Celebrating 35 Years of the AJNR: July 1982 edition

AJNR Am J Neuroradiol 2017, 38 (7) 1461
doi: https://doi.org/10.3174/ajnr.P0038
http://www.ajnr.org/content/38/7/1461

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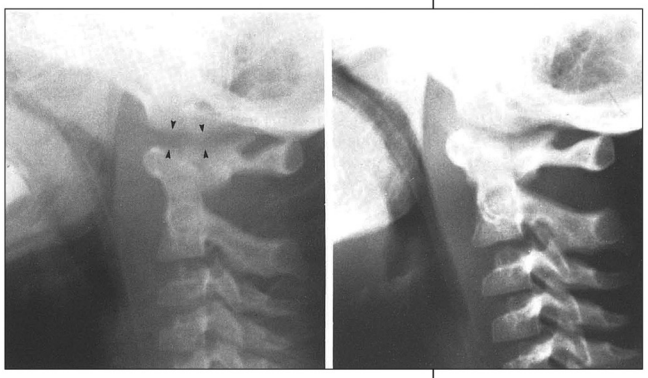

Traumatic Longitudinal Atlanto-occipital Distraction Injuries in Children

Traumatic atlanto-occipital dislocation with survival is possible and, in fact may be relatively more common than once thought. The spectrum of neurologic manifestations is broader than previously described and does not necessarily end in death or tragic neurologic deficit. Radiographic diagnosis of this injury may be difficult, particularly in the longitudinal distraction-dislocation type. Although several methods have been proposed to evaluate the atlanto-occipital relationship, none of these is infallible in the recognition of distraction injury in children. Immobilization rather than skeletal traction provides sufficient immediate stabilization when the dislocation at the atlanto-occipital junction is of the longitudinal distraction type. Three cases are reported: in one, death occurred early; in the second, recovery was partial, but sudden death occurred 2 years later; the third child recovered fully.

Traumatic atlanto-occipital dislocation is a rare injury of the craniovertebral junction and is thought to be immediately fatal in most instances [1]. There are but 16 well documented cases of survival following this injury; in three, death occurred within 36 hr. Nine of these 16 cases were adults. We report three children who were seen recently, two of whom survived this injury. The importance of longitudinal atlanto-occipital distraction is stressed, and several new aspects of this injury, its radiographic evaluation, and its treatment are suggested.

Case Reports

Case 1

A 5½-year-old girl was a passenger in the front seat of an auto when it hit a tree. Her head hit the dashboard and she slumped unresponsive in the front seat. She became apneic and cyanotic and immediate cardiopulmonary resuscitation (CPR) led to improvement in color.

On arrival at Children's Hospital Medical Center (CHMC) emergency room she had no palpable blood pressure, no spontaneous movement, and no spontaneous respiration. Neurologic examination revealed flaccid paralysis and absent deep tendon reflexes, but a positive response to deep pain in the lower extremities. Slight toe flexion occurred in response to plantar stimulation. Cranial nerves were intact. Her blood pressure responded to intravenous fluids and manual ventilation by resuscitation bag. She was cautiously intubated and placed on a ventilator, her neck immobilized. Bedside radiographs of the cervical spine showed longitudinal atlanto-occipital distraction (fig. 1), and the child was thought to have a brain stem contusion as well.

Within the first 10 days of admission she awoke and could respond to communication by blinking. There was some recovery of deep tendon reflexes in her lower extremities. She required posterior wiring of C1 to the occiput for atlanto-occipital stabilization. During the next 10 months she progressed slowly and eventually could vocalize weakly and move all four extremities weakly. She was alert and oriented and her mental status was normal. However, she suffered from speech difficulties and was unable to swallow solid foods. She continued to experience occasional nocturnal dusky episodes and required an apnea monitor at home. She died suddenly 2 years after injury. No autopsy was performed.

Received June 12, 1981; accepted after revision January 6, 1982.

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AJNR 3:415–419, July/August 1982
0195–6108/82/0304–0415 $00.00

Computed Tomographic Anatomy of the Temporal Bone

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With the recent development of high-resolution computed tomography (CT), there is a growing need to explore the full potential of this new method in demonstrating the detailed anatomy of the temporal bone. For this purpose, dry skulls with intact ossicles were scanned in axial and coronal projections. The detailed CT anatomy of the temporal bone was documented, complemented by images from live patients. Because of its superior contrast resolution, CT was able to demonstrate numerous structures, such as the tympanic membrane, ossicles, and supporting structures, hitherto never or poorly visualized by any other method. In addition, the ease by which axial sections of the temporal bone could be obtained is of great benefit in displaying several structures previously difficult to evaluate.

Computed tomographic (CT) scanning has proven to be indispensable in the evaluation of intracranial pathology, but its role in the evaluation of the temporal bone anatomy and pathology has not been fully explored [1]. Recent improvements in CT scanners have made available detailed information of the temporal bone [2], and certain structures that were previously poorly visible by other methods are now clearly seen [1–6]. The wealth of anatomic data displayed in various projections on CT poses a diagnostic challenge to neuroradiologists and clinicians. Furthermore, the understanding of the CT anatomy of the temporal bone is difficult due to complex
a single plane [7]. Our systema
taken to demonstrate and docu

Materials and Methods

All scans were obtained with a P
The scanner contains a detector ar
The detectors are collimated so th
beam. The x-ray beam width is narr
is collimated to 2 mm by a removat
The scanning algorithm is modif
and by decreasing the translation
two software modifications and c
resolution allowing visualization of
in Medicine phantom. The image is
in the usual manner.
Hounsfield [8] suggested that
degraded by graininess at pixel siz
projected the epithympanum into
rate would again be halved, 0.3 m
small pixel size, the zone of recons
It is possible to reconstruct only
simultaneously. This disadvantage
recomputing the opposite temporal

This article appears in the July/August 1982 issue of *AJNR* and the October 1982 issue of *AJR*.

Received March 9, 1981; accepted after revision January 6, 1982.

Presented at the annual meeting of the American Society of Neuroradiology, Chicago, April 1981.

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AJNR 3:379–389, July/August 1982
0195–6108/82/0304–0379 $00.00