## Triangles of the neck

Ni Posterior triangle: CN XI, cervical plexus skin brs., plexus trunks

Aa Carotid triangle: bifurcation; superior thyroid, lingual, facial aa.

Vv IJV deep to SCM; EJV crosses the posterior triangle to the subclavian v.

**Anterior triangle** B Midline, anterior border of SCM, inferior border of the mandible P Submental, submandibular, carotid, muscular triangles

**Posterior triangle** B Posterior border of SCM, trapezius, middle third of the clavicle Fl Prevertebral fascia on splenius, levator scapulae, scalenes P Omohyoid splits it: occipital, omoclavicular triangles

**Carotid triangle** B SCM, posterior belly of digastric, superior belly of omohyoid C Carotid bifurcation, IJV, vagus n., hypoglossal n., ansa cervicalis

**Submandibular triangle** B Inferior border of the mandible and both bellies of the digastric C Submandibular gland and nodes, facial a. and v., hypoglossal n.

**Submental triangle** B Both anterior bellies of the digastric and the body of the hyoid Fl Mylohyoid muscles; submental lymph nodes

## SUP Superficial layer · cervical fascia

Ni Platysma: cervical br. of the facial n.; SCM and trapezius: accessory n. (CN XI)

Aa SCM: brs. of the occipital and superior thyroid aa.

Vv EJV runs on the SCM, deep to the platysma

**Platysma** At Pectoral and deltoid fascia to mandible, skin of mouth F Tenses neck skin; depresses mandible and mouth corners Ne Cervical branch of the facial n.

**Sternocleidomastoid** At Manubrium and medial third of clavicle to mastoid process F One side: tilts head to same side, turns face to opposite · Both: flex neck, protrude head; accessory inspiration C Congenital torticollis: one SCM fibrosed

**Deep cervical fascia** L Investing (SCM, trapezius), pretracheal (thyroid, trachea), prevertebral F Planes let structures glide in swallowing; channel infection C Retropharyngeal infection can spread to the mediastinum

**Carotid sheath** C Carotid a. medial, IJV lateral, vagus n. posterior between them R Ansa cervicalis on it; sympathetic trunk posterior

## ANT Suprahyoid and infrahyoid muscles

Ni Anterior digastric, mylohyoid: V3; posterior digastric, stylohyoid: VII

Ni Geniohyoid: C1 fibres via the hypoglossal n.

Ni Infrahyoid: ansa cervicalis (C1–C3); thyrohyoid: C1 via CN XII

Aa Lingual, facial, superior thyroid aa.; vv. to the IJV

Ff Suprahyoid mm. raise hyoid and larynx in swallowing · Thyrohyoid: depresses hyoid; raises larynx if hyoid fixed

**Digastric** At Anterior belly: digastric fossa; posterior belly: mastoid notch F Depresses mandible; elevates and steadies the hyoid No Tendon slung to the hyoid by a fibrous loop

**Stylohyoid** At Styloid process to hyoid; split by the digastric tendon F Elevates and retracts the hyoid

**Mylohyoid** At Mylohyoid line to median raphe and hyoid body F Elevates hyoid, mouth floor and tongue in swallowing No Floor of the mouth; submandibular gland wraps its posterior border

**Geniohyoid** At Inferior mental spine to hyoid body, deep to mylohyoid F Pulls hyoid anterosuperiorly; depresses mandible if hyoid fixed

**Sternohyoid and sternothyroid** At Manubrium to hyoid; sternothyroid deeper, to the oblique line F Depress the hyoid (sternohyoid) and larynx (sternothyroid)

**Omohyoid** At Superior border of scapula to hyoid; intermediate tendon on the IJV F Depresses and steadies the hyoid No Inferior belly divides the posterior triangle

## DEEP Scalenes · prevertebral · brachial plexus

Ni Scalenes and longus colli: ventral rami of cervical nn.

Ni Phrenic n. descends on scalenus anterior, lateral to medial

Aa Subclavian a. and plexus pass between scalenus anterior and medius

Vv Subclavian v. crosses the first rib anterior to scalenus anterior

**Scalenus anterior** At Anterior tubercles C3–C6 to scalene tubercle of first rib F Elevates first rib; flexes neck laterally R Anterior: phrenic n., subclavian v.; posterior: subclavian a., plexus

**Scalenus medius and posterior** At Medius: posterior tubercles to first rib; posterior: to second rib F Elevate first and second ribs; flex neck laterally R Dorsal scapular n., long thoracic n. (C5–C6) pierce scalenus medius

**Longus colli and longus capitis** P On anterior vertebral bodies, deep to prevertebral fascia F Flex the neck (colli) and the head (capitis) R Sympathetic trunk lies on them

**Brachial plexus in the neck** R Ventral rami C5–T1 in the scalene interval T Superior (C5–C6), middle (C7), inferior (C8–T1) C Erb: superior trunk; Klumpke: inferior trunk

## Carotid arteries

Ni Carotid sinus br. of CN IX; vagus n. posterior in the sheath

Aa Right CCA from brachiocephalic trunk; left CCA from aortic arch

Vv IJV lateral to the carotid arteries in the sheath

**Common carotid artery** C Ascends in the carotid sheath; no branches E Divides at superior border of thyroid cartilage (C3–C4) No Compressible on the carotid tubercle (C6)

**Internal carotid artery** C Posterolateral to ECA at origin; enters the carotid canal B None in the neck

**Carotid sinus and carotid body** P Sinus: dilated ICA origin; body: in the bifurcation F Sinus: baroreceptor (BP); body: chemoreceptor (O2, CO2, pH)

## ANT External carotid artery · branches

Ni Hypoglossal n. crosses ICA and ECA, loops round the occipital a.

Ni External laryngeal n. runs with the superior thyroid a.

Aa Anterior: superior thyroid, lingual, facial; medial: ascending pharyngeal

Aa Posterior: occipital, posterior auricular

Aa Terminal: maxillary, superficial temporal aa. in the parotid

Vv Matching vv. drain to the IJV

**External carotid artery** C Anteromedial at the bifurcation; ascends into the parotid E Maxillary and superficial temporal aa., at mandibular neck

**Superior thyroid artery** Ar First anterior branch, near the greater horn of the hyoid B Superior laryngeal a. (pierces thyrohyoid membrane), glandular C Ligate close to the gland: spares the external laryngeal n.

**Lingual artery** C Loop at the greater horn; passes deep to hyoglossus R Hypoglossal n. superficial to hyoglossus, artery deep

**Facial artery** C Grooves submandibular gland; crosses mandible at masseter B Ascending palatine, tonsillar, submental, glandular

**Occipital and posterior auricular arteries** C Posterior branches along the posterior belly of digastric

## LAT Subclavian artery · branches

Ni Right recurrent laryngeal n. hooks round the right subclavian a.

Ni Ansa subclavia loops round the first part

Aa Right from brachiocephalic trunk; left from the aortic arch

Vv Subclavian v. anterior to scalenus anterior; vertebral v. to brachiocephalic

**Subclavian artery** P Three: medial, posterior, lateral to scalenus anterior E Axillary a. at the lateral border of the first rib

**Vertebral artery** Ar First part: first branch C Enters C6 foramen transversarium; ascends through C6–C1

**Thyrocervical trunk** Ar First part, at medial border of scalenus anterior B Inferior thyroid, suprascapular, transverse cervical aa. No Inferior thyroid a. closely related to recurrent laryngeal n.

**Costocervical trunk and internal thoracic artery** Ar Costocervical: second part (left: often first); internal thoracic: first B Costocervical: deep cervical and supreme intercostal aa.

## Jugular veins · lymphatics

Ni Great auricular, transverse cervical nn. cross SCM near the EJV

Aa IJV runs with the common and internal carotid aa.

Vv IJV + subclavian v. = brachiocephalic v., posterior to SC joint

Vv Lymph: all nodes drain to deep cervical nodes, jugular trunk

## Jugular veins · lymphatics (cont.)

**Internal jugular vein** C Jugular foramen to sternoclavicular joint, lateral in the sheath T Facial, lingual, pharyngeal, superior and middle thyroid vv. C Central line between the two heads of SCM

**External jugular vein** Fo Posterior auricular v. + posterior division of retromandibular v. C Crosses SCM obliquely, deep to platysma, to the subclavian v.

**Anterior jugular vein** C Near the midline; jugular venous arch in the suprasternal space E EJV or subclavian v.

**Thoracic duct in the neck** C Arches laterally at C7, posterior to the carotid sheath E Left venous angle (IJV + subclavian v.) F Returns chyle and lymph of all but the right upper body No Right lymphatic duct ends at the right venous angle

**Deep cervical lymph nodes** P Along the IJV, deep to SCM F Final filter for all head and neck lymph K Jugulodigastric (tonsil), jugulo-omohyoid (tongue) C Left supraclavicular (Virchow) node: abdominal cancer

## Cervical plexus

Ni Ventral rami C1–C4, deep to SCM, on scalenus medius and levator scapulae
Aa Ascending cervical a. runs medial to the phrenic n.
Vv EJV crosses the cutaneous branches on the SCM

**Cutaneous branches** E Nerve point: midpoint of the posterior border of SCM B Lesser occipital, great auricular, transverse cervical, supraclavicular

**Ansa cervicalis** Fo Superior root (C1, via CN XII) + inferior root (C2–C3) S Infrahyoid muscles except thyrohyoid

**Phrenic nerve** Fo C3–C5, mainly C4 C On scalenus anterior, deep to prevertebral fascia F Sole motor to diaphragm; sensory to pericardium, pleura C Referred shoulder-tip pain; hemidiaphragm paralysis

## Cranial nerves IX–XII in the neck

Ni IX, X, XI leave the jugular foramen; XII the hypoglossal canal
Aa Laryngeal aa. accompany the internal and recurrent laryngeal nn.
Vv IJV at the jugular foramen, lateral to IX–XI

**Glossopharyngeal nerve** C Curves round stylopharyngeus, between ICA and ECA B Stylopharyngeus, carotid sinus, pharyngeal plexus, posterior tongue

**Vagus nerve** C In the carotid sheath, posterior, between IJV and carotid a. B Pharyngeal, superior laryngeal, cardiac, recurrent laryngeal

**Superior laryngeal nerve** In Pierces thyrohyoid membrane, sensory superior to vocal folds E With superior thyroid a., motor to cricothyroid C External br. injury in thyroidectomy: weak, monotone voice

**Recurrent laryngeal nerve** C Right: round subclavian a.; left: round aortic arch P Tracheo-oesophageal groove; enters deep to inferior constrictor S All intrinsic laryngeal mm. except cricothyroid C Hoarseness; bilateral injury: stridor

**Accessory nerve** C Through SCM, across posterior triangle to trapezius C Node biopsy injury: weak shoulder shrug

**Hypoglossal nerve** C Crosses ICA and ECA, round occipital a., onto hyoglossus S All tongue muscles except palatoglossus C Tongue deviates to the injured side on protrusion

## POST Cervical sympathetic trunk

Ni Preganglionic fibres from T1–T4 ascend; only grey rami in the neck
Aa Inferior thyroid a. near the middle ganglion; vertebral a. near the stellate
Vv Carotid sheath with the IJV lies anterior to the trunk

**Cervical sympathetic trunk** P On longus colli and capitis, posterior to the carotid sheath F Head, neck, upper limb: vasomotor, sweat, dilator pupillae B Grey rami to C1–C8; cardiac nn. (heart rate up)

**Superior cervical ganglion** P Near C2 (C1–C3), the largest; posterior to the ICA B Internal carotid n., external carotid nn., cardiac n.

**Middle and cervicothoracic ganglia** P Middle: C6; stellate: on the neck of the first rib No Ansa subclavia loops round the subclavian a. C Horner syndrome: ptosis, miosis, anhidrosis

## ANT Thyroid and parathyroid glands

Ni Recurrent and external laryngeal nn. at risk in thyroid surgery
Aa Superior thyroid (ECA), inferior thyroid (thyrocervical), ± thyroid ima aa.
Vv Superior, middle thyroid vv. to IJV; inferior to brachiocephalic vv.
Vv Lymph: prelaryngeal, pretracheal, paratracheal, deep cervical nodes

**Thyroid gland** P C5–T1: lobes lateral to larynx and trachea, deep to strap muscles R In pretracheal fascia: moves with swallowing F T3/T4 set metabolic rate; C cells: calcitonin

**Isthmus and pyramidal lobe** P Isthmus on tracheal rings 2–4; pyramidal lobe toward the hyoid No Pyramidal lobe: remnant of the thyroglossal duct

**Parathyroid glands** P Two pairs on the posterior surface of the thyroid lobes F Parathyroid hormone raises blood calcium No Superior: near cricothyroid joint; inferior: near inferior pole S Mainly the inferior thyroid a.

## ANT Larynx

Ni Sensory: internal laryngeal (superior to vocal folds), recurrent (inferior)
Ni Motor: recurrent laryngeal n., except cricothyroid (external laryngeal n.)
Aa Superior and inferior laryngeal aa. (superior, inferior thyroid aa.)
Vv Laryngeal vv. join the superior and inferior thyroid vv.
Ff Phonation; airway protection (inlet closes in swallowing) · Effort closure (Valsalva); cough reflex

**Thyroid cartilage** S Two laminae fused at the laryngeal prominence; superior, inferior horns L Oblique line: sternothyroid, thyrohyoid, inferior constrictor

**Cricoid cartilage** S Complete ring: narrow anterior arch, broad posterior lamina P C6: larynx and pharynx end; trachea and oesophagus begin

**Arytenoid cartilages and epiglottis** Ar Apex, vocal process (anterior), muscular process (lateral) E Elastic cartilage, stalk on the thyroid angle

**Laryngeal cavity** P Vestibule, ventricle (between the folds), infraglottic cavity Fo Vestibular (false): protective; vocal (true): phonation No Rima glottidis: narrowest part of the adult larynx

**Median cricothyroid ligament** P Midline between thyroid and cricoid cartilages C Emergency cricothyrotomy site

**Intrinsic laryngeal muscles** F Abduct: posterior cricoarytenoid only · Adduct: lateral cricoarytenoid, transverse and oblique arytenoids · Tense: cricothyroid; relax: thyroarytenoid; vocalis fine-tunes

## POST Pharynx · trachea · oesophagus

Ni Pharyngeal plexus: motor X (stylopharyngeus: IX); sensory mainly IX and X
Aa Ascending pharyngeal, ascending palatine, tonsillar, inferior thyroid brs.
Vv Pharyngeal venous plexus to the IJV; lymph to deep cervical nodes
Ff Shared air and food passage; swallowing; speech resonance · Tonsils (Waldeyer ring) guard the entry

**Nasopharynx** P Posterior to the choanae, superior to the soft palate Fe Auditory tube opening, torus tubarius, pharyngeal recess, tonsil

**Oropharynx** P Soft palate to the tip of the epiglottis Fe Palatoglossal, palatopharyngeal arches; palatine tonsil; valleculae

**Laryngopharynx** P Epiglottis tip to inferior border of cricoid (C6) Fe Piriform recesses lateral to the laryngeal inlet C Fish bones lodge in the piriform recess

**Pharyngeal muscles** C Superior, middle, inferior: overlap on the pharyngeal raphe L Stylopharyngeus, salpingopharyngeus, palatopharyngeus F Constrictors propel the bolus; longitudinal raise pharynx, larynx · Cricopharyngeus: upper oesophageal sphincter C Pharyngeal pouch: between thyro- and cricopharyngeal parts

**Cervical trachea and oesophagus** P Both begin at C6; oesophagus posterior to the trachea R Recurrent laryngeal nn. in the grooves; thyroid lobes lateral F Trachea: airway held open by C-rings; oesophagus: bolus transport

## Typical vertebra

Ni Meningeal branches: periosteum, disc, PLL · Zygapophysial joints: medial branches of posterior rami

Aa Spinal branches of vertebral, posterior intercostal, lumbar aa.

Vv Basivertebral vv. to the internal vertebral venous plexus

P Body anterior, arch posterior: vertebral foramen · 1 spinous, 2 transverse, 4 articular processes

**Vertebral body** F Anterior part; bears and transmits body weight J Adjacent bodies through the intervertebral discs

**Vertebral arch** P Two pedicles and two laminae No Pars interarticularis: site of spondylolysis

**Spinous process** P Posterior, at the junction of the laminae F Levers for muscles; ligament attachment

**Transverse process** P Lateral, at the pedicle-lamina junction F Levers for deep muscles; thoracic: rib tubercle joint

**Articular processes** J Superior and inferior processes form the zygapophysial joints

**Intervertebral foramen** B Pedicles, disc and bodies, facet joint C Spinal nerve, spinal ganglion, vessels C Herniated disc or osteophytes compress the root

## Atlas and axis

Ni C1 n.: between occiput and atlas posterior arch · C2 n.: between atlas posterior arch and axis lamina

Aa Vertebral a.: C1 foramen transversarium, then posterior-arch groove

Vv Suboccipital venous plexus; vertebral v. forms here

P Atlas: no body, no spinous process; axis: dens

**Atlas (C1)** P Anterior arch, posterior arch, two lateral masses Fa Superior: occipital condyles; inferior: axis T Anterior: longus colli; posterior: rectus capitis post. minor

**Groove for the vertebral artery** P Superior surface of the posterior arch of the atlas C Vertebral a. and suboccipital n. (C1)

**Axis (C2)** Fe Dens; large bifid spinous process No First spinous process palpable inferior to the occiput

**Dens of the axis** J Median atlanto-axial joint with the anterior arch H Transverse ligament of the atlas C Dens fracture endangers the spinal cord

## Cervical, thoracic, lumbar

Ni C1-C7 nn. exit superior to their vertebra; C8 onward inferior

Aa Vertebral a. ascends through the foramina transversaria of C6-C1

Vv Vertebral v. descends with the artery to the brachiocephalic v.

C 7 cervical, 12 thoracic, 5 lumbar, 5 sacral (fused), 4 coccygeal

**Cervical vertebra** Fe Foramen transversarium, small body, bifid spine No Uncinate processes; carotid tubercle on C6

**Vertebra prominens (C7)** Fe Longest non-bifid cervical spinous process No Foramen transversarium usually lacks the vertebral a.

**Thoracic vertebra** Fe Costal facets on the body and transverse process S Heart-shaped body; long spine sloping inferiorly No T1: full facet for rib 1; T11-T12: no transverse costal facet

**Lumbar vertebra** Fe Large kidney-shaped body; no costal facets or foramen transversarium P Mammillary and accessory processes; hatchet-shaped spine

## POST Sacrum and coccyx

Ni Anterior/posterior rami via anterior/posterior sacral foramina · Middle clunial nn.: posterior rami S1-S3

Aa Lateral sacral aa. (internal iliac a.); median sacral a. (aorta)

Vv Lateral, median sacral vv. to internal, common iliac vv.

**Sacral promontory** P Anterior lip of the S1 body No Posterior landmark of the pelvic inlet

**Median sacral crest** Fo Fused spinous processes No Intermediate crest: articular, lateral: transverse processes

**Auricular surface** F Sacro-iliac joint: transfers trunk weight to the pelvis No Sacral tuberosity: interosseous ligament

**Sacral hiatus** P Inferior end of the sacral canal, between the cornua C Caudal epidural anaesthesia

**Coccyx** P Usually four fused vertebrae; coccygeal cornua At Gluteus maximus, coccygeus, filum terminale

## Disc and intervertebral joints

Ni Outer anulus: meningeal branches; facets: medial branches

Aa Adult disc avascular: diffusion through the end plates

Vv Bodies drain through basivertebral vv. to the internal plexus

**Intervertebral disc** P Anulus fibrosus, nucleus pulposus, end plates F Absorbs shock; allows movement between bodies C Posterolateral L4-L5 herniation compresses the L5 root

**Zygapophysial joint** T Synovial plane joint between articular processes F Guide and limit movement; orientation sets regional motion

**Uncovertebral joint** P Uncinate processes, C3-C7 C Osteophytes narrow the intervertebral foramen

**Rib joints** H Rib head on two demifacets and the disc T Rib tubercle on the transverse costal facet L Radiate, intra-articular; costotransverse (superior, lateral)

## POST Ligaments of the column

Ni Meningeal branches: posterior longitudinal ligament and dura

Aa Spinal branches of the segmental aa.

Vv External and internal vertebral venous plexuses

L Needle: supraspinous, interspinous, flavum, dura, arachnoid

**Anterior longitudinal ligament** C Anterior bodies, occiput to sacrum F Limits extension; supports the disc anteriorly

**Posterior longitudinal ligament** C Posterior bodies, in the vertebral canal F Limits flexion; narrow lumbar: posterolateral herniation

**Ligamentum flavum** B Laminae of adjacent vertebrae F Elastic: limits flexion, helps restore erect posture

**Supraspinous and interspinous ligaments** C Spine tips C7-sacrum; between adjacent spines F Limit flexion

**Nuchal ligament** At External occipital protuberance to C7 spine; trapezius, splenius, rhomboid minor F Muscle attachment; supports the head

## Atlanto-occipital and atlanto-axial

Ni C1 and C2 spinal nn.

Aa Branches of the vertebral and ascending pharyngeal aa.

Vv Suboccipital and internal vertebral venous plexuses

M Atlanto-occipital: flexion and extension; atlanto-axial: rotation

**Atlanto-occipital joint** T Synovial condylar: occipital condyles on the atlas M Anterior and posterior atlanto-occipital

**Transverse ligament of the atlas** F Holds the dens against the anterior arch No With the longitudinal bands: cruciate ligament

**Alar ligaments** At Sides of the dens to the occipital condyles F Limit rotation of the head

**Tectorial membrane** P Superior continuation of the posterior longitudinal ligament F Covers the cruciate ligament, reinforcing it posteriorly

## SUP Superficial back muscles

Ni Trapezius: CN XI; latissimus: thoracodorsal n. · Levator, rhomboids: dorsal scapular n. (C5); levator also C3-C4

Aa Transverse cervical, dorsal scapular aa.; latissimus: thoracodorsal a.

Vv Transverse cervical v. to EJV; thoracodorsal to subscapular v.

**Trapezius**

O Superior nuchal line, nuchal ligament, spines C7-T12

I Lateral clavicle, acromion, scapular spine

F Descending: elevates; transverse: retracts; ascending: depresses scapula · With serratus anterior: rotates glenoid superiorly

**Latissimus dorsi**

O Spines T7-T12, thoracolumbar fascia, iliac crest, ribs 9-12

I Floor of the intertubercular groove

F Extends, adducts, medially rotates arm · Climbing; forced expiration (cough)

**Levator scapulae**

O Transverse processes C1-C4

I Medial border, superior angle to spine

F Elevates scapula · Rotates glenoid inferiorly

## SUP Superficial back muscles (cont.)

### Rhomboid major and minor
- O Minor: C7-T1 spines; major: T2-T5 spines
- I Medial border of the scapula
- F Retract and elevate scapula · Rotate glenoid inferiorly; fix scapula to the thoracic wall

## POST Serratus posterior, thoracolumbar fascia

- Ni Serratus posterior: intercostal nn. (superior T2-T5, inferior T9-T12)
- Aa Posterior intercostal and subcostal aa.
- Vv Posterior intercostal vv. to the azygos system

### Serratus posterior superior
- O Nuchal ligament, spines C7-T3
- I Ribs 2-5, lateral to the angles
- F Elevates ribs 2-5; mainly proprioceptive

### Serratus posterior inferior
- O Spines T11-L2
- I Ribs 9-12
- F Depresses ribs 9-12; mainly proprioceptive

### Thoracolumbar fascia
L Posterior, middle, anterior; erector spinae, quadratus lumborum between
F Encloses deep muscles; origin of latissimus, internal oblique, transversus

## DEEP Splenius and erector spinae

- Ni All intrinsic back muscles: posterior (dorsal) rami · Erector spinae mainly lateral branches
- Aa Dorsal branches of posterior intercostal, subcostal, lumbar aa. · Neck: occipital, deep cervical, vertebral aa.
- Vv Accompanying vv. to the vertebral venous plexuses
- C Lateral to medial: iliocostalis, longissimus, spinalis
- Ff Both sides: extend the column; one: lateral flexion

### Splenius capitis and cervicis
- O Nuchal ligament, spines C7-T6
- I Mastoid, superior nuchal line; C1-C3 transverse processes
- F Both: extend head and neck · One: laterally flexes, rotates head to the same side

### Iliocostalis
- O Common tendon: iliac crest, sacrum, lumbar spines
- I Rib angles, cervical transverse processes
- F Extends column; one side: laterally flexes it

### Longissimus
- O Common tendon; transverse processes
- I Transverse processes, ribs, mastoid process
- F Extends column; capitis: extends, turns head same side

### Spinalis
- O Spinous processes
- I Spinous processes more superior
- F Extends the column

## DEEP Transversospinales

- Ni Medial branches of the posterior rami
- Aa Dorsal branches of segmental aa.; occipital and deep cervical aa.
- Vv External vertebral venous plexus; deep cervical v.
- R Transverse process to spinous process superior to it
- S Semispinalis 4-6 segments, multifidus 2-4, rotatores 1-2

### Semispinalis capitis
- O Transverse processes T1-T6, articular C4-C7
- I Occiput between the nuchal lines
- F Extends head; rotates it to the opposite side

Note: Pierced by the greater occipital n.

### Multifidus
- O
- I Spinous processes 2-4 segments superior
- F Stabilises lumbar segments; extends, rotates to opposite side

Position:
On the laminae; thickest in the lumbar region

### Rotatores
P Deepest layer; best developed in the thoracic region
F Rotate to the opposite side; stabilise; proprioception

### Interspinales and intertransversarii
P Between adjacent spines; between adjacent transverse processes F Interspinales extend; intertransversarii laterally flex

## DEEP Suboccipital muscles and triangle

- Ni Suboccipital n. (C1 posterior ramus): all four · Greater occipital n. (C2) emerges inferior to obliquus inferior
- Aa Vertebral a. (atlantic part) and occipital a.
- Vv Suboccipital plexus to vertebral, deep cervical vv.
- Ff Mainly postural; proprioception of head position

### Rectus capitis posterior major
- O Spinous process of the axis
- I Lateral inferior nuchal line
- F Extends head; rotates it to the same side

### Rectus capitis posterior minor
- O Posterior tubercle of the atlas
- I Medial inferior nuchal line
- F Extends head

### Obliquus capitis superior
- O Transverse process of the atlas
- I Occiput between the nuchal lines
- F Extends and laterally flexes head

### Obliquus capitis inferior
- O Spinous process of the axis
- I Transverse process of the atlas
- F Rotates atlas and head to the same side

### Suboccipital triangle
B Rectus capitis posterior major, both obliques Fl Atlas posterior arch, posterior atlanto-occipital membrane C Vertebral a., suboccipital n. R Semispinalis capitis

## POST Triangles of the back

- Ni Subcostal n., vessels cross the superior lumbar triangle floor
- Aa Lumbar and subcostal aa. deep to the lumbar triangles
- Vv Lumbar vv. deep to the lumbar triangles

### Triangle of auscultation
B Trapezius, latissimus dorsi, medial border of scapula Fl Rhomboid major, sixth intercostal space F Lung sounds clearest; widens with arms folded, trunk flexed

### Inferior lumbar triangle
B Latissimus dorsi, external oblique, iliac crest Fl Internal oblique C Lumbar hernia (Petit)

### Superior lumbar triangle
B 12th rib, erector spinae, internal oblique Fl Transversus abdominis aponeurosis

## Posterior (dorsal) rami and nerves of the back

- Ni Posterior rami: intrinsic muscles, facet joints, skin of back · Superficial back muscles: anterior rami and CN XI
- Aa Occipital a. runs with the greater occipital n.
- Vv Occipital v. to the suboccipital venous plexus

### Posterior ramus of a spinal nerve
C Posteriorly, lateral to the articular process B Medial and lateral branches

### Suboccipital nerve (C1)
C Between the vertebral a. and the posterior arch of atlas S Suboccipital muscles; motor

### Greater occipital nerve (C2)
C Pierces semispinalis capitis and trapezius S Skin of the posterior scalp

### Clunial nerves
S Posterior rami L1-L3, across the iliac crest M Posterior rami S1-S3

## DEEP Spinal cord and meninges

- Ni Meningeal branches supply the dura
- Aa 1 anterior, 2 posterior spinal aa.; segmental medullary aa. · Great anterior segmental medullary a.: usually left, T9-L2
- Vv Spinal vv. to the valveless internal vertebral plexus · Valveless: route of metastatic spread
- L Adult cord ends L1-L2; dural sac ends S2

### Spinal cord
E Foramen magnum to L1-L2 E Cervical, lumbosacral (limb plexuses) F Conducts ascending, descending tracts; segmental reflexes

### Conus medullaris and cauda equina
C Tapered end of the cord, L1-L2 C Lumbosacral roots in the lumbar cistern

### Spinal nerve roots
R Posterior sensory, anterior motor; join in the foramen G Spinal ganglion (posterior root): sensory cell bodies

### Spinal meninges
L Dura, arachnoid, pia, superficial to deep S Epidural: fat, veins; subarachnoid: CSF F Protect the cord; CSF cushions it

### Denticulate ligament
F Anchors the cord laterally to the dura, between roots

### Filum terminale
F Anchors the conus to the coccyx; dura-covered from S2

### Lumbar cistern
E Subarachnoid space, L2 to S2 C Lumbar puncture at L3-L4 or L4-L5