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Case Report
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Early Surgical Treatment for Fracture-Dislocation of the Thoracic Spine in a Patient in Poor General Condition

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Abstract

Our case describes the early surgical treatment for a thoracic fracture-dislocation, with complete motor paralysis and sensory loss in a 74-year-old man who fell from a height. Associated injuries included traumatic aortic dissection and an acute subdural hematoma. We proceeded with posterior spinal decompression and fusion on the same day as the injury. His breathing status improved with postural drainage that was possible due to early spinal stabilization. The patient was discharged three months after surgery. As injuries to the thoracic spine result from high-energy trauma, patients are generally in poor health and surgical treatment is usually delayed. However, if a patient is medically stable, early surgical treatment should be considered despite other major injuries to reduce the risk of further spinal damage and facilitate post-injury care.

Keywords: Spine damage control surgery; Poor general condition; Thoracic fracture-dislocation

Introduction

Thoracic dislocation fracture often occurs due to high energy trauma, frequently complicating head injury, respiratory injury, and vascular injury. As a result, there are many cases in which surgery cannot be performed early after injury, and a consensus on optimal surgery timing has not been obtained. We undertook reconstruction and fixation of a thoracic dislocation fracture accompanying multiple trauma on the same day as the injury, which was useful for systemic management after surgery.

Case Presentation

A 74-year-old man was transported to our emergency department following a fall from a height of 6 m. Neurological examination revealed complete motor paralysis and sensory loss below thoracic level seven (T7), with absent anal-bulbocavernosus reflexes. Radiographic and computed tomography imaging identified: Burst fracture of T4 (AO classification, 52-B2.3; load sharing classification, 7 points) [1,2]; fracture-dislocation of T5 (AO classification, 52-C1.3; load sharing classification, 9 points); and spinal cord function, Frankel grade A (Figure 1). Associated injuries included acute subdural hematoma, traumatic aortic dissection, bilateral hemithorax, and bilateral clavicular fracture (Figure 2).

Emergency medical treatment comprised blood transfusion and thoracic drainage. After drain placement, cessation of bleeding into the chest cavity was confirmed *via* angiography; the patient underwent surgery for his spinal injuries 6 hours after sustaining the trauma.

Surgical Procedure

Following an incision along the thoracic spine, free bone fragments were excised. The T5 vertebral arch was resected to decompress the spinal cord, and the damaged dura mater was repaired. Pedicle screws were inserted at the levels of T2 to T3 and T6 to T8 (Figure 3). The surgical time was 158 min, with an intraoperative blood loss volume of 748 mL.

Post-surgery, the patient was admitted to the intensive care unit for medical management. As the spinal injury had been stabilized early, postural drainage was possible and the patient's respiratory status and overall medical status improved. Three months post-surgery, the patient no longer complained of back pain. His motor paralysis and sensory loss had recovered to a Frankel classification grade B. He could maintain static sitting and could transfer into and out of a wheelchair with assistance.

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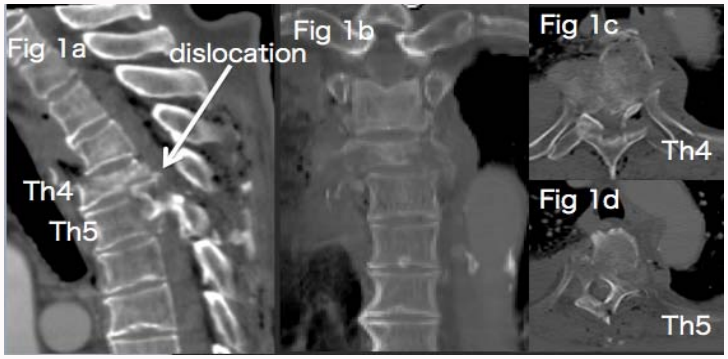

Figure 1: Computed tomography imaging of the thoracic spine injury on admission: (a) sagittal plane; (b) coronal plane; (c) T4 axial plane; and (d) T5 axial plane.

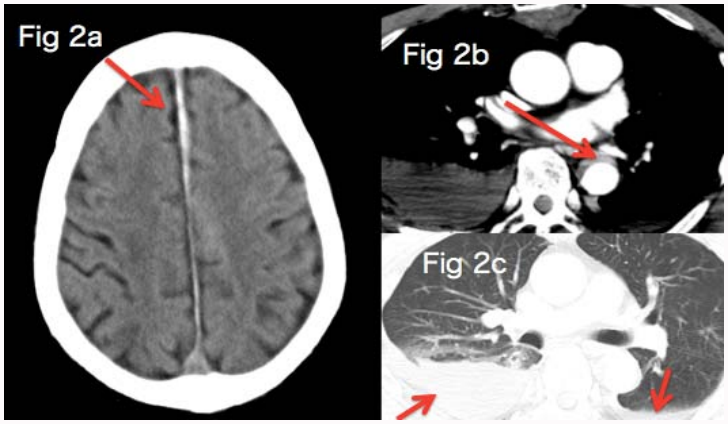

Figure 2: Computed tomography images of (a) the brain, showing an acute subdural hematoma; (b) chest, showing a traumatic aortic dissociation; (c) chest, showing a bilateral hemothorax.

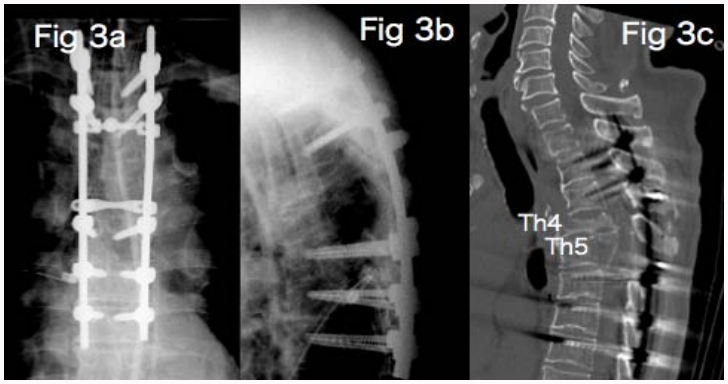

Figure 3: A, B): Post-operative radiograph of the thoracic spine. C): Post-operative computed tomography in the sagittal plane.

Discussion

Thoracic spine injury usually results from high-energy trauma, such as a fall from a height or motor vehicle accident. For our patient, all three columns had been disrupted by the fracture-dislocation, with compression of the spinal canal. Early decompression and stabilization was performed to allow early mobilization and rehabilitation. Several factors must be considered when determining the timing of surgical treatment of thoracic spine fractures: Patients' age, clinical symptoms, neurological injury and impairment, status of accompanying injuries, and type of stabilization required (anterior, posterior or combined stabilization) [3-7]. An anterior approach allows decompression under direct vision, rigid reconstruction of the anterior column, and sufficient correction of the spinal kyphosis. There is, however, a risk for increased bleeding from the vertebral bodies and epidural bleeding. A posterior approach is technically simpler than an anterior approach; the surgical stress on the patient is relatively lower. However, a posterior approach carries the risk for loss of the kyphosis correction and insufficient decompression. Although decompression of the spinal canal and stabilization should be performed as soon as possible, timing of the surgical treatment must be balanced with a patient's medical status. In trauma care of a patient with multiple fractures involving long bones, treatment is guided by the concept of Damage Control Orthopedic (DCO) surgery [8]. Similarly, the concept of Spine Damage Control (SDC) surgery

has recently been proposed for the management of patients presenting with multiple injuries including the spine, due to high energy trauma [9], the priorities being hemodynamic and spinal stabilization and improving respiratory status. As a majority of patients with thoracic spine injury are in a poor general condition, it is often required to wait until the surgery. However, even in a case with poor general condition such as our patient, from the point of view of damage control surgery, surgery early after injury is useful.

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