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CASE REPORT

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Fracture of the thoracic spine with paralysis and esophageal perforation

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Abstract A 17-year-old young man presented with a highly unstable fracture dislocation of the third and fourth thoracic vertebrae with neurological deficit, in which the fractured spine had perforated the thoracic esophagus. Open reduction and internal fixation of the spinal fractures in combination with aggressive treatment of the mediastinitis caused by esophageal perforation, consisting of two re-thoracotomies, was performed. Two years after the accident, the patient had recovered well. The neurological deficit had recovered, and there were no difficulties with swallowing.

Key words Anterior spinal fusion · Brown-Sequard · Esophageal perforation

Introduction

Spinal fractures in the thoracic region with rotation and shearing are severely unstable, with a high risk of complete neurological deficit. Total recovery after treatment for a partial neurological deficit (the Brown-Sequard syndrome) is uncommon [4, 10]. Esophageal perforation caused by a fracture of the thoracic spine is so rare that it has never previously been reported in the literature. However, there are reports about cervical spine fractures that caused injuries to the hypopharynx and the cervical esophagus [2, 5, 12, 13, 16]. Both the diagnosis and treatment of thoracic esophageal injuries can be very problematic.

We encountered a patient with an unstable fracture dislocation of the fourth thoracic vertebra (Comprehensive Classification C3.1) [9] with a partial neurological deficit (Brown-Sequard), in which the fractured spine had perforated the thoracic esophagus. The treatment, which led to complete recovery, consisted of open reduction and internal fixation of the fracture, with the mediastinitis caused by esophageal perforation being treated aggressively by two re-thoracotomies.

Case report

A 17-year-old male patient was referred to us from elsewhere with fractures of the third and fourth thoracic vertebrae and partial neurological deficit (Brown-Sequard from T6). The patient had been involved in a moped accident 5 days previously. Besides the spinal fractures, the following diagnoses were made: thoracic trauma with fractured ribs, pneumothorax, lung contusions, and a femoral shaft fracture. All these injuries were on the left side.

CT showed a spinal fracture at T4, while the reconstructed images revealed a shear mechanism that had caused stenosis of the spinal canal (Fig. 1). According to the Comprehensive Classification, this was a type C3.1 fracture [9].

At this stage, the pulmonary complications formed a contraindication for immediate surgery to the spinal column. Therefore, halo traction [11] was applied to prevent deterioration of the neurological deficit resulting from compression of the spinal canal by the dislocated fracture; this did not aggravate the symptoms.

The pulmonary condition had recovered sufficiently 14 days after the accident to allow surgery. Thoracotomy was performed on the right side and the fracture was reduced and anteriorly stabilized with the aid of the Slot-Zielke device [8]. During the operation, a para-esophageal abscess was encountered, caused by perforation of the esophagus (Fig. 2). Although *Streptococcus milleri* had been found in the blood culture performed in the preoperative period, this had not led us to suspect that the patient had a perforated esophagus [1]. Despite the presence of the abscess, we consciously opted to perform the fixation procedure to alleviate the spinal canal compression. Although the wound drained extensively and the patient received antibiotic therapy, mediastinitis devel-

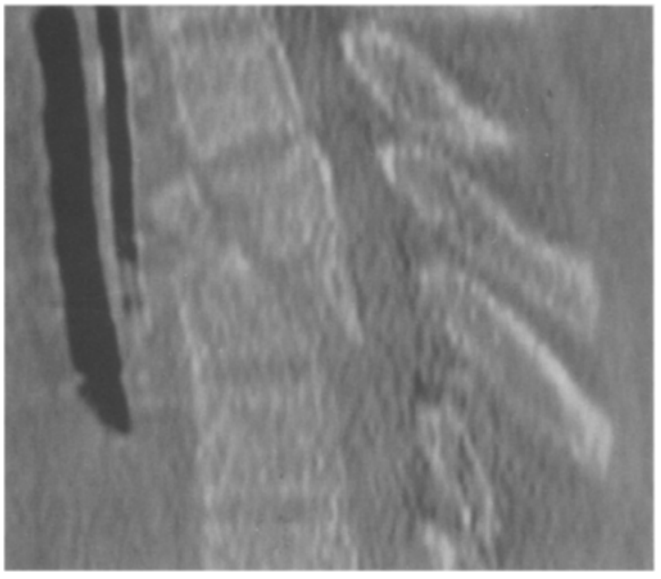
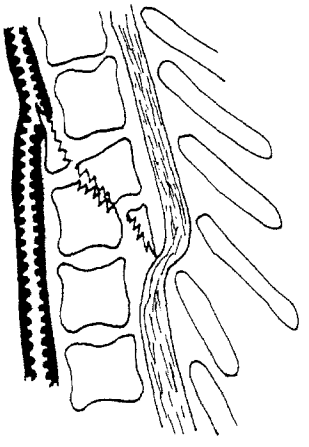


Fig. 1 CT reconstruction of the fractured spine, showing stenosis of the spinal canal caused by the fracture

Fig. 2 Perforation of the esophagus caused by the fractured spine



oped, which required a second thoracotomy. Directly afterwards, the patient started to recover.

For 10 weeks, the patient was fed exclusively by jejunostomy. Three months after the accident, esophography revealed a fistula between the esophagus and the osteosynthesis material. Because of the existence of this fistula, drainage was secured and oral nutrition was started.

Ten months after the accident, repeat esophography did not show the fistula. Oral nutrition was uneventful and the patient was otherwise complaint free. With the exception of function loss of the right peroneal nerve, the neurological deficit had recovered.

One year after the accident, the patient was admitted to hospital with high fever. Esophography demonstrated epyema of the right thorax, which was draining via the fistula in the oesophagus. Treatment comprised removal of the osteosynthesis material and drainage of the empyema via the thoracic wall. There were no further complications.

At follow-up 2 years after the accident, the patient was complaint free. The neurological deficit, including the right peroneal nerve, had recovered completely and there were no difficulties with swallowing.

Discussion

Partial neurological deficit, which includes the Brown-Sequard syndrome, as a result of spinal trauma, forms an indication for surgery to alleviate stenosis of the spinal canal [14]. Decompression can be expected to improve the neurological deficit, but the patient seldom makes a full recovery [4, 10]. Traumatic esophageal perforation is associated with a high mortality rate (17–23%) [3, 6, 15]. External trauma is responsible for 10% of esophageal injuries; the majority of these are caused by penetrating injury. The incidence of esophageal perforation after blunt injury is 0.001% [3]. Hypopharyngeal and cervical esophageal perforation are rare in cervical spine injuries, with an incidence of 0.1% [5]. Esophageal perforation due to a fracture of the thoracic spine has never been described in the literature.

The symptoms of esophageal perforation are non-specific, or they may be absent [7]. As this injury is nearly always encountered in association with other injuries, it can be very difficult to diagnose.

If the patient is healthy and has no pre-existent esophageal disorders and the lesion is diagnosed at an early stage, primary closure of the defect is the treatment of choice [7].

If the diagnosis is made at a late stage, then the lesion is very likely to be infected and primary reconstruction will no longer be possible. Treatment must then be aimed at clearing up the infection [7].

Our patient had a spinal fracture with stenosis of the spinal canal, respiratory insufficiency, and esophageal perforation that was diagnosed at a late stage (during thoracotomy). The indication for exploration was the spinal fracture, not the esophageal perforation. A spinal fracture with spinal cord compression, which can cause partial neurological deficit, forms an urgent indication for open reduction and fixation of the spinal fracture. If our patient had not shown symptoms of paralysis, we would probably not have stabilized the spinal fracture during thoracotomy, but only drained the mediastinum because of the esophageal perforation. In this case, the unforeseen esophageal perforation formed an additional problem. Complications such as mediastinitis and pleural empyema were anticipated; these were treated with drainage, a second thoracotomy, and finally with a third thoracotomy, during which the osteosynthesis material was removed.

It was decided to start oral nutrition, on the basis of the existence of the fistula between the esophagus and the osteosynthesis material. Ten months after the accident there was no sign of a fistula at esophography; it looked as if the infection had ceased. Though the fistula may have closed, 12 months after the accident a thorax empyema developed, for which thoracotomy and removal of the osteosynthesis material was required. Hereafter, fast recovery occurred.

In our opinion, the result was achieved because of early, aggressive treatment of the spinal fracture that was causing spinal cord compression (open reduction and fixation) and of the esophagus perforation (drainage and re-thoracotomy).

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