Case Report

Infected Charcot spine

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Study design: Case report of an infected Charcot spine following spinal cord injury.

Objective: To describe this very rare pathological condition and the results of surgical treatment.

Setting: A department of orthopaedic surgery in Japan.

Methods: A 44-year-old man presented with a destructive lesion in the lumbo-sacral spine and a fistula in his back. Anterior bone graft, percutaneous external spinal fixation, and suction/irrigation of the wound were performed. After 4 months, posterior spinal instrumentation surgery was carried out.

Results: Primary closure of the fistula and complete bone fusion was achieved after the operation.

Conclusion: Infection of a Charcot spine, although a rare clinical entity, should be considered as a diagnostic possibility in the spinal cord-injured patients. External spinal fixation is a useful method for the unstable spinal lesion with infection.

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Keywords: Charcot spine; spinal infection; external spinal fixation

Introduction

The development of Charcot spine following spinal cord injury is rare.^{1–4} Furthermore, infection in Charcot spine following spinal cord injury is extremely rare, and only two cases have been previously cited.^{5,6}

We report a third such case of infected Charcot spine who suffered spinal cord injury 7 years ago. He was successfully treated by posterior spinal instrumentation following percutaneous external spinal fixation.

Case report

In August 1993, a 37-year-old man was injured in a working accident, and he was immediately paraplegic. He underwent posterior spinal instrumentation from L1 to S1. In November 1995, the implants were removed, but L5/S1 segment was a nonunion. In July 1996, a fistula formed in his back, and it did not heal despite several debridement procedures. In December 2000, he was referred to our hospital and was admitted for the treatment of the persistent fistula and lumbo-sacral instability.

Examination on admission showed a complete paraplegia below the 7th thoracic level. Movement of the trunk produced an audible grinding noise. A fistula was

found in the back, and bacteriologic study of the fistula showed methicillin-resistant *Staphylococcus aureus* (MRSA). Laboratory evaluation revealed a white blood cell count of 5600, a sedimentation rate of 62 mm/h, C-reactive protein of 7.8, and a negative test for syphilis. Plain radiographs and computed tomography (CT) showed absorption of L5 vertebral body and lamina (Figure 1a–c). MRI demonstrated a low intensity area in T1-weighted image, and an area with a mixture of low and high pattern in T2-weighted image continued from the L5 vertebral body to the posterior fistula (Figure 2a and b).

On January 18, 2001, surgery was performed through a posterior incision, and a large cavity was noted between the L4 and S1 vertebral bodies. The sclerotic bone was excised, and an autogenous fibular bone graft was inserted between the L4 and S1 vertebral bodies. External spinal fixation was then performed with percutaneously inserted screws into the Th12, L1, L2, S1 and S2 pedicles, and the ilium (Figure 3). Bacteriologic cultures taken at the time of surgery were negative, and histologic examination demonstrated granulation tissue with no evidence of infection. Suction/irrigation was conducted for 3 weeks, and the fistula was primarily healed. On May 17, 2001, removal of the percutaneous screws, placement of posterior internal spinal instrumentation with an autogenous fibular graft between the L4 and S1 laminae were

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Figure 1 (a) Anteroposterior, (b) lateral X-ray of lumbar spine, and (c) CT through the L5 level demonstrate absorption of the L5 vertebral body and lamina

Figure 2 MRI of lumbar spine. (a) Sagittal T1-weighted image. (b) Sagittal T2-weighted image. A low intensity area in T1-weighted image, and an area with a mixture of low and high pattern in T2-weighted image continue from the L5 vertebral body to the posterior fistula

performed. After 4 weeks, the patient was allowed to sit in a rigid brace. Radiographs and CT taken in October 2003 showed solid bony fusion (Figure 4a–d).

Figure 3 A lateral radiograph taken after the first operation. An intervertebral fibular bone graft with an external spinal fixation system was performed

Discussion

Although Jean Martin Charcot's⁷ name has become synonymous with the neuropathic joint, the first description of such an entity was noted by John Kearsley Mitchell.⁸ In 1884, Kronig⁹ first reported a case of Charcot spinal arthropathy in a tabetic patient. The pathogenesis of this disorder is a result of the destruction of afferent proprioceptive fibers by the primary disease. The affected joint becomes insensitive to pain, and it is unable to compensate for repeated minor injury. An inflammatory reaction of the synovium is incited, cartilage is destroyed and the joint become unstable. Repeated motion of the joint leads to disc degeneration, destruction of the facets, vertebral collapse, ligament relaxation, and vertebral subluxation.

The differential diagnosis of Charcot arthropathy must include extensive osteoarthritis, osteomyelitis, Paget's disease of bone, and destructive tumors. Although characteristic radiographic findings can help establish the diagnosis, its definitive diagnosis depends

Figure 4 (a, b) Plain X-ray, and (c, d) CT taken in October 2003 show solid bony fusion

on tissue from the involved joints, which allows for appropriate staining and culture to rule out infection, as well as for characterization of the histologic findings of neuropathic arthropathy. Tissue pathology includes fibrosis without acute inflammation, normal granulation tissue, and sclerotic bone without malignant change. In our case, bacteriologic cultures taken at the time of surgery was negative, and histologic examination demonstrated granulation tissue with no evidence of infection or tumor. Therefore, we diagnosed this patient as Charcot spine. As L5/S1 segment was a nonunion, the repeated torque during transfer activities concentrated on this segment, and Charcot spinal arthropathy developed in the absence of protective sensation. On the pathogenesis of the fistula, a synovial cavity was produced in the L5 vertebral space through the inflammatory state caused by gross instability, and this cavity was communicated with infected decubitus ulcer.

Tabes dorsalis has classically been the most frequent etiology of Charcot spine, and the reports of cases after traumatic paraplegia have been very rare.¹⁻⁴ Furthermore, infection in Charcot spine following spinal cord injury is extremely rare, and only two cases have been previously cited.^{5,6} Mikawa *et al*⁵ reported a case of L2/3 Charcot spine with a fistula, and successful bone fusion was achieved using a combined method of anterior interbody fusion and posterior fusion employing the L-rod instrumentation with autogenous iliac bone grafts. Pritchard⁶ reported a case of Th12/L1 Charcot spine with a subcutaneous paraspinal mass, and successfully treated with posterolateral fusion using an autogenous iliac crest graft and segmental spinal instrumentation. The causative organism was *Staphylococcus epidermidis* and *Streptococcus faecalis* in the first case, and *Corynebacteria* in the second case. In our case, MRSA was detected from the refractory fistula, and the use of internal spinal instrumentation was contraindicated. However, the achievement of stability was considered to be necessary to heal the fistula since the cavity between the L4 and S1 vertebral bodies was grossly unstable and in communication with the infected decubitus ulcer. Therefore, an intervertebral bone graft with an external spinal fixation system was performed. The refractory fistula healed primarily without complications. After 4 months, posterior spinal instrumentation was performed, and rigid bone fusion was achieved.

Percutaneous external spinal fixation was introduced by Magerl¹⁰ in 1977, and Jeanneret and Magerl¹¹ reported the effectiveness of this method for the treatment of osteomyelitis of the spine. Although the indications for this technique have been limited with the rapid improvement of more sophisticated internal fixation devices, it is useful method for the unstable spinal lesion with infection.

Infection of a Charcot spine, although a rare clinical entity, should be considered as a diagnostic possibility in the spinal cord-injured patients.

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