Partial Injury to the Transverse Atlantal Ligament, causing Torticollis and Atlantoaxial Rotary Subluxation Instability. – A Case Report -

Jae-Hyuk Shin, M.D., Jiyong Jung, M.D., Kee-Won Rhyu M.D.*

Dept. of Orthopedic Surgery, St. Vincent’s Hospital, The Catholic Univ. of Korea, Suwon Korea

Introduction

Atlantoaxial rotary subluxation (AARS) is presented as torticollis and still can cause torticollis if it persists for more than three months. The mechanism of injury is often trivial trauma, other causes, including inflammation or respiratory tract infection. We present a case of AARS with partial injury to the transverse atlantal ligament, alar ligament, and apical ligament, which is adjacent to the synchondrosis intraoccipitalis anterior.

CASE

A 10-year old boy visited our emergency department with posterior neck pain accompanied by torticollis, with the head and chin in cock-robin deformity. The symptom developed while the boy was walking over irregular rocksurfaces (Fig 1AB).

Fig 1AB. 10/M pt sustains cock-robin deformity (A) during walking over irregular rock surfaces (B).

Fig 2AB. (A) Open mouth view show 1) asymmetric distance of the odontoid from the bilateral C1-lateral masses, 2) different sizes of the C1 lateral masses, indicating 3) rotation of C1. (B) AP & lat views demonstrate torticollis and that the C2-post arch is partially not superimposed. Atlantodental interval (ADI: 3.31mm), C2 line, prevertebral soft tissue thickness were unremarkable (C3:3.78mm, C7:5.33mm) of lower cervical injuries.

Fig 3AB. (A) Axial CT show an 8.4º rotation between C1-2. (B) Dynamic CT with maximal bilateral rotations shows a difference in the rotations capacity between the C1 and the C2 (Rt: Lt, 39.8º:31.1º: Δ = 8.7º).

Fig 4A-C. MRI shows partial disruption of the (A-B) transverse atlantal ligament, (B) the alar ligament on the Lt side, and (C) the apical ligament.

Fig 5. CT of the occipital condyle shows wedge-shaped depression in the articular surface, which is “synchondrosis intraoccipitalis anterior (SIA)” (arrow), known as normal developmental synchondrosis in the skull. The maximal condylar gap was Rt-6.24mm, Lt-5.94mm, respectively.

Fig 6. Following Halter Traction reduction, the AARS was reduced. Due to the remaining laxity, we recommended subsequent brace stabilization.

Discussion

We describe a patient who sustained an atlantoaxial subluxation with partial injury to the transverse atlantal ligament.

The alar ligament and the apical ligament are attenuated as well. AARS could be attributed to trauma or infection (Grisel's syndrome). Traumatic etiology include severe injuries such as cervical fractures to minor injuries. In the occipitoatlantal joint, the occipital condyles contribute largely to flexion and extension of the head and neck.

Synchondrosis intraoccipitalis anterior (SIA) is a wedge-shaped depression in the occipital condyle's articular surface. SIA is known as normal synchondrosis development in the skull between the lateral and anterior ossification centers. SIA usually disappears after 10-12 years of age.

Kaufman's condylar gap is the distance between the occipital condyles and the condylar facets of the atlas. The normal joint should be congruently <5mm throughout the joint. In this patient, SIA affected the occipitoatlantal joint's congruency, hypothetically weakening the mechanical stability of the occipitoatlantal joint, thereby increasing susceptibility to the AARS through the incidental subtle impact during walking over the irregular surface of rocks.

The study's limitation is that the C1-2 joint showed asymmetric rotation capabilities in the dynamic CT instead of the complete mechanical block of the C1-2 joint. However, we suggest that the asymmetric location of C1 concerning the C2 suggests subluxation of the joint before dislocation. Correlation between mechanical strength and loss of partial congruency in the occipitoatlantal joint through the SIA requires further investigation.

This case presents the occurrence of AARS with transverse atlantal ligament and associated adjacent ligament injuries caused by minor trauma in the SIA presence.

CONCLUSION

Pediatric torticollis with Atlantoaxial rotary subluxation (AARS) demands a high index of suspicion concerning the transverse atlantal ligament injury and the synchondrosis intraoccipitalis anterior (SIA).