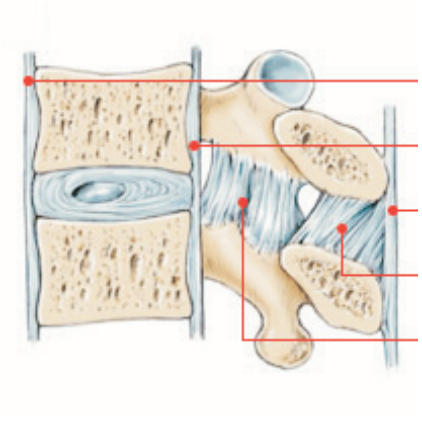
Ligamentous apparatus (ligaments) of the spinal column

· Main components of the spinal column · Anatomy

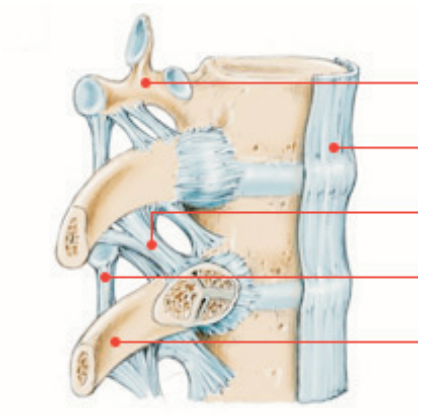
The stability and mobility of the spinal column is maintained by an extensive interwoven network of strong ligamentous structures supported by the back muscles.
The anterior longitudinal ligament (1) (ligamentum longitudinale anterius) forms a bordering lamella between the vertebral body and the abdominal or thoracic cavity in the form of a broad band drawn across the front (anterior) sides of all vertebrae from the sacrum to the head.
The posterior longitudinal ligament (2) (ligamentum longitudinale posterius) runs along the back (posterior) surface of the vertebral body and therefore lines the anterior wall of the spinal canal.
The supraspinal ligament (3) (ligamentum supraspinale) is the third longitudinal ligament running from the sacrum up to the spinous process of the 7th cervical vertebra, covering all spinous processes along the way.
The yellow ligament (4) (ligamentum flavum) lies between the vertebral arches.
The interspinal ligaments (5) (ligamenta interspinalia) stretch between the spinous processes.
The intertransverse ligaments (6) (ligamenta intertransversaria) the transverse processes with one another.
The costotransverse ligaments (7) (ligamenta costotransversaria) connect the ribs to each other.

• Cross-sectional view of vertebral ligamentous connections



· Ligamentum longitudinale anterius, anterior longitudinal ligament (1)
· Ligamentum longitudinale posterius, posterior longitudinal ligament (2)
· Ligamentum supraspinale, supraspinal ligament (3)
· Ligamentum interspinale, interspinal ligament (5)
· Ligamentum flavum, yellow ligament (4)

• Side view of vertebral ligamentous connections – thoracic spine



· Transverse process, processus transverses
· Ligamentum longitudinale anterius, anterior longitudinal ligament (1)
· Ligamentum costotransversarium, costotransverse ligament (7)
· Ligamentum intertransversarium, Intertransverse ligament (6)
· Rib, costa

The ligamentous apparatus and vertebral joints of the atlanto-occipital and atlanto-axial joints, which connect and the 1st and 2nd cervical vertebrae (atlas and axis) and the head while allowing them to move, have some special features that different from those in other spinal segments. These two joints act together to facilitate movements and function similarly to a ball and socket joint.

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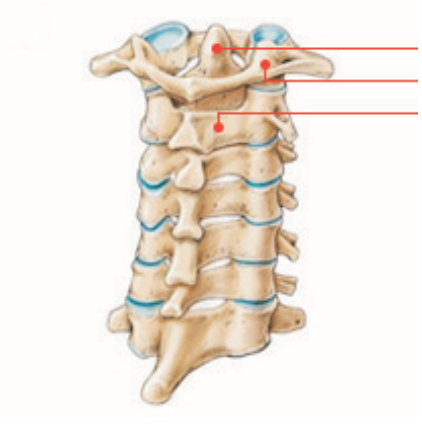
• Rear view of the cervical spine



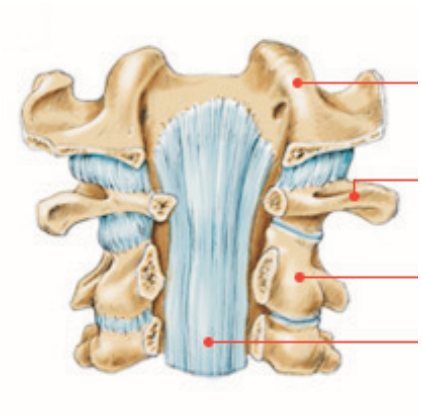
· Dens axis
· 1st cervical vertebra, atlas
· 2nd cervical vertebra, axis

The atlanto-occipital joint connects the occipital bone (os occipitale) to the articular processes of the 1st cervical vertebra (atlas), providing for head mobility as follows:
· up to 20° flexion (forward motion)
· up to 30° extension (backward motion)
· up to 15° lateral motion (sideward motion)
The atlanto-axial joint connects the 1st and 2nd cervical vertebrae and is made up of three components (2 lateral components and a middle component). It is a rotation joint that rotates around the fixed pivot of the 2nd cervical vertebra (dens axis).

The atlanto-axial joint allows the head to turn up to about 30°.

The individual head joints are not highly mobile per se; it is the interplay of the two head joints with the other cervical vertebrae that gives the head its great range of mobility. The stability of the connection between the 1st and 2nd cervical vertebrae, the atlanto-occipital and atlanto-axial joints and the head is maintained by a strong ligamentous apparatus.

• Ligamentous apparatus of the atlanto-occipital and atlanto-axial joints, upper cervical spine from the rear; parts of the occipital bone and the arches of the 1st-3rd cervical vertebrae have been removed.



· Occipital bone, os occipitale
· Atlas, 1st cervical vertebra
· Axis, 2nd cervical vertebra
· Tectorial membrane, membrana tectoria

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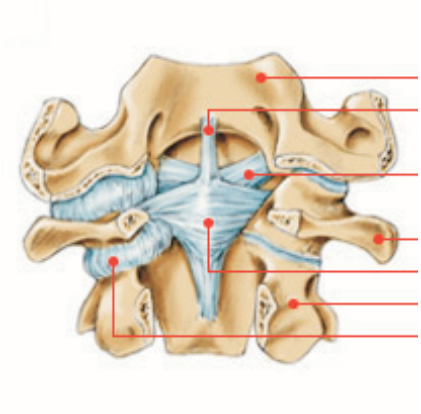
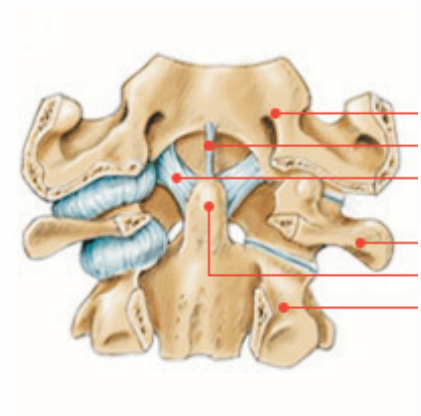
• Ligamentous apparatus of the atlanto-occipital and atlanto-axial joints, rear view of the upper cervical spine, tectorial membrane removed, the cruciform ligament connects the atlas, axis and occipital bone, the alaria ligaments connect the dens axis with the occipital bone and the atlas.



· Occipital bone (os occipitale)
· Cruciform ligament (ligamentum cruciforme), superior crux (crus superius)
· Alaria ligaments (ligamenta alaria)
· Atlas
· Cruciform ligament of the atlas (ligamentum cruciforme atlantis)
· Axis
· Vertebral joint capsule

• Ligamentous apparatus of the atlanto-occipital and atlanto-axial joints, rear view of the upper cervical spine, the cruciform ligament has been removed; the fixation ligaments of the dens axis (alaria ligaments and apical dental ligament) are exposed.



· Occipital bone
· Apical dental ligament
· Alaria ligaments
· Atlas
· Dens axis
· Axis