

Anatomy, head and neck lecture 4

Cervical vertebrae

Talib Jawad
2023-
march



The vertebral column

**comprises 24
separate (presacral)
vertebrae and two
composite
vertebrae, the
sacrum and coccyx**

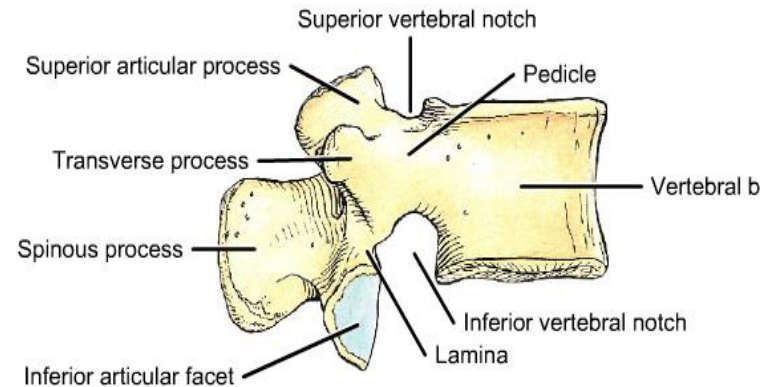
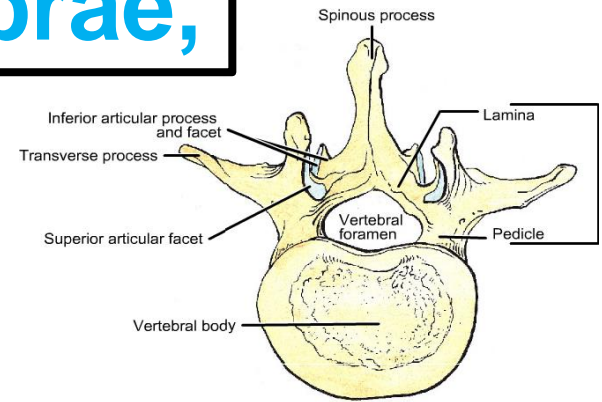
the 24 separate vertebrae,

-12 support ribs
(thoracic),

-7 are in the neck
(cervical)

-5 are in the lumbar
region

(lumbar);



Cervical vertebra

_ The cervical spine (vertebra) consists of **seven** vertebrae, which are the smallest and uppermost in location within the spinal column.

_ Together, the vertebrae support the skull, **move the spine** and **protect the spinal cord** (*a bundle of nerves connected to the brain*).



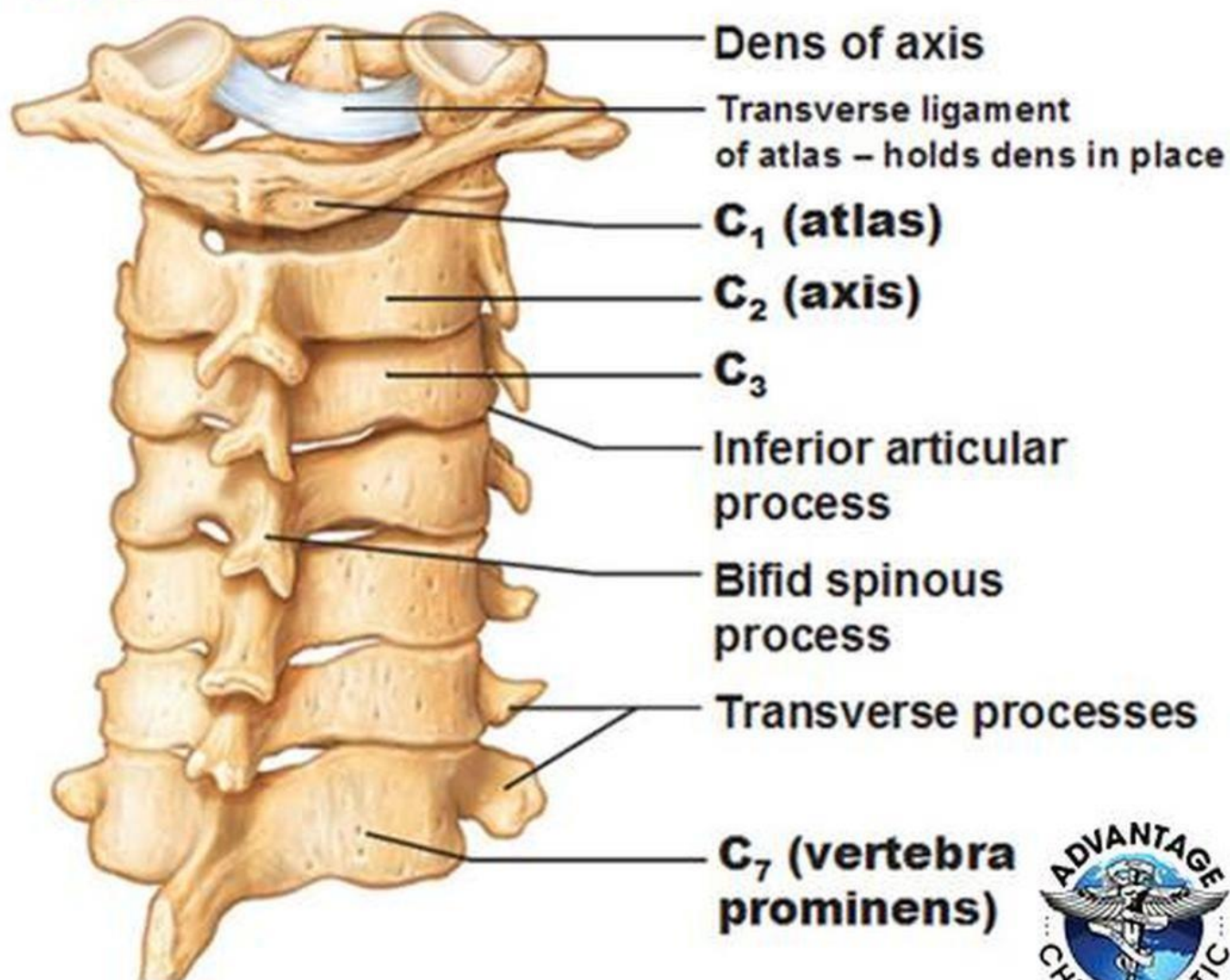
Cervical Vertebrae

Definition

The cervical vertebrae are the bones within the neck, that make up the backbone of vertebrate and are the smallest in the body. **The bones are identified as C1 through C7, and they increase in size as you move down the body.**

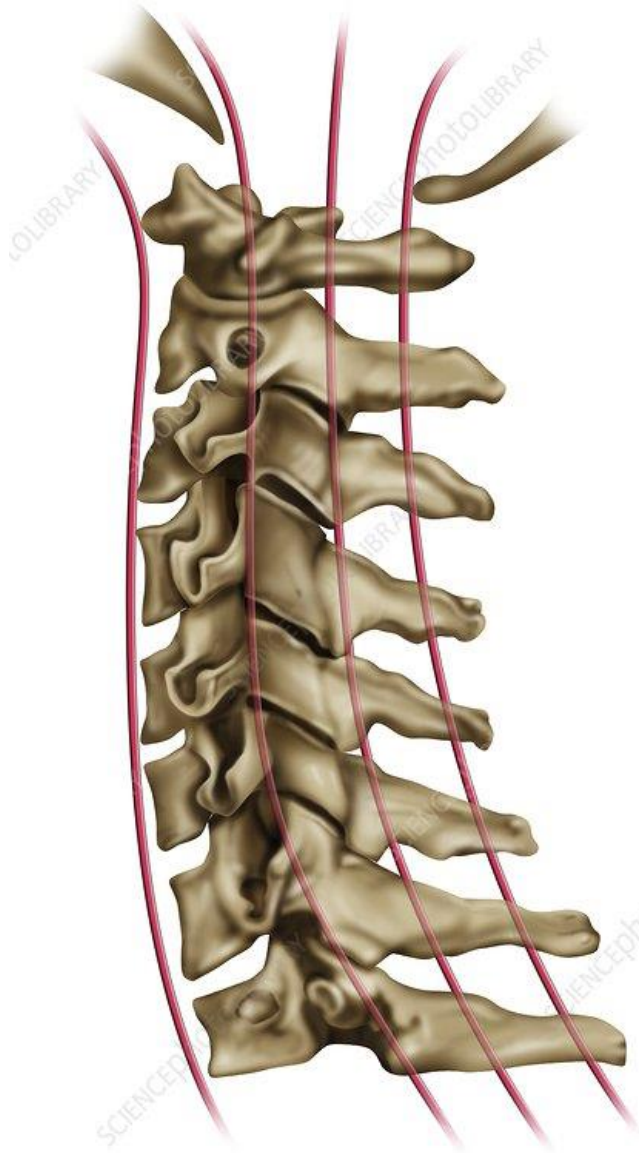


Cervical Vertebrae



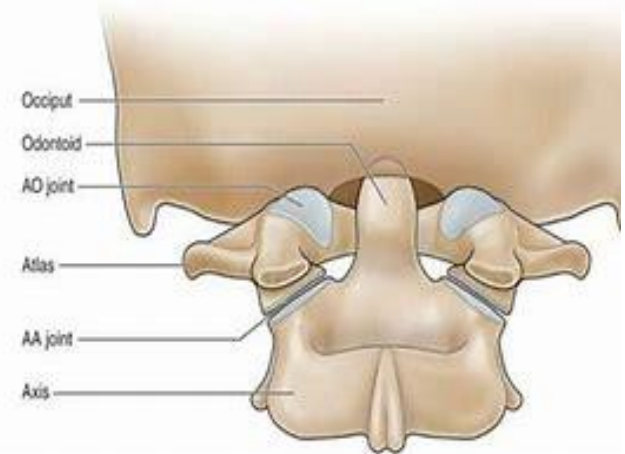
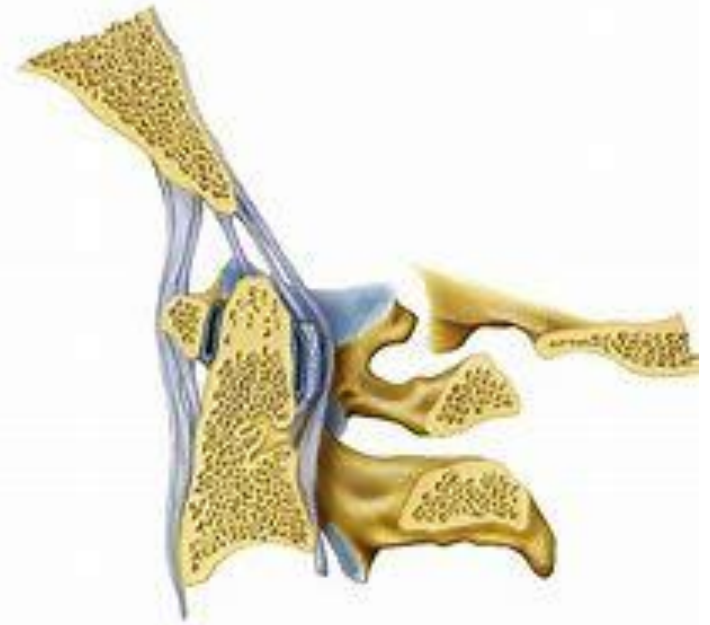
Cervical Vertebrae Function

The cervical vertebrae are responsible for **movements of the head and neck**. They are relatively mobile and allow **flexion and extension of the joints between the vertebrae**, which helps to produce movement.

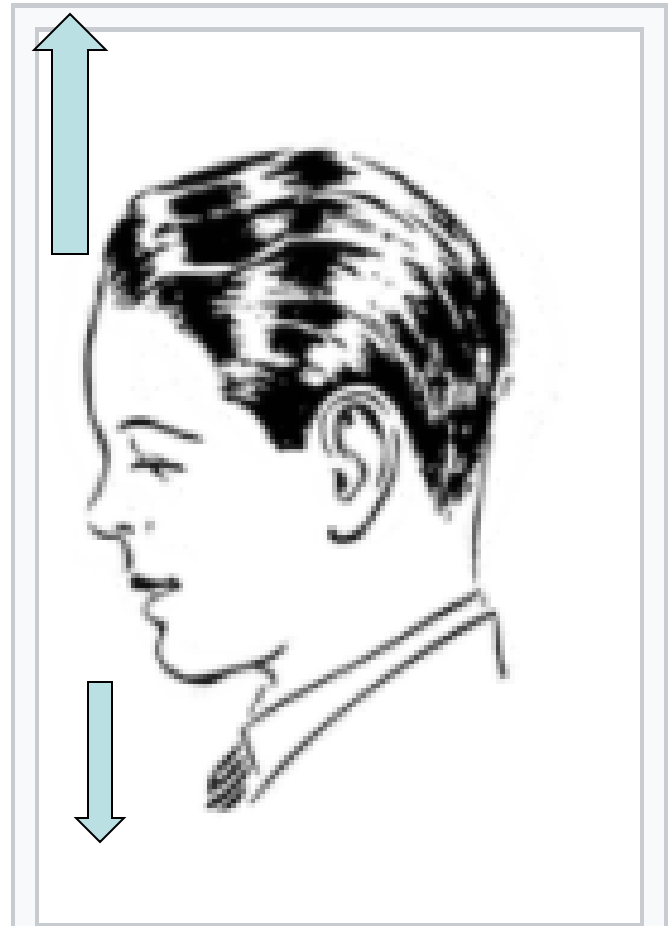


The atlanto-occipital joint • has also been dubbed the “yes” joint because the joint allows you to **nod your head**. The atlanto-axial joint is the “no” joint, allowing you to shake your head.

The rest of the cervical vertebrae contribute to this movement through rotation, flexion, and extension. •

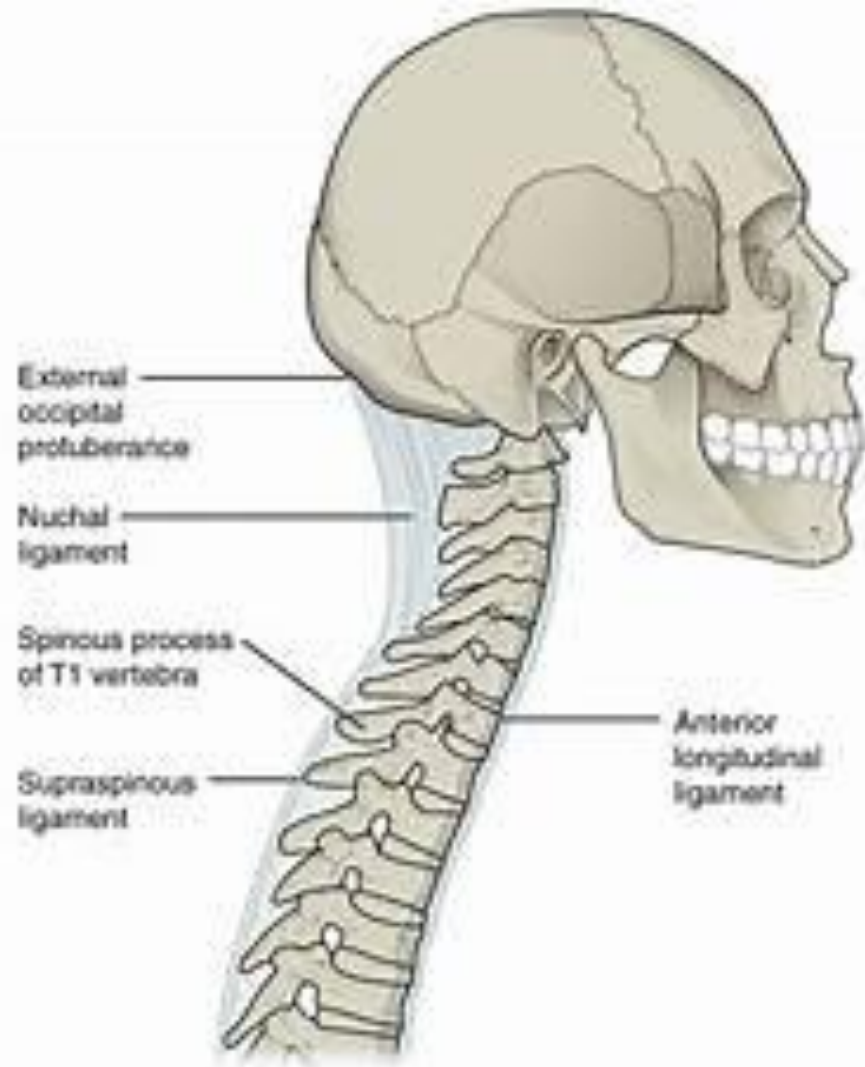


A **nod** of the **head** is a gesture in which the **head** is tilted in alternating up and down arcs along the sagittal plane. In many cultures, it is most commonly, but not universally, used to indicate agreement, acceptance, or acknowledgement.



A depiction of a man nodding

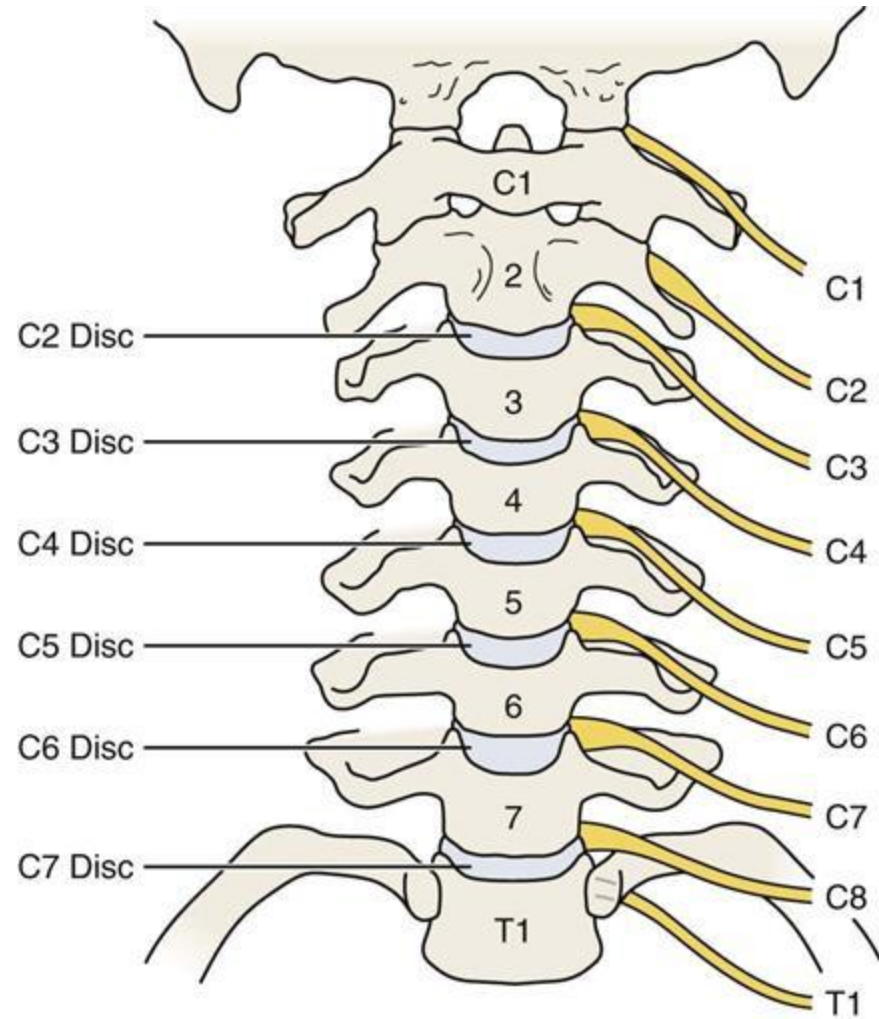
The **spinous process** of each vertebrae is short, which means that some muscles attach to the nuchal ligament rather than the spinous process itself.



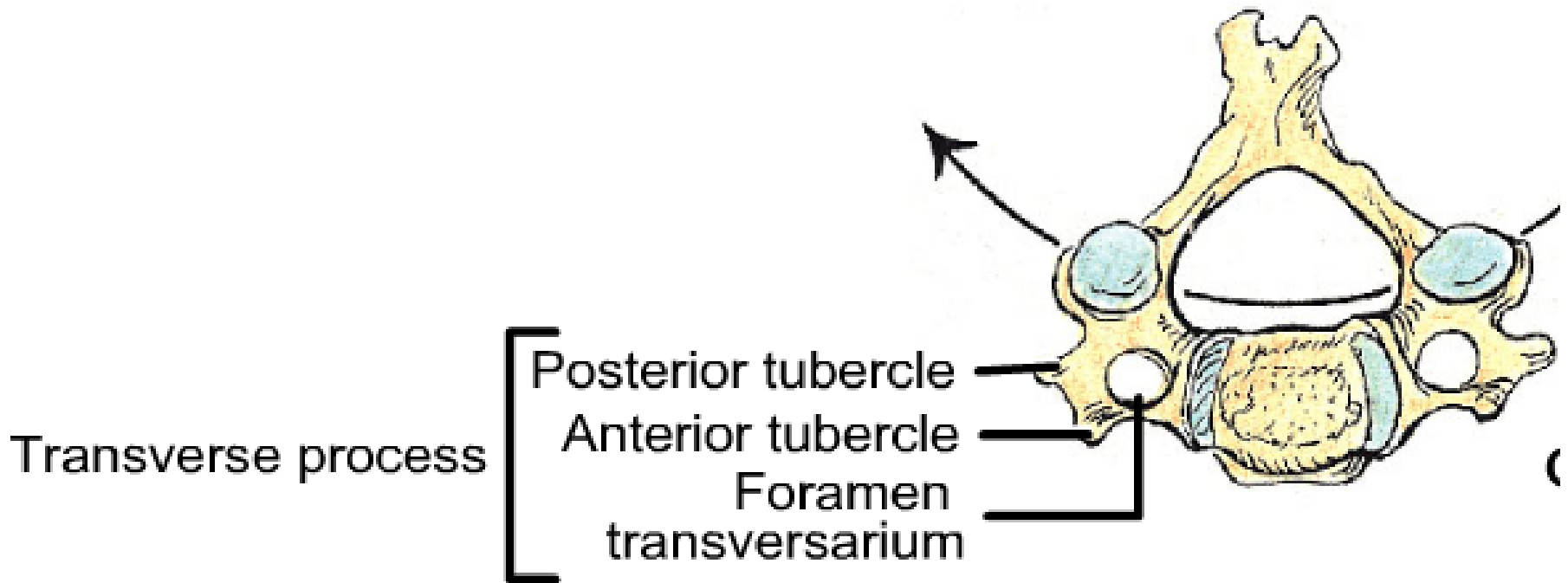
This spinous process is a normal attachment point for muscles throughout the remaining vertebrae. The articular processes are fused to form **اعمدة** articular pillars.

The cranial spinal nerves pass above the corresponding cervical vertebrae, meaning cranial nerve 5 passes above C5.

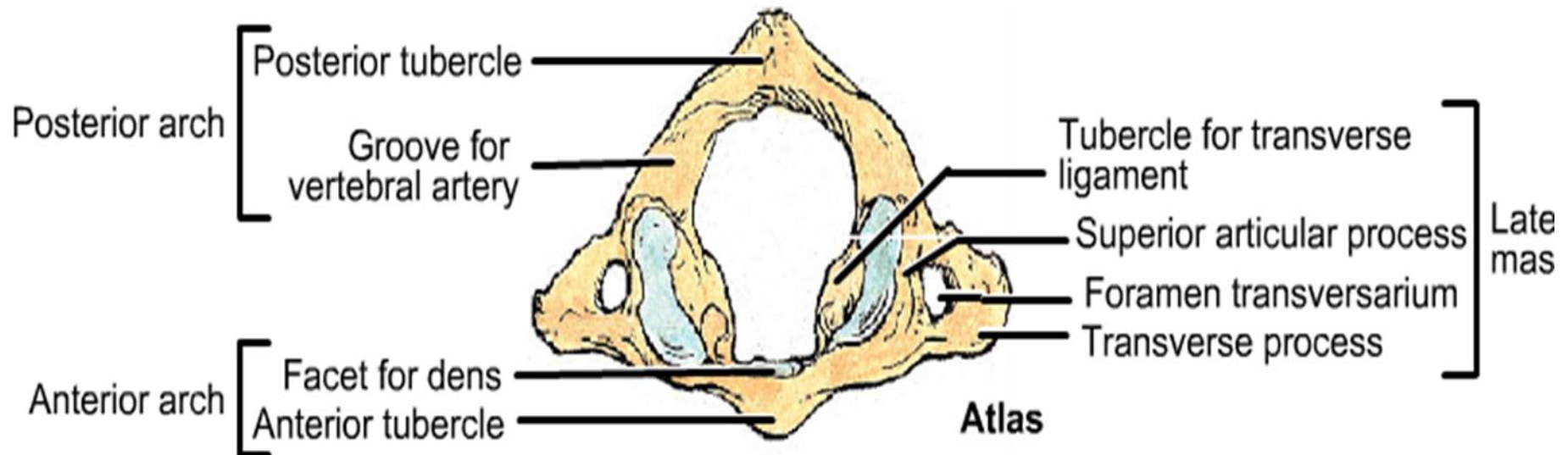
تمر الأعصاب الشوكية القحفية فوق الفقرات العنقية المرادفة بالعدد لها مما يعني أن العصب القحفي 5 يمر فوق C5.



.The transverse processes are short, perforated, and end laterally in **anterior** and **posterior tubercles** with a **gutter** between them;



The C1 vertebra is also known as the **atlas**. It sits at the base of the skull and forms the **atlanto-occipital joint**. The next vertebra, C2, is known as the axis, and it forms the **atlanto-axial joint**. These are important for the movement of the head and neck, including the action of **nodding**.



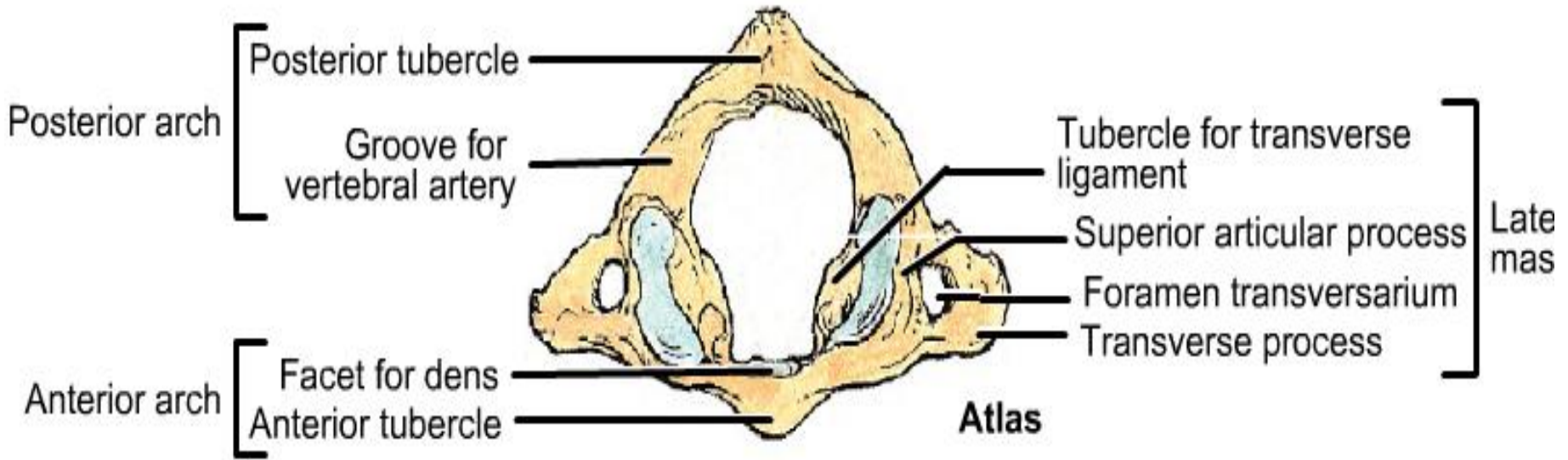
Cervical vertebrae :

Atypical v. (c1+c2+C7)

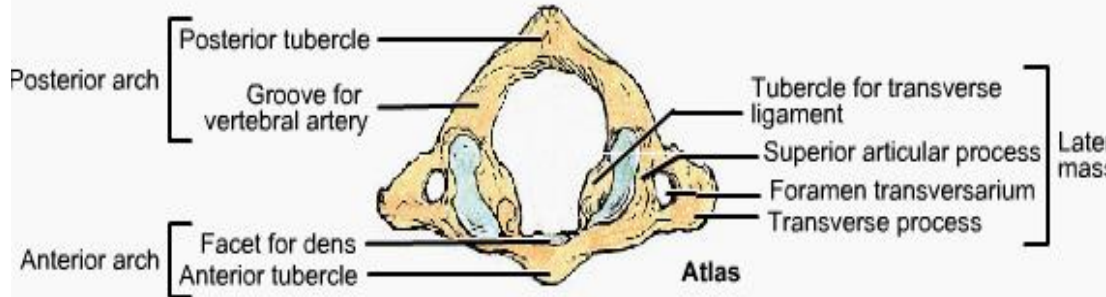
C1: -no body (**Dens: process from C2**)

-2 lateral masses

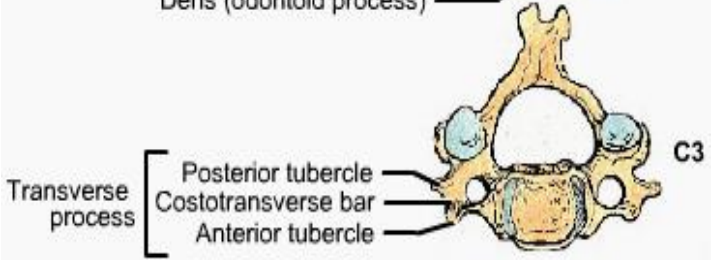
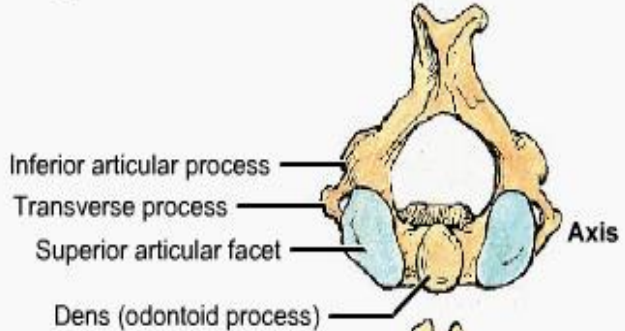
-2 anterior and posterior arch (**laminae and pedicles**)

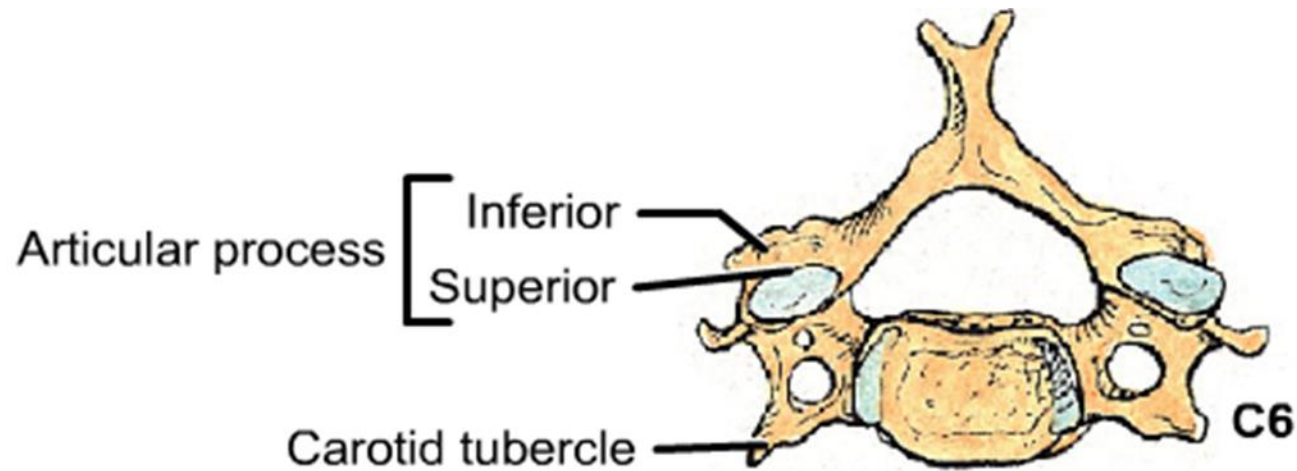


C3 through C6 are "typical" cervical vertebrae, and C1, C2, and C7 are "atypical";



Typical vertebrae,
Body :- @transversely elongated,
@lateral lips (upturned side arms)
@facets articulate with the vertebrae above .





The vertebrae **C3 through C6** have a more regular shape. They have small bodies, with pedicles that extend backwards and laterally. These vertebrae have large vertebral foramen in the transverse processes, which the vertebral artery, veins, and inferior cervical ganglion pass through.



C7 is also known as the vertebra prominens. It has a **longer spinous process** than most of the other vertebrae, which is largely **horizontal in its orientation**. It also contains a sulcus for spinal nerve 8 to run along.

The transverse processes are large, but the transverse foramen tends to be smaller than in the other cervical vertebrae or absent.

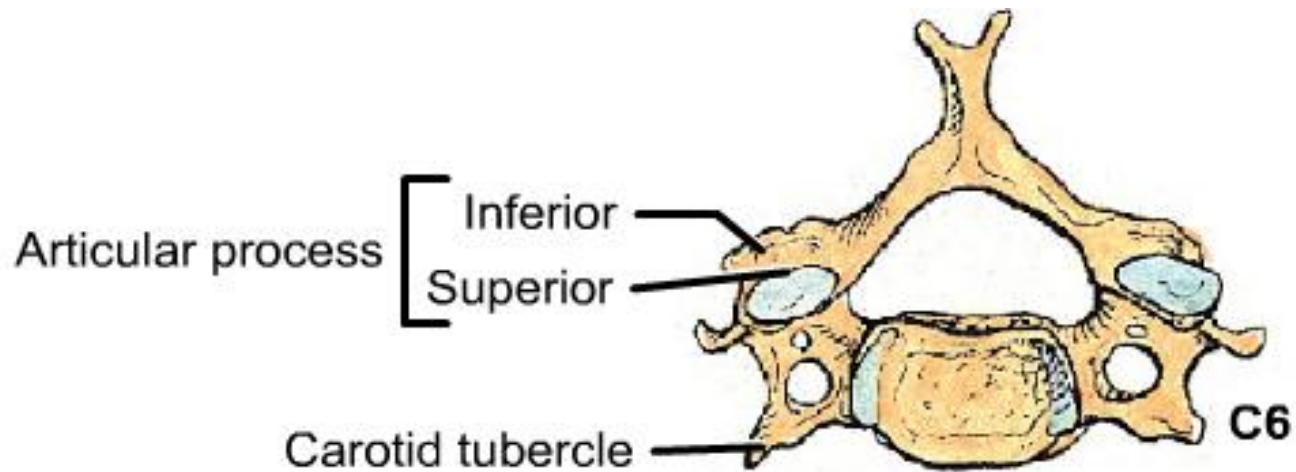
C3 Spinal Vertebra Defined •

The C2 - C3 junction of the spinal column is • important, as this is where **flexion and extension occur** (flexion is the movement of the chin toward the chest and extension is the backward movement of the head). **Patients with a cervical vertebrae injury at the C3 level will have limited mobility in both their flexion and extension.**

Palpable parts of c.v. •

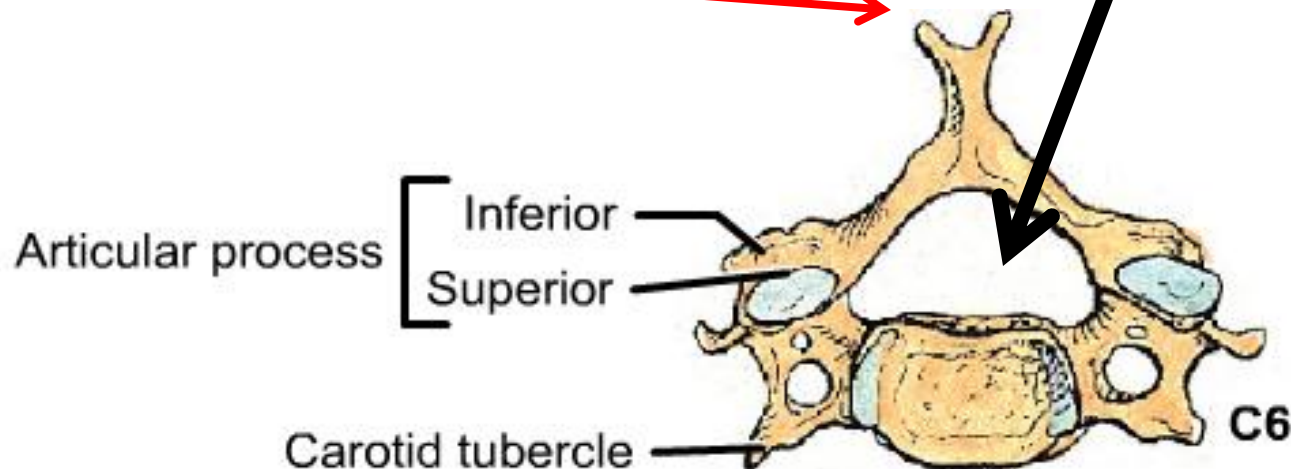
Spine of C2 5 cm below ext.occ. Protuber. •

Spine of C7. (vertebral prominence) •



Typical cervical vertebrae (C3-C6)

- =vertebral bodies transversely elongated,
- =their superior surfaces with lateral lips,
- =vertebral foramina are large & triangular;
- =The superior and inferior vertebral notches are nearly equal in depth;
- =The spinous processes are short and bifid,;



Transvers foramen •

transmit :

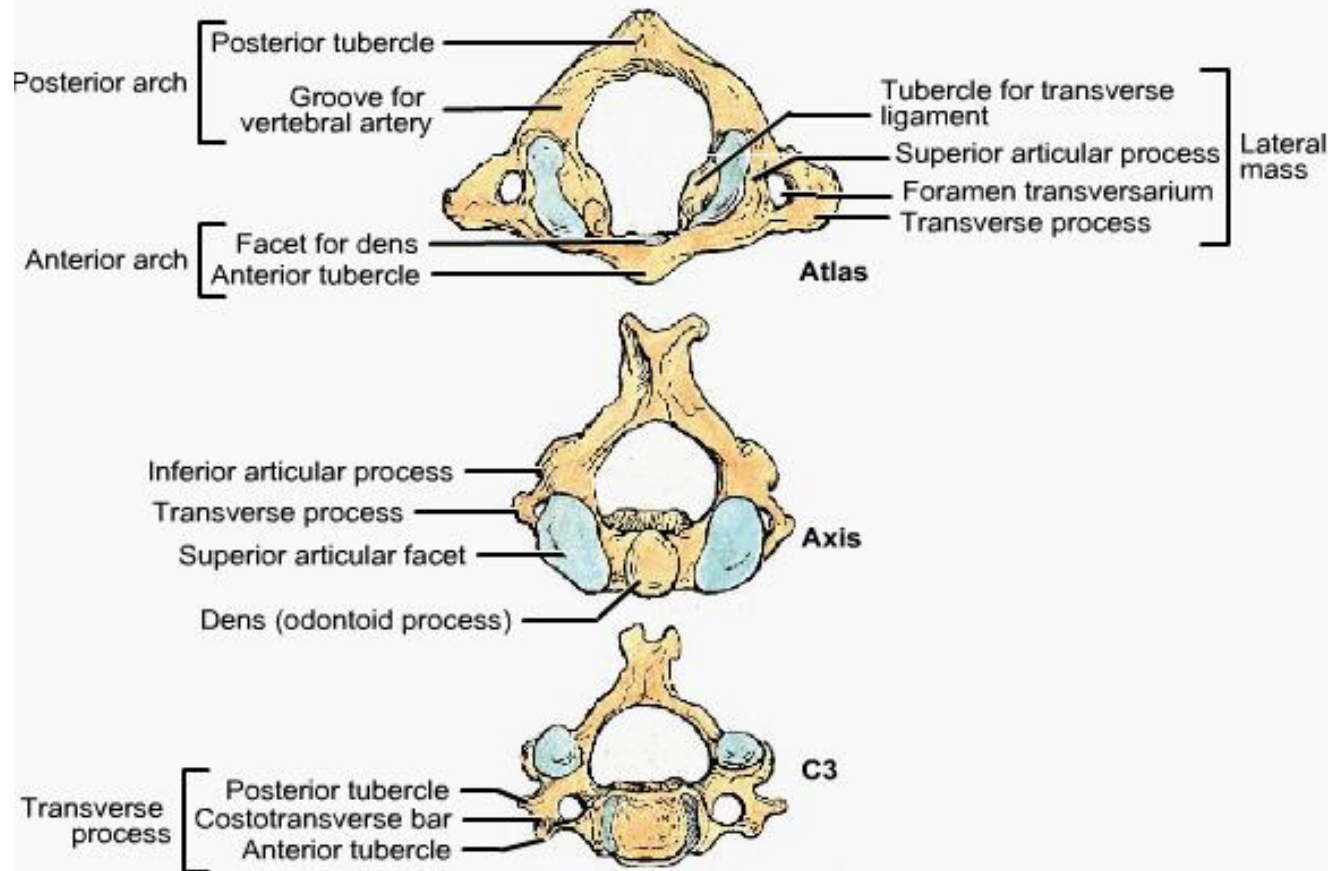
Artery •

Vein •

Sympathetic plexus

Cv7 transmit vein only !!!

those of the **C1 and C7** are long and •
 have one (posterior) tubercle, as does
 the axis, but it is short.



C2

-spin shape replaced by posterior tubercle

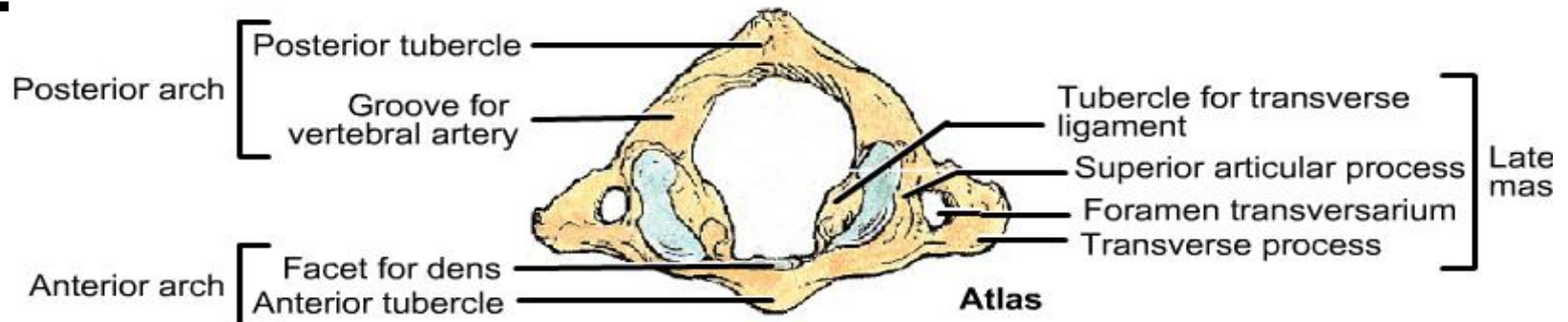
-lateral masses (superior: concave shape like kidney

(inferior : circle in shape)+ and have 2

Medial projections for transvers

ligament

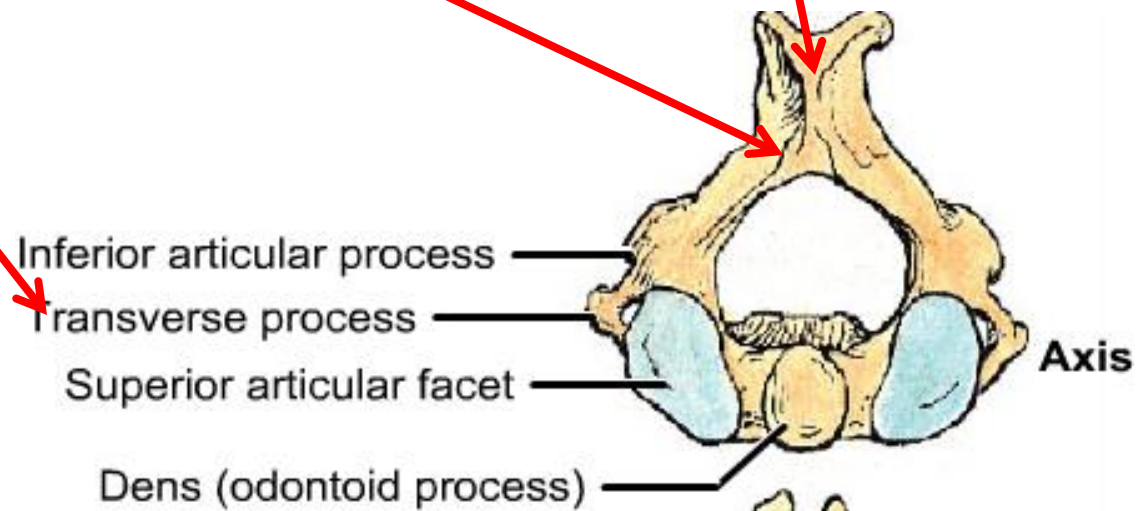
- L



C2: •

Dens: articulate with arch of C1 by transverse l. •

- have superior and inferior articular facets •
- lamina thickened carry massive spine •
- transverse process have no anterior tubercle •
- foramen transversarium 90° under superior proc •
- spine is long non bifid •

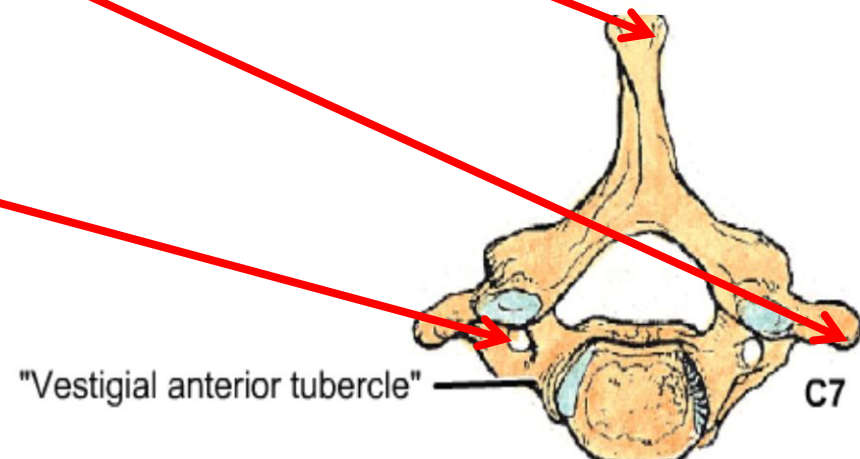


C7;

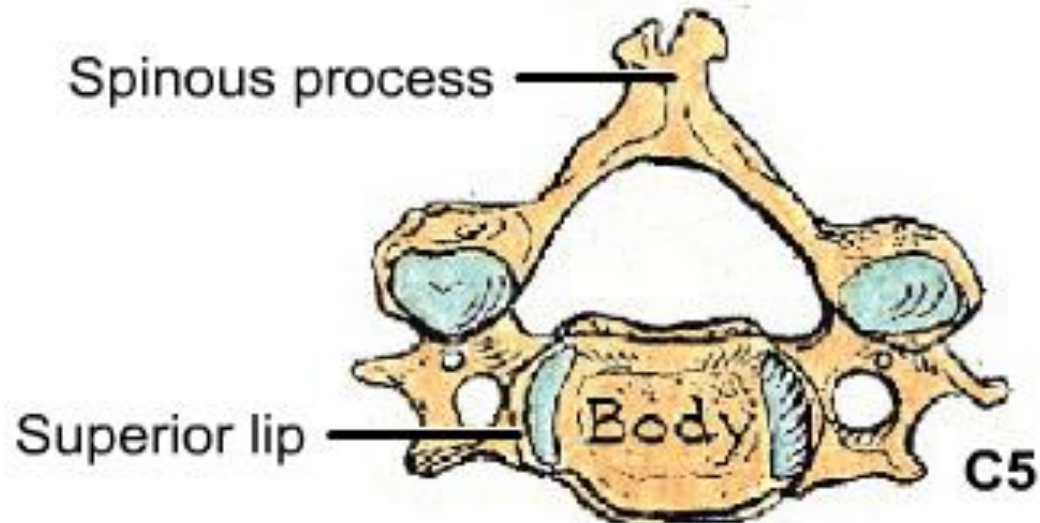
-spin is long(vertebra prominens) un bifid

~~-Transverse process lack anterior tubercle -~~

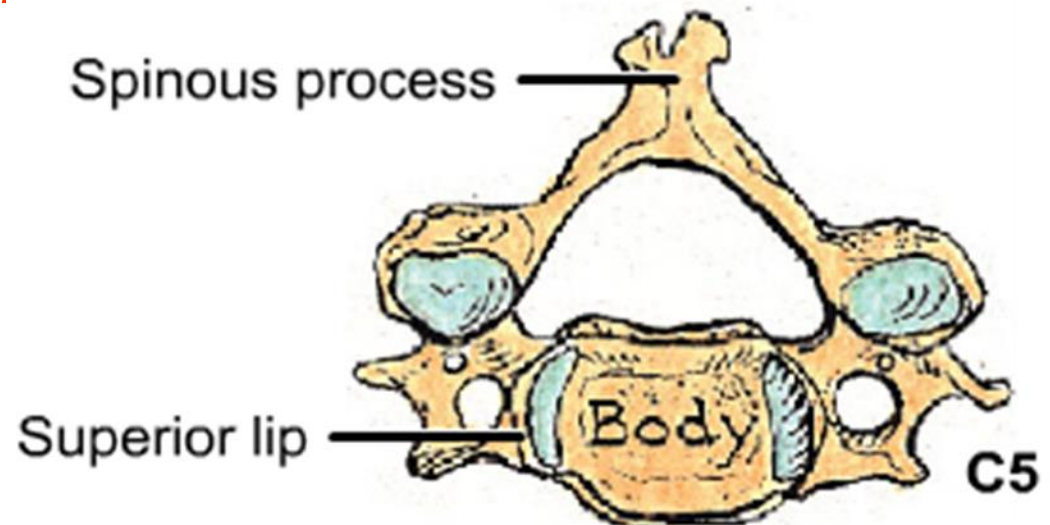
~~-Foramen transversarium transmit vein only~~



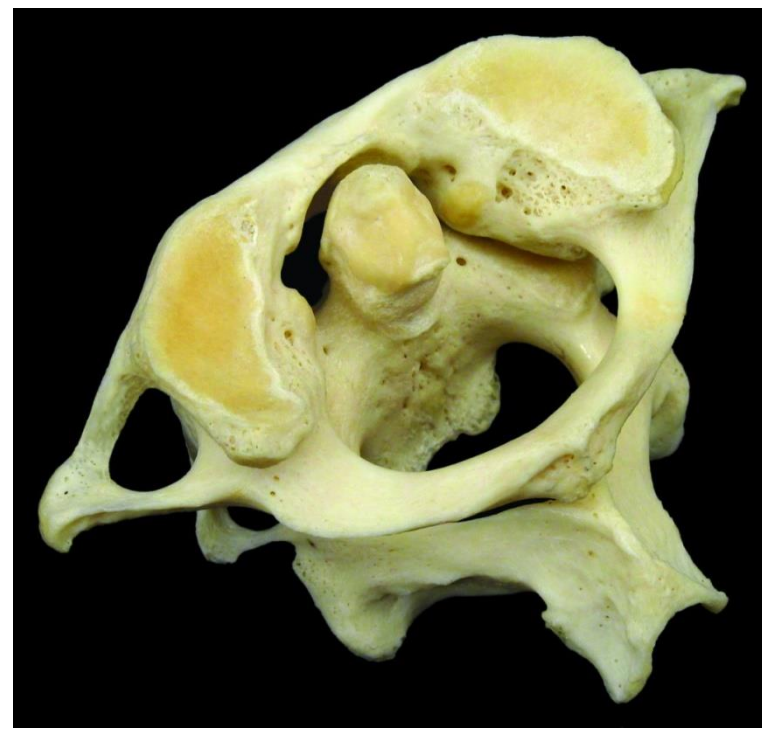
=The transverse processes are short, perforated, and end laterally in anterior and posterior tubercles with a gutter between them; those of the atlas and C7 are long and have one (posterior) tubercle, as does the axis, but it is short.



- **Arthritic expansion of these joints encroach (يتجاوز الالتهاب) on the vertebral canal (spinal cord) and the foramen transversarium (vertebral artery):**



- **. The body of the atlas is missing: it is joined to the axis at the dens; the anterior arch on the atlas lies anterior to the dens and articulates with it;**
- **.4 The vertebral foramina are large and triangular**

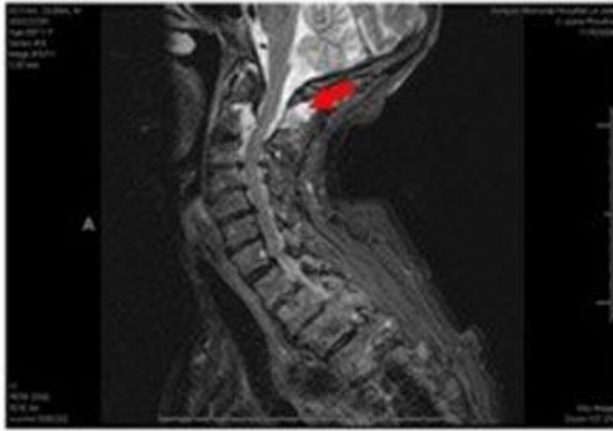


- ***7. The transverse processes are short, perforated, and end laterally in anterior and posterior tubercles with a gutter between them; those of the atlas and C7 are long and have one (posterior) tubercle, as does the axis, but it is short.***

Clinical importance

Injuries to the cervical vertebrae are uncommon but possible, often resulting in significant disabilities. Paralysis can occur, as can death. The most common areas of injury in the cervical spine are C2, C4, and C5, with odontoid fractures being one of the more common injury patterns seen.

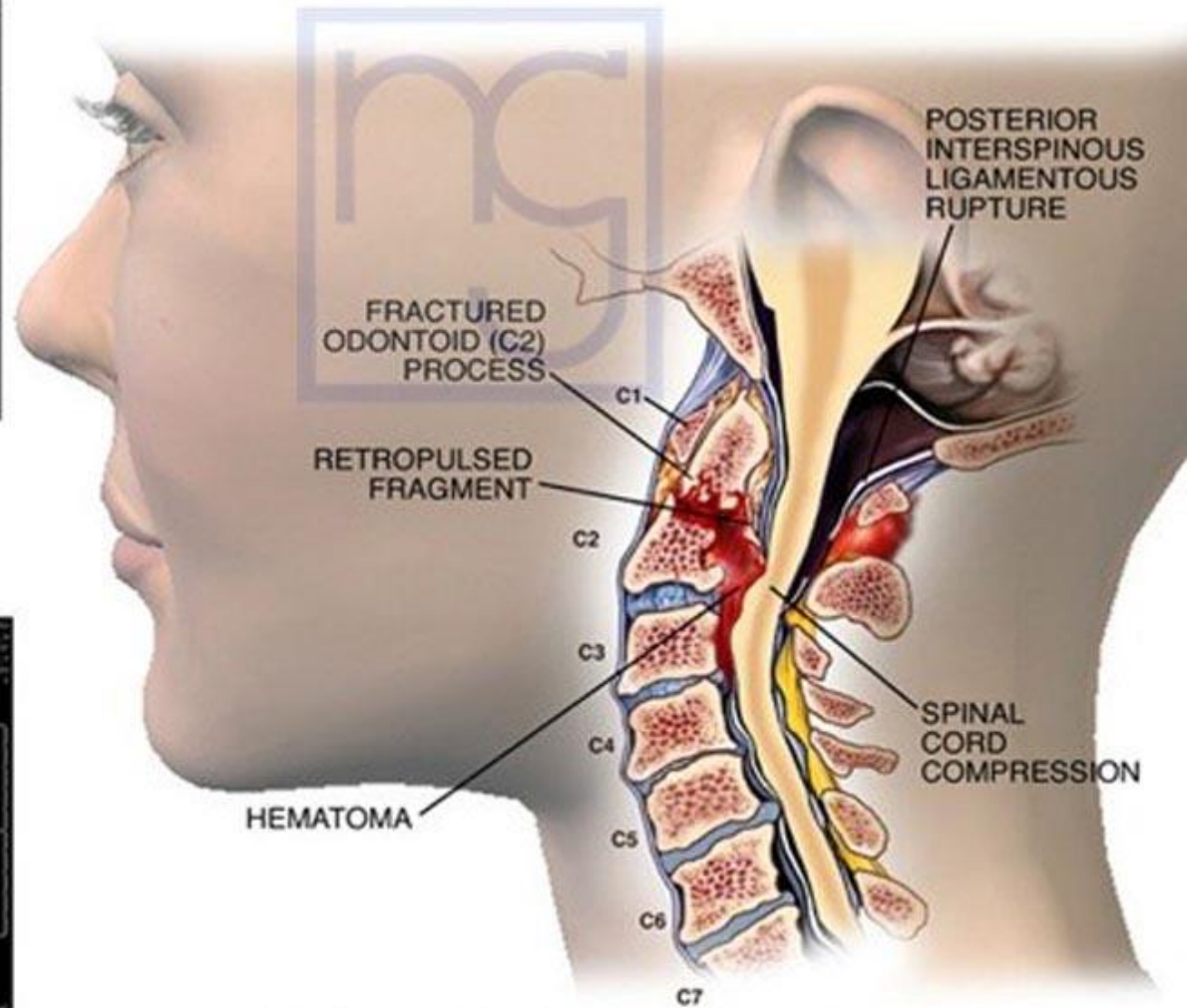
FRACTURED BASE OF ODONTOID TYPE III FRACTURE - CERVICAL SPINE



NOV. 9, 2008 MRI SCAN
ARROW POINTS TO EPIDURAL
HEMATOMA (BLOOD) FROM THE
TIP OF THE ODONTOID PRECESS
TO C4



NOV. 9, 2008 TRAUMA CT SCAN
FRACTURED BASE OF ODONTOID (C2)



FRACTURED BASE OF ODONTOID (C2) WITH
RETROPULSED BONE FRAGMENT / TYPE III
FRACTURE DISPLACED INTO SPINAL CANAL

What Causes Cervical Spinal Cord Injuries? •

The most common causes of cervical vertebrae injury and spinal cord damage include a spinal fracture from driving accidents and sports, as well as medical complications. •

Other common causes include: •

Tumors •

Trauma •

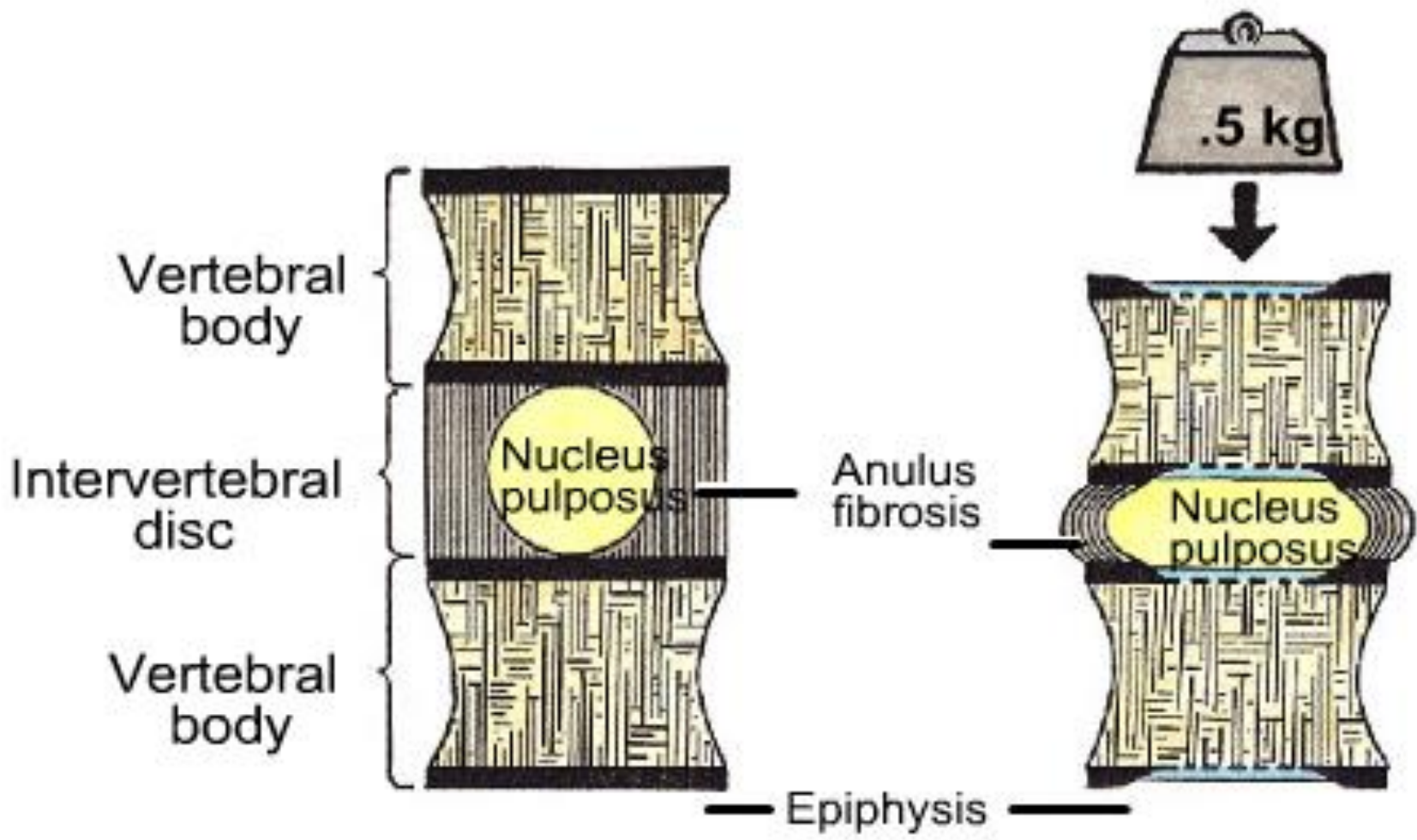
Birth defects •

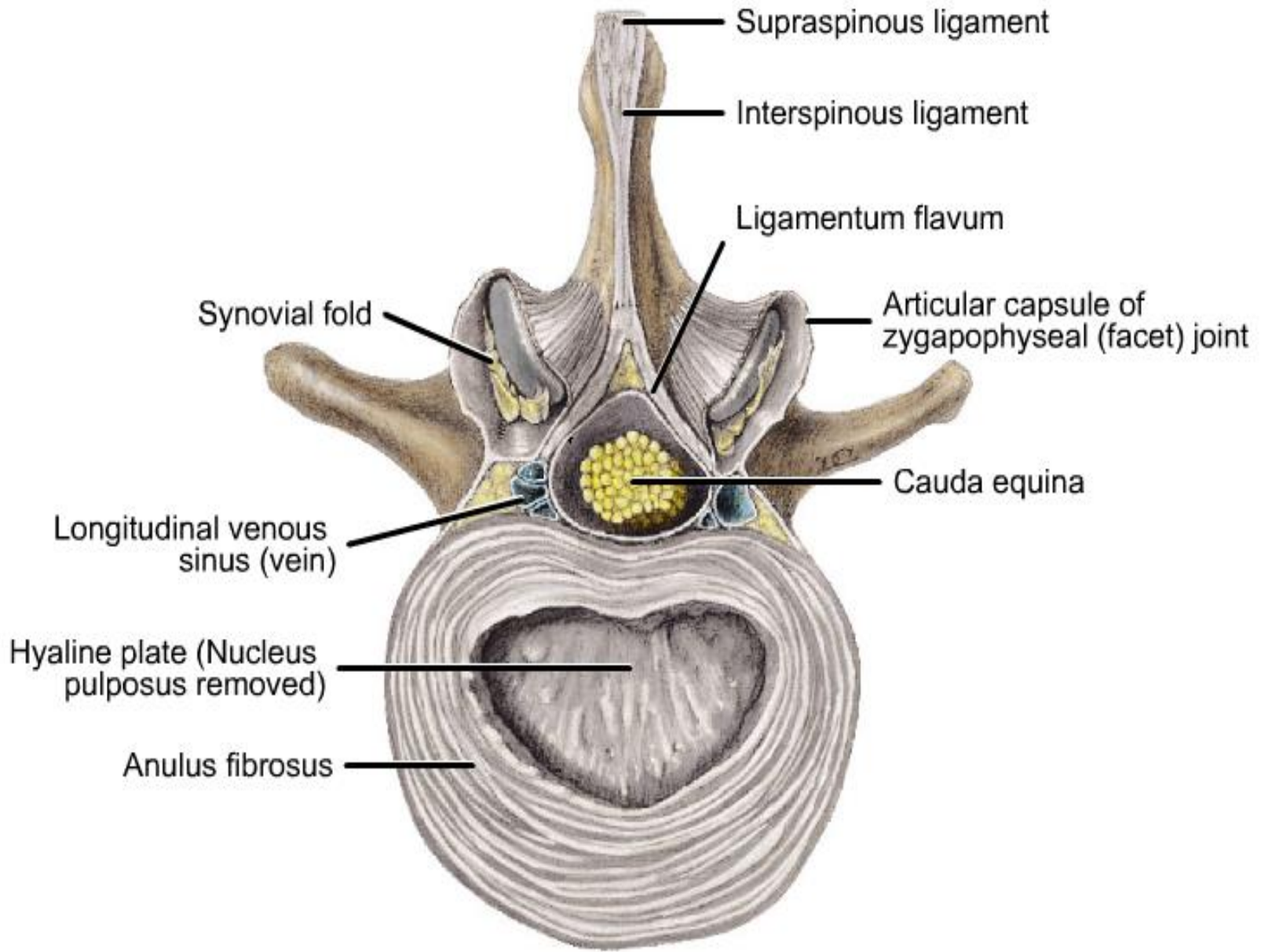
Motor vehicle accidents •

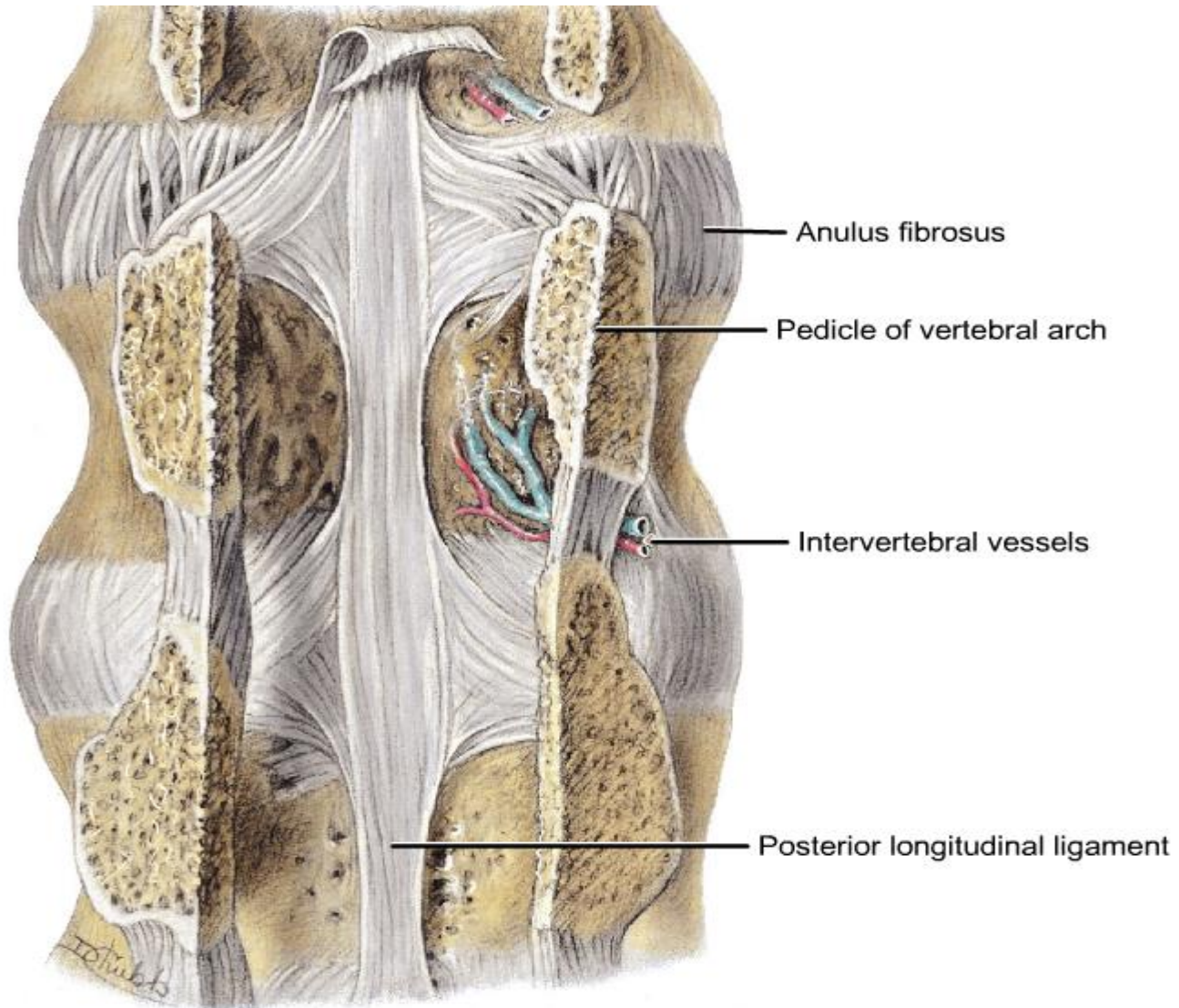
Infections or diseases •

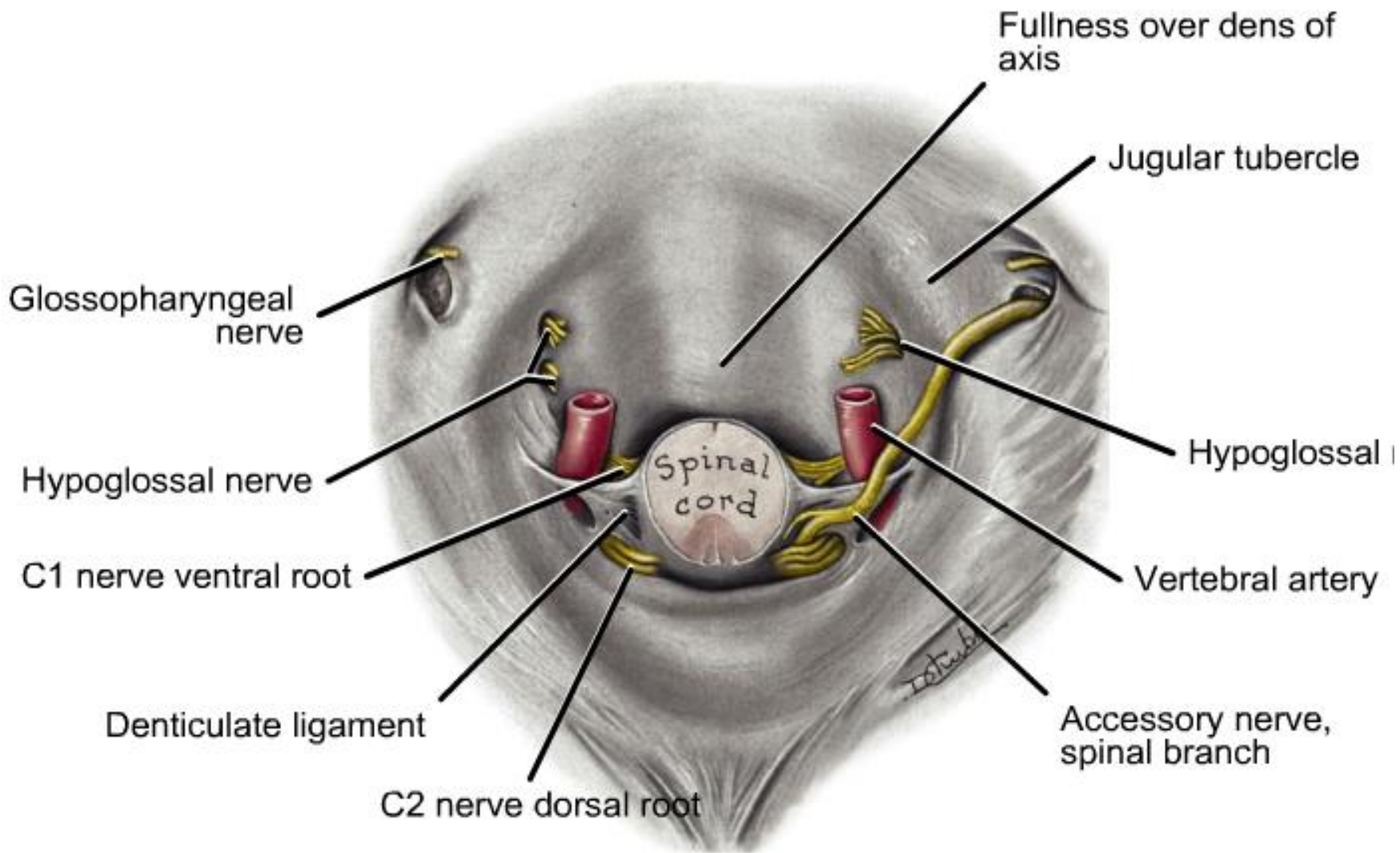
Slip and fall incidents •

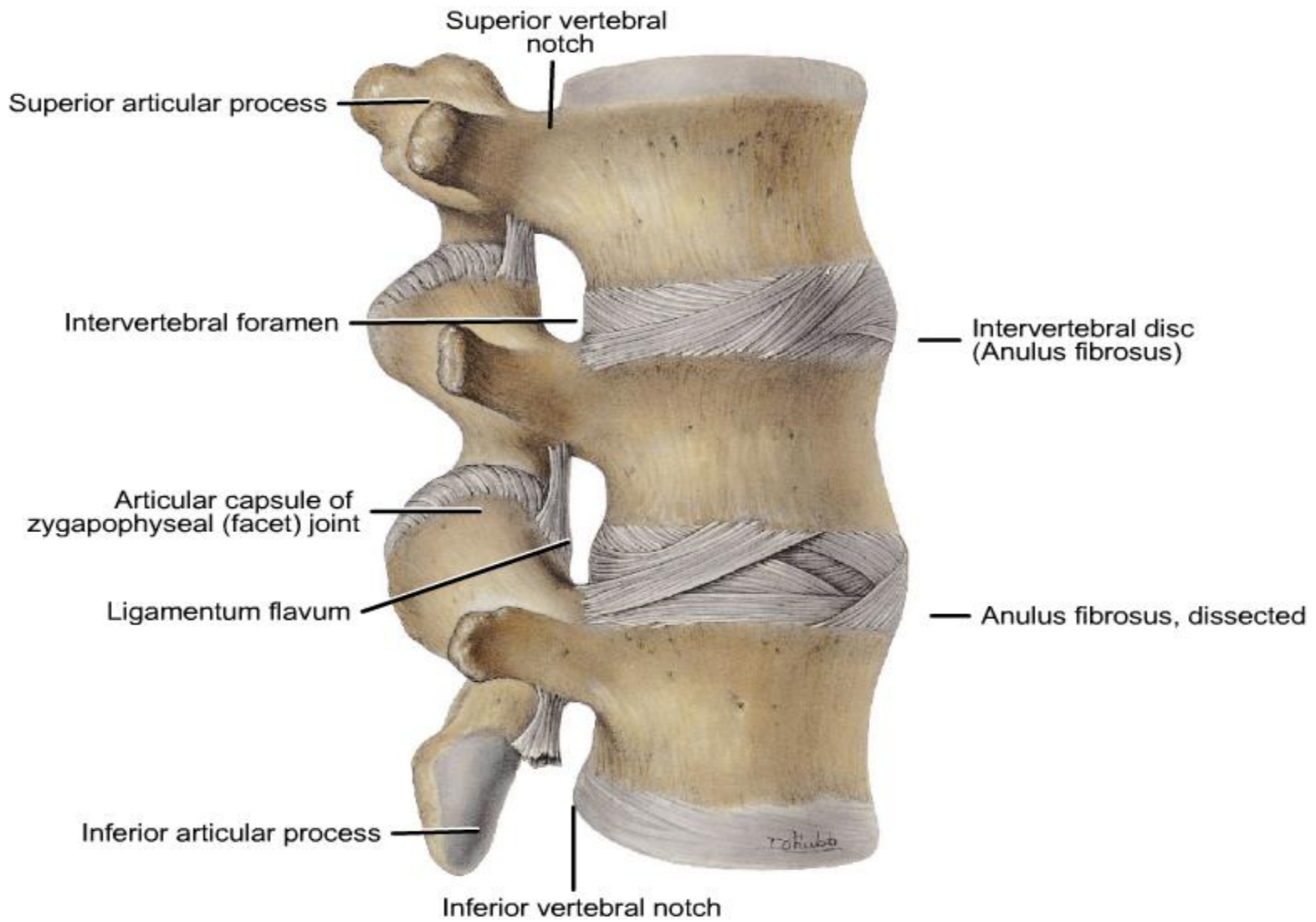
Articulation of neck



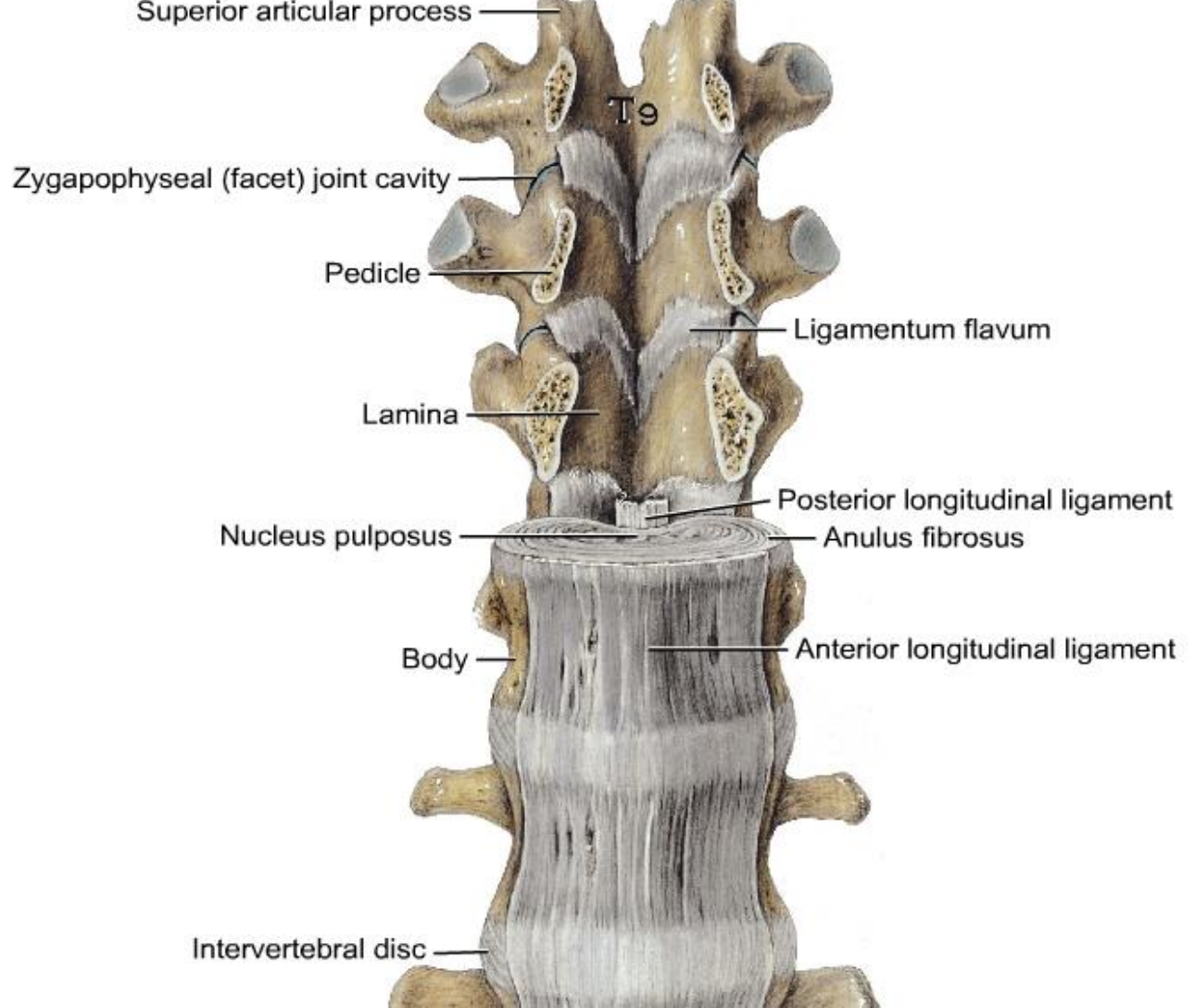






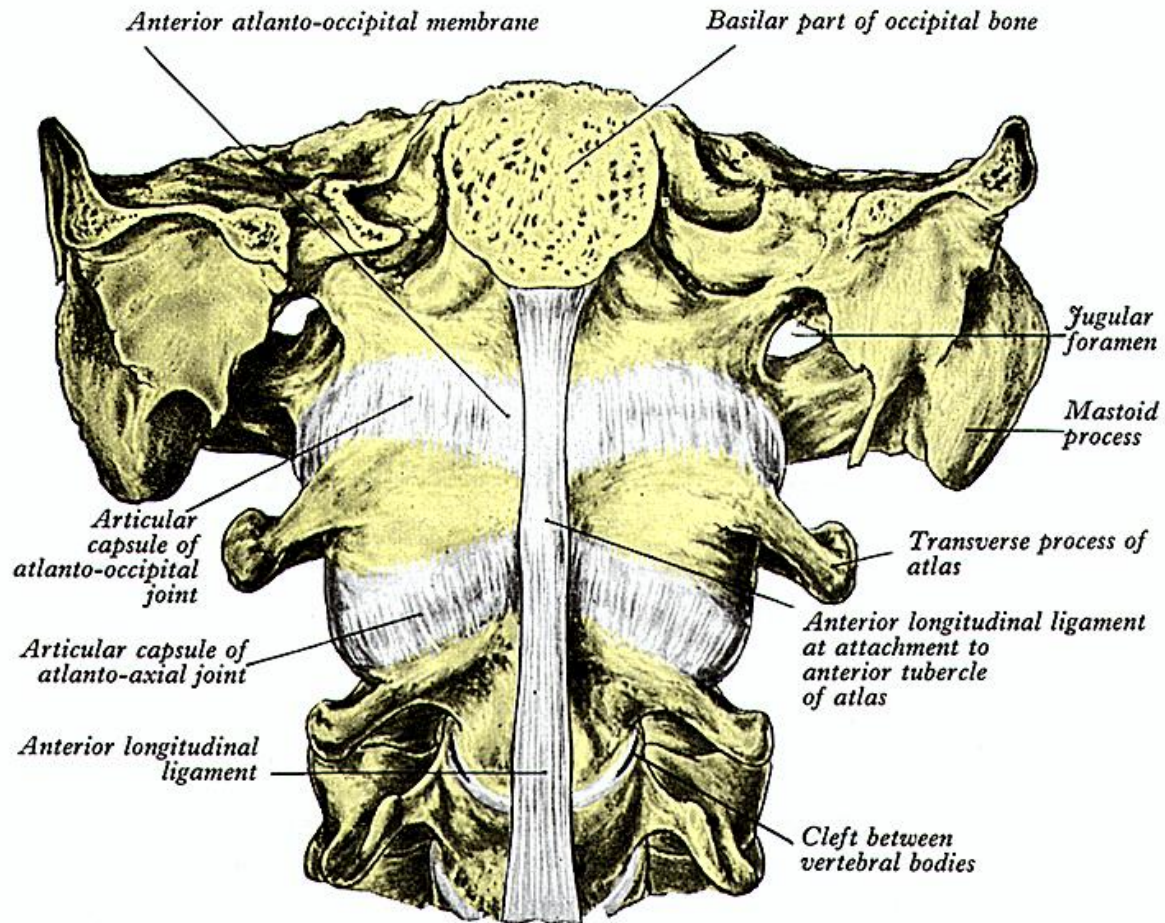


the posterior longitudinal ligament, a taut, but somewhat flimsy, band passing from disc to disc, spans the posterior surfaces of the vertebral bodies and renders smooth the anterior wall of the vertebral canal



Atlanto-Axial Joints

Articulation of atlas to axis is at three synovial joints, a pair between lateral masses, and a median complex between the dens of the axis and the anterior arch and transverse ligament of the atlas.

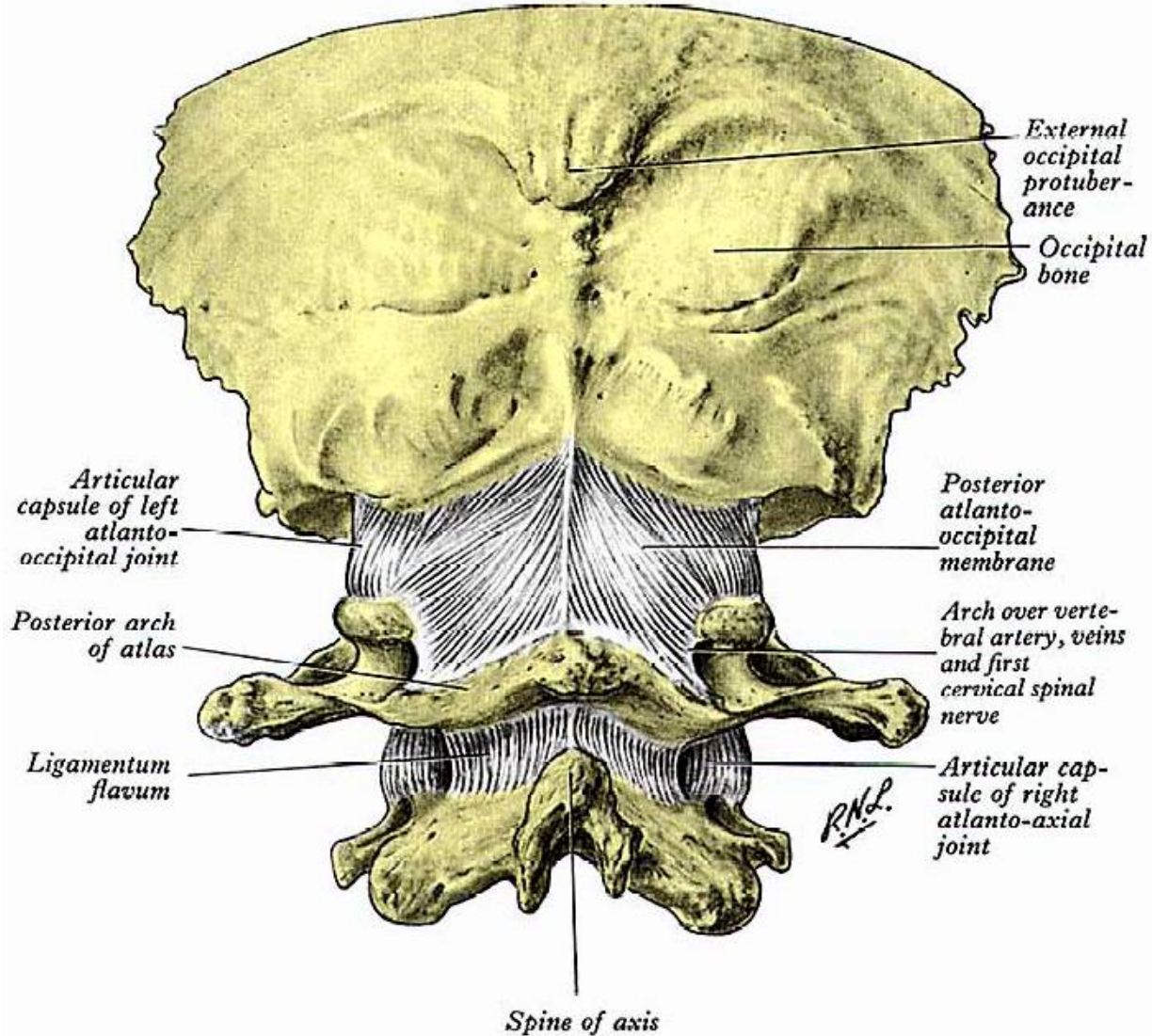


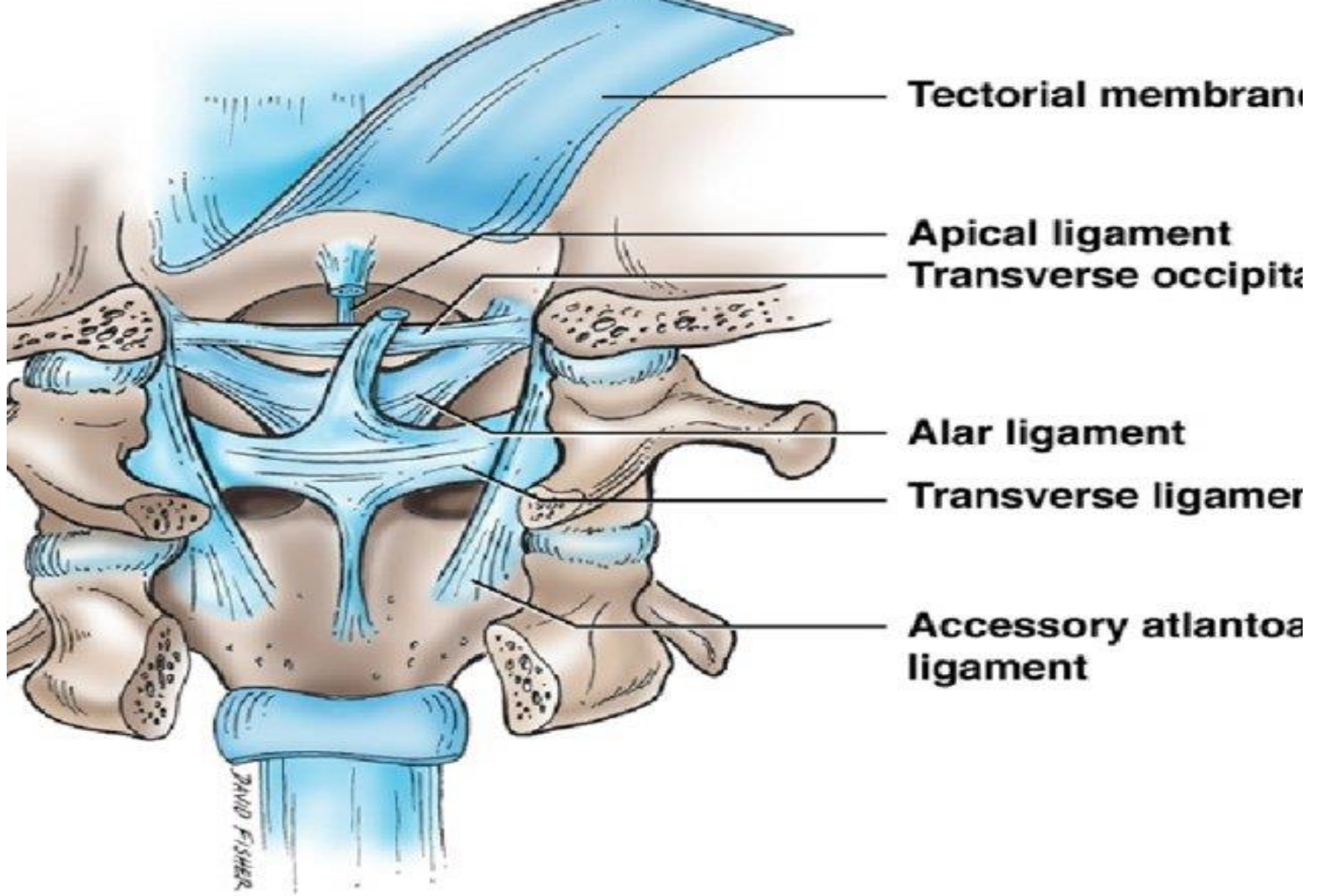
Movements at the Atlanto-Occipital Joints

The main movement is flexion, with a little lateral flexion and

rotation

Atlanto-Occipital Joints Each joint consists of two reciprocally curved articular surfaces, one on the occipital condyle the other on the lateral mass of the atlas; The bones are connected by articular capsules and the **anterior and posterior**



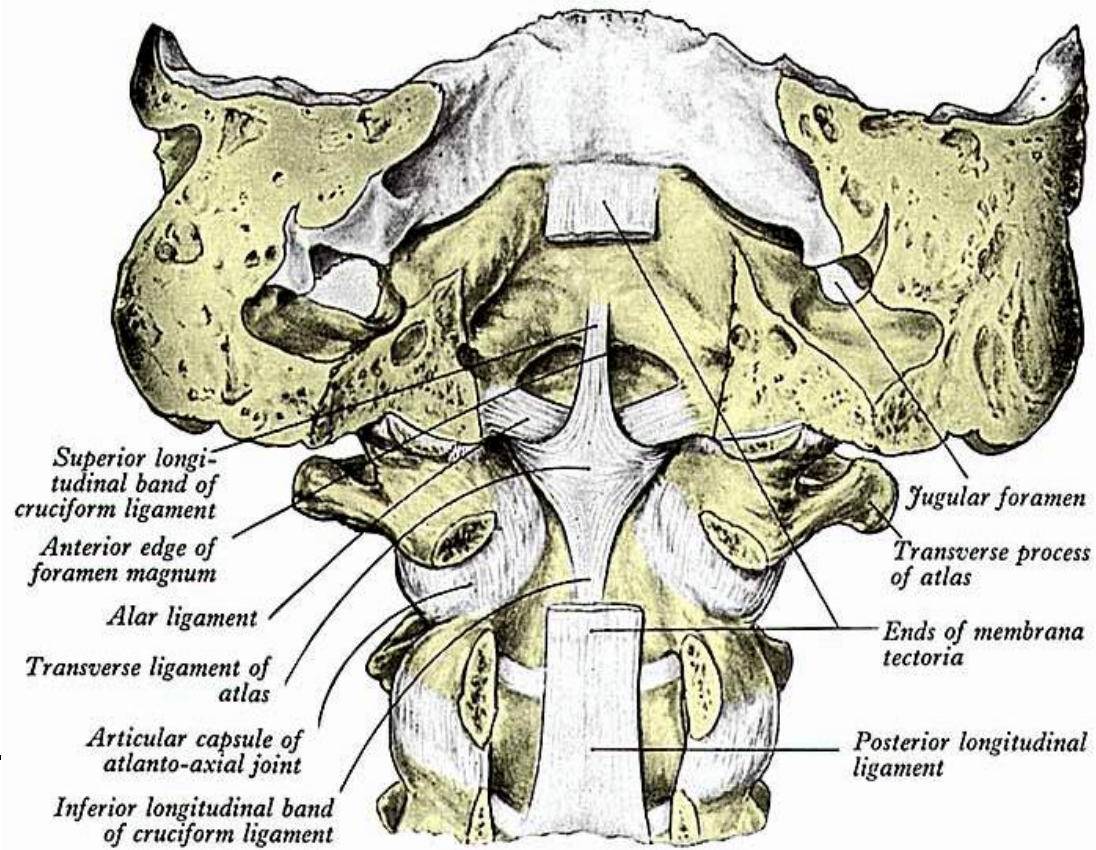


Ligaments Connecting Axis and Occipital Bone

membrana tectoria, and paired alar and median apical ligaments.

Membrana Tectoria : upward continuation of the posterior longitudinal ligament

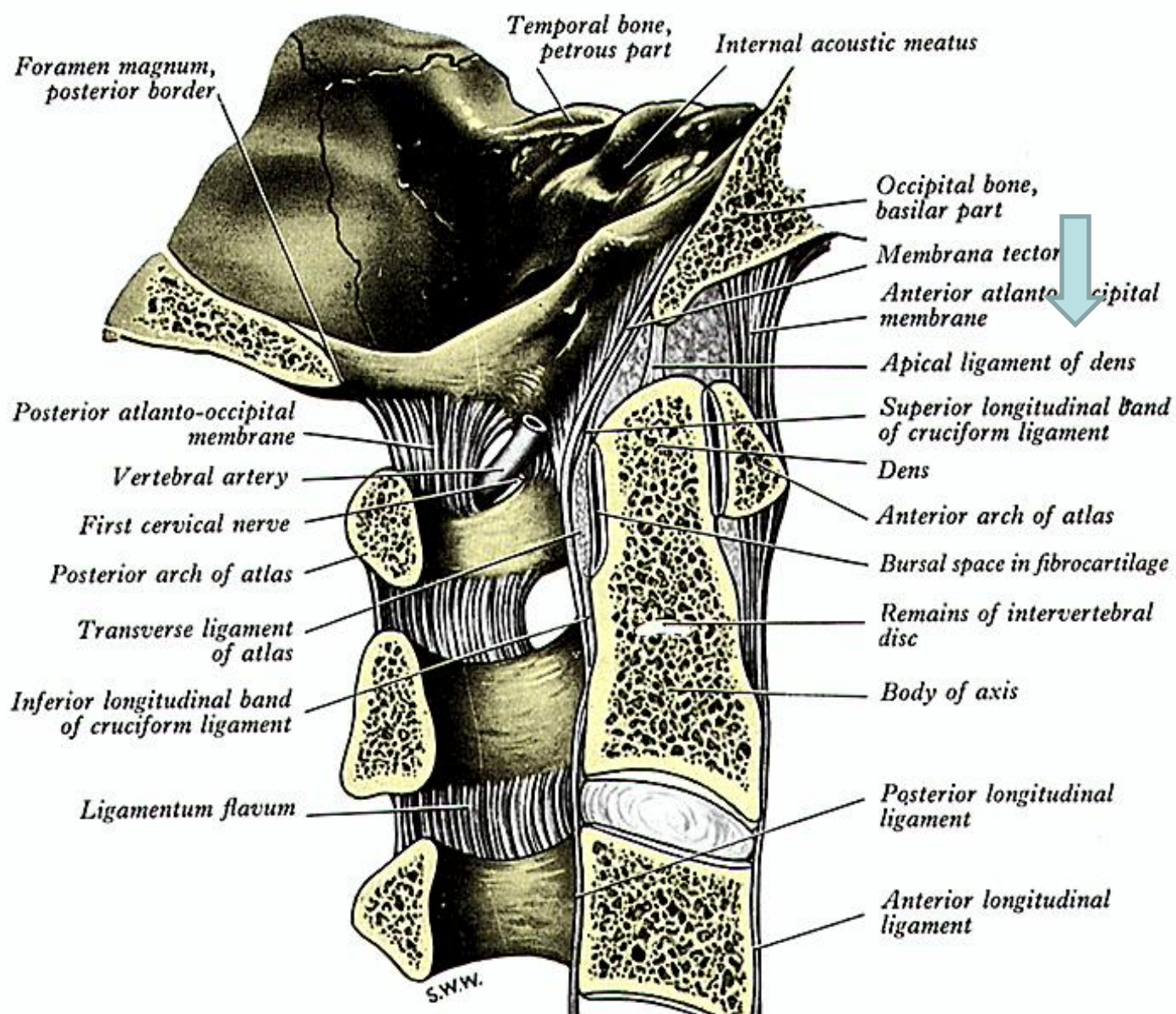
Its superficial deep laminae are both attached to the posterior surface of the axial body,



the superficial lamina expanding as it ascends to the upper surface of the basilar occipital bone, attaching above the foramen magnum, where it blends with the cranial **dura mater**



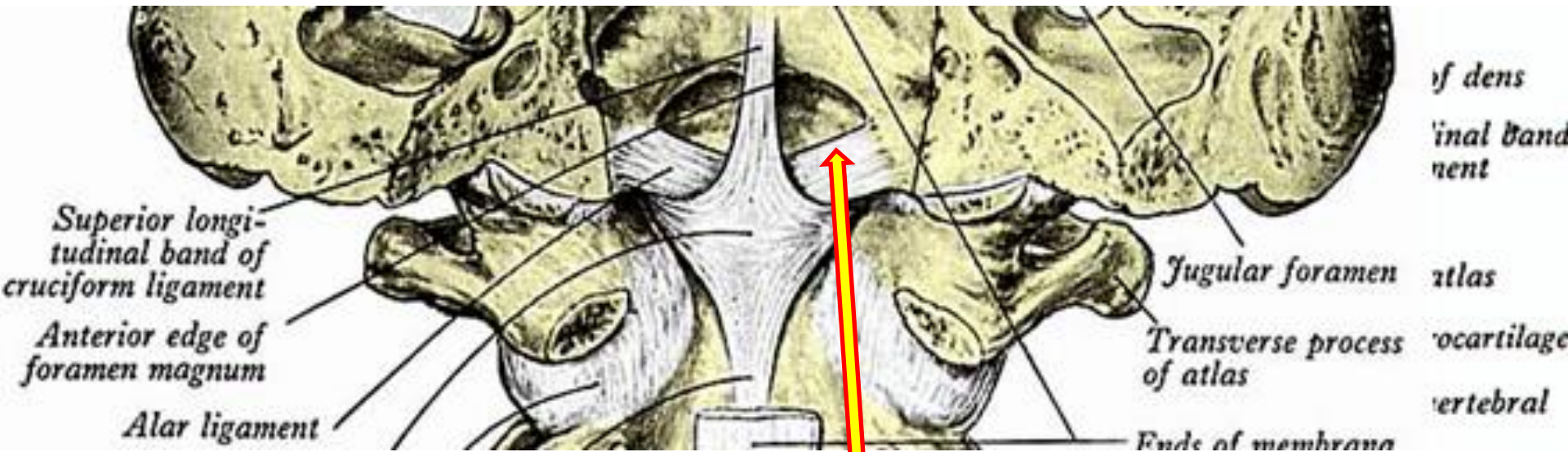
The deep lamina has a strong median band ascending to the foramen magnum, and two lateral bands which pass and blend with the capsules of the atlanto-occipital joints as they reach the foramen



The membrana tectoria is separated from the cruciform ligament of the atlas by a thin layer of loose areolar tissue, and sometimes by a

Alar Ligaments ; from dens to the side of the occipital condyles and into the lateral mass of the atlas

These ligaments consist mainly of collagen fibres arranged in parallel. The main function of the alar ligaments is now considered to be limitation of atlantoaxial rotation, the left becoming taut on rotation to the right and vice versa.



It is separated for most of its extent from the anterior atlanto-occipital membrane and cruciform ligament by pads of fatty tissue, though it blends with their attachments at the foramen magnum, and with the alar ligaments at the apex of the dens.

Apical Ligament of the Dens •

It fans out from the apex of the dens into the anterior margin of the foramen magnum between the alar ligaments. •



Prof. Dr. •
Talib Jawad