Non-traumatic posterior atlanto-occipital joint dislocation

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Abstract This report presents a case of non-traumatic posterior atlanto-occipital dislocation. A 36-year-old female was referred with a history of numbness of the extremities, vertigo and neck pain for 1 year. The patient had no history of trauma. The axial rotation of range of motion of the cervical spine was severely restricted. A lateral cervical radiograph in the neutral position demonstrated a posterior atlanto-occipital dislocation. A coronal view on a computed tomography (CT) reconstruction image showed a loss of angle of the bilateral atlanto-occipital joint, and a sagittal reconstruction view of CT images also demonstrated flatness of atlanto-occipital joint. Instrumented occipito-cervical fusion was performed after reduction. A lateral cervical radiograph in the neutral position 1 year after surgery showed the reduction of atlanto-occipital joint, moreover, it was maintained even in an extended position. The patient had neurologic improvement after surgery. Flatness of the bilateral atlanto-occipital joint may have induced this instability. Occipital-cervical fusion was chosen in the present case since the patient showed restricted axial rotation of the neck before surgery. The surgery improved the preoperative symptoms including the function of cervical spine evaluated by JOACMEQ.

Keywords Atlanto-occipital joint · Subluxation

Introduction

There are numerous reports of patients showing posterior atlanto-occipital dislocation due to trauma [4, 5, 7]. This disorder is often associated with fatal results. However, non-traumatic posterior atlanto-occipital joint dislocation has only been rarely reported. This report presents a case of non-traumatic posterior atlanto-occipital dislocation.

Case report

A 36-year-old female was referred with a history of numbness of the extremities, vertigo and neck pain for 1 year. The patient had no history of trauma. The axial rotation of the range of motion of her cervical spine was severely restricted, and she did not move her head position spontaneously, since it induced deterioration of vertigo. She did not describe any improvement of symptoms in the flexion position, and experienced deterioration in the extension position. A neurological examination demonstrated no hyperreflexia of the deep tendon reflex, and slight muscle weakness of the left lower extremity. The Japanese orthopedic association cervical myelopathy evaluation questionnaire (JOACMEQ) [2] showed 5 points in the function of the cervical spine, 58 points in the motor function of the upper extremities, 27 points in the motor function of the lower extremities, 44 points in bladder function, and 21 points in quality of life (QOL). A lateral cervical radiograph in the neutral position demonstrated a posterior atlanto-occipital dislocation (Fig. 1a). Dynamic lateral views showed instability with increased dislocation in extension and reduction in flexion (Fig. 1b, c). A coronal view on a computed tomography (CT) reconstruction image showed a loss of angle of the bilateral atlanto-occipital joint, and a sagittal reconstruction

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Fig. 1 The lateral view of the cervical radiographs showed displacement between the occipital bone and atlas in the neutral position. This displacement was severe in the extended position, although reduction of atlanto-occipital joint was observed on a flexion radiograph. **a** Neutral, **b** flexion, **c** extension

Fig. 2 Computed tomography on a coronal reconstruction view showed a loss of slope of the atlanto-occipital joint. That on sagittal reconstruction view also showed a flatness of the atlanto-occipital joint on both sides. **a** Coronal reconstruction view; **b** sagittal reconstruction view (Rt); **c** sagittal reconstruction view (Lt)

view of CT images also demonstrated flatness of the atlanto-occipital joint (Fig. 2a–c). Spinal cord compression and signs of myelopathy due to chronic instability were not detected on MR images (Fig. 3). Surgical intervention was indicated because of the atlanto-occipital instability demonstrated on dynamic X-rays. We put the patient in the prone position under general anesthesia, and examined her to get a reduction between the occipital bone and the atlas under an image intensifier. A posterior fusion was performed from the occipital bone to C2 using the Axon system (Synthes) performed with a bone graft from the posterior iliac bone. A lateral cervical radiograph in the neutral position 1 year after surgery showed the reduction of the atlanto-occipital joint. Moreover, the reduction was maintained even in an extended position (Fig. 4a–c). A sagittal reconstruction image on CT clearly demonstrated the fusion mass from the occipital bone to C2 (Fig. 5). Postoperative JOACMEQ showed 35 points in the function of the cervical spine, 84 points in motor function of the upper extremities, 55 points in motor function of the lower extremities, 63 points in bladder function, and 39 points in QOL. A significant improvement was demonstrated in the function of the cervical spine, and motor function of the upper and lower extremities. The patient was able to move her head much

Fig. 3 Magnetic resonance image before surgery, showing no significant change

Fig. 4 The lateral view of a cervical radiograph 1 year after surgery, showing no bone displacement between the atlas and occipital bone even in the extended position. **a** Neutral, **b** flexion, **c** extension

Fig. 5 Computed tomography on a sagittal reconstruction view demonstrating a good fusion mass from the occipital bone to C2

better compared to before surgery, but her movement was still restricted. Although the patient's vertigo improved after surgery, it still remained.

Discussion

Traumatic atlanto-occipital instability is usually fatal, as has been documented in numerous reports. However, Papadopoulos et al. [7] noted that 23 out of 30 cases observed in their study were long-term survivors beyond the immediate hospitalization. Guigui et al. [4] reviewed 38 cases, and noted that those included 24 children and 14 adults. They also noted that 7 of the 14 adults and 10 of the 24 children completely recovered from this injury. In addition, Hosalkar et al. [5] reported only cases involving children, and noted that 5 of 16 children ultimately survived, although only one patient was neurologically normal.

Non-traumatic atlanto-occipital instability is rare. Abumi et al. [1] reported a case of non-traumatic atlanto-occipital joint dislocation. That case demonstrated posterior dislocation only in an extension position, moreover, with flatness of the atlanto-occipital joint on one side. On the other hand, in the current case, dislocation of the atlanto-occipital joint was clearly demonstrated even in the neutral position. Flatness of the bilateral atlanto-occipital joint may have induced this instability.

McRae [6] reported that many neurological signs and symptoms are observed in a patient with instability at the occipito-cervical junction. However, there may be no initial neurological symptoms in a patient with osseous anomalies of the upper cervical spine, and such symptoms tend to present later, in the third and fourth decade of life. The current case developed a deterioration of the neurological symptoms in her thirties.

Grob [3] applied O-C1 transarticular screw fixation to traumatic atlanto-occipital dislocation in children. Abumi et al. [1] applied posterior atlanto-occipital fusion using wiring with a bone graft. Occipital-cervical fusion was chosen in the present case since the patient showed restricted axial rotation of the neck before surgery. The surgery improved the pre-surgery symptoms, including the function of the cervical spine.

Conflict of interest statement No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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