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** *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*