Vertebra

The vertebral column, also known as the backbone or spine, is a bony structure found in vertebrates. It is formed from individual bones called vertebrae,

Singular: vertebra

The vertebrae are bones in the spine joined by articulations that not only protect the spinal cord but also allow axial loading and support of the limbs. The spine is made up of 33 vertebrae. The word 'vertebra' originates from the Latin word meaning 'joint or articulation' or from the word 'vertere' meaning “to turn.” Embryologically the vertebral body is formed by the fusion of adjacent sclerotomes. Cancellous spongy bone fills the center and then comes together to create the superior and inferior endplates. The cortical compact bone then covers the rest of the cancellous bone. The endplates are made of thickened cancellous bone and are responsible for providing nutrients and attachments to the disk. These bones are made up of a ventral cylinder mass of cancellous bone called the body and a dorsal vertebral cortical arch. The ventral body has two pedicles coming off that lead to the lamina and join dorsally to make up the spinous process. Two adjacent vertebrae form the vertebral foramen between each pedicle bilaterally. Anterior to the vertebral body is the anterior longitudinal ligament that runs from the skull down to the sacrum and aids in limiting extension. Immediately posterior to the body is the posterior longitudinal ligament that runs from the tectorial membrane to the sacrum and aids in limiting flexion. The laminae connect by the discontiguous ligamentum flavum and help preserve upright posture. The interspinous ligament fortifies the spinous processes. The facet joints are covered and stabilized with a ligamentous capsule, and each body gets affixed to a disk above and below that aids in diffusing axial loads. Zygapophyses (greek=yoke) or articular processes sprout off the pedicle at the laminar junction, are encased in hyaline cartilage, and depending on the degree of angulation, determine spine movement. A thorough understanding of the bony and ligamentous anatomy is important when evaluating and treating a vertebral fracture.

Vertebral fractures result from improper axial loading with or without a rotational component and/or distraction/dislocation in the setting of trauma, osteoporosis, infection, metastatic, or other bone diseases.

Fracture classification systems were designed to guide treatment decisions. Systems evaluate spinal stability, neurological deficit, location, the extent of damage to the bony elements, and associated ligamentous complexes. One of the first models to classify traumatic thoracolumbar fractures and pathomorphology was the three-column system of Denis. The anterior column is made up of the anterior longitudinal ligament, annulus fibrosus, and the anterior part of the vertebral body. The middle column includes the posterior part of the vertebral body, annulus, and posterior longitudinal ligament (PLL). The posterior column includes all the structures posterior to the PLL. Three system types currently prevail in classifying traumatic fractures: the Spine Trauma Study Group developed the Subaxial Injury Classification and Severity scale (SLICS) and Thoracolumbar Injury Classification and Severity score (TLICS). In 1994, the AO spine classification was proposed (a two-column model) but has had poor intraobserver and interobserver reliability [1)].

Parts

Vertebral Body

Vertebral Arch

Pedicles

Laminae

Spinous Process

Transverse Process

Articular Process:

Superior Articular Processes: Projections that face upwards and articulate with the inferior articular processes of the vertebra above.

Inferior Articular Processes: Projections that face downwards and articulate with the superior articular processes of the vertebra below.

Intervertebral Foramen: The openings between adjacent vertebrae formed by the superior and inferior notches on the pedicles, through which the spinal nerves exit the spinal column.

Intervertebral Discs: Not part of the vertebrae themselves but important to note, these are the fibrocartilaginous cushions located between adjacent vertebrae, acting as shock absorbers.

Vertebral Foramen

Each of these parts plays a crucial role in the function and stability of the vertebral column.

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see Cervical vertebra

see Lumbar vertebra

1)
Whitney E, Alastra AJ. Vertebral Fracture. 2023 Apr 3. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan–. PMID: 31613453.