

# Transverse ligament injury

Excessive laxity of the posterior [transverse ligament](#) can lead to [atlantoaxial subluxation](#), a common [complication](#) in Down's Syndrome patients.

The transverse ligament is the primary restraint against atlantoaxial, anteroposterior movement.

Anterior and posterior [atlantodental interval](#) values indicate that complete destruction of the transverse ligament coupled with alar and/or capsular ligament compromise is requisite if advanced levels of atlantoaxial subluxation are present <sup>1)</sup>.

## Diagnosis

The [rule of Spence](#) is a radiographic method that attempts to determine the integrity of the [transverse ligament](#) when doing an open mouth (odontoid view) radiograph.

If the combined measurement of the right and left lateral masses of C1 hang over the lateral masses of C2 by more than 6.9 mm then there should be concern for a possible transverse ligament injury and the patient should get an [MRI](#) or flexion or extension imaging. While the data supporting its ability to correlate it can be one of several radiographic methods when assessing for cervical spine injuries. If there is any doubt or concern, an MRI is warranted.

## Case series

Among 125 patients with craniovertebral junction injuries, 40 (32%) had atlas fractures, 59 (47.2%) odontoid fractures, 31 (24.8%) axis fractures, and 4 (3.2%) occipital condyle fractures. TAL disruption was documented on MRI in 11 cases (8.8%). The average ADI for TAL injury was 1.8 mm (range 0.9-3.9 mm). Nine (81.8%) of the 11 patients with TAL injury had an ADI of less than 3 mm. In 10 patients (90.9%) with TAL injury, overhang of the C-1 lateral masses on C-2 was less than 7 mm. ADI, ALD1, ALD2, ALD1 - ALD2, and ALD1/ALD2 did not correlate with the integrity of the TAL.

CONCLUSIONS No current measurement method using CT, including the ADI, ALD1, and ALD2 or their differences or ratios, consistently indicates the integrity of the TAL. A more reliable CT-based criterion is needed to diagnose TAL disruption when MRI is unavailable <sup>2)</sup>.

---

Ten human cadaveric occipitocervical specimens were mounted horizontally in a supine posture with wooden inserts attached to the back of the skull to maintain a neutral or flexed (10°) posture. Specimens were scanned in neutral and flexed postures in a total of 4 conditions (3 conditions in each specimen): 1) intact (n = 10); either 2A) after a simulated Jefferson fracture with an intact TAL (n = 5) or 2B) after a TAL disruption with no Jefferson fracture (n = 5); and 3) after TAL disruption and a simulated Jefferson fracture (n = 10). The atlantodental interval (ADI) and cross-sectional canal area were measured. RESULTS From the neutral to the flexed posture, ADI increased an average of 2.5% in intact spines, 6.25% after a Jefferson fracture without TAL disruption, 34% after a TAL disruption without fracture, and 25% after TAL disruption with fracture. The increase in ADI was significant with both TAL disruption and TAL disruption and fracture (p < 0.005) but not in the other 2 conditions (p >

0.6). Changes in spinal canal area were not significant ( $p > 0.70$ ). CONCLUSIONS This novel method was more sensitive than the rule of Spence for evaluating the integrity of the TAL on CT and does not increase the risk of further neurological damage <sup>3)</sup>.

<sup>1)</sup>

Puttlitz CM, Goel VK, Clark CR, Traynelis VC, Scifert JL, Grosland NM. Biomechanical rationale for the pathology of rheumatoid arthritis in the craniovertebral junction. Spine (Phila Pa 1976). 2000 Jul 1;25(13):1607-16. PubMed PMID: 10870135.

<sup>2)</sup>

Perez-Orribo L, Snyder LA, Kalb S, Elhadi AM, Hsu F, Newcomb AG, Malhotra D, Crawford NR, Theodore N. Comparison of CT versus MRI measurements of transverse atlantal ligament integrity in craniovertebral junction injuries. Part 1: A clinical study. J Neurosurg Spine. 2016 Jun;24(6):897-902. doi: 10.3171/2015.9.SPINE13808. Epub 2016 Feb 26. PubMed PMID: 26918572.

<sup>3)</sup>

Perez-Orribo L, Kalb S, Snyder LA, Hsu F, Malhotra D, Lefevre RD, Elhadi AM, Newcomb AG, Theodore N, Crawford NR. Comparison of CT versus MRI measurements of transverse atlantal ligament integrity in craniovertebral junction injuries. Part 2: A new CT-based alternative for assessing transverse ligament integrity. J Neurosurg Spine. 2016 Jun;24(6):903-9. doi: 10.3171/2015.9.SPINE13807. Epub 2016 Feb 26. PubMed PMID: 26918571.

From:

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

Permanent link:

[https://neurosurgerywiki.com/wiki/doku.php?id=transverse\\_ligament\\_injury](https://neurosurgerywiki.com/wiki/doku.php?id=transverse_ligament_injury)

Last update: **2024/06/07 02:57**

