



Departement of Anesthesia Techniques



كلية المستقبل الجامعة
قسم تقنيات التخدير

المرحلة الاولى ٢٠٢٢-٢٠٢٣

Anatomy

Lecture :Vertebral column

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Anatomy of The Back

Vertebral column

The Vertebral Column, structure and functions

The vertebral column is the central, bony pillar of the body. It extends from the neck to the coccyx (figure.1) . Its functions are:

1. Supports the skull, shoulder girdle, upper limbs, and thoracic cage.
2. Transmits body weight to the lower limbs.



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Figure.1

Structure and functions of vertebral column

3. It protects the roots of the spinal nerves, and the covering meninges that lie within its cavity.

The vertebral column is composed of **33 vertebrae** organized in five regions—7 cervical (C1-C7), 12 thoracic (T1-T12), 5 lumbar (L1-L5), 5 sacral (S1-S5)(fused to form the sacrum (figure.2.)

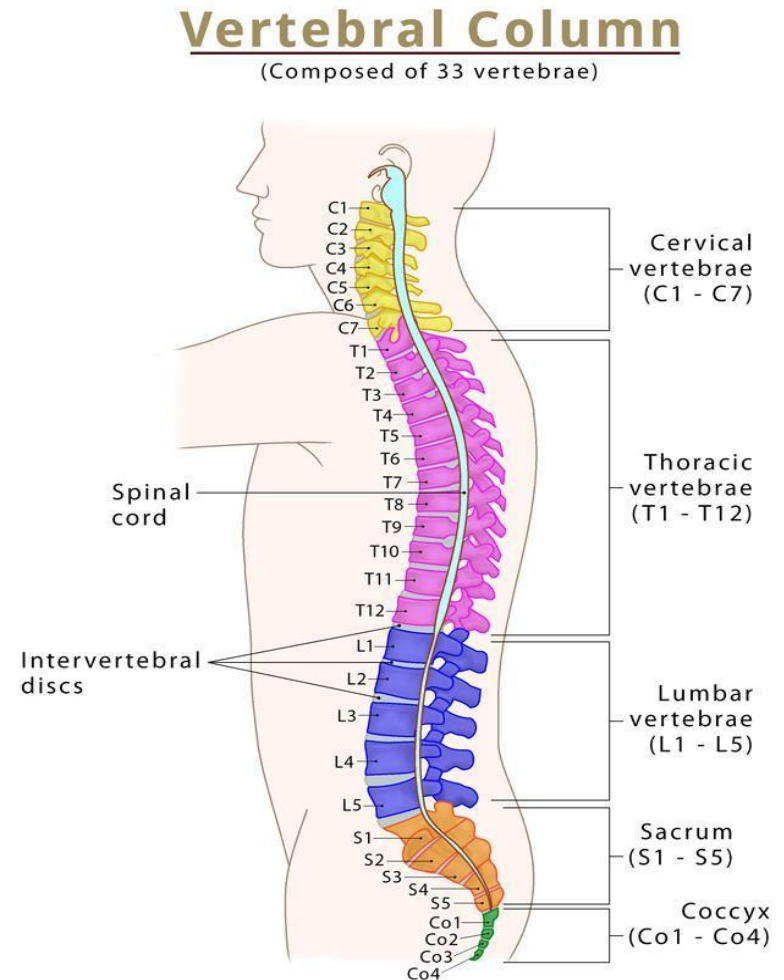


Figure.2

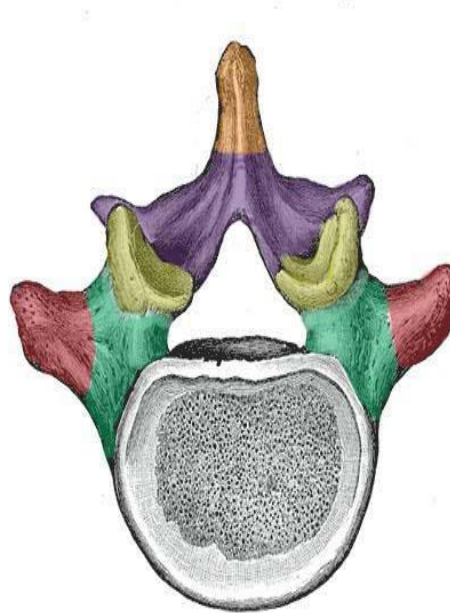
Structure and functions of vertebral column

and 4 coccygeal (Co1- Co4) (the lower 3 are commonly fused). The vertebrae within each region have distinctive features. However, all vertebrae share a common basic structural component.

The typical vertebra (figure.3)

A typical vertebra consists of the following parts:

1.The body which is round and situated anteriorly



- Spinous process
- Lamina
- Superior articular processes
- Pedicles
- Transverse processes

Figure.3

Structure and functions of vertebral column

the vertebral arch posteriorly. The arch and the body enclose a space known as the;

2. vertebral foramen.

The vertebral foramina form the **vertebral canal** in articulated skeleton (figure .4), the canal conveys the spinal cord and the meninges.

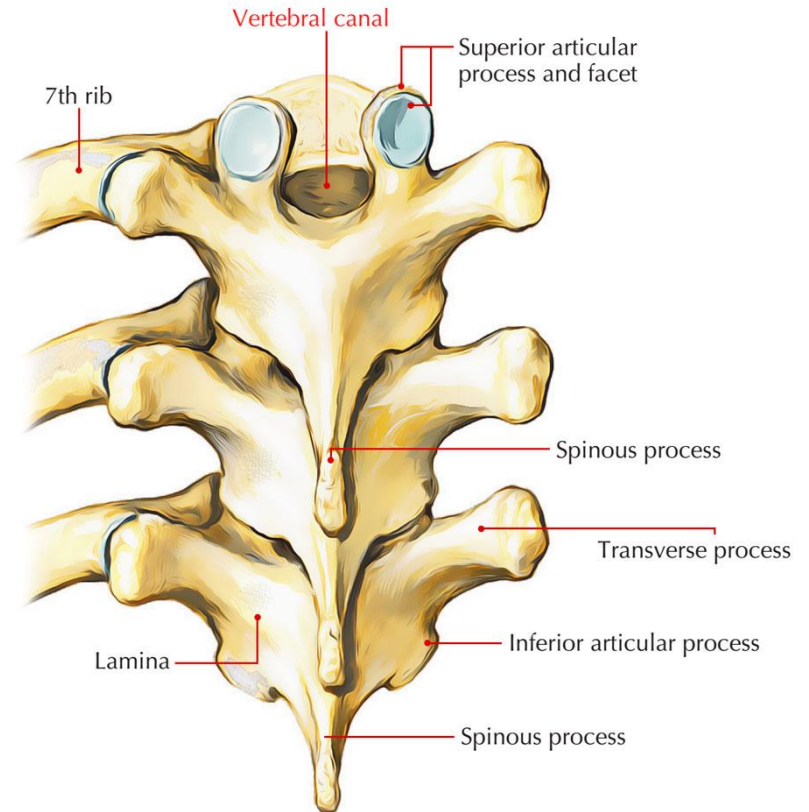


Figure .4

Structure and functions of vertebral column

3. The vertebral arch, consists of a pair of **cylindrical pedicles**, which form the sides of the arch, and a pair of flattened **laminae**, which complete the arch posteriorly (figure.5). The vertebral arch gives rise to **seven processes**: one spinous, two transverse, and four articular.

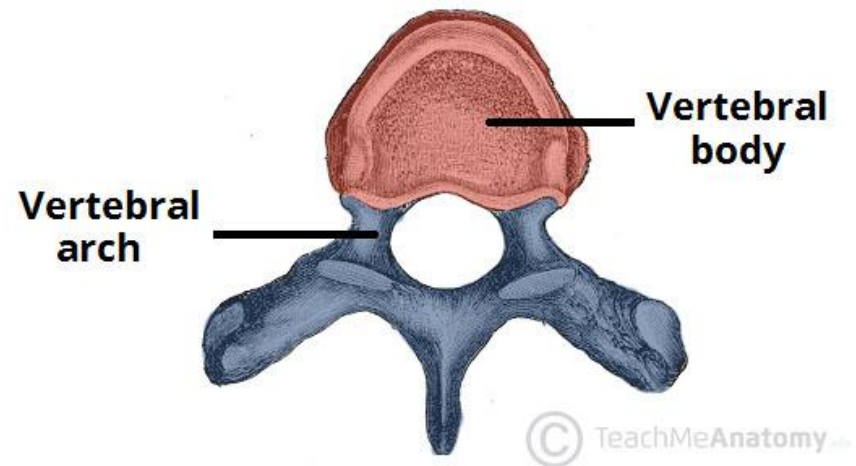


Figure.5

Structure and functions of vertebral column

4.The spinous process (spine) (figure.6) is directed posteriorly from the junction of the two laminae.

5.The transverse processes (figure.6) are directed laterally from the junction of the laminae and the pedicles. Both the spinous and transverse processes serve as levers and receive attachments of muscles and ligaments.

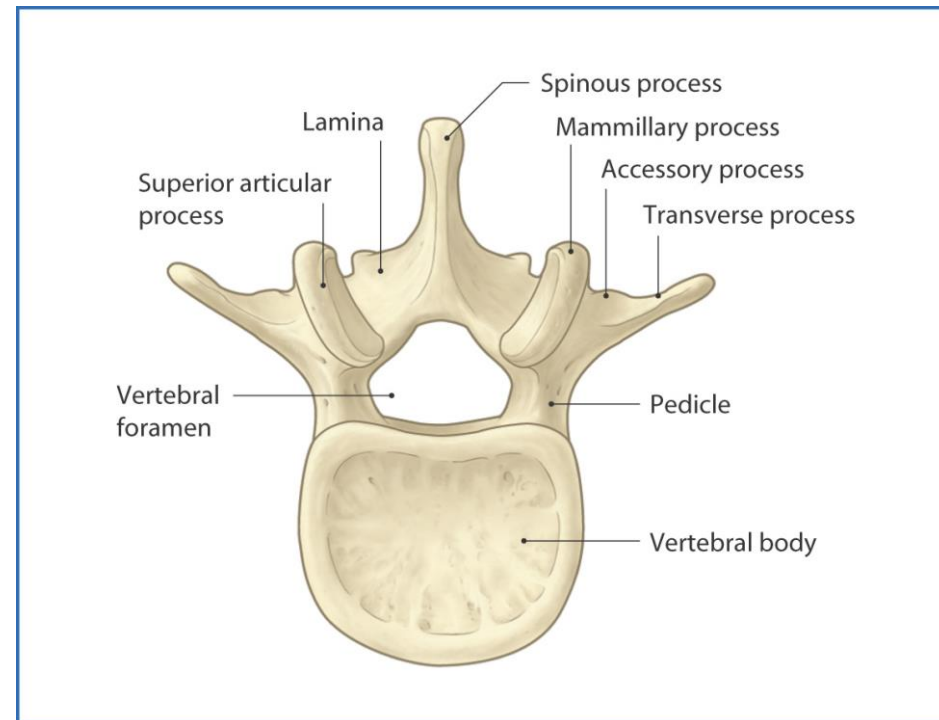


Figure.6

Structure and functions of vertebral column

The **articular processes (figure.7)** are vertically arranged and consist of two superior and two inferior processes. They arise from the junction of the laminae and the pedicles, and their articular surfaces (facets) are covered with hyaline cartilage. Each vertebra possesses a total of four synovial articular joints.

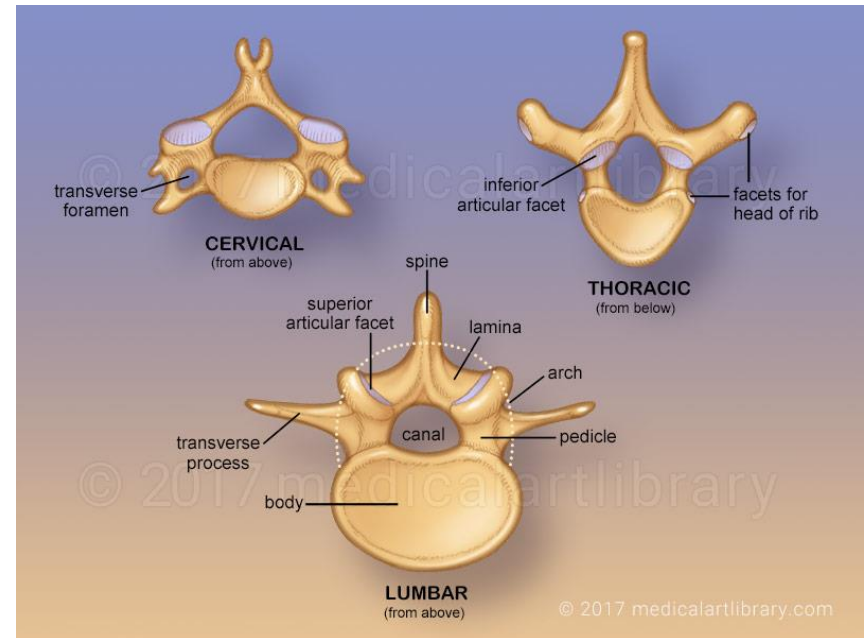


Figure. 7

Structure and functions of vertebral column

The pedicles are notched on their superior and inferior borders, forming the **superior and inferior vertebral notches (figure.8)**. On each side in an articulated skeleton, the superior notch of one vertebra and the inferior notch of the adjacent vertebra above align together and form an **intervertebral foramen**.

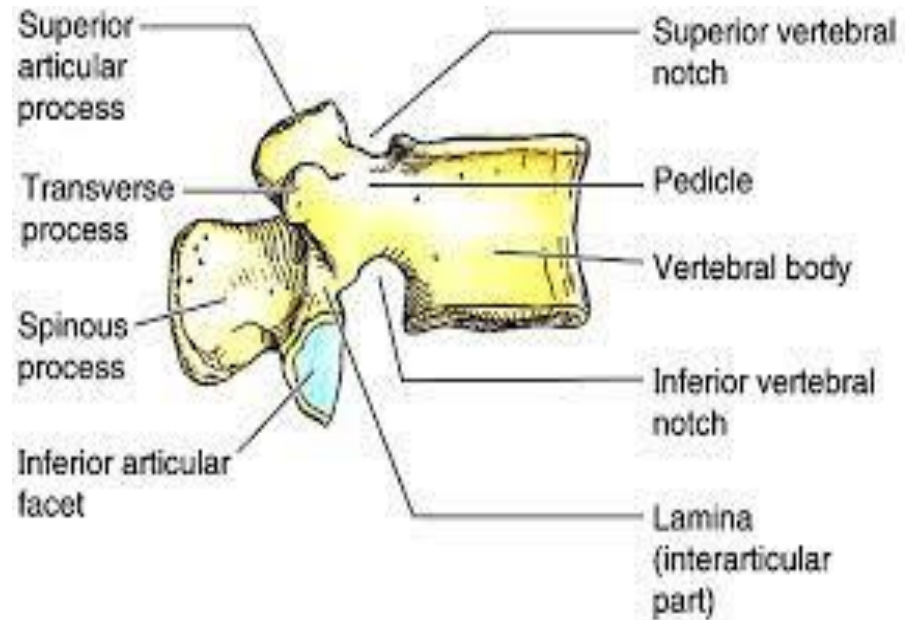


Figure.8

Structure and functions of vertebral column

These foramina serve to transmit the **spinal nerves and blood vessels (figure.9)**. The anterior and posterior nerve roots of a spinal nerve unite within these foramina with their meningeal coverings to form the segmental spinal nerves.

The **first, second, and seventh cervical vertebrae** and the **1st, 10th, 11th, and 12th thoracic vertebrae** are atypical.

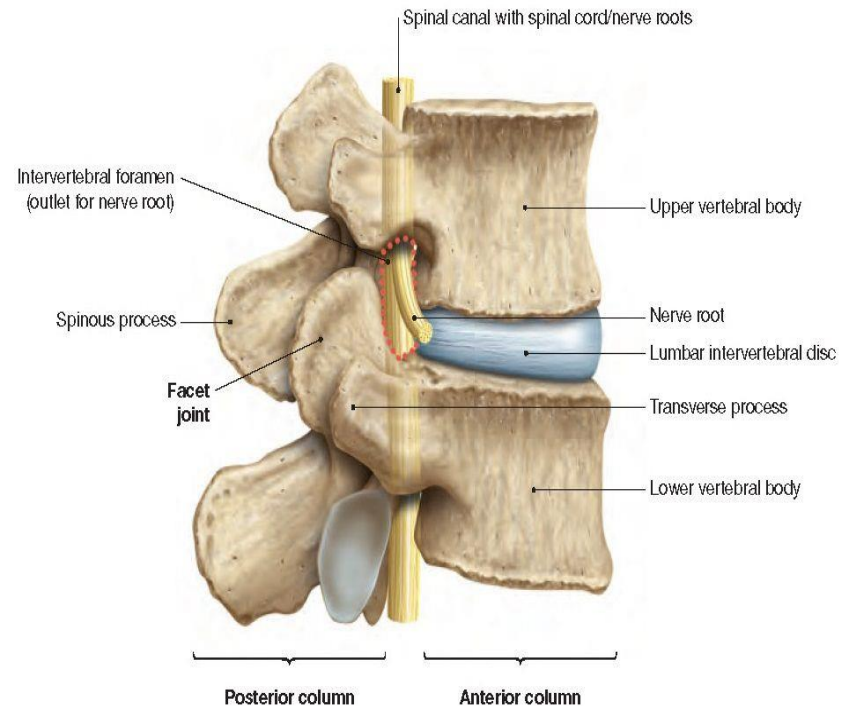


Figure.9

	CERVICAL (C3–6)	THORACIC (T2–9)	LUMBAR (L1–5)
Body	Small and transversely broad No costal facets	Medium sized and valentine heart shaped Costal facets (demifacets) present on each side at the posterior superior and posterior inferior corner for articulation with the heads of the ribs	Large and kidney shaped No costal facets
Vertebral foramen	Large and triangular to accommodate the cervical enlargement of the spinal cord	Small and circular	Large and triangular to accommodate the lumbar enlargement of the spinal cord
Spinous process	Short, bifid, and inclined inferiorly	Long and inclined inferiorly Thoracic spines overlap in a shingle-like pattern	Short, flat, quadrangular, and projecting posteriorly
Transverse process	Possesses a foramen transversarium for passage of the vertebral artery and veins Note: vertebral artery passes through transverse processes of C1–6 but not C7 No costal facet	No foramen transversarium Possesses a costal facet for articulation with the tubercle of a rib Note: T11 and 12 do not have costal facets	No foramen transversarium No costal facet
Articular processes	Relatively flat facets Facets on superior articular processes face superiorly and posteriorly Facets on inferior processes face inferiorly and anteriorly	Relatively flat facets Facets on superior articular processes face posteriorly and laterally Facets on inferior processes face anteriorly and medially Note: facets on the inferior processes of T12 face laterally, in typical lumbar fashion	Curved facets Facets on superior articular processes are concave and face medially Facets on inferior processes are convex and face laterally
Interlaminar space	Small	Small	Short laminae in the vertical dimension produce large interlaminar spaces

Structure and functions of vertebral column

The sacrum (figure.10)

consists of five rudimentary vertebrae fused together to form a wedge-shaped bone, which is concave anteriorly. The upper border, or **base**, of the bone articulates with the fifth lumbar vertebra.

The narrow inferior border, or **apex**, articulates with the coccyx. Laterally, the sacrum articulates with the two iliac bones to form the **sacroiliac joints**.

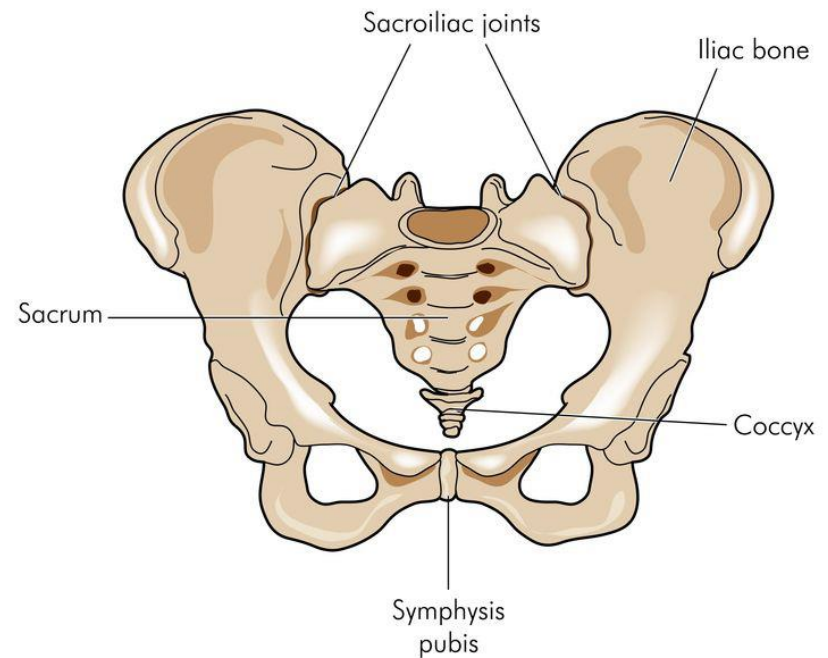


Figure.10

Vertebral Column Joints

In general, the individual vertebrae from levels C2 to L5 articulate with each other by means of cartilaginous joints **between their bodies** and by synovial joints between their **articular processes** (figure. 11) . Vertebra C1 (the atlas) articulates with the base of the skull at the **atlanto-occipital** joints and with vertebra C2 (the axis) at the **atlantoaxial** joints.

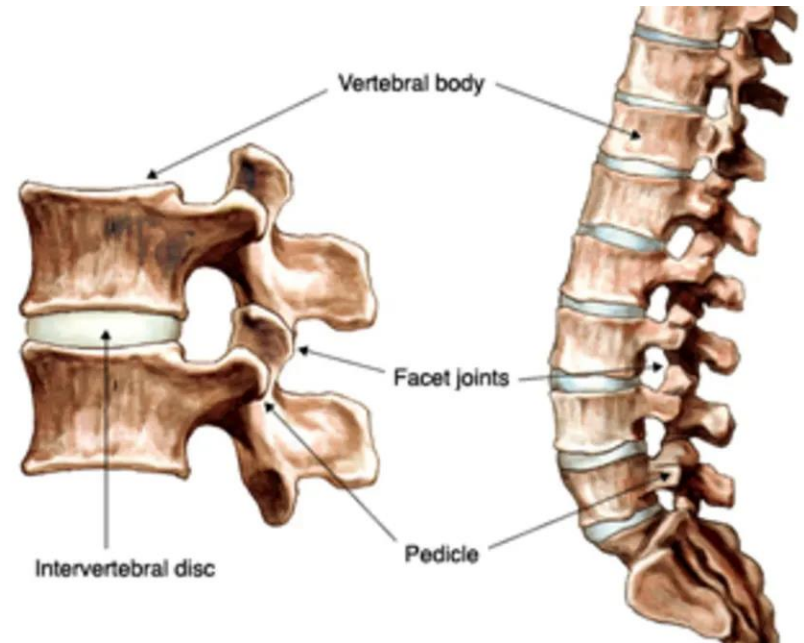


Figure.11

Structure and functions of vertebral column

Intervertebral Discs

Intervertebral discs are present from vertebra C2 to the sacrum and are the main structures that bind together the vertebral bodies. Because vertebra C1 has no body, intervertebral discs do not occur between C1 and the base of the skull and between vertebrae C1 and 2. The adult sacrum and coccyx also lack intervertebral discs.

