

Atlanto-axial subluxation

- [Nazheng stretch-rotation manipulation in the treatment of atlantoaxial subluxation in children: A case report](#)
- [The Impact of Atlantoaxial Intra-Articular Fusion on Cervical Spine Curvature and Sagittal Balance](#)
- [A novel Z-shaped anti-rotation rod for atlantoaxial dislocation reduction: finite element analysis](#)
- [Prolonged glucocorticoid use and rheumatoid arthritis-associated cervical spine deformity](#)
- [Severe Kyphosis with Os Odontoideum in Chondrodysplasia Punctata and the Case for Occipitocervical Fusion: A Case Report](#)
- [Infliximab use and cervical spine deformity in patients with rheumatoid arthritis](#)
- [Atlantoaxial rotary subluxation in children after trampoline injury: A critical but overlooked diagnosis](#)
- [Axis 4-screw technique for occipital-cervical fixation in the treatment of atlantoaxial dislocation with axis osseous deformity: a retrospective study with a minimum 1-year follow-up](#)

Atlanto-axial [subluxation](#) (AAS) is a disorder of [C1-C2](#) causing impairment in rotation of the [neck](#). The anterior facet of C1 is fixed on the facet of C2. It may be associated with dislocation of the lateral mass of C1 on C2.

Atlantoaxial instability (AAI) is characterized by excessive movement at the junction between the [atlas](#) (C1) and [axis](#) (C2) as a result of either a bony or [ligament](#) abnormality.

Atlantoaxial instability with and without [basilar invagination](#) poses a considerable challenge in management regarding reduction, surgical approach, decompression, instrumentation choice, and extent of fusion. A variety of strategies have been described to reduce and stabilize cranial settling with basilar invagination.

Epidemiology

Atlantoaxial [dislocation](#) (AAD) is the most common bony [craniovertebral junction](#) (CVJ) anomaly followed by [basilar invagination](#) (BI) and [assimilation of the atlas](#).

Atlantoaxial dislocation in children is a very rare condition.

Classification

Antero-posterior subluxation

[Atlantoaxial rotatory subluxation](#).

The **Fielding classification** is commonly used to categorize **atlanto-axial subluxation** based on

the degree of displacement and the associated neurological or ligamentous damage. This classification system is primarily used to assess subluxations that occur due to trauma or inflammatory diseases, particularly in cases of rheumatoid arthritis or other conditions that lead to instability in the cervical spine.

Fielding Classification for Atlanto-Axial Subluxation

The etiology and pathological morphology of atlantoaxial dislocation (AAD) are complex. Based on the pathological anatomical characteristics of AAD, combined with clinical techniques, it is essential to formulate reasonable classification criteria and develop corresponding treatment strategies for different types of AAD. The satisfactory outcome of surgical treatment for AAD can only be achieved through the comprehensive application of various atlantoaxial reduction techniques, tension band releasing techniques, internal fixation, and fusion techniques. This article discusses the latest advancements in surgical treatment techniques for AAD, thoroughly explores treatment strategies based on different types of AAD, and analyzes the practicality and effectiveness of clinical classification and treatment strategies. The posterior atlantoaxial facet releasing and distraction compression reduction technique may pose challenges to traditional treatment strategies in the future. In the development of surgical treatment techniques for AAD, micro spinal surgical techniques may play a significant role in improving surgical methods and enhancing treatment outcomes ¹⁾.

Etiology

[Atlanto-axial subluxation etiology](#).

Atlanto-axial subluxation in rheumatoid arthritis

see [Atlanto-axial subluxation in rheumatoid arthritis](#).

As a manifestation of [ankylosing spondylitis](#) (juvenile and adult onset), reactive arthritis, juvenile idiopathic arthritis.

Craniocervical malformation

Congenital [os odontoideum](#)

[Odontoid fracture](#)

Disruption of transverse ligament

Atlantoaxial fracture

[Chiari malformation](#) and herniation of the cerebellar tonsils into the foramen magnum appears to the

natural protective phenomenon in the face of atlantoaxial instability ²⁾.

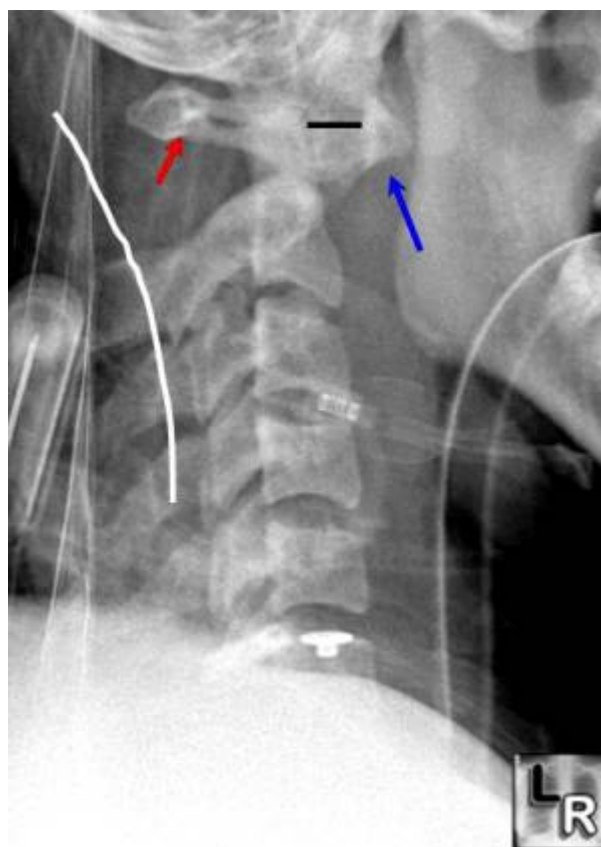
Upper cervical spinal epidural abscess (UCEA) (occiput to C2) is an uncommon condition. In upper cervical spine infections, degradation of the odontoid ligaments with subsequent Atlanto-axial subluxation or dislocation is a risk.

Clinical Features

Neurologic symptoms occur when the spinal cord is involved.

AAD commonly present with progressive neurologic deficits due to compression of high **cervical cord**, lower **brainstem** and lower **cranial nerves**. Less commonly patient's with AAD may also present with neurologic symptoms attributable to vascular compromise at the CVJ ³⁾.

Diagnosis



Distance between the anterior surface of the dens and the posterior surface of the tubercle of C1 is usually 3 mm or less in adults and 5 mm or less in children. This space is called by many names: predentate space, predental space, atlantodental distance.

The distance may increase slightly on flexion in children but is usually unchanged between flexion and extension in adults.

Forward movement of the atlas on the axis is normally restricted by the [transverse ligament](#).

Atlantoaxial instability is defined by an increase in the predentate space of greater than 3 mm in adults and 5 mm in children

Radiographic features

Plain film (C spine)

In a non traumatic setting flexion and extension views may be performed. The expected distance between anterior arch of C1 and the dens in the fully flexed position should be <3 mm in an adult (~5 mm in a child).

In a vertical subluxation the dens is often above the McGregor line by over 8 mm in men and 9.7 mm in women

CT

On CT, C1 is not oriented in line with the head. The head may be pointed anteriorly, C1 is turned. If this is a fixed defect, C2 is rotated in conjunction with C1.

Predisposing factors

Congenital

os odontoideum

Down syndrome (20%)

Morquio syndrome

spondyloepiphyseal dysplasia

[Osteogenesis imperfecta](#)

Marfan disease

neurofibromatosis type 1 (NF1)

Arthritides

rheumatoid arthritis

psoriatic arthritis

Reiter syndrome (reactive arthritis)

ankylosing spondylitis

systemic lupus erythematosus (SLE)

Acquired

trauma

retropharyngeal abscess/Grisel syndrome

Differential diagnosis

[Atlanto-axial rotatory subluxation.](#)

Odontoid fracture.

Atlanto-axial subluxation in Down syndrome

[Atlanto-axial subluxation in Down syndrome](#)

Treatment

[Atlanto-axial Subluxation Treatment.](#)

Traumatic atlantoaxial dislocation

Posterior atlantoaxial dislocation (AAD) is rare and mostly follows trauma to the craniovertebral junction (CVJ).

Biomechanics include a significant force with severe hyperextension and cranial traction at CVJ. This is known to be associated with extensive facial injuries ^{4) 5)}.

Traumatic posterior atlantoaxial dislocation without fracture of odontoid process usually presents without a severe neurological deficit. Even if it presents with mild or transient neurological deficit, it would be restored without any residual deficits. Closed reduction is usually successful and safe. The need for fusion after successful closed reduction depends on the integrity of the [transverse ligament](#) and the stability of cervical spine. If anatomic reduction is not achieved by closed reduction, open reduction and fusion should be performed.

Case series

see [Atlanto-axial subluxation case series.](#)

Case reports

[Atlanto-axial subluxation case reports.](#)

Case report from the HGUA



[Atlanto-axial subluxation](#) with a predominant right-sided component (difficulty in right [rotation](#)), accompanied by wedging of the right posterior [lateral mass](#) of C1 and tearing of the [odontoid process](#), which has migrated with the anterior [arch](#) of C1, causing secondary compression of the posterior arch of the [atlas](#) in the vertebral canal.

It is challenging to reduce.

[C1-C2 wiring](#) involves significant technical difficulty with a higher risk of [myelopathy](#).

1)

Zhang C, Chen Z. [Advances in the technology of surgical treatment for atlantoaxial dislocation]. Zhonghua Wai Ke Za Zhi. 2024 Jan 30;62(3):182-186. Chinese. doi: 10.3760/cma.j.cn112139-20231219-00287. Epub ahead of print. PMID: 38291633.

2)

Goel A. Is atlantoaxial instability the cause of Chiari malformation? Outcome analysis of 65 patients treated by atlantoaxial fixation. J Neurosurg Spine. 2015 Feb;22(2):116-27. doi: 10.3171/2014.10.SPINE14176. PubMed PMID: 25415487.

3)

Menezes AH, Traynelis VC. Anatomy and biomechanics of normal craniovertebral junction (a) and biomechanics of stabilization (b) Childs Nerv Syst. 2008;24:1091-100.

4)

Jiang LS, Shen L, Wang W, Wu H, Dai LY. Posterior atlantoaxial dislocation without fracture and neurologic deficit: A case report and the review of literature. Eur Spine J. 2010;19:S118-23.

5)

Haralson RH, 3rd, Boyd HB. Posterior dislocation of the atlas on the axis without fracture. Report of a case. J Bone Joint Surg Am. 1969;51:561-6.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

https://neurosurgerywiki.com/wiki/doku.php?id=atlanto-axial_subluxation

Last update: **2024/12/29 15:09**

