Atlanto-axial subluxation after pyogenic spondylitis of the atlanto-occipital joint

Kazuhiko Tsunoda · Haku Iizuka · Yasunori Sorimachi ·
Tsuyoshi Ara · Masahiro Nishinome ·
Yasuhiko Takechi · Kenji Takagishi

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Abstract This report presents a case of atlanto-axial subluxation after treatment of pyogenic spondylitis of the atlanto-occipital joint. A 60-year-old male had 1-month history of neck pain with fever. Magnetic resonance imaging showed inflammation around the odontoid process. Intravenous antibiotic therapy was administrated immediately. After 6 weeks, CRP had returned almost to normal. After 4 months, laboratory data was still normal, but the patient experienced increasing neck pain. Lateral cervical radiography in the neutral position showed instability between C1 and C2. Computed tomography showed a bony union of the atlanto-occipital joint and severe destruction of the atlanto-axial joint on the left side. Transarticular screw fixation for the atlanto-axial joint was performed. A lateral cervical radiograph in the neutral position after surgery showed a solid bony union. Neck pain improved following surgery. We speculate that spondylitis of the atlanto-occipital joint induced a loosening of the transverse ligament and articulation of the atlanto-axial joint. A bony fusion of the atlanto-occipital joint after antibiotic treatment resolved the pyogenic inflammation concentrated stress to the damaged atlanto-axial joint, resulting in further damage. The atlanto-axial instability was finally managed by the insertion of a transarticular screw.

Keywords Atlanto-axial subluxation · Atlanto-occipital joint · Pyogenic spondylitis

Introduction

Pyogenic spondylitis of the cervical spine is less common than that of the thoracic or lumbar spine. Malawski et al. [1] reported that the cervical spine is affected in 5.9% of cases, with involvement of the upper cervical spine seen in only 0.7% of all cases. This report presents a case of atlanto-axial subluxation after the successful treatment of pyogenic spondylitis of the atlanto-occipital joint.

Case report

A 60-year-old male had a 1-month history of neck pain with fever. The patient also had diabetes mellitus, which had been poorly controlled. The patient had previously been admitted to another hospital, where his neurological status was found to be normal. His C-reactive protein (CRP) was 6.5 mg/dL, and his leukocyte count was 15,300/ μ L. Magnetic resonance imaging (MRI) showed inflammation around the odontoid process (Fig. 1a, b). Intravenous antibiotics were administrated immediately, and a Philadelphia brace was implemented. After 6 weeks, the patient's CRP had returned close to getting normal, however, his neck pain continued. Lateral cervical radiography in flexion position showed enlargement of the atlanto-dental interval (Fig. 2). After 4 months, the abscess around the odontoid process had clearly disappeared when examined by MRI (Fig. 3a, b). In addition, laboratory data were normal. However, the patient

K. Tsunoda · H. Iizuka (✉) · Y. Sorimachi · T. Ara ·
M. Nishinome · Y. Takechi · K. Takagishi
Department of Orthopaedic Surgery, Gunma University
Graduate School of Medicine, 3-39-22, Showa, Maebashi,
Gunma 371-8511, Japan
e-mail: ihaku@showa.gunma-u.ac.jp

Fig. 1 Magnetic resonance image showing inflammation of the odontoid process.
a T1-weighted image,
b T2-weighted image

Fig. 2 The lateral view of the cervical radiograph showing mild instability between C1 and C2 in the flexion position

continued to have increasing neck pain. Lateral cervical radiography in the neutral position showed increased instability between C1 and C2 (Fig. 4), precipitating his being transferred to our hospital.

The patient's erythrocyte sedimentation rate (ESR) was 20 mm/h, his C-reactive protein (CRP) was 0.1 mg/dL,

and his leukocyte count was 5,900/ μ L. Computed tomography (CT) showed a bony union of the atlanto-occipital joint and severe destruction of the atlanto-axial joint on the left side, although the joint space of each joint on the right side was maintained (Fig. 5a, b). Surgical intervention was indicated for this patient because severe displacement between the atlas and axis was clearly demonstrated, and the patient continued to have severe neck pain. Transarticular screw fixation for the atlanto-axial joint was performed. A lateral cervical radiograph in the neutral position 1 year after surgery showed a solid bony union (Fig. 6a). A sagittal reconstruction image on CT clearly demonstrated the fusion of the atlanto-axial joint itself (Fig. 6b, c). The patient's neck pain improved following the surgery.

Discussion

There have been a few reported cases of pyogenic osteomyelitis of the occipito-cervical junction. For example, Zigler et al. [2] reported five cases of pyogenic osteomyelitis of the occipito-cervical junction that required surgical intervention, and noted that those cases consisted of 1 case that required a transoral biopsy and posterior occipito-C3 arthrodesis, 1 case that needed anterior drainage and posterior occipito-C4 arthrodesis, 1 case that needed anterior drainage, 1 case that needed posterior occipito-C2 arthrodesis, and 1 case that required a C1–2 arthrodesis. Spies et al. [3] reported 3 cases of pyogenic osteomyelitis

Fig. 3 Magnetic resonance image after 3 months demonstrating the lack of inflammation. **a** T1-weighted image, **b** T2-weighted image

Fig. 4 The lateral view of a cervical radiograph after 4 months, showing improved stability between C1 and C2 in the flexion position

of the occipito-cervical region that were treated non-surgically with intravenous antibiotics and application of a halo vest. The authors noted that conservative management

is only possible if the neurological status of the patient is normal and if no abscess formation is present.

In the present case, the treatment of the pyogenic inflammation with intravenous antibiotics and external fixation were the first steps taken after ascertaining that the patient's neurologic status was normal. However, after resolution of the inflammation, the patient's neck pain continued, and mild instability between C1 and C2 was demonstrated. Stein et al. [4] and Washington et al. [5] noted that osteomyelitis of the atlanto-occipito joint can induce loosening of the transverse ligament and articulation of the atlanto-axial joint. We speculated that this mechanism occurred in our patient, and in confirmation, severe destruction of the atlanto-axial joint was demonstrated in CT images. Furthermore, we also speculated that bony fusion of the atlanto-occipital joint after treatment of pyogenic inflammation concentrated stress on the damaged atlanto-axial joint, finally resulting in atlanto-axial instability. Spies et al. [3] reported a case that demonstrated destruction of the atlanto-axial and atlanto-occipital joints on one side; however, surgical intervention was not selected for their patient. As a result, it may be possible to treat such cases without surgery, but we suggest that careful observation of the patient is needed to determine whether surgery should be performed. In addition, our case and the limited data published by other investigators indicate that special attention should be paid to patient pain and mobility

Fig. 5 Computed tomography (sagittal reconstruction view) showing bony fusion of the atlanto-occipital joint and destruction of the atlanto-axial joint on the left side, with maintenance of joint space on the right side. **a** Right side, **b** left side

Fig. 6 Solid bony fusion occurred between C1 and C2. Computed tomography (sagittal reconstruction view) 1 year post-op demonstrated an auto-fusion of the atlanto-axial joint. **a** Radiograph, **b** CT image (right side), **c** CT image (left side)

after treatment of pyogenic osteomyelitis of the occipito-cervical junction.

Conflict of interest None of the authors has any potential conflict of interest.

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