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 I 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 I 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 Ar 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) Fs 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 Fs Foramen transversarium, small body, bifid spine No Uncinate processes; carotid tubercle on C6

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

Thoracic vertebra Fc 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 Ac Large kidney-shaped body; no costal facets or foramen transversarium M 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 Fs 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 hemiation

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

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 C 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