Vertebral Column and Back

Learning Outcomes

- Understand and communicate the key functions of the vertebral column
- Distinguish and differentiate the regions of the vertebral column
- Identify the major anatomical landmarks of a typical vertebra and describe their basic functions
- Differentiate typical cervical, thoracic and lumbar vertebra via distinctive features
    - *Note that thoracic and lumbar vertebral regions will be our primary focus this year*
- Identify and describe the different joints of the vertebral column
- Identify the major vertebral ligaments and the respective landmarks to which they attach
- Identify, name and describe the key muscle groups of the back

Vertebral Column Curvatures

Primary curvatures are 'kyphotic' while secondary curvatures are 'lordotic', with the latter developing in cervical and lumbar regions.

Atypical or Abnormal Curvatures

- Excessive lordosis (lumbar), excessive kyphosis (thoracic), and scoliosis are examples of abnormal curvatures.

Major Anatomical Landmarks of Typical Vertebra

- Vertebral body: weight bearing; articular superiorly and inferiorly; epiphyseal ring
- Arch: pedicles + lamina; forms vertebral foramen; protects spinal cord
- Spinous (directly down) and transverse (sideward) processes: levers for muscles and ligamentous attachment
- Articular processes: projections with articular facets; articulate superiorly and inferiorly; important in synovial joint formation

- As we travel inferiorly along the vertebral column, there is more weight bearing = increase in size of vertical body
    - Thoracic: heart-shaped
    - Lumbar: kidney-shaped
- Cervical vertebrae have transverse foramina and bifid spinal processes
- Thoracic spinous processes projects down (posteriorly and inferiorly) to limit extension
- Lumbar spinal processes are relatively larger
- Sacrum has fused vertebrae

Intervertebral Foramen, Canal, and Notches

- Vertebral foramen: opening in a vertebra through which the spinal cord passes.
- Vertebral canal: passage formed by the vertebral foramen of the vertebrae
- Superior and inferior vertebral notches: indentations on the upper and lower borders of the pedicles of vertebrae, which together form the intervertebral foramina
    - Spinal nerve roots, dorsal root ganglia, and vessels

Intervertebral Joints: Vertebral Body-Disc Joint

- Secondary cartilaginous joint
- Composed of annulus fibrosus and nucleus pulposus
    - Annulus fibrosus: outer layer; attaches to epiphyseal ring; keeps the vertebrae together; concentric lamellae of collagen; permits movement in all directions; resists excessive rotation
    - Nucleus Pulposus: inner layer; keeps the vertebrae apart; gelatinous consistency; shock absorber (disperses compressive forces); deforms but not compressible

Zygopophyseal Joints

- These are plane synovial joints whose movement depends on the orientation of the articular surfaces involved
    - Superior and inferior articular processes have the articular surfaces or (facets)
- The plane of lumbar articular surfaces help with anterior/posterior movement
- The plane of thoracic articular surfaces help with lateral movement and rotation

Major Vertebral Column Ligaments

- Posterior and anterior longitudinal ligaments
- Interspinous ligament
- Supraspinous ligament
- Ligamentum flavum.

Muscles of the Back

- Extrinsic back muscles attach to and act on the upper limb
- Intrinsic back muscles (primarily) attach to and act on the back
    - Erector spinae are the prime movers of the back, particularly in the sagittal plane
        - Concentrically extend the trunk
        - Eccentrically control trunk flexion (eg slowly bending over)
        - Commonly implicated with postural issues
    - Deep to the erector spinae are a group of short muscles collectively known as ‘transversospinalis’