Injuries of the occipitoatlantoaxial region (Oc-C2) are the predominant form of cervical injury in children younger than 10 years of age. Magnetic resonance (MR) imaging can be used to visualize directly the traumatic ligamentous and soft-tissue abnormalities of the Oc-C2 region. A retrospective review was undertaken to examine the spectrum of pediatric Oc-C2 injuries seen on MR imaging, their correlation with plain x-ray film and computerized tomography findings, and their clinical course.

Seventy-one consecutive children younger than 10 years of age underwent cervical MR imaging for evaluation of traumatic injury. Magnetic resonance imaging was used to document abnormalities in 23 children; 20 of these injuries involved the Oc-C2 region. Abnormalities in the Oc-C2 region included disruptions of the musculature, apical ligament, atlantooccipital joint(s), tectorial membrane, and spinal cord. A spectrum of injury with progressive involvement of these structures was seen, ranging from isolated muscular injury to the multiple soft-tissue and ligamentous disruptions with craniocervical dislocation. Involvement of the tectorial membrane was the critical threshold in the transition from stable to unstable injury. Analysis of plain x-ray films revealed that a novel interspinous C1-2:C2-3 ratio criteria of greater than or equal to 2.5 was predictive of tectorial membrane abnormalities on MR imaging, with 87% sensitivity and 100% specificity. In patients with tectorial membrane abnormalities who underwent immobilization alone, interim platybasia was demonstrated on follow-up MR images. Conclusions. A progressive spectrum of distinct Oc-C2 injuries can occur in young children; the tectorial membrane is a critical stabilizing ligamentous structure in the Oc-C2 complex; and tectorial membrane abnormalities may be identified by a C1-2:C2-3 ratio of greater than or equal to 2.5 [1)].

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Sun PP, Poffenbarger GJ, Durham S, Zimmerman RA. Spectrum of occipitoatlantoaxial injury in young children. J Neurosurg. 2000 Jul;93(1 Suppl):28-39. PubMed PMID: 10879755.