Cervical Spines

Lecture 4

تحت المراجعة
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Please check our Editing File.

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

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.

- Text in BLUE was found only in the boys' slides
- Text in PINK was found only in the girls' slides
- Text in RED is considered important
- Text in GREY is considered extra notes

Team 436:
Extra slide for understanding

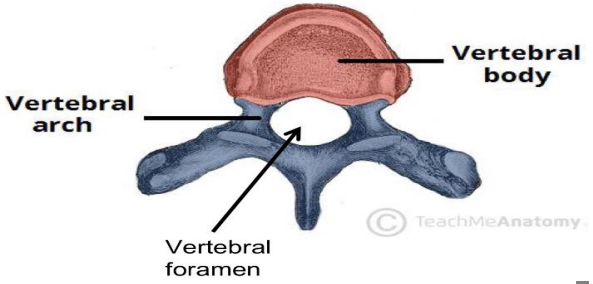
Introduction to vertebrae

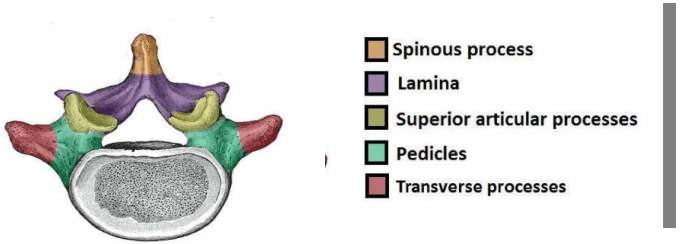
There are approximately 33 vertebrae which are subdivided into 5 groups based on morphology and location: cervical, thoracic, lumbar, sacral, and coccygeal.

Typical Vertebra

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

- Vertebral body:
  - weight-bearing part. The size increases 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)

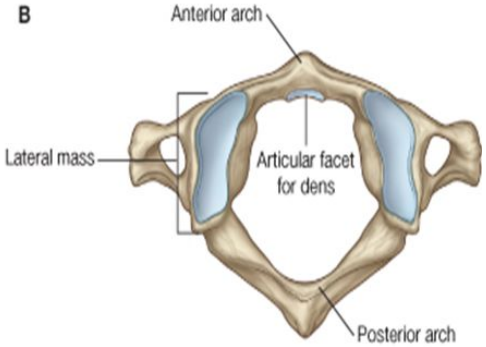


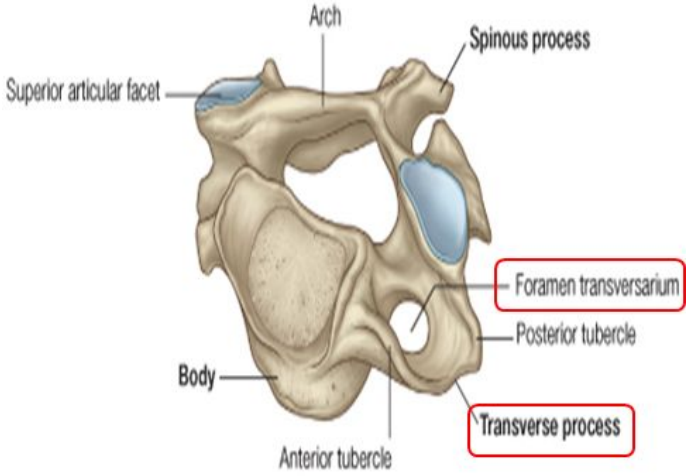


The vertebral foramen is the hole in the middle of the vertebra. Collectively they form the vertebral canal through which the spinal cord passes

Cervical Spines

- 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: 1st, 2nd and 7th.





TYPICAL CERVICAL VERTEBRAE {C3,C4,C5,C6}

- The body is small, longer horizontally than antero-posteriorly
- Its spinous processes is short and bifid. (مشقوقة، مثل لسان الثعبان)
- The transverse processes has an oval foramen transversarium, through which the vertebral vessels pass.

The vertebral foramen is large & triangular to accommodate the cervical enlargement of the spinal cord.

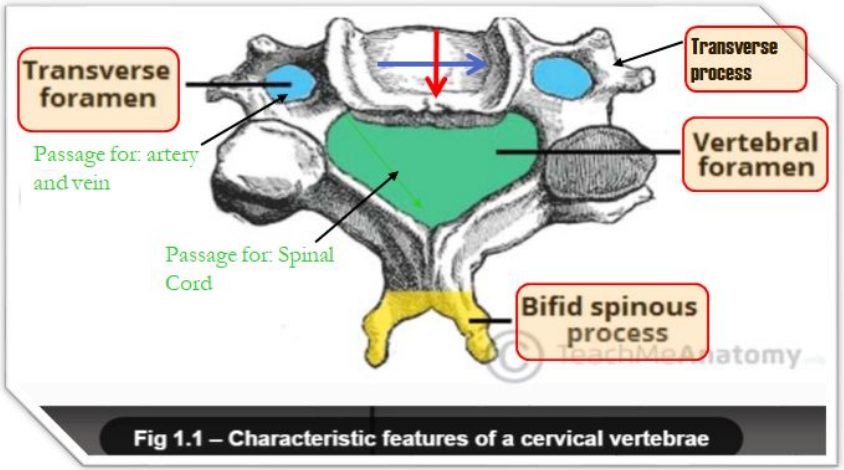


Fig 1.1 – Characteristic features of a cervical vertebrae

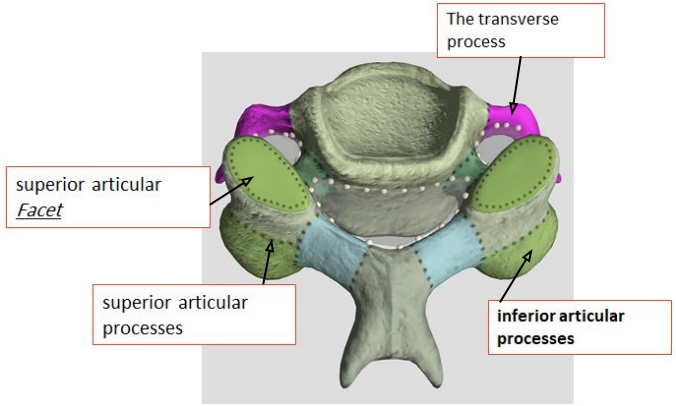
#Extra:

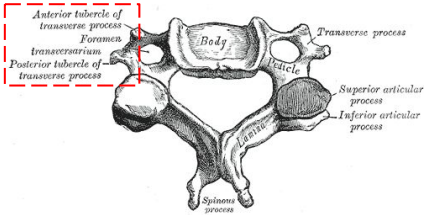
- foramen transversarium is **only** present in cervical vertebrae.
- typical cervical vertebrae has 2 types of foramen:
1. **vertebral foramen:** for cervical enlargement of spinal cord.
2. **transverse foramen (foramen transversarium):** for vertebral vessels.
- there are 2 enlargements in the spinal cord:
1. **cervical enlargement**: give the brachial plexus "for UL"
2. **Lumbosacral enlargement**: give the lumbosacral plexus "for LL"

TYPICAL CERVICAL VERTEBRAE {C3,C4,C5,C6}

- **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 in front and one behind the foramen transversarium.

*Facet: مثل البصمة على الصلصال

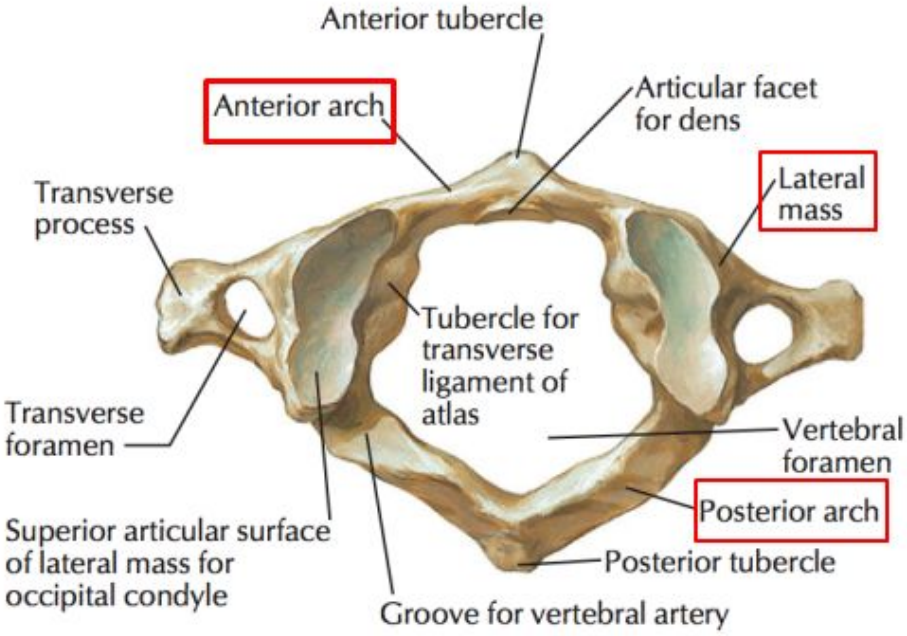




Atypical (Non typical) cervical vertebrae

Atlas-C1

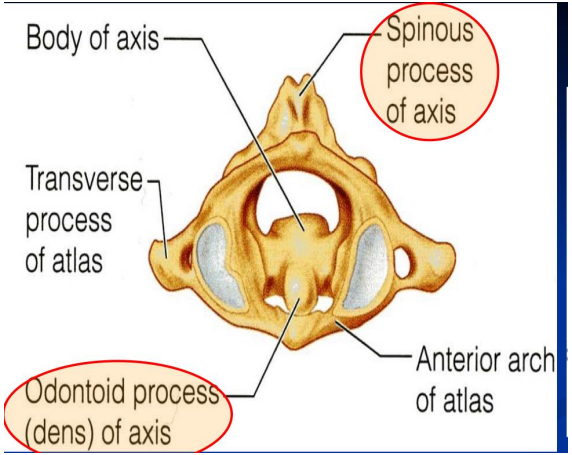
- It has no body, no spine.
- It has 2 lateral masses (which is found only in the atlas) connected together by small anterior arch & long posterior arch.
- Each lateral mass has articular surface on its upper and lower aspects.
- The upper articular surface is kidney shaped
- The lower articular surface is circular shaped



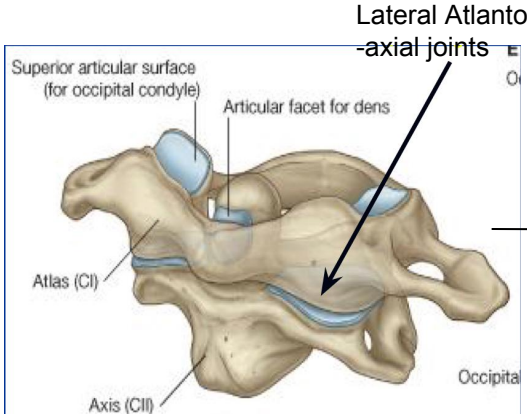
Atlas (C1): superior view

Atypical (Non typical) cervical vertebrae

AXIS- C2

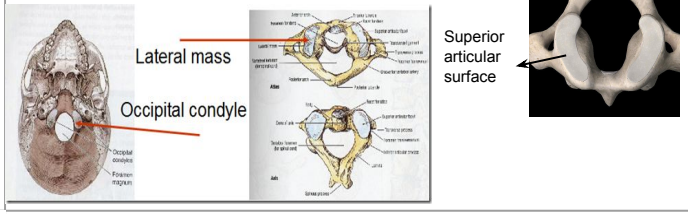
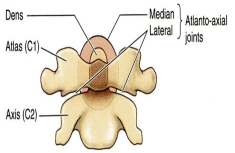
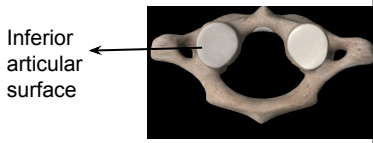
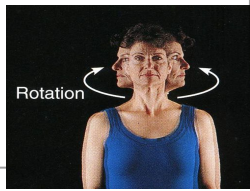


- It acts as a pivot (محور) for the rotation of the atlas (and the skull) above.
- It has a large upright peg-like odontoid process, or dens, which projects upward from the superior surface of the body which represents the body of the atlas that has fused with the axis.



صورة لتوضيح
Atlanto-axial joints

Joints of the Cervical Vertebrae: Altas-C1 Joints

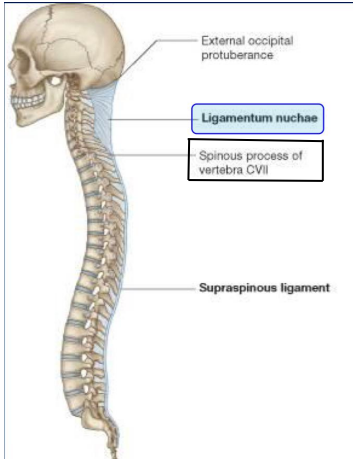
	Atlanto-Occipital joints (two)	Atlanto-Axial joints (three)
Characteristics:	• The upper articular surface is kidney-shaped articulates with occipital condyles of the skull to form the joint. • Synovial joints 	Three Synovial Joints • **One Medial:** between the odontoid process and the anterior small arch of atlas. • **Two Lateral:** between the inferior facet "circular" of the lateral masses of the atlas and superior facets of the axis.  
Movement: Team 436 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	- Flexion - Extention - Lateral Flexion - They do not rotate They allow you to nod your head "say Yes" (Flexion of the Head) 	- Extensive rotation of the atlas and the skull. It allows you to "say no" (Lateral Rotation of the head) 

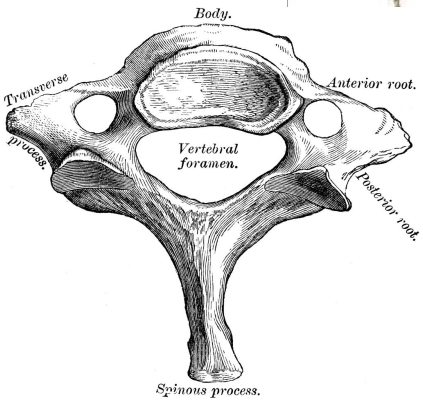
Atypical (Non typical) cervical vertebrae

7th Cervical Vertebrae

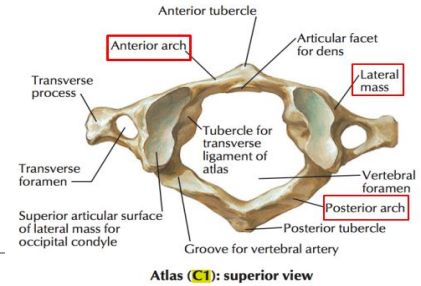
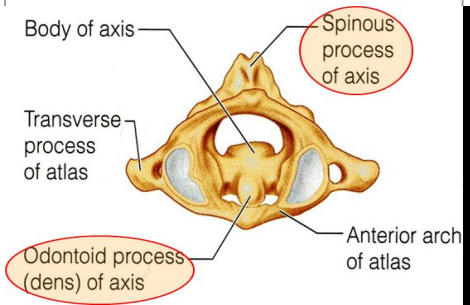
OR Cervica/vertebra Prominens

- It has the longest spinous process which is not bifid (not separated by a ridge).
- It is the first spine to be felt subcutaneously in the root of the back of the neck.
- The transverse process is large while its foramen transversarium is small and may be absent, and does not transmit the vertebral artery. (only small accessory vein)





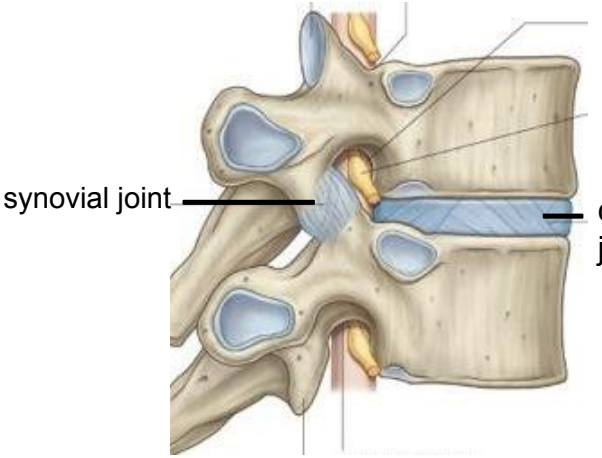
Atypical (Non typical) cervical vertebrae

Vertebra name	Altas-C1	AXIS- C2	C7 (Cervica/vertebra Prominens)
Main characteristic	It has no body, no spine. It has 2 lateral masses -small anterior arch -long posterior arch.	It has a large upright peg-like odontoid process, or dens	has longest not bifid spinous process, which can be felt subcutaneously
Picture	 Atlas (C1): superior view		

Joints Between Two Vertebral Bodies

<u>with exception of the first two cervical vertebrae</u> , the other cervical vertebrae (the vertebral column below the Axis "C2" **)**
articulate with each other by means of :
1- synovial : joints between their articular processes

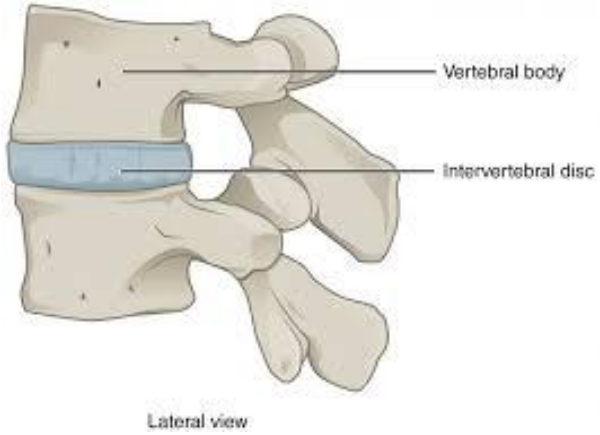
2- cartilaginous : joints between their bodies



تذكر كلمة الsynovial من :
مثل اللي في الرياضيات :) syn = sin
ovial = ovum

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.

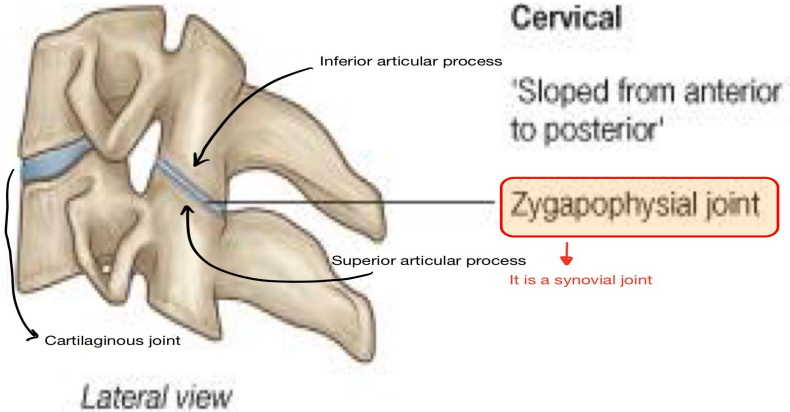


يعني مثل الساندويتش.. ال intervertebral disc محصور بين طبقتين من الhyaline cartilage

Joints between two vertebral Arches

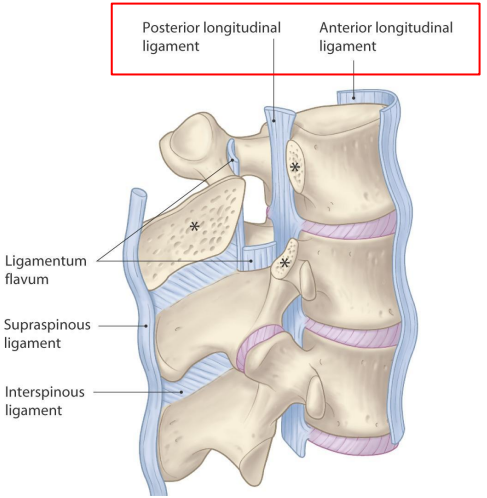
Zygapophysial joint:

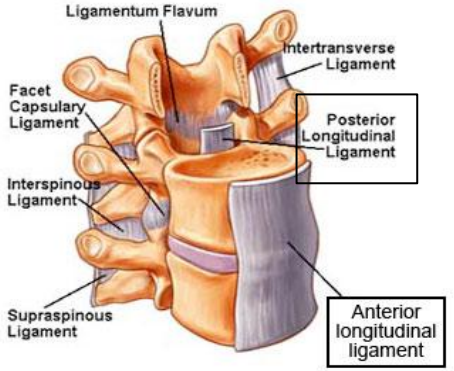
-The joints between two vertebral arches consist of synovial joints between the superior and inferior articular processes of adjacent vertebrae to connect the Arches together.
-The articular facets are covered with hyaline cartilage, and the joints are surrounded by a capsule.



Ligaments

- The anterior and posterior longitudinal ligaments run as continuous bands along the anterior and 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





Only in Girls lecture

Ligaments:

Very important

1-Apical Ligaments: (شكلها ومكانها في القمة)

Median ligament connects Apex of Odontoid process to foramen magnum "in the skull"
(UNDER COVER OF CRUCIATE LIGAMENT) (cruciate ligament جايه خلف او تحت ال)

2-Alar Ligament: (شكله زي الأجنحة)

These lie on each side of Apical ligament and connects Odontoid process to medial side of occipital condyles

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3- Cruciate (Cruciform) ligaments: (شكله زي الصليب)

Consist of 3 parts 2 Vertical parts AND 1 Transverse "horizontal" part: (3a-b-c)

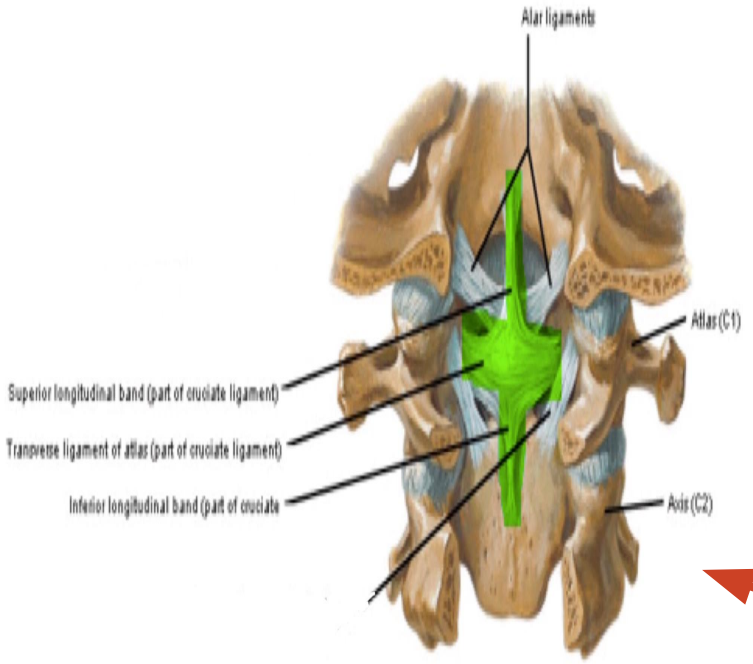
The two vertical parts is

3a-The Superior Cruciform Ligament(bind to Foramen magnum)
3b-The inferior Cruciform Ligament(bind in between the body of Axis)

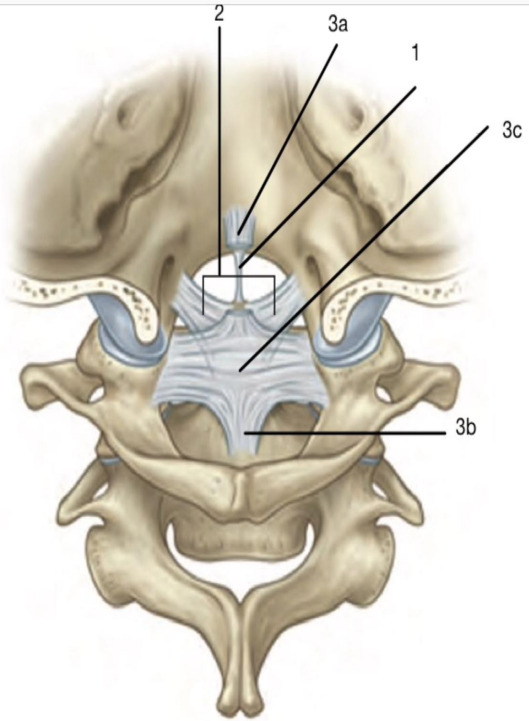
The Transverse part is

3c-The Transverse Cruciform ligament
(binds odontoid process to anterior arch of atlas)
also known as: the transverse ligament of Atlas

check next slide for pics



لازم تعرفون ان ال
Apical ligament
هي أساساً خلف
Cruciate ligament
فيكون شكلها الحقيقي
اللي هو في الخلف مثل
الصورة هذي



Posterior view

1-Apical ligament
2-Alar ligament
3a-The Superior Cruciform Ligament
3b-The inferior Cruciform Ligament
3c-The Transverse Cruciform ligament(aka the transverse ligament of Atlas)

Ligaments

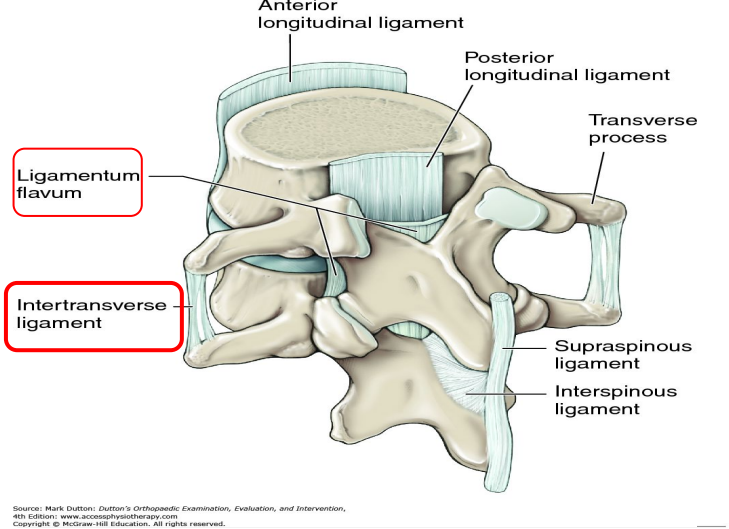
Supraspinous ligament: It runs between the tips of adjacent spines.

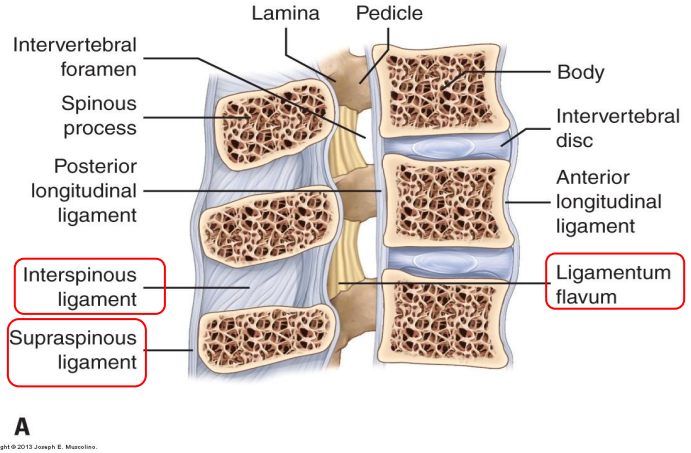
Ligamentum flavum: It connects the laminae of adjacent vertebrae.

Ligaments

Interspinous ligament: It connects adjacent spines.

Intertransverse ligaments: They run between adjacent transverse processes.

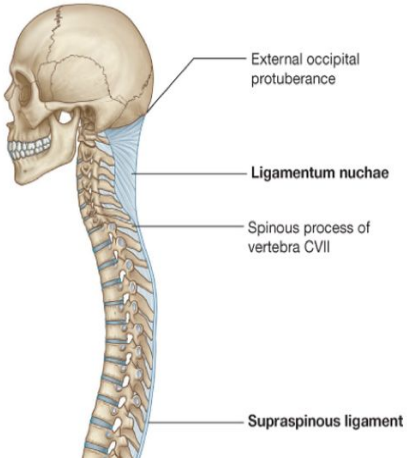




LIGAMENTUM NUCHAE

-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 vertebrae with its anterior border being strongly attached to the cervical spines in between.



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.

Questions (MCQs)

1- the type of joint between two articular processes is:

A- cartilaginous B- synovial C- intervertebral disc D-none of these

2- all the cervical vertebrae articulate with each other by intervertebral discs except :

A- C1,C2 B-C2,C3 C- C3,C4 D- C4,C5

3- the LIGAMENTUM NUCHAE extends from..... to ..... ?

A- skull, CVII B- skull,CVI C- CI,CVII D- CI, CVII.

4- foramen transversarium is present on:

A- Spinous process B- Transverse process C- Pedicles D- Lamina

5- The cervical vertebral foramen is:

A- Triangular B- Oval C- flattened D- non of the above

Questions (SAQ)

1-What is the main features of the cervical vertebrae?

2- What type of joints are found between the atlas and the axis?

3- What is the difference between the movement of Atlanto-Occipital Joints and Atlanto-Axial Joints?
Enumerate the movements of Atlanto-occipital joint?

4- Which kind of connective tissue is the Intervertebral disc is made of?

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

Questions (true or false)

1-There is a plate of hyaline cartilage between two intervertebral discs.

2- The articular facets are covered with hyaline cartilage, and the joints are surrounded by a capsule.

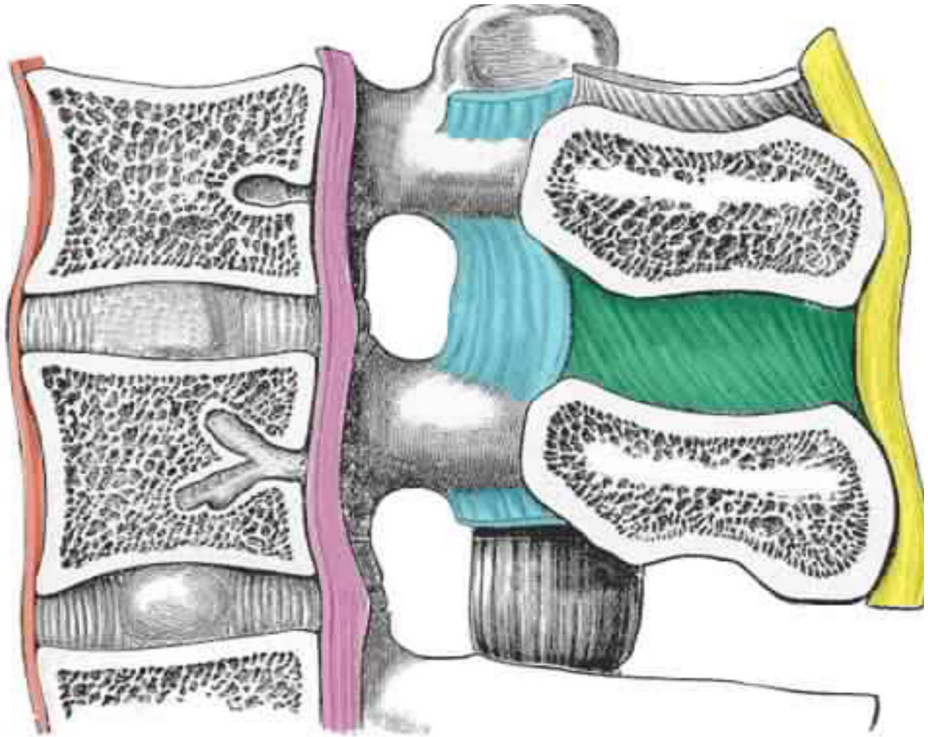
3- Movement of the Atlanto-Occipital joints include rotation.

4- The Atlanto-Occipital joint allow you to say yes.

5- The spinous process of the typical cervical vertebra is short and not bifid.

Questions (OSPE)

Q:Name the colored structures.



A:

- Anterior longit. ligament
- Posterior longit. ligament
- Ligamentum flavum
- Interspinal ligament
- Supraspinous ligament

Answers:

MCQ:

1-(B)
2-(A)
3-(A)
4-(B)
5-(A)

SAQ:

1-Foramen transversarium and bifid spine
2- Synovial joints
3- 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)
4- Fibrocartilage
5- 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.

True & False:

1-False
2-True
3-False
4-True
5- False

Team Members

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Afnan Abdulaziz Almustafa
Ahad Algrain
Alanoud Almansour
Albandari Alshaye
AlFhadah abdullah alsaleem
Arwa Alzahrani
Dana Abdulaziz Alrasheed
Dimah Khalid Alaraifi
Ghada Alhaidari
Ghada Almuhanna
Ghaida Alsanad
Hadeel Khalid Awartani
Haifa Alessa
Khulood Alwehabi
Layan Hassan Alwatban
Lojain Azizalrahman
Lujain Tariq AlZaid
Maha Barakah
Majd Khalid AlBarrak
Norah Alharbi
Nouf Alotaibi
Noura Mohammed Alothaim
Rahaf Turki Alshammari
Reham Alhalabi
Rinad Musaed Alghoraiby
Sara Alsultan
Shahad Alzahrani
Wafa Alotaibi
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Abdullah Almeaither
Yazeed Aldossari
Muath Alhumood
Abdulrahman Almotairi
Abdulelah Aldossari
Abdulrahman Alduhayyim
Hamdan Aldossari
Abdullah Alqarni
Mohammed Alomar
Abdulrahman Aldawood
Saud Alghufaily
Hassan Aloraini
Khalid Almutairi
Abdulmajeed
Alwardi
Abdulrahman Alageel
Rayyan Almousa
Sultan Alfuhaid
Ali Alammari
Fahad alshughaithry
Fayez Ghiyath
Aldarsouni
Mohammed Alquwayfili
Abduljabbar Al-yamani
Sultan Al-nasser
Majed Aljohani
Zeyad Al-khenaizan
Mohammed Nouri
Abdulaziz Al-drgam
Fahad Aldhowaihy
Omar alyabis