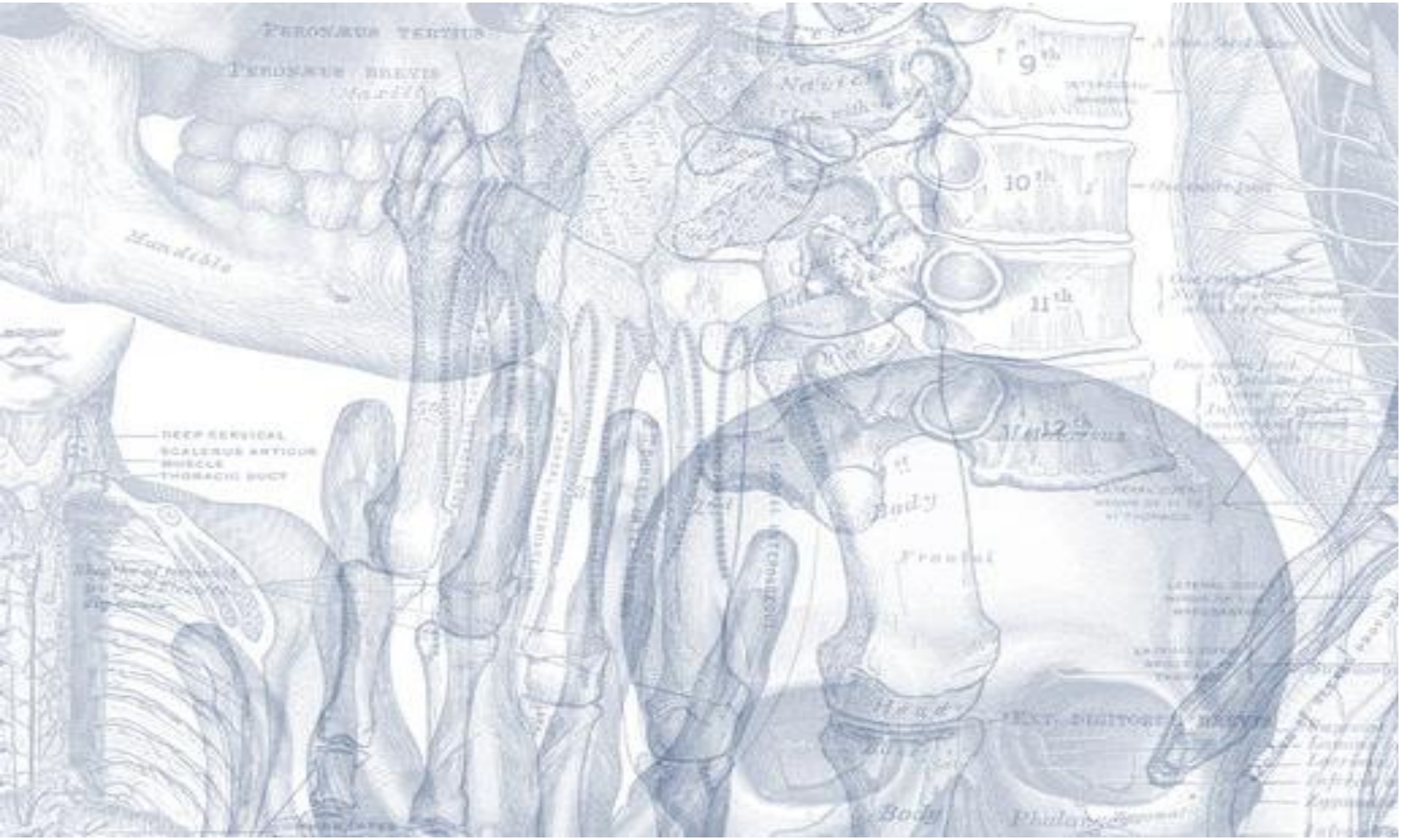
بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ



ANATOMY
TEAM 436

436
MEDICINE
KING SAUD UNIVERSITY

Cervical Spine

Editing File

Color Code

- **Important**
- **Doctors Notes**
- **Notes/Extra explanation**

Objectives

- ✓Describe the 7 cervical vertebrae, (typical & atypical (Non-typical)).
- ✓Describe the joints between the cervical vertebrae.
- ✓Describe the movement which occur in the region of the cervical vertebrae.
- ✓List the structures which connect 2 adjacent vertebrae together.

Overview of lecture

-The Cervical Spine

They are **7** in number.

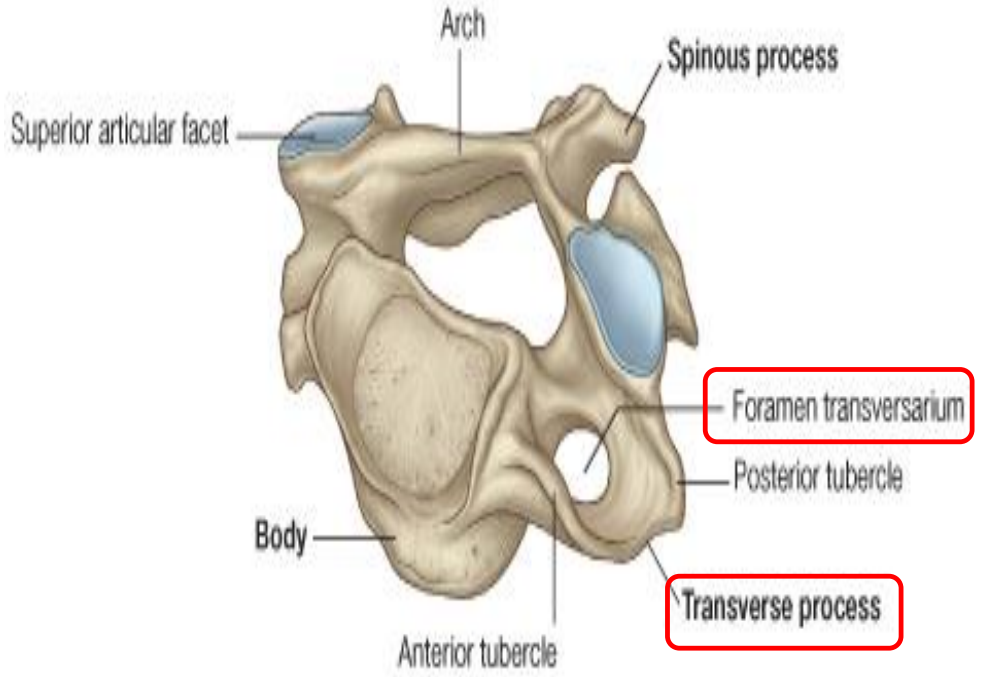
All characterized by presence of **foramen transversarium** in the transverse process.

They are classified into:

1- **Typical**: **3rd , 4th ,5th & 6th.** (Look exactly the same).

2- **Atypical (**Non-typical): **1st, 2nd and 7th**.

This Video will Explain the lecture in a few minutes:
https://www.youtube.com/watch?v=RNUpMNd_u1U



Introduction to Vertebrae

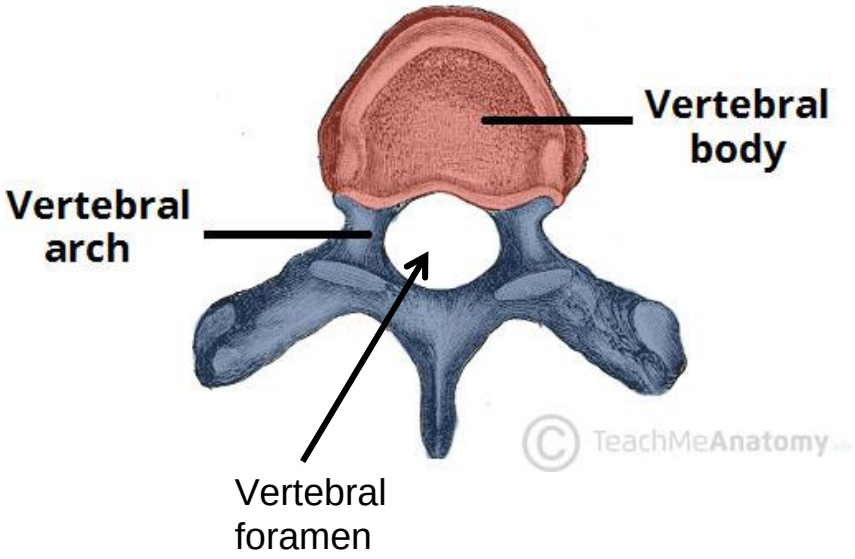
There are approximately 33 vertebrae which are subdivided into 5 groups based on morphology and location: cervical, thoracic, lumbar, sacral, and coccygeal.

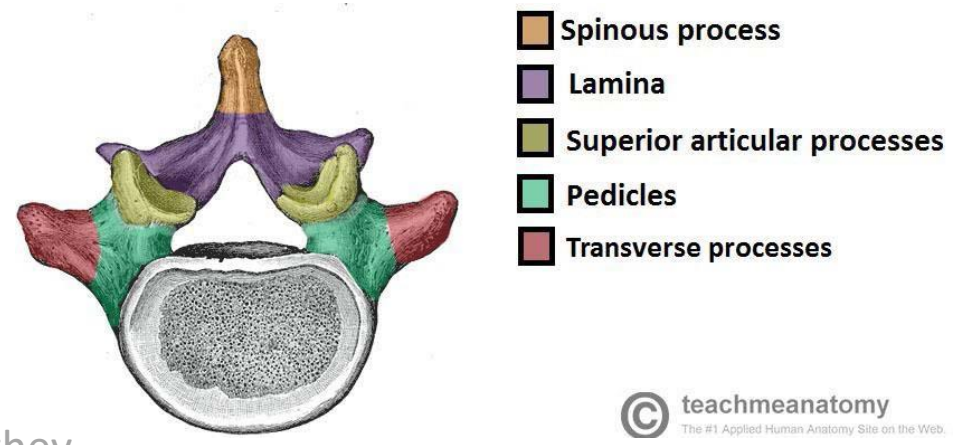
Typical Vertebra

All typical vertebrae consist of a vertebral body and a posterior vertebral arch.

- Vertebral body:
  - weight-bearing part. The size increases inferiorly as the amount of weight supported increases.
- Vertebral arch:
  - Extending from the arch are a number of processes for muscle attachment and articulation with adjacent bones.
  - It consists of:
    1. Two pedicles (towards the body)
    2. Two lamina (towards the spine)
    3. Spinous process
    4. Transverse process
    5. Superior and inferior articular processes. (for articulation with adjacent vertebra)

The vertebral foramen is the hole in the middle of the vertebra. Collectively they form the vertebral canal through which the spinal cord passes.





TYPICAL CERVICAL

Typical cervical vertebrae are 3rd 4th 5th and 6th.

The body is small and longer horizontally than anteroposterior
the vertebral foramen is large and triangular in shape

3 The transverse processes has an oval foramen transversarium* which is wide and large in shape to accumulate the vertebral vessels (arteries veins) that pass inside it.

*Transverse foramen or foramen transversarium

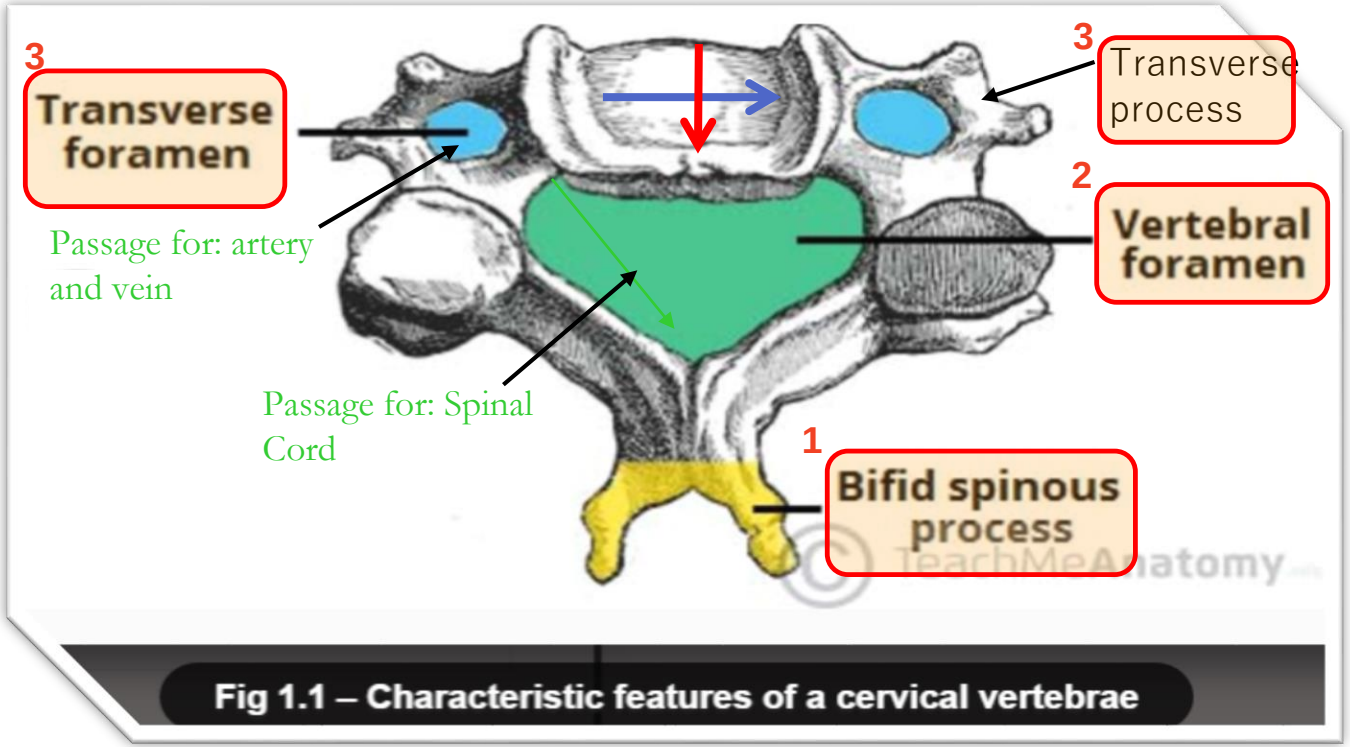


Fig 1.1 – Characteristic features of a cervical vertebrae

2 Vertebral foramen is triangullar in shape.
-The Vertebral foramen is large because there's an enlargement in the spinal cord in the cervical region to feed the upper limbs.

1 The spinous process arises from junction of the two lamina of vertebra is short and bifid (مشقوقة (مثل لسان الثعبان)).

TYPICAL CERVICAL VERTABRAE (3rd, 4th, 5th and 6th).

The superior articular processes:

Have a facet that face upward & backward.

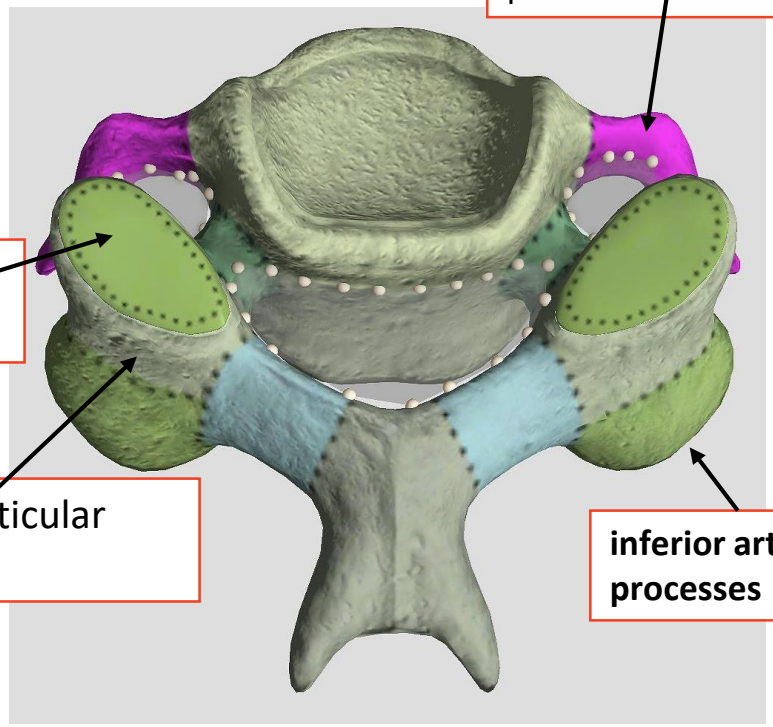
The inferior articular processes:

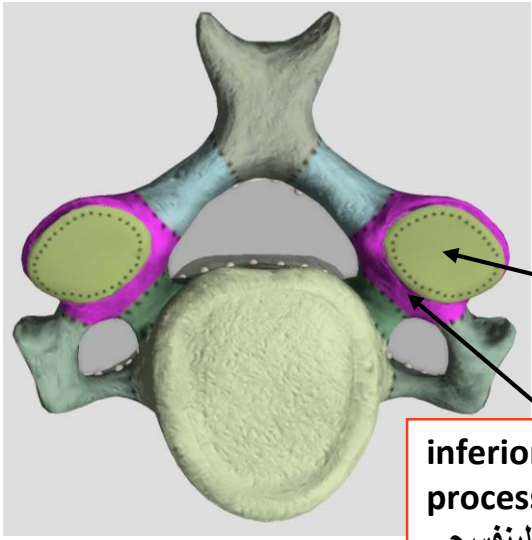
Have a facets that, face downward and forward.

The transverse process :

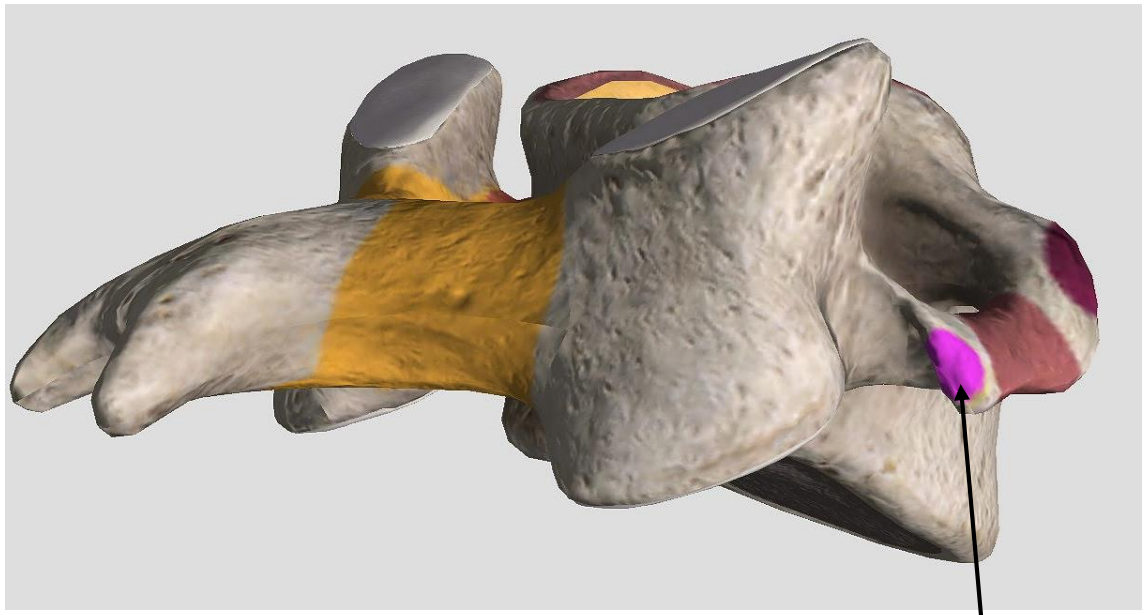
has 2 tubercles one infront and one behind the foramen transversarium.

-Facet = Articular surface. مثل الصلصال

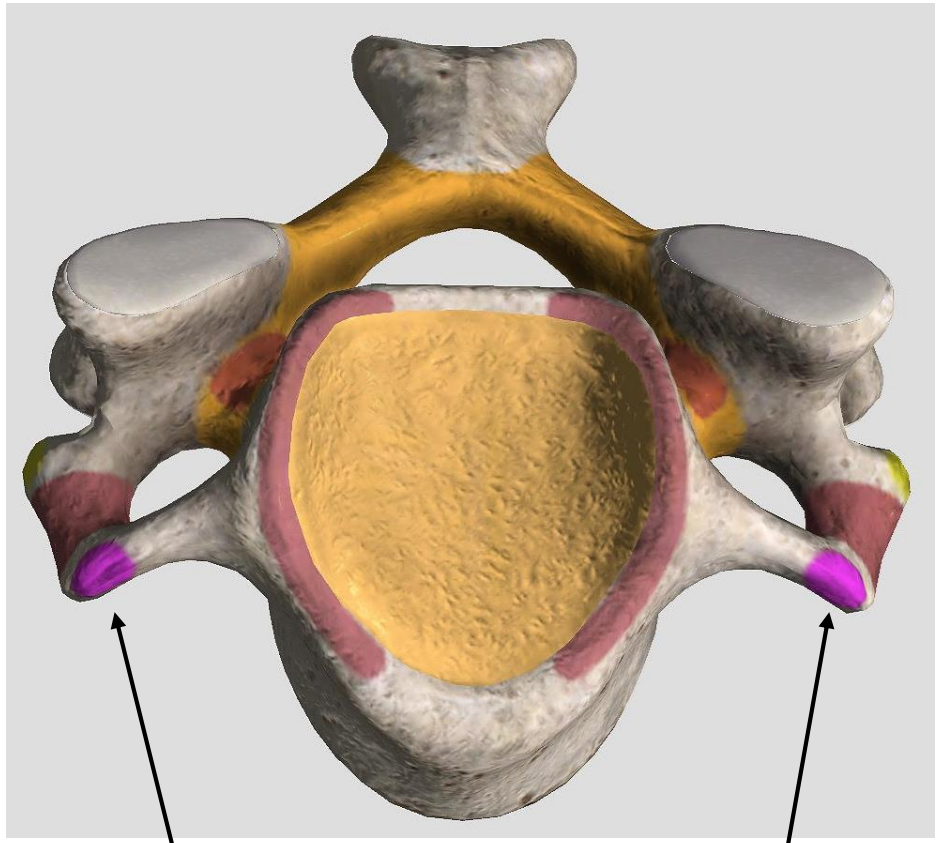




TYPICAL CERVICAL VERTABRAE (3rd, 4th, 5th and 6th).



Posterior tubercle
(المظللة باللون البنفسجي)



Anterior tubercle (المظللة باللون البنفسجي)

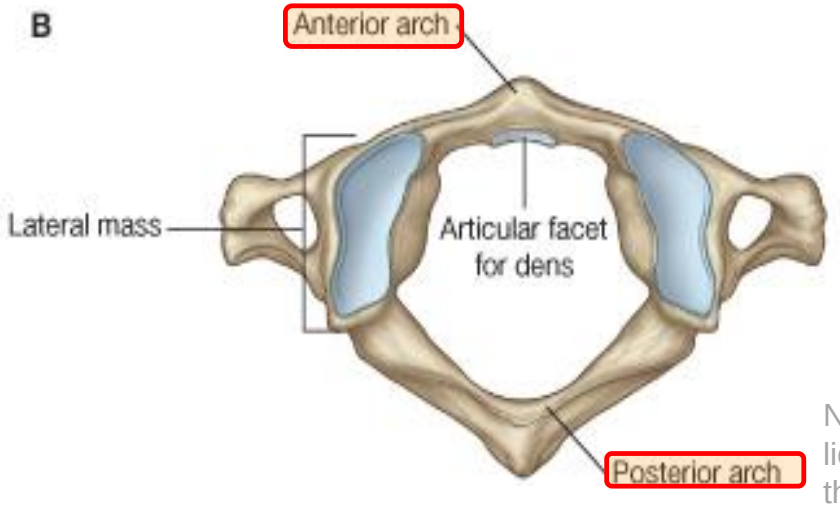
ATYPICAL: ATLAS- C1

- It has No body, No spine.
- It has 2 lateral masses connected together by small anterior arch & long posterior arch.
- Each lateral mass has articular surface on its upper and lower aspects.

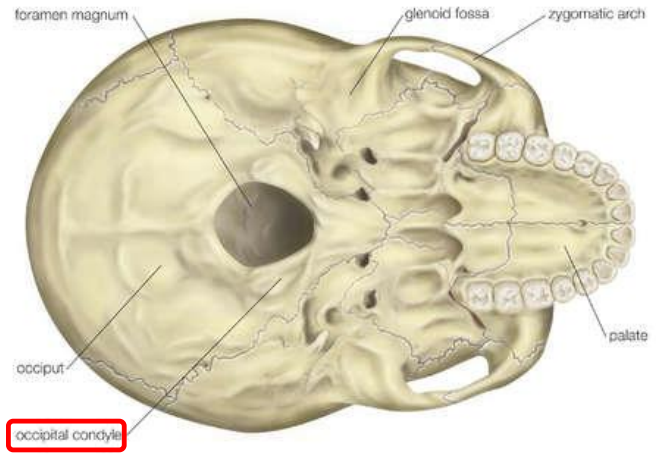
The superior articular surface :

- The upper articular surface is kidney-shaped
- Articulates with the occipital condyles of the skull.
- It forms the Atlanto-Occipital joints.
- This joint allows you to nod "say Yes". (flexion and extension)

Note: the anterior arch lies above the bodies of the rest of the vertebrae



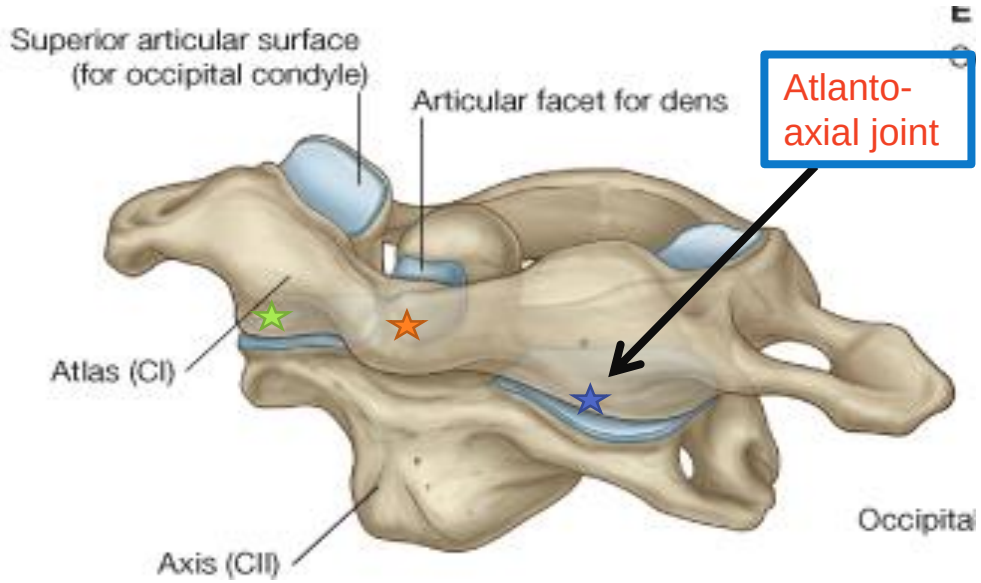
Note: the posterior arch lies above the spines of the rest of the vertebrae

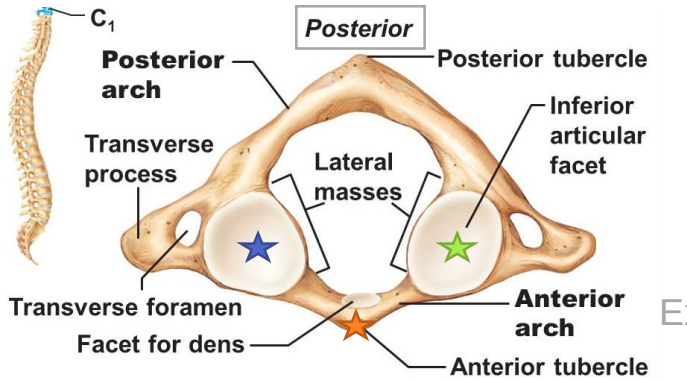


ATYPICAL: ATLAS- C1 (con.)

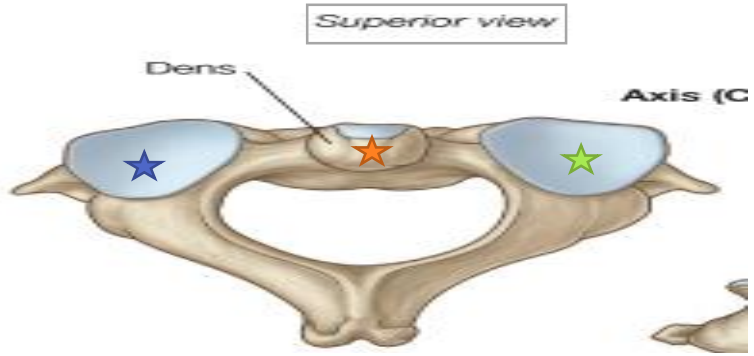
The inferior articular surface of the atlas:

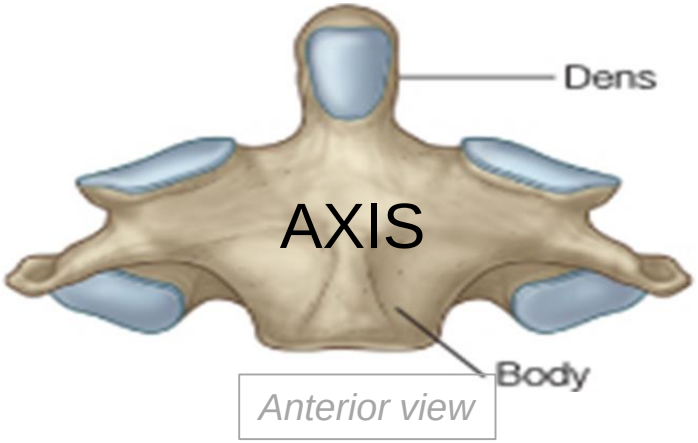
- is circular and articulates with the axis.
- It forms the 2 **lateral** Atlanto-Axial joints.
- This joint together with the joint between the dens of axis and the anterior small arch of atlas allow you to "Say No " lateral rotation of the face.





Extra

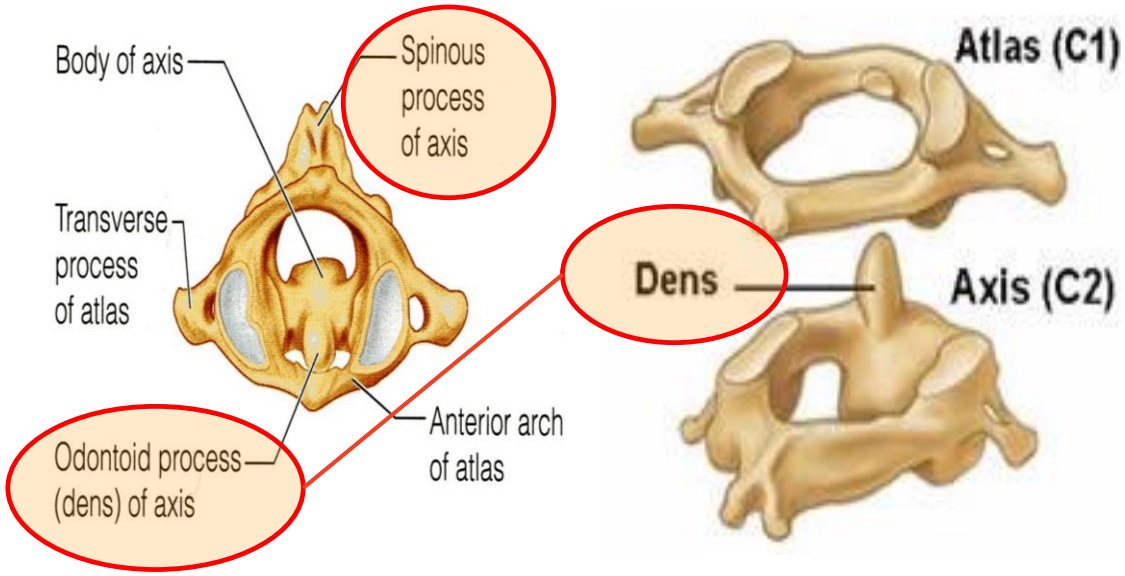




Atypical spines (C2 & C7):

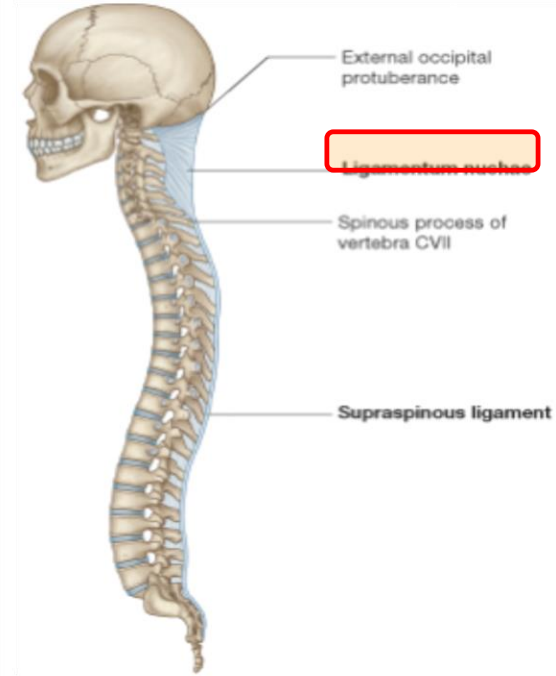
AXIS- C 2

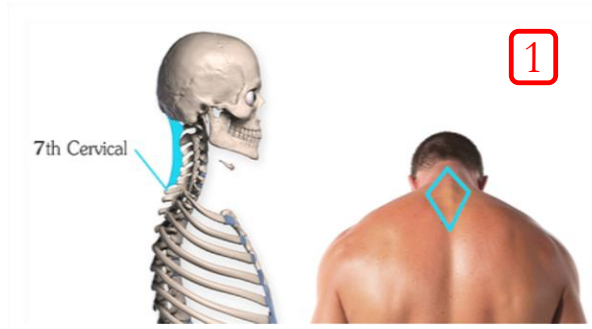
- It acts as a pivot (محور) for the rotation of the atlas (and the skull) above.
- It has a large upright peg-like odontoid process, or dens, which projects upward from the superior surface of the body.
- Actually it represents the body of the atlas that has fused with the axis.

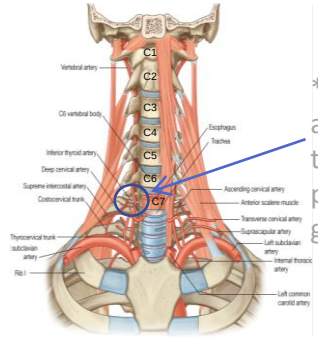


7th CERVICAL VERTEBRA (Vertebra/Cervica Prominens)

- It has the longest **spinous process** which is not bifid.
- It is the first spine to be felt **subcutaneously**[1] in the root of back of neck.(تقدر تشعر فيها بيدك)
- The transverse process is large while its foramen transversaium is small and may be absent, and **does not transmit the vertebral artery.*** (only small accessory vein)
- The ligamentum nuchae is attached to it (last slide)







* Notice how the artery goes in front of the transverse process instead of going through it

Joints of Cervical Vertebrae:

1.Atlanto-Occipital Joints

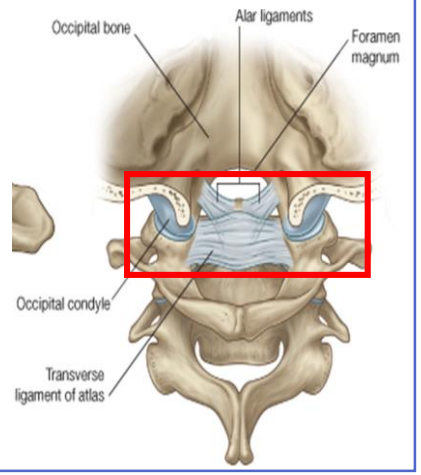
The **Atlanto-occipital** joints are **synovial joints**:

between the occipital condyles of skull

and the facets on the superior surfaces

(or upper facets) of the lateral masses

of the atlas below.



MOVEMENTS:

The joints are capable of:

-Flexion

-Extension

-Lateral flexion

They do not rotate.

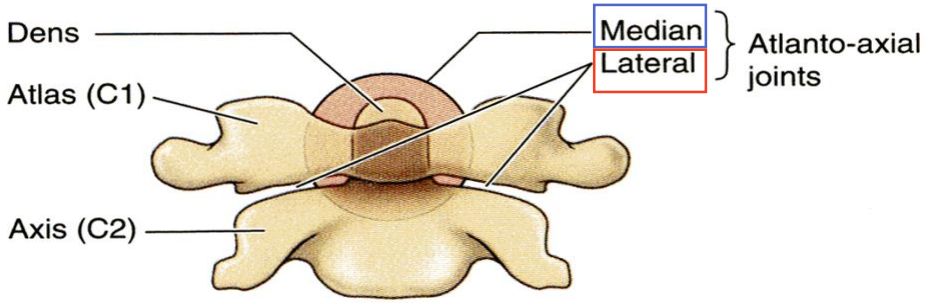
That is to say yes

To help you remember:
-When you say yes it is only involves 2 movements (you look down then up) so 2 joints are used.
-When you say no it involves 3 movements (you look the right, then to the left, then back to the middle) so 3 joints are used

2.Atlanto-Axial Joints

The **Atlanto-axial** joints are Three Synovial Joints:

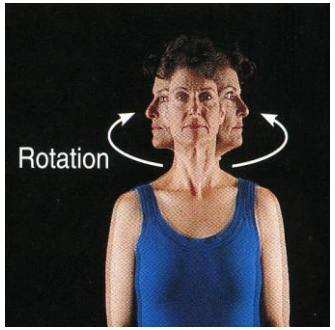
- **One median**: between the odontoid process and the anterior arch of the atlas.
- **Two lateral**: between the inferior facet of lateral masses of the atlas and superior facets of the axis.



MOVEMENTS:

There can be **extensive rotation** of the **atlas** and the **skull** (and thus of the head on the **axis**).

That is to say NO



The JOINTS OF THE VERTEBRAL COLUMN BELOW THE AXIS

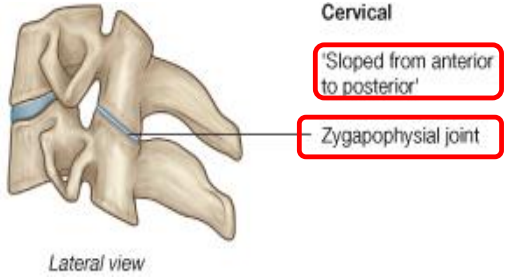
With exception of the first two cervical vertebrae, the other cervical vertebrae articulate with each other by means of:

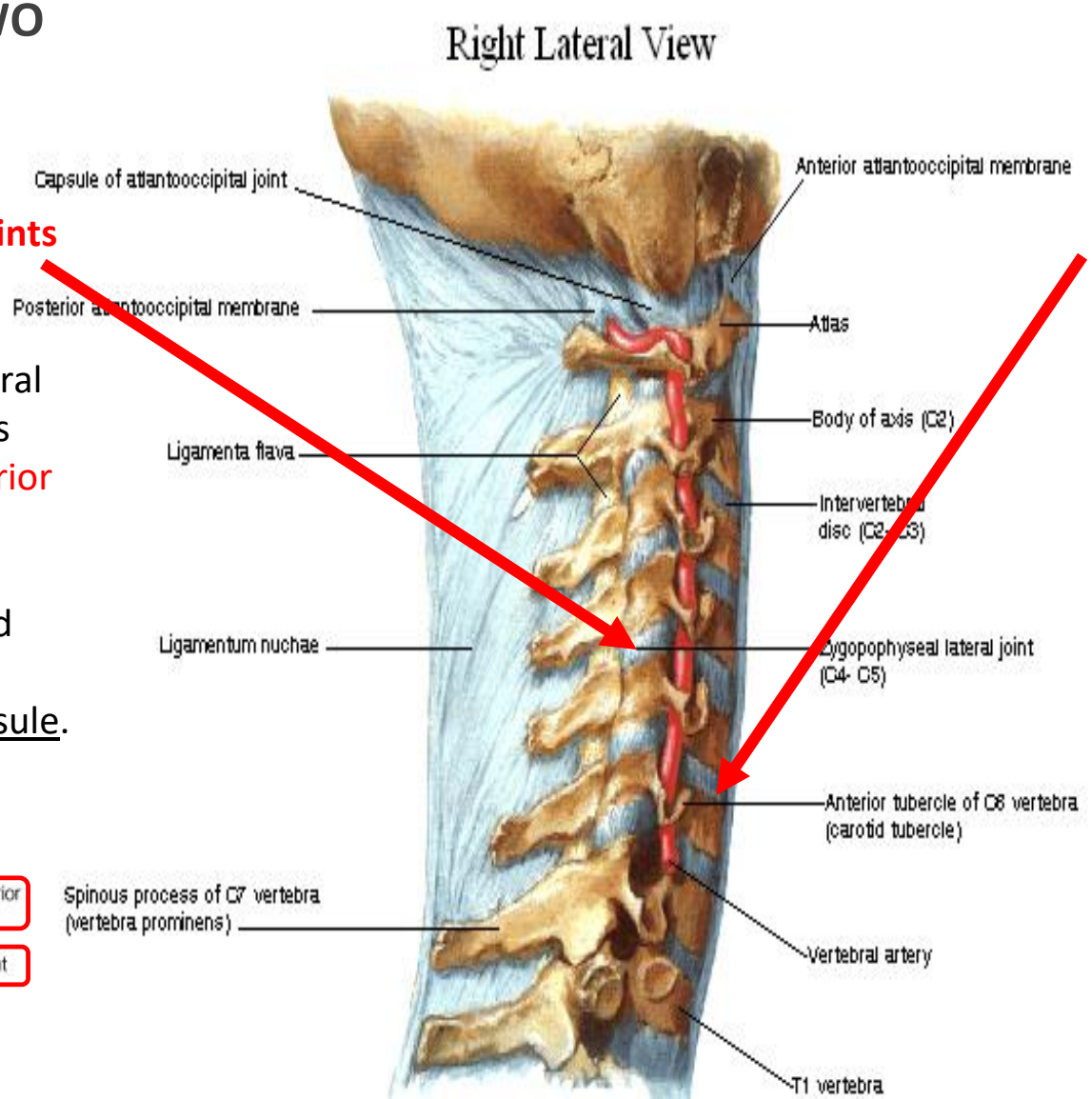
The JOINTS BETWEEN TWO VERTEBRAL ARCHES

Synovial joints

Intervertebral (zygapophyseal) joints
(Between articular processes)

- The joints between two vertebral arches consist of synovial joints between the superior and inferior articular processes of adjacent vertebrae.
- The articular facets are covered with hyaline cartilage, and the joints are surrounded by a capsule.
- supported by the following ligaments: next slide



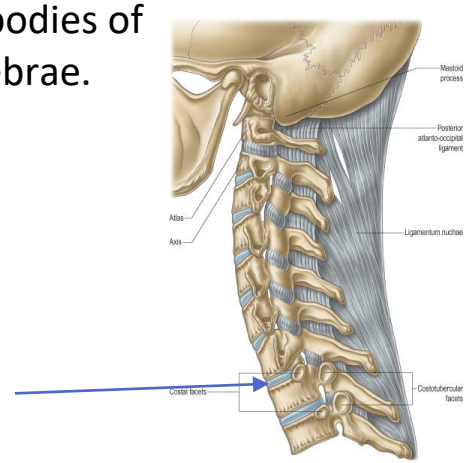


The JOINTS BETWEEN TWO VERTEBRAL BODIES

Cartilaginous joints

Intervertebral disc

- The upper and lower surfaces of the bodies of two adjacent vertebrae are covered by thin plates of hyaline cartilage.
- Between the plates of hyaline cartilage is an intervertebral disc of fibrocartilage.
- The collagen fibers of the disc strongly connect the bodies of the two vertebrae.



Ligaments

Anterior

Posterior

- The anterior and posterior **longitudinal** ligaments run as continuous bands along the anterior & posterior surfaces of the vertebral bodies.
- These ligaments hold the vertebrae firmly together but at the same time permit a small amount of movement to take place.

- Supraspinous ligament

It runs between the tips of adjacent spines.

- Interspinous ligament

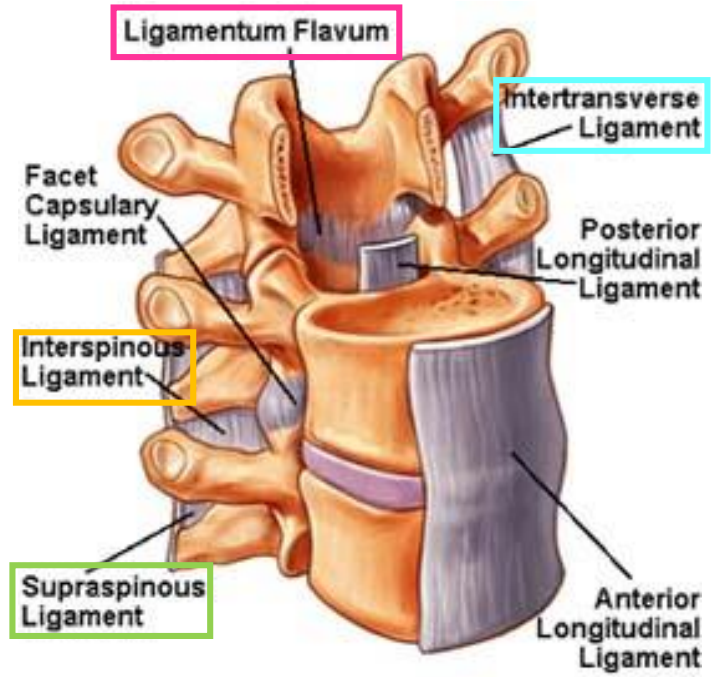
It connects adjacent spines.

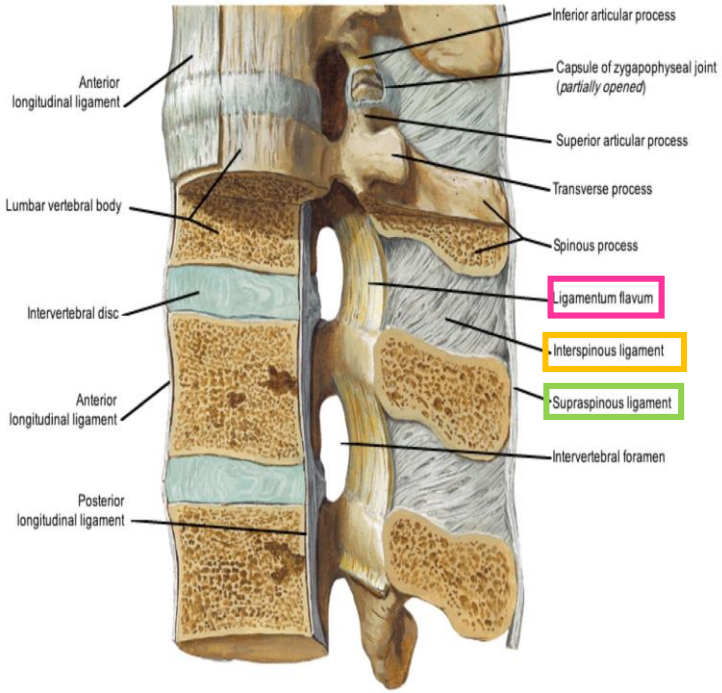
- Ligamentum flavum

Connects the laminae of adjacent vertebrae.

- Intertransverse ligaments

They run between adjacent transverse processes.





- **Apical** ligament:

  median ligament *connects* apex of odontoid process **to** foramen magnum (the hole in base of the skull through which the spinal chord passes)

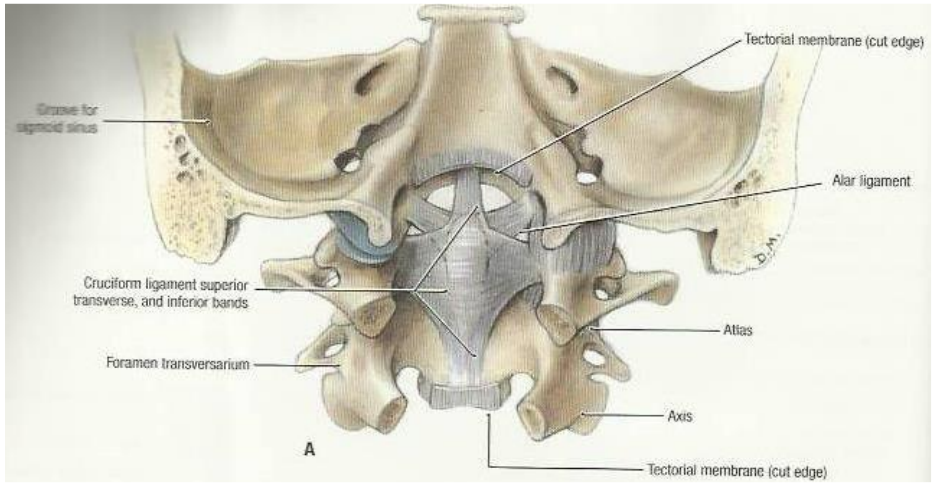
  (it is undercover of (covered by) cruciate ligament).

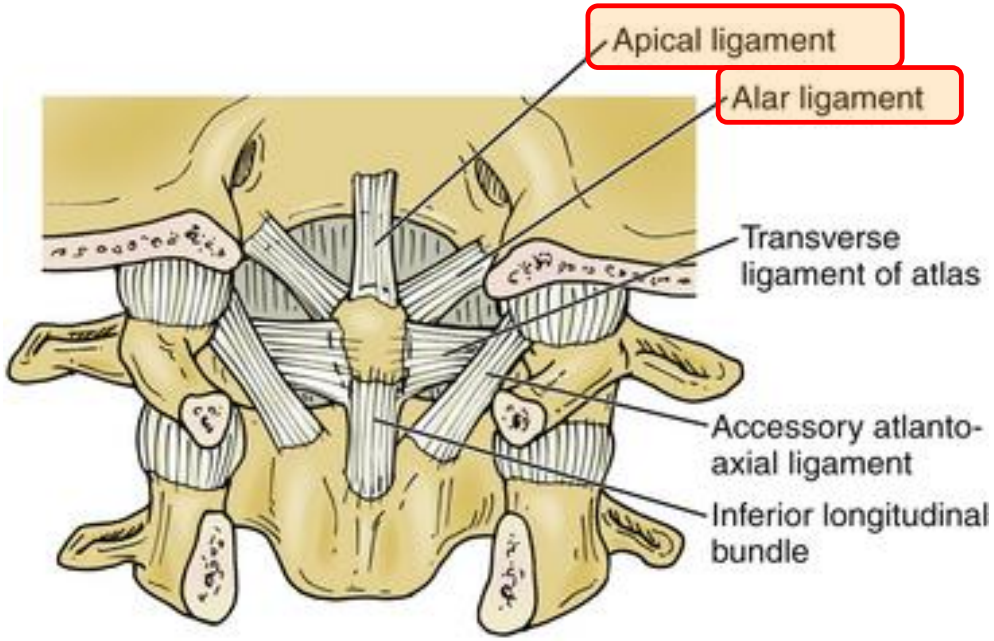
- **Alar** ligaments:

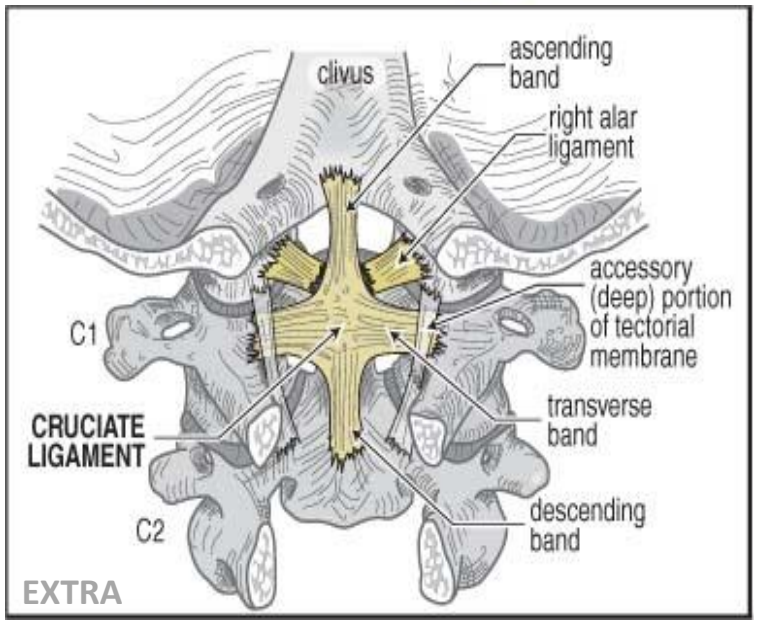
  these lie on each side of apical ligament and *connect* odontoid process **to** medial side of occipital condyles.

- **Cruciate** ligament:

  consists of vertical (*between* body of axis **and** foramen magnum) & transverse (*binds* odontoid process **to** anterior arch of atlas) parts.



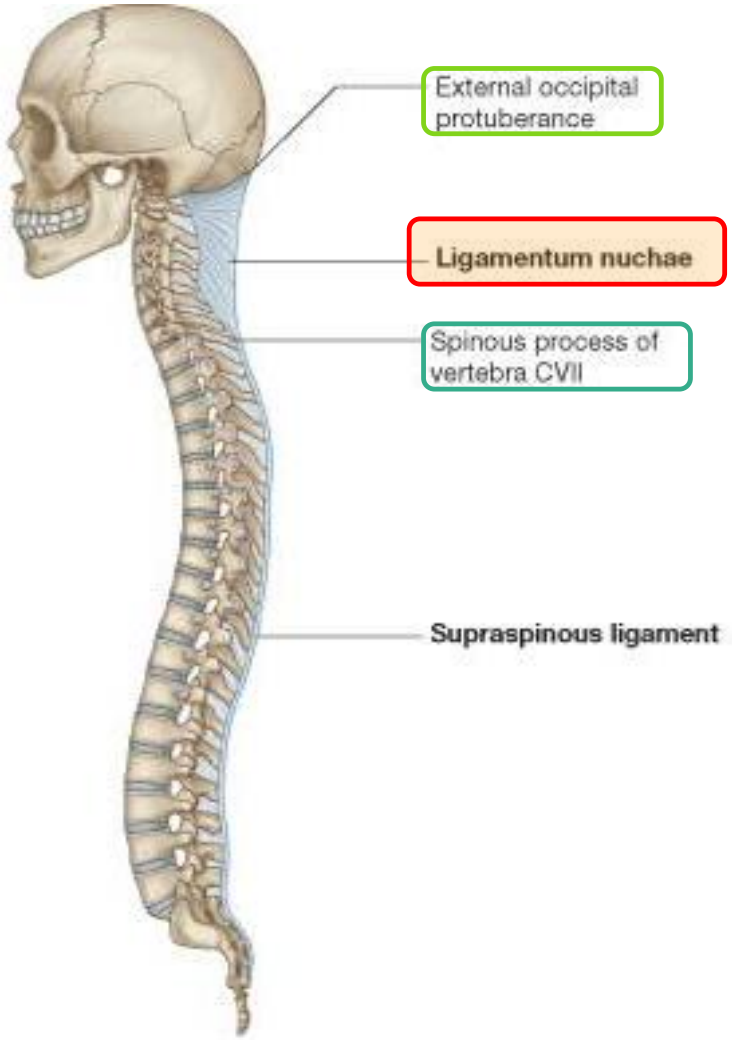




ONLY ON THE GIRLS' SLIDES

LIGAMENTUM NUCHAE

- **In the cervical region**, the Supraspinous and Interspinous ligaments are greatly thickened to form the strong ligamentum nuchae.
- It extends from the external occipital protuberance of the skull to the spine of the seventh cervical vertebra.
- Its anterior border is strongly attached to the cervical spines in between.



MCQ's

1.The spinous process of the cervical vertebra is short and not bifid:
a)True **b)False**

2.The superior articular surface of The Atlas(C1) Articulates with:
A) Axis(C2) **B) C4**
C) C3 **D) Occipital condyles of the skull.**

3.Which of the following is **Atypical** Cervical spine:
A) C1 **B) C3** **C) C4** **D) C5**

4.Which of the following Cervical spine can be felt **subcutaneously:**
A) C2 **B) C4** **C) C5** **D) C7**

5.Witch one of the following is a continuous ligament ?
A) Ligamentum flavum. **B) Interspinous ligament.**
C) posterior ligament. **D) Intertransverse ligaments**

SAQ's

1.What is the difference between the movement of **Atlanto-Occipital Joints** and **Atlanto-Axial Joints?**

2.-Enumerate the movements of Atlanto-occipital joint:

3.Which kind of connective tissue is the Intervertebral disc is made of ?

4.A 26-year-old heavyweight boxer was punched on his mandible, resulting in a slight subluxation (dislocation) of the atlantoaxial joint. The consequence of the injury was decreased range of motion at that joint. What movement would be most affected?

The Answers:

1.B
2.D
3.A
4.D
5.C

1.Atlanto-Occipital Joints : Flexion, Extension (allow you to say yes) and Lateral flexion
Atlanto-Axial Joints : extensive rotation of the atlas and the skull (allows you to say no)
2. Flexion, Extension, and Lateral flexion
3. Fibrocartilage
4. Rotation, The atlantoaxial joints are synovial joints that consist of two plane joints and one pivot joint and are involved primarily in rotation of the head. Other movements do not occur at this joint.

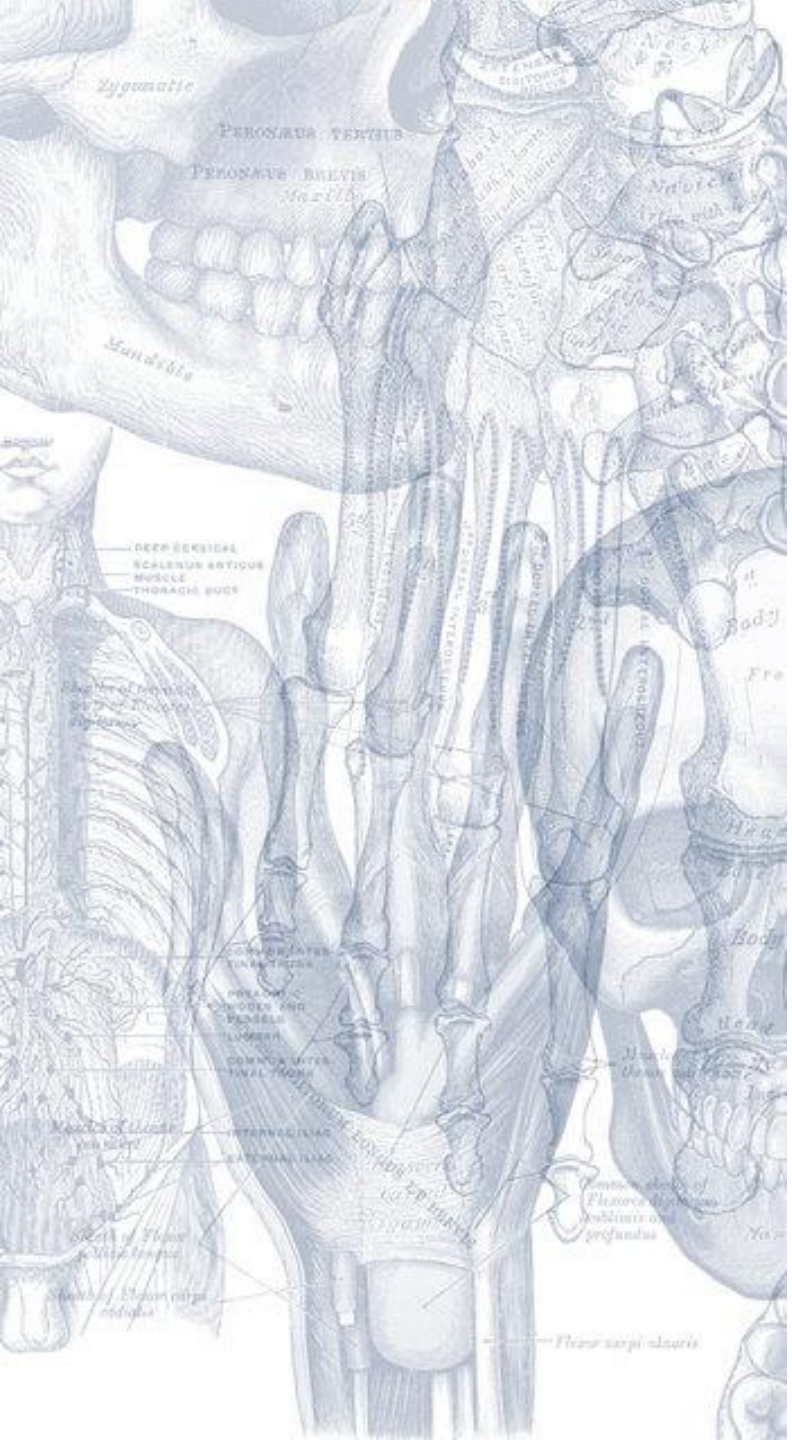
Summary

- The cervical vertebrae are 7 in number, classified into typical & atypical (non-typical) vertebrae.
- **All the typical vertebrae** have a foramen transversarium and bifid spinous processes.
- **Atypical vertebrae (1,2,7) :**
- **1st (Atlas) :** has no body nor spine, has short anterior arch and long posterior arch.
- **2nd (Axis):** has odontoid process (dens).
- **7th (Cervica Prominens) :** has **longest not bifid** spinous process, which can be felt **subcutaneously.**
- **Atlanto-Occipital joints are:** 2 synovial joints, the function: flexion and extension, and lateral flexion, This joint allows you to say **"Yes".**
- **Atlanto-Axial joints are :** 3 synovial joints, the function : extensive rotation, this joint allows you to say **" No"**.
- **JOINTS BELOW THE AXIS are:**

I- **Synovial** joints between their articular processes.

II- **Cartilaginous** joints between their bodies (intervertebral disc of fibrocartilage).

- **Ligaments of cervical spines:**
- **Supraspinous ligament, between tips of spines.**
- **Interspinous ligament, between adjacent spines.**
- **Supraspinous & Interspinous ligaments are thickened to form ligamentum nuchae.**
- **Ligamentum flavum, between laminae.**
- **Intertransverse ligaments, between transverse processes.**



Leaders:

Nawaf AlKhudairy

Jawaher Abanumy

Ghada Almazrou

anatomyteam436@gmail.com

@anatomy436

Members:

Abdulaziz Alangari

Mohammed Alduayj

Abdulmohsen alghannam

Abdulaziz ALMohammed

Mosaed Alnowaiser

Rayan ALQarni

abdullah hashem

Khalid Al-dakheel

Moayed Ahmad

Abdulmohsen Alkhalaf

Fahad Alzahrani