Atlanto–Occipital Dislocation: a Case Report and Review of the Literature

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Althrough traumatic atlanto-occipital dislocation is perceived to be an uncommon injury frequently resulting in death, improvements in emergency management of the patient in the field, rapid transport, and better recognition have resulted in more survivors of atlanto-occipital dislocation in the past 2 decades. Infrequent observation of patients with atlanto-occipital dislocation and missed diagnosis may impair outcomes of patients with this unusual injury. The case of atlanto-occipital dislocation that is presented here is particularly interesting because the patient was missed diagnosis for eight months after the accident. He came to Prasat Neurological Institute by wheel chair with tetraparesis and could not help himself. After investigation by cervical spine radiograph and MRI of the cervical spine confirming the diagnosis, he was operated on the following day. The plates were fixed in the occipital bone and lateral mass of the cervical spine on both sides, craniectomy of the occipital bone at the foramen magnum and laminectomy C_1 for decompression, then auto bone graft was fused at the occiput and C_2. After the operation the patient was sent for 3 months physical therapy, he improved well and gained power of the extremities and could walk with a walker.

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Although traumatic atlanto-occipital dislocation is perceived to be an uncommon injury frequently resulting in death from transection of the brain stem, improvements in emergency management of the patient in the field, rapid transport, and better recognition have resulted in more survivors of atlanto-occipital dislocation in the past 2 decades[1-3]. Failed observation of patients with atlanto-occipital dislocation and missed diagnosis may impair the outcomes of patients with this unusual injury[4]. The case of atlanto-occipital dislocation that is presented here is particularly interesting because the patient had been misdiagnosed for months with a neurological deficit. After the patient was evaluated, investigated and then treated, his neurological status improved.

Case Report

The patient, a Thai male, 34 years old, had a motorcycle accident 1 year before. After the accident he developed tetraparesis and neck pain. He could hardly move the extremities and could not help himself. He was sent to a hospital in Bangkok but after 8 months there was no improvement. He was discharged and returned for treatment to his provincial hospital for 3 months without improvement. Then he came to Prasat Neurological Institute. Physical examination revealed neck pain, slow speech, tetraparesis (upper extremities gr III and lower extremities gr II) sensory deficit from upper extremities down, Barbinski and clonus positive bilaterally. Lateral plain radiograph and MRI of the cervical spine revealed anterior displacement of the atlanto-occipital dislocation (type I) (Fig. 1), and the dislocation was still irreducible. Because the dislocation was irreducible surgery for decompression and fixation was planned for the following day. Exposure to the

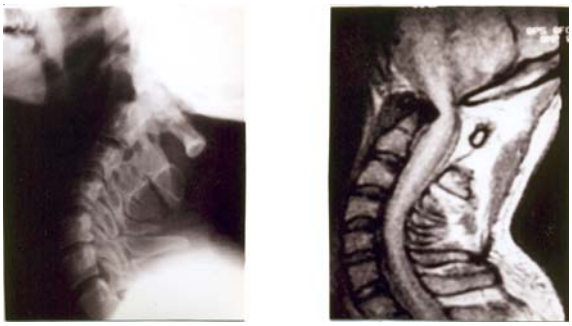

Fig. 1 Pre-operative plain x-ray film and MRI

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posterior cervical spine and occiput, then craniectomy of the occiput at the foramen magnum and laminectomy of C_1 for decompression were carried out. Plates were used to fix the occiput and the cervical spine at postero-lateral mass bilaterally, and using auto bone graft fusion at the occiput and C_2 (Fig. 2). After the operation the patient had no complaint of neck pain and the sensory deficit was decreased.The motor power was gained in the upper extremities gr III and lower extremities gr IV. Ten days after the operation he was sent for physical therapy and discharged three months later. Four years after the operation he came back for removal of the plate at the cervical spine. Motor power at that time was improved and he could walk with a walker. The upper extremities were gr III - IV and lower extremities were gr IV.

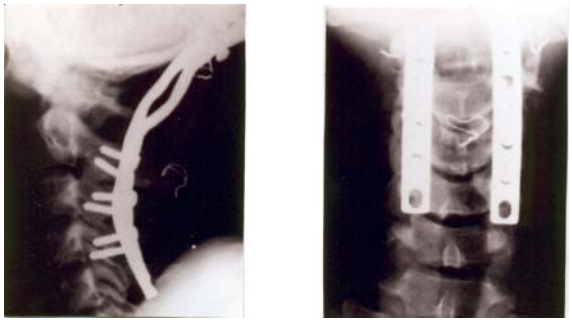

Fig. 2 Post-operative plain x-ray of the patient

Discussion

Atlanto-occipital dislocation denotes separation of the joint between the occipital bone and the first cervical spine (Atlas). Stability and function of this articulation are provided by the crusiate ligament, tectorial mambrane, apical dental ligament and paired alar ligament as well as the articular capsule ligaments[5].

The type of dislocation was classified according to Traynelis et al[11] into type I (anterior displacement of the cranium with respect to atlas), type II (longitudinal) and type III (posterior) dislocations. Lateral rotational and multidirectional dislocations that could not be classified into one of these types were considered separately and are noted as 'Other type' (Fig. 3). The incidence of atlanto-occipital dislocation was encountered in 1% of alive or dead victims of cervical spine injuries in the report of Powers et al[6]

Clinical presentation of the patient with atlanto-occipital dislocation almost invariably associated with head or lower cervical spine injury[7-9]. Severe neck pain and neurologic presentation can range from no deficits to quadriplegia with ventilatory dependency.Cranial nerve palsy, the fifth, sixth, ninth and eleventh nerves also have been noted to be affected, but the sixth nerve is involved most frequenly[7,10,11]. Radiologic evaluation and diagnosis can be established by the initial lateral radiograph of the cervical spine.

However, in some reported cases, atlanto-occipital dislocation was not recognised until further studies could be obtained such as CT and MRI of the cervical spine[10,12,13]. Generally, marked swelling of the prevertebral space is highly suggestive of spinal injury[5,7-9] but may be insufficient for diagnosis.

A variety of radiographic measurements have been purposed for the diagnosis of atlanto-occipital dislocation on a lateral cervical radiograph (Fig. 4). A displacement of more than 10 mm between the basion and dens is considered abnormal by Wholey et al[14]. A ratio of the basion- posterior atlas arch distance to the opisthion-anterior atlas arch distance of more than 1 is considered abnormal by Powers et al[6]. A distance of more than 13 mm between the posterior mandible and anterior atlas or 20 mm between the posterior mandible and dens is considered abnormal by Dublin et al[10]. Failure of a line from the basion to the axis spinolaminar junction to intersect C_2 or a line from thopisthion to the posterior inferior corner of

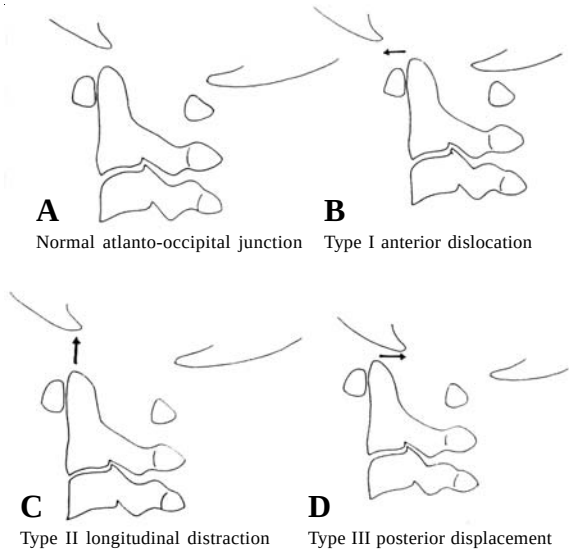

Fig. 3 Classification of atlanto-occipital dislocation. (A)Normal atlanto-occipital junction (B)Type I: anterior dislocation (C)Type II: longitudinal distraction (D)Type III: posterior displacement

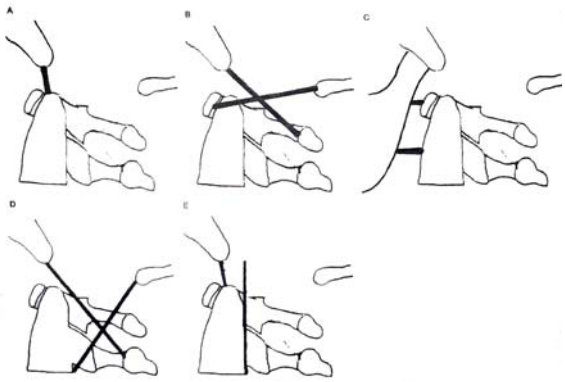

Fig. 4 Midsagittal diagrams of the craniocervical junction show the various methods for identifying AOD on a lateral cervical x-ray. (A)the Wholey measure; (B)the Powers ratio; (C)the Dublin measure; (D)the X-line measure; (E)the BAI-BDI measure

the body of the axis to intersect C_1 are considered abnormal by Lee et al[15]. Finally, a displacement of more than +12 mm or more than -4 mm between the basion and posterior C_2line, or a displacement of more than 12 mm from the basion to the dens is considered abnormal by Harris et al[16]. The BAI-BDI method proposed by Harris et al is at present the most reliable means to diagnosis atlanto-occipital dislocation on a lateral cervical spine radiograph.When conventional radiography is not sufficient for accurate assessment of atlanto-occipital dislocation, more sophisticated studies should be obstained such as CT and MRI of the cranio-cervical junction.

The treatment of choice of atlanto-occipital dislocation is internal fixation[8,11] by wiring the first cervical spine to the occiput or fixation with a plate and screw of the occiput to the lateral mass of the cervical spine with the addition of a bone auto graft. Skull traction is indicated only in type I and type III atlanto-occipital dislocation[1], traction helps to realign the bony structures and decompress the brain stem and spinal cord. But traction has been reported to cause occasional neurological deficit worsening[6,9,11]. A halo vest, an external immobilization device, has been sufficient for some patients, but the best method is spinal fusion because of the ligamentous nature of the injury and the long-term need to protect the spinal column from further damage[5,17].

Conclusion

Atlanto-occipital dislocation is uncommon traumatic injury that is difficult to diagnosis and is frequently missed on initial lateral cervical radiography. Patients who survive often have neurological impairment, including lower cranial neuropathies, unilateral or bilateral weakness, quadriplegia and respiratory instability. Severe neck pain and prevertebral soft tissue swelling on the a lateral cervical radiography may help to recognize the diagnosis. Additional imaging, including CT and MRI, may be required to confirm the diagnosis of atlanto-occipital dislocation if the plain X-ray is inadequate. All patients with atlanto-occipital dislocation should be treated. Craniocervical fusion with internal fixation is recommended for the treatment of patients with atlanto-occipital dislocation.

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กระดูกข้อต่อ Atlanto-occipital joint เคลื่อนจากอุบัติเหตุ: รายงานผู้ป่วย 1 ราย และทบทวนบทความ

สวิง ปันจัยสีห์

ภาวะ atlanto-occipital dislocation พบไม่บ่อย เนื่องจากผู้ป่วยมักจะเสียชีวิตทันที ณ ที่เกิดเหตุ แต่เนื่องจากปัจจุบันการพัฒนาให้ความรู้ในการปฐมพยาบาลผู้ป่วยในที่เกิดเหตุ และการส่งต่อผู้ป่วย ซึ่งมักให้คำนึงถึงการบาดเจ็บที่ต้นคอ ทำให้ผู้ป่วยกลุ่มนี้มีโอกาสรอดชีวิตมากขึ้น ในช่วง 20 ปีมานี้ การสังเกตอาการอย่างไม่ถี่ถ้วน หรือ การวินิจฉัยผิดพลาดอาจทำให้ผู้ป่วยอาการทรุดหนักลง

ผู้รายงานได้เสนอผู้ป่วย 1 รายที่ได้รับการวินิจฉัยผิดพลาดหลังจากอุบัติเหตุประมาณ 8 เดือน ผู้ป่วยมีอาการแขนขาอ่อนแรงไม่สามารถช่วยตัวเองได้ต้องนั่งรถเข็น การตรวจร่างกาย ตรวจภาพรังสี และ MRI ของกระดูกต้นคอ วินิจฉัยว่าเป็น atlanto-occipital dislocation จากนั้นผู้ป่วยจึงได้รับการผ่าตัดในวันรุ่งขึ้น โดยใช้ plates และ screws ยึดตรึงกระดูก occipital bone และ lateral mass ของกระดูกต้นคอทั้ง 2 ข้าง ตัดกะโหลกศีรษะรอบ ๆ foramen magnum ออก และ laminectomy C_1 เพื่อ decompression จากนั้นจึงใช้ auto bone graft ยึดกระดูก occiput และ C_2 หลังผ่าตัดได้ส่งผู้ป่วยทำกายภาพบำบัดเป็นเวลา 3 เดือน พบว่าผู้ป่วยมีกำลังแขน และขาดีขึ้นมาก สามารถเดินโดยใช้เครื่องช่วยพยุงเดิน และสามารถช่วยเหลือตัวเองได้