Back pins · front

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.

Back pins · back

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

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

Spinal dura mater (superf.) ★ **Dural sac** (inf) (N) **Cauda equina** (inf) ★ **Spinal arachnoid mater** **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

Spinal pia mater (deep) **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

Spinal cord ★ (N) **Rootlets** (lat) **Cervical enlargement** (sup) **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

Anterior median fissure (ant) (V) **Anterior spinal vein** (ant) **Anterolateral sulcus** (ant) *One anterior spinal artery (from both vertebral arteries), two posterior spinal arteries*

Posterior surface of the cord: posterior spinal vessels

Posterior median sulcus (post) (V) **Posterior spinal vein** (post) **Posterior intermediate sulcus** (post) **Posterolateral sulcus** (post) *Two posterior spinal arteries (posterolateral sulci), one anterior spinal artery*

Grey matter and central canal

Grey matter of the spinal cord **Anterior horn** (ant) ★ **Lateral horn** (lat) (N) **Spinal nerve** (lat) ★ **Posterior horn** (post) **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*