

General Vertebral Osteology

- I. Functions of the vertebral column
 - A. Protection of spinal cord and spinal nerve roots
 - B. Support of the body
 - C. Movement of the trunk and limbs

- II. Curvatures of the spine
 - A. Nomenclature
 1. Kyphotic: spinal concavity faces anteriorly
 2. Lordotic: spinal concavity faces posteriorly
 3. Primary curvature: present from early fetal development
 - a. Thoracic curvature: kyphotic (i.e., concave anteriorly)
 - b. Sacrococcygeal (aka, pelvic) curvature: kyphotic (i.e., concave anteriorly)
 4. Secondary (aka, compensatory) curvature: develops after the primary curvature is already established
 - a. Cervical curvature: lordotic (i.e., concave posteriorly)
 - b. Lumbar curvature: lordotic (i.e., concave posteriorly)
 5. Lateral curve: slight spinal concavity facing laterally, either right or left

- III. Morphology of a typical vertebra
 - A. Vertebral body: anterior portion of the vertebra

1. Shape: roughly cylindrical but specific shape varies by region
2. [Annular] epiphyseal rim (superior and inferior)
3. Nutrient foramina: small foramina on front, back, and sides of vertebral body for arteries and veins
4. Basivertebral venous foramen/foramina: 1 or 2 large, centrally placed foramina on posterior wall of vertebral body, for basivertebral veins

B. Vertebral arch (aka, posterior or dorsal arch)

1. Pedicle: anterior portion of the arch
 - a. Superior and inferior vertebral notches (aka, incisures)
 - b. Intervertebral foramen (aka, IVF): foramen formed between pedicles of adjacent vertebrae
2. Lamina (laminae, pl.): posterior portion of the arch
 - a. Para-articular processes: accessory bone on the superior and/or inferior edge of the lamina
3. Vertebral foramen and vertebral canal
4. Lamina-pedicle junction

D. Processes (aka, apophyses)

1. Spinous process: located at the junction of the right and left laminae
 - a. Spinous tubercle: swelling of bone at the tip of the process
2. Transverse process: located at the lamina-pedicle junction
 - a. Consists of a true transverse process + costal element
 - b. Transverse tubercle: swelling of bone at the tip of the process

3. Articular processes (aka, zygapophyses) and facets
 - a. Superior articular process and facet
 - i. Projects superiorly from the lamina-pedicle junction
 - ii. Articular facet faces posteriorly and superiorly
 - b. Inferior articular process and facet
 - i. Projects inferiorly from the lamina-pedicle junction
 - ii. Articular facet faces anteriorly and inferiorly

IV. General development of a vertebra

A. Three primary ossification centers

1. Primary Ossification Centers

- a. Centrum: anterior ossification center
- b. Neural arches (right and left): latero-posterior ossification centers

2. Cartilaginous joints between the primary ossification centers

- a. Neurocentral synchondrosis: joint between the neural arch and the centrum (right and left)
- b. Neural arch synchondrosis: posterior, midline joint between the right and left neural arches; lack of proper ossification results in spina bifida

Note: centrum ≠ vertebral body; neural arch ≠ vertebral arch

B. Five secondary centers of ossification

1. Annular epiphyseal rims (superior and inferior)
2. Transverse processes (right and left)
3. Spinous process