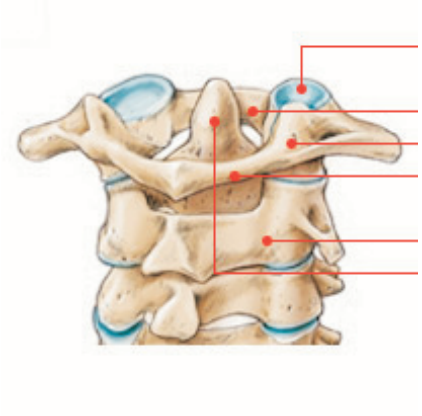
Welche anatomischen Besonderheiten zeigt die obere Halswirbelsäule (C0-C2)?

The forms of the first and second cervical vertebrae, atlas (C1) and axis (C2), differ considerably from those of the other vertebrae to ensure the fixation and mobility of the head.

• Atlas (C1) and axis (C2), from the rear



· Atlas (C1) with Fovea articularis superior

· Anterior arch (arcus anterior)
· Massa lateralis
· Posterior arch (arcus posterior)

· Axis (C2)
· Dens axis

The ring-shaped atlas (C1) carries the head and consists of two side pieces, massae laterales, connected by the anterior and posterior arches. The atlas is connected to the occipital bone of the skull via joint facets (fovea articularis superior) on the massae laterales, forming the atlantooccipital joint. This joint allows the head to move forward, backward and slightly to the side.

• Atlas (C1), view from above

The 2nd cervical vertebra (axis) provides the transition from the 1st cervical vertebra to the lower cervical spine by virtue of the special structure of its vertebral body and its pivot-shaped process, the dens axis, which extends into a gap in the 1st cervical vertebra.
The dens axis is held in position by a taut ligament to keep it from damaging the spinal cord.

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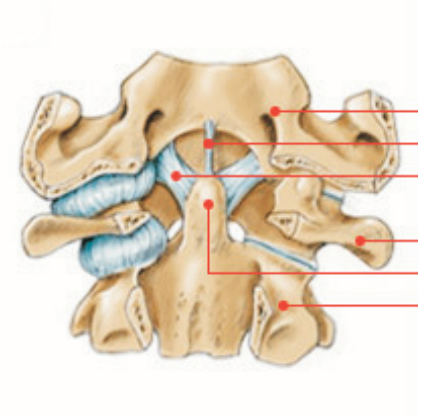
• Axis (C2), view from above

With the 4 atlantoaxial joints, the atlas and axis facilitate rotating movement of the head, where the atlas rotates eccentrically about the dens axis.
Atlas, axis, and occiput are connected by a complex ligamentous apparatus which, together with the atlantooccipital joints, the atlantoaxial joints, and the corresponding muscles, gives the head its great range of mobility.

• Ligamentous apparatus of the atlantooccipital and atlantoaxial joints, deep layer of upper cervical spine viewed from the rear, cruciform ligament removed; the ligaments fixing the dens axis (alar ligaments and apical odontoid ligament) are exposed.

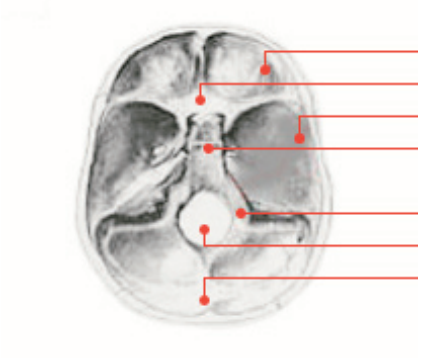


Occipital condyle fractures

Where is this injury located?

The occiput (os occipitale) forms the rear portion of the bony cranium and the occipital foramen (foramen magnum), through which the spinal cord extension (medulla oblongata) extends from the brain to the spinal column. The lower portion of the os occipitale (pars basilaris) forms the posterior skull base. The condyles of the occipital bone (condylus occipitalis) are found in the region of the pars lateralis of the occiput, on the outer side. The condyles are connected to the joint facets (fovea articularis superior) of the 1st cervical vertebra (atlas). These joint connections, together with the complex ligamentous apparatus, form the atlantooccipital joint (C0/C1).

• Base of the skull, interior view



· Os frontale, frontal bone
· Os sphenoidale, sphenoid bone
· Os temporale, temporal bone
· Pars basilaris of the occipital bone
· Pars lateralis of the occipital bone
· Foramen magnum
· Os occipitale, occipital bone

How are occipital condyle fractures classified?

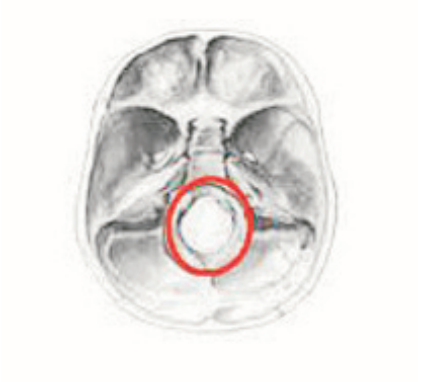
Occipital (os occipitale) condyle fractures are classified by Jeanneret in 4 subtypes.

Subtype I is a skull base fracture extending to the occipital foramen (foramen magnum), often involving the foramen nervi hypoglossi (exit canal of the 12th cranial nerve) in the fracture, potentially resulting in neurological deficits in the area supplied by this nerve (paralysis of the tongue and tongue muscles, speech deficits).

• Base of the skull, interior view, Jeanneret subtype I

Subtype II is a ring fracture of the base of the skull around the foramen magnum that may involve one or both of the occipital condyles. This fracture type is normally fatal.

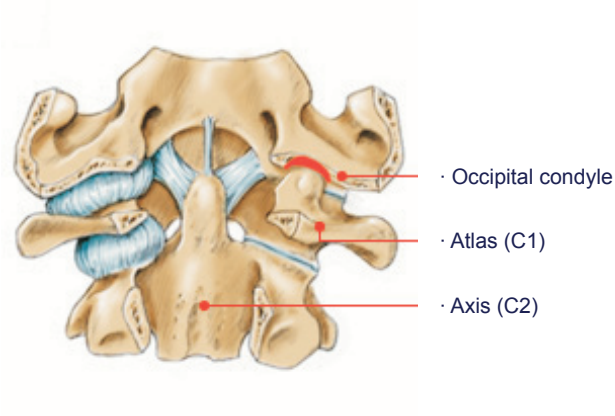
• Base of the skull, interior view, Jeanneret subtype II



Subtype III is a unilateral or bilateral compression fracture of the occipital condyles, which occasionally occurs in combination with a fracture of the massa lateralis of the atlas.

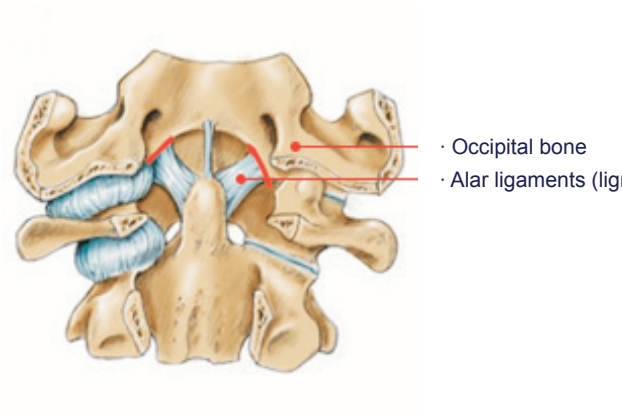
Occipital bone

• Upper cervical spine, C0-C2, dorsal view, Jeanneret subtype III



Subtype IV is a unilateral or bilateral rupture of the alar ligaments (ligmenta alaria) , frequently coupled with an atlantooccipital

• Upper cervical spine, C0-C2, dorsal view, Jeanneret subtype IV



What accident mechanisms result in occipital condyle injuries?

Injuries of the occipital condyles are usually caused by severe axial compression acting upon the upper cervical spine.

What are the symptoms of this injury?

Depending on the fracture type, a range of mild symptoms are observed including some neck and head pain, nausea and vertigo. If vital centers in the medulla oblongata are affected, death may occur immediately. Depending on the fracture type, the inferior cranial nerves may be affected (nervus abducens, nervus facialis, nervus hypoglossus).

How is it diagnosed?

These injuries are not visible in normal x-rays of the cervical spine.
Computer tomography allows for an exact diagnosis and may also detect any secondary injuries sustained by the atlantooccipital joints C0/C1.

How are condyle fractures treated?

Isolated fractures without avulsed ligaments are normally treated conservatively by immobilization with a cervical brace or halo brace. Condyle fractures with pronounced dislocation and compression (stenosis) of the upper cervical medulla must be decompressed and stabilized.
Surgical reconstruction of the dislocated condylar fragment can be done, for example, by anterior repositioning of the dislocated fragment and anterior and posterior fusion together with the decompression of the cervical medulla.