

Atlanto-Axial Subluxation Treatment

- [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 condition where there is abnormal movement or instability between the atlas (C1) and the axis (C2) vertebrae. Treatment depends on the cause, severity, and presence of neurological symptoms.

1. Conservative Management (Mild, Stable Cases)

1. Immobilization:

1. Soft or hard cervical collar (Philadelphia collar)
2. Halo vest for more rigid immobilization in some cases

2. Medication:

1. Nonsteroidal anti-inflammatory drugs (NSAIDs) for pain relief
2. Muscle relaxants if muscle spasm is contributing
3. Corticosteroids for inflammatory causes (e.g., rheumatoid arthritis)

3. Physical Therapy:

1. Strengthening and stabilization exercises once pain is controlled
2. Avoiding excessive neck movement

2. Surgical Treatment (Unstable or Neurologically Compromised Cases)

1. [Posterior C1-C2 Fusion](#)

1. Gold standard for unstable AAS
2. Techniques: Magerl's screw fixation, Harms' technique, or wiring techniques (e.g., Gallie, Brooks-Jenkins)

1. [Transoral Odontoidectomy](#)

1. For severe anterior compression of the spinal cord, especially in cases of congenital or inflammatory pannus

1. [OccipitoCervical Fusion](#)

1. If instability extends beyond C1-C2

3. Disease-Specific Management

1. Rheumatoid Arthritis-Associated AAS

see [Rheumatoid Arthritis treatment](#)

1. Surgical fusion if instability worsens
 2. **Trauma-Related AAS**
 3. Immediate immobilization
 4. Surgery if instability is significant
 5. **Congenital or Down Syndrome-Associated AAS**
 6. Regular monitoring with imaging
 7. Surgery if significant instability
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The earlier treatment paradigms of [Atlanto-Axial Subluxation](#) treatment focused on [transoral](#) excision of the dens followed by posterior instrumented fusion.

The more recent therapies have focused on a single-stage correction using joint distraction or more recently using corrective motions in both the vertical and horizontal axis, thus shifting the attention to the joints.

The shift in philosophy in treatment has also encouraged studies, which have examined various joint parameters (in both cases and controls) and have defined normal and abnormal parameters.

Sagittal joint inclination and craniocervical tilt significantly correlated with both BI and AAD ($P < .01$). Coronal joint inclination correlated with BI ($P = .2$). The mean sagittal joint inclination value in control subjects was $87.15 \pm 5.65^\circ$ and in patients with BI and AAD was $127.1 \pm 22.05^\circ$. The mean craniocervical tilt value in controls was $60.2 \pm 9.2^\circ$ and in patients with BI and AAD was $84.0 \pm 15.1^\circ$. The mean coronal joint inclination value in control subjects was $110.3 \pm 4.23^\circ$ and in patients with BI and AAD was $121.15 \pm 14.6^\circ$.

It is a important role of joint orientation and its correlation with the severity of BI and AAD and has described new joint indexes ¹⁾.

There are no pharmacologic interventions for atlantoaxial instability (AAI). Because of the chronicity of the instability at the time of presentation in most cases, corticosteroids have little, if any, impact on neurologic findings and may present many undesirable outcomes. In the acute traumatic setting, corticosteroids remain controversial in the literature. Current guidelines provided by the American Academy of Neurological Surgeons (AANS) include level I evidence against the use of corticosteroids or gangliosides in the acute trauma patient.

Unless symptoms of spinal cord compression occur, AAI requires no treatment. Once symptoms arise, cervical spine stabilization is indicated until surgical stabilization is performed.

In persons with rotatory displacement, the time of presentation dictates the treatment. Most of these patients' conditions resolve spontaneously, and additional care is not sought.

Patients presenting with subluxation of less than 1 week's duration are treated with a soft collar and

rest for a week. If close follow-up fails to document reduction, a period of halter traction with analgesics and muscle relaxants is warranted. If this fails, halo bracing can be undertaken.

In patients with rotatory displacement of more than 1 month's duration, a period of halo traction for 3 weeks is tried. Usually, two types of patients are in this group: (1) those whose subluxation resolves with bracing but recurs when bracing stops and (2) those who usually present with a fixed deformity.

Atlanto-axial ventral stabilisation using 3D-printed patient-specific drill guides for placement of bicortical screws in dogs

Toni et al. reported the outcome and complications following atlanto-axial stabilisation by polymethylmethacrylate applied to screws placed using 3D-printed patient-specific drill guides.

Materials and methods: Case series of dogs treated with this technique between May 2016 and August 2018 including pre- and post-operative modified Frankel score, imaging and complications. Screw placement was graded using a modified Zdichavsky classification based on post-operative CT. Telephone follow-up was obtained for surviving dogs.

Results: Twelve cases were included. At presentation, modified Frankel score was 3 in five dogs and 4 in seven dogs on presentation. Of 61 bicortical screws placed, 57 (93%) were fully contained within the pedicle and vertebral body and four (7%) partially breached the medial pedicle wall. Post-operative CT revealed good alignment of C1 and C2 in all planes. Reversible perioperative adverse events were described in five of 12 dogs and two dogs were euthanased shortly after discharge. At 18 to 50 days after surgery eight dogs had improved neurological status. Neurological status remained unchanged in the remaining two dogs. All dogs were reported ambulatory and pain-free at telephone follow-up (median 405 days post-surgery, range 180 to 780 days).

Clinical significance: This technique resulted in safe bicortical screw placement in dogs with atlanto-axial subluxation ²⁾.

¹⁾

Chandra PS, Goyal N, Chauhan A, Ansari A, Sharma BS, Garg A. The severity of basilar invagination and atlantoaxial dislocation correlates with sagittal joint inclination, coronal joint inclination, and craniocervical tilt: a description of new indexes for the craniovertebral junction. *Neurosurgery*. 2014 Dec;10 Suppl 4:621-30. doi: 10.1227/NEU.0000000000000470. PubMed PMID: 25320950.

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Toni C, Oxley B, Behr S. Atlanto-axial ventral stabilisation using 3D-printed patient-specific drill guides for placement of bicortical screws in dogs [published online ahead of print, 2020 Aug 12]. *J Small Anim Pract*. 2020;10.1111/jsap.13188. doi:10.1111/jsap.13188

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