Tectorial membrane injury

The current knowledge base of craniocervical injury is very limited. A study of Child et al. showed that the key restraints to craniocervical instability are the alar ligaments, tectorial membrane, and the atlantooccipital joint capsules. Dissociation requires the complete incompetence of all three. The craniocervical traction test reliably demonstrates instability and requires no more than 5-10 lb of traction to perform [1].

The tectorial membrane is the major craniocervical stabilizer and plays an essential role in the pathogenesis of retroclival epidural hematoma (REH) [2].

It is a rare entity in the pediatric population. High-speed motor vehicle accidents (MVAs) are the predominant cause of injury [3].

Abrupt acceleration/decelerations in combination with craniocervical junction hyperextension/hyperflexion (eg, in MVAs) is believed to be causative of pediatric tectorial membrane injury with REH [4].

The postulated mechanism for tectorial membrane injury is sagittal dislocation of the odontoid process associated with disruption of the transverse ligament that detaches the tectorial membrane from the clivus. In children, the dura matter and tectorial membrane are not firmly attached to the skull; stripping tectorial membrane injury could result in traction damage to the adjacent vascular structures such as the basilar venous plexus and dorsal meningeal branch of the meningohypophyseal trunk. This may result in the accumulation of blood in the retroclival epidural space [5] [6] [7].

Tubbs et al [8] had reported an association with craniocervical junction dislocation and spinal cord injury. This may be explained by the larger mobility and ligamentous flexibility of the craniocervical junction in children, which indirectly “protects” the osseous structures of the craniocervical junction but enhances ligamentous injuries.

Diagnosis

Meoded et al. aimed to describe the neuroimaging findings in pediatric REHs, to summarize the mechanism of injury, and to correlate the imaging findings with the clinical presentation.

They retrospectively evaluated CT and/or MR imaging studies of 10 children with traumatic REH. Most patients were involved in MVAs. The tectorial membrane was injured in 70% of patients, and REHs were medium to large in 80%. None of the patients had a focal spinal cord or brain stem injury, craniocervical junction dislocation, or vertebral fractures. Tectorial membrane disruption was diagnosed in most patients without craniocervical junction-related symptoms. Tectorial membrane lesions and REHs were seen in young children who sustained high-speed head and neck injuries.

Clinical symptoms may be minimal or misleading. The radiologist should be aware of these injuries in children. MR imaging appears to be more sensitive than CT [9].

References

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