, nuchal lines and nuchal ligament B **External occipital protuberance** post B **Superior nuchal line** post A **Occipital artery** lat ★ N **Greater occipital nerve** med ★ B **Inferior nuchal line** post M **Rectus capitis posterior major** med deep ★ M **Rectus capitis posterior minor** med deep M **Obliquus capitis superior** lat deep B **Nuchal ligament** med ★ B **Mastoid process** lat *External occipital protuberance (inion) anchors the nuchal ligament and trapezius; superior nuchal line for trapezius and sternocleidomastoid, inferior nuchal line for the suboccipital muscles*

↳ **Descending branch of the occipital artery** inf deep

Greater occipital nerve with the occipital vessels V **Occipital vein** lat N **Third occipital nerve** med *Posterior rami: C1 suboccipital (motor only), C2 greater occipital, C3 third occipital*

Suboccipital triangle: its muscles M **Suboccipital muscles** deep M **Obliquus capitis inferior** inf deep ★ B **Posterior tubercle of the atlas** post *Boundaries: rectus capitis posterior major (superomedial), obliquus capitis superior (superolateral), obliquus capitis inferior (inferior); rectus capitis posterior minor is not a boundary*

Floor of the suboccipital triangle: vertebral artery and suboccipital nerve B **Posterior arch of the atlas** post ★ A **Vertebral artery** lat deep ★ N **Suboccipital nerve** inf deep ★ M **Suboccipital triangle** deep ★ B **Groove for the vertebral artery** sup ★ B **Posterior atlanto-occipital membrane** sup V **Vertebral vein** lat deep *Contents on the posterior arch of the atlas: vertebral artery and suboccipital nerve (C1); the greater occipital nerve crosses the roof*

↳ **Atlantic part of the vertebral artery** sup deep

↳ **Suboccipital venous plexus** post deep

Superior: craniovertebral joints (atlas, axis, ligaments of the dens) 30

Atlas (C1): ring and transverse process **Atlas** ★ **Lateral mass of the atlas** lat **Transverse process of the atlas** lat **Foramen transversarium of the atlas** lat *Atlas holds the globe: no body, no spinous process*

Axis (C2) and the lateral atlanto-axial joint **Axis** **Body of the axis** ant **Superior articular facet of the axis** sup **Inferior articular facet of the atlas** inf **Lateral atlanto-axial joint** lat **Inferior articular process of the axis** inf **Spinous process of the axis** post *C2 spinous process is the first large palpable spine inferior to the occiput*

Atlanto-occipital joint **Occipital condyle** inf **Superior articular facet of the atlas** sup **Atlanto-occipital joint** lat **Anterior atlanto-occipital membrane** ant *Atlanto-occipital = 'yes' joint (nodding: flexion and extension)*

Median atlanto-axial joint: dens in the ring of the atlas **Anterior arch of the atlas** ant **Anterior tubercle of the atlas** ant **Facet for the dens** post **Dens of the axis** sup ★ **Anterior articular facet of the dens** ant **Apex of the dens** sup **Posterior articular facet of the dens** post **Median atlanto-axial joint** med *Atlanto-axial = 'no' joint (rotation around the dens)*

Ligaments of the dens (anterior to posterior) **Apical ligament of the dens** sup **Alar ligament** lat **Transverse ligament of the atlas** post ★ **Tubercle for the transverse ligament** med **Cruciate ligament of the atlas** post **Longitudinal bands of the cruciate ligament** sup **Tectorial membrane** post *Anterior to posterior: apical ligament, alar ligaments (check rotation), cruciate ligament (transverse ligament), tectorial membrane (continuation of the posterior longitudinal ligament)*

Superior: cervical vertebrae 11

Cervical transverse process: vertebral artery and spinal nerve groove B **Typical cervical vertebra** B **Foramen transversarium** lat ★ A **Cervical part of the vertebral artery** lat deep B **Anterior tubercle of the transverse process** ant B **Carotid tubercle (C6)** ant B **Posterior tubercle of the transverse process** post B **Groove for the spinal nerve** sup *Vertebral artery enters the foramen transversarium at C6 (not C7); C1 to C7 nerves exit superior to their vertebra, C8 inferior to C7*

Uncinate processes and cervical spines **Uncinate process** sup **Uncovertebral joint** lat **Bifid spinous process** post **Vertebra prominens (C7)** post ★ *Bifid spines C3 to C6; C7 vertebra prominens; uncovertebral joints (of Luschka) C3 to C6*

Posterior: superficial layer (trapezius, latissimus dorsi, rhomboids, levator scapulae) and intermediate layer (serratus posterior) 26

Trapezius: accessory nerve and transverse cervical vessels on its deep surface M **Descending part of trapezius** sup superf. N **Accessory nerve** sup deep ★ A **Transverse cervical artery** sup ★ V **Transverse cervical vein** sup *Trapezius: motor from the accessory nerve (XI), proprioception C3, C4; the only back muscle supplied by a cranial nerve*

↳ **Superficial branch of the transverse cervical artery** sup

Trapezius insertion: spine of the scapula and acromion B **Spine of the scapula** post M **Trapezius** sup superf. ★ M **Transverse part of trapezius** med superf. M **Ascending part of trapezius** inf superf. M **Rhomboid minor** med deep B **Acromion** lat *Trapezius and deltoid mirror each other: lateral clavicle, acromion, spine of the scapula*

Latissimus dorsi at the inferior angle B **Inferior angle of the scapula** inf M **Latissimus dorsi** inf superf. ★ N **Thoracodorsal nerve** lat deep A **Thoracodorsal artery** lat deep *Lady between two majors (latissimus dorsi inserts in the intertubercular groove between pectoralis major and teres major); thoracodorsal nerve C6 to C8*

Levator scapulae and rhomboids along the medial border B **Superior angle of the scapula** sup M **Levator scapulae** sup deep ★ N **Dorsal scapular nerve** med deep A **Dorsal scapular artery** med deep B **Medial border of the scapula** med M **Rhomboid major** inf deep ★ *Medial border, superior to inferior: levator scapulae (superior angle), rhomboid minor (root of the spine), rhomboid major (spine to inferior angle); dorsal scapular nerve (C5), levator scapulae also C3, C4*

Serratus posterior over the rib angles; intercostal vein and artery (VAN) M **Serratus posterior superior** sup deep M **Serratus posterior inferior** inf deep B **Angle of the rib** post A **Posterior intercostal artery** post V **Posterior intercostal vein** post *VAN (vein, artery, nerve, superior to inferior) in the costal groove; pass a needle along the superior border of the rib inferior to the space; serratus posterior superior and inferior form the intermediate layer, supplied by intercostal nerves*

Medial (deep): splenius, erector spinae, transversospinales 36

Nuchal fascia and splenius **Nuchal fascia** post superf. **Splenius capitis** sup superf. ★ **Splenius cervicis** inf superf. *Splenius = bandage: superficial layer of the intrinsic back muscles, wrapping the deeper columns*

Erector spinae: iliocostalis (lateral column) **Erector spinae** ★ **Common tendon of erector spinae** inf **Iliocostalis** lat ★ **Iliocostalis lumborum** inf **Iliocostalis thoracis** lat **Iliocostalis cervicis** sup *I Love Spine (iliocostalis, longissimus, spinalis, lateral to medial)*

Erector spinae: longissimus (intermediate column) **Longissimus** med ★ **Longissimus thoracis** inf **Longissimus cervicis** lat **Longissimus capitis** sup deep *I Love Spine (iliocostalis, longissimus, spinalis, lateral to medial)*

Erector spinae: spinalis (medial column) **Spinalis** med ★ **Spinalis thoracis** med **Spinalis cervicis** sup **Spinalis capitis** sup *I Love Spine (iliocostalis, longissimus, spinalis, lateral to medial)*

Semispinalis and the deep cervical vessels between its parts M **Semispinalis capitis** sup deep ★ M **Semispinalis cervicis** med deep M **Semispinalis thoracis** inf deep A **Deep cervical artery** post deep V **Deep cervical vein** post deep *Some Men Rarely (semispinalis, multifidus, rotatores, superficial to deep)*

Multifidus and rotatores **Multifidus** med deep ★ **Rotatores** med deep **Rotatores longi** med deep **Rotatores breves** med deep *Some Men Rarely (semispinalis, multifidus, rotatores, superficial to deep)*

Short segmental muscles **Interspinales** med deep **Intertransversarii** lat deep **Levatores costarum** lat deep *Deepest segmental layer: interspinales, intertransversarii, levatores costarum*

Posterior rami and dorsal branches between the muscle columns N **Posterior ramus of a spinal nerve** post deep ★ A **Dorsal branch of the posterior intercostal artery** post deep V **Dorsal branch of the posterior intercostal vein** post deep A **Dorsal branch of the lumbar artery** post deep *Intrinsic (true) back muscles are all supplied by posterior rami; extrinsic back muscles by anterior rami (trapezius by XI)*

↳ **Medial branch of a posterior ramus** med deep **Lateral branch of a posterior ramus** lat deep **Posterior cutaneous branch of a posterior ramus** post superf.

Medial: thoracic vertebrae, joints and ligaments of the column 43

Vertebral body, intervertebral disc and longitudinal ligaments **Vertebral body** ant ★ **Epiphysial rim of the vertebral body** sup **Cartilaginous end plate** sup **Intervertebral disc** ant ★ **Anulus fibrosus** superf. **Nucleus pulposus** post deep ★ **Anterior longitudinal ligament** ant ★ **Posterior longitudinal ligament** post ★ *Disc herniates posterolaterally and hits the nerve root of the lower level (L4/L5 disc compresses L5); anterior longitudinal ligament limits extension, posterior limits flexion*

Pedicles and the intervertebral foramen **Vertebral arch** post **Pedicle of the vertebral arch** lat ★ **Superior vertebral notch** sup **Inferior vertebral notch** inf **Intervertebral foramen** lat ★ **Vertebral foramen** **Vertebral canal** *C1 to C7 exit superior to the pedicle of their vertebra, C8 and all others inferior to it*

Laminae and spines with their ligaments **Lamina of the vertebral arch** post ★ **Ligamentum flavum** post deep ★ **Spinous process** post ★ **Interspinous ligament** post **Supraspinous ligament** post superf. *Lumbar puncture, superficial to deep: skin, supraspinous ligament, interspinous ligament, ligamentum flavum (the 'give'), epidural space, dura, arachnoid*

Articular and transverse processes: zygapophysial joint **Superior articular process** sup **Inferior articular process** inf **Pars interarticularis** post **Zygapophysial joint** post ★ **Transverse process** lat ★ **Intertransverse ligament** lat *Scottie dog (oblique radiograph): nose = transverse process, eye = pedicle, ear = superior articular process, neck = pars interarticularis (collar = spondylolysis), front leg = inferior articular process*

Thoracic vertebra: costal facets and joint of the head of the rib **Thoracic vertebra** **Superior costal facet** sup **Inferior costal facet** inf **Joint of the head of the rib** med **Radiate ligament of the head of the rib** ant **Intra-articular ligament of the head of the rib** med *Ribs 2 to 9 meet two demifacets (own vertebra + the one superior); 1, 10, 11, 12 single full facets*

Costotransverse joint and its ligaments **Transverse costal facet** ant ★ **Tubercle of the rib** post **Costotransverse joint** lat **Costotransverse ligament** med **Lateral costotransverse ligament** lat **Superior costotransverse ligament** sup *Tubercle of rib N to transverse process of vertebra N; no costotransverse joints for ribs 11 and 12*

Named thoracic vertebrae (superior to inferior) **Spinous process of a thoracic vertebra** post **First thoracic vertebra (T1)** sup **Tenth thoracic vertebra (T10)** inf **Eleventh thoracic vertebra (T11)** inf **Twelfth thoracic vertebra (T12)** inf *Spine levels: T3 at the root of the spine of the scapula, T7 at the inferior angle; T1, T10, T11, T12 have full facets for one rib*

Medial: meninges, epidural space and venous plexuses 20

External vertebral venous plexus **External vertebral venous plexus** superf. *Vertebral venous plexuses (Batson) are valveless: route for prostate and breast metastases to the spine*

↳ **Anterior external vertebral venous plexus** ant superf.

Posterior external vertebral venous plexus post superf.

Epidural space: internal vertebral venous plexus **Or Epidural space** V **Internal vertebral venous plexus** deep ★ *Epidural space holds fat and the valveless internal vertebral venous plexus (Batson); reached caudally through the sacral hiatus*

↳ **Anterior internal vertebral venous plexus** ant deep

↳ Anterior internal vertebral venous plexus: **Basivertebral vein** ant deep

↳ **Posterior internal vertebral venous plexus** post deep

Dura and arachnoid mater **Or Spinal dura mater** superf. ★ **Or Dural sac** inf N **Cauda equina** inf ★ **Or Spinal arachnoid mater** **Or Subarachnoid space** A **Anterior spinal artery** ant A **Posterior spinal artery** post *PAD (pia, arachnoid, dura, inner to outer); dural sac and subarachnoid space end at S2*

Pia mater and denticulate ligament **Or Spinal pia mater** deep **Or Denticulate ligament** lat ★ N **Anterior root** ant N **Posterior root** post ★ *21 pairs of denticulate ligaments, between the anterior and posterior roots, anchor the cord to the dura*

↳ **Spinal ganglion** post ★

Medial: spinal cord, roots and arteries 34

Spinal cord and its enlargements **Or Spinal cord** ★ N **Rootlets** lat **Or Cervical enlargement** sup **Or Lumbosacral enlargement** inf A **Great anterior segmental medullary artery** ant ★ *Cord ends at L1/L2 in adults (L3 at birth); cervical enlargement for the brachial plexus, lumbosacral for the lumbosacral plexus*

Conus medullaris, cauda equina and filum terminale **Conus medullaris** inf ★ **Filum terminale** inf ★ **Pial part of the filum terminale** inf **Dural part of the filum terminale** inf

Lumbar cistern inf *Cord ends L1/L2, sac ends S2; lumbar puncture at L3/L4 or L4/L5, using the intercristal (Tuffier) line at L4*

Anterior surface of the cord: anterior spinal vessels **Or Anterior median fissure** ant V **Anterior spinal vein** ant **Or Anterolateral sulcus** ant *One anterior spinal artery (from both vertebral arteries), two posterior spinal arteries*

Posterior surface of the cord: posterior spinal vessels **Or Posterior median sulcus** post V **Posterior spinal vein** post **Or Posterior intermediate sulcus** post **Or Posterolateral sulcus** post *Two posterior spinal arteries (posterolateral sulci), one anterior spinal artery*

Grey matter and central canal **Or Grey matter of the spinal cord** **Or Anterior horn** ant ★ **Or Lateral horn** lat N **Spinal nerve** lat ★ **Or Posterior horn** post **Or Central canal** med *SAME DAVE (sensory afferent, motor efferent; dorsal = afferent, ventral = efferent): posterior root and horn sensory, anterior root and horn motor; lateral horn = sympathetic, T1 to L2*

↳ **Meningeal branch of the spinal nerve** med

↳ **Anterior ramus** ant

↳ Anterior ramus: **Rami communicantes** ant

White matter funiculi **Anterior funiculus** ant **Lateral funiculus** lat **Posterior funiculus** post *Posterior funiculus = fine touch and proprioception; lateral = corticospinal and spinothalamic; anterior = anterior spinothalamic and corticospinal*

Spinal nerve roots in the dural root sleeve **Dural root sleeve** lat *SAME DAVE (sensory afferent, motor efferent; dorsal = afferent, ventral = efferent): posterior root and horn sensory, anterior root and horn motor; the spinal ganglion sits on the posterior root*

Intervertebral foramen: spinal nerve and segmental vessels A **Spinal branch of a segmental artery** med deep V **Intervertebral vein** lat *31 pairs of spinal nerves: 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, 1 coccygeal; white rami communicantes only T1 to L2*

Radicular and medullary arteries **Radicular artery** lat **Segmental medullary artery** lat *Great anterior segmental medullary artery (Adamkiewicz) usually from the left, T9 to T12*

Lateral: triangles of the back and thoracolumbar fascia 17

Triangle of auscultation **Triangle of auscultation** med ★ *Boundaries: trapezius, latissimus dorsi, medial border of the scapula (rhomboid major)*

Superior lumbar triangle B **Twelfth rib** inf A **Subcostal artery** sup M **Quadratus lumborum** ant deep M **Superior lumbar triangle** sup deep M **Internal oblique** lat deep *Grynfeltt: 12th rib, internal oblique, erector spinae / quadratus lumborum*

Inferior lumbar triangle and the iliac crest M **Inferior lumbar triangle** inf superf. ★ B **Iliac crest** sup N **Superior clunial nerves** inf superf. M **External oblique** lat superf. *Petit: iliac crest, latissimus dorsi, external oblique; floor = internal oblique*

Thoracolumbar fascia (posterior to anterior layer) **Thoracolumbar fascia** ★ **Posterior layer of the thoracolumbar fascia** post superf. **Middle layer of the thoracolumbar fascia** lat deep **Anterior layer of the thoracolumbar fascia** ant deep *Three layers wrap two muscles: posterior layer superficial to erector spinae, middle layer between erector spinae and quadratus lumborum, anterior layer anterior to quadratus lumborum*

Quadratus lumborum: subcostal and lumbar vessels A **Lumbar artery** med deep V **Lumbar vein** med deep V **Ascending lumbar vein** med deep *Quadratus lumborum: 12th rib, transverse processes L1 to L4, iliolumbar ligament and iliac crest; anterior rami T12 to L4*

Inferior: lumbar vertebrae 5

Lumbar vertebra: processes **Lumbar vertebra** **Spinous process of a lumbar vertebra** post **Costal process** lat **Accessory process** post **Mammillary process** post *Breakfast at 7, lunch at 12, dinner at 5 (7 cervical, 12 thoracic, 5 lumbar vertebrae); lumbar: no costal facets, no foramina transversaria*

Inferior: sacrum and coccyx 36

Lumbosacral junction: L5, sacral base and iliolumbar ligament B **Fifth lumbar vertebra (L5)** inf B **Lumbosacral joint** inf B **Sacrum** ★ B **Base of the sacrum** sup B **Sacral promontory** ant ★ A **Median sacral artery** med B **Ala of the sacrum** lat B **Superior articular process of the sacrum** sup B **Iliolumbar ligament** lat *Spondylolisthesis is commonest at L5 on S1; the sacral promontory is the posterior landmark of the pelvic inlet*

Pelvic surface of the sacrum: anterior foramina and sacral arteries B **Pelvic surface of the sacrum** ant A **Lateral sacral artery** lat B **Transverse lines of the sacrum** ant B **Anterior sacral foramina** ant *Four pairs of anterior sacral foramina for the anterior rami S1 to S4*

Dorsal surface of the sacrum: crests and posterior foramina (medial to lateral) B **Dorsal surface of the sacrum** post B **Median sacral crest** post ★ B **Intermediate sacral crest** post B **Posterior sacral foramina** post N **Middle clunial nerves** post superf. B **Lateral sacral crest** post *Median crest = fused spines, intermediate = fused articular processes, lateral = fused transverse processes (medial to lateral)*

Sacro-iliac joint (superficial to deep) **Posterior superior iliac spine** post **Posterior sacro-iliac ligament** post superf. **Sacral tuberosity** lat **Interosseous sacro-iliac ligament** post deep **Auricular surface of the sacrum** lat ★ **Sacro-iliac joint** lat *S2 level: posterior superior iliac spines (dimples of Venus), end of the dural sac, middle of the sacro-iliac joint*

Sacral canal and hiatus **Sacral canal** **Sacral hiatus** post ★ **Sacral cornu** inf **Apex of the sacrum** inf *Sacral hiatus at S5 (unfused laminae), found between the sacral cornua: caudal epidural access*

Coccyx and sacrococcygeal joint **Coccyx** **Base of the coccyx** sup **Coccygeal cornu** sup **Transverse process of the coccyx** lat **Apex of the coccyx** inf **Sacrococcygeal joint** sup **Superficial posterior sacrococcygeal ligament** post superf. *Coccyx: 3 to 5 (usually 4) fused vertebrae; only the first carries cornua and transverse processes*