Midline longitudinal fracture of the sacrum: case report and review of the literature

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Abstract Midline longitudinal fracture of the sacrum rarely occurs, and the mechanism of the injury is still unclear. We report a 68-year-old man with midline longitudinal fracture of the sacrum. At the first consultation, he showed no neurological findings. Neither longitudinal nor rotational instability was observed. Therefore, 4 weeks of bed rest was prescribed as conservative treatment. Standing training using a tilt table was initiated 5 weeks after injury and gait training after 6 weeks. However, since radiographic examination in the standing position 7 weeks after injury showed instability, surgery was performed. This instability was due to conic separation of the sacrum (conical instability) during weight bearing and cannot be classified according to the conventional classification of instability which is vertical instability as a parameter of ring fracture of the pelvis or rotational instability. Eleven patients with this fracture have been reported. This report discusses the characteristics of the pathological condition of this fracture and its treatment with a brief review of the literature.

Key words Sacral fracture • Sacrum • Treatment • Pathology • Classification

Introduction

Midline longitudinal fracture of the sacrum rarely occurs, and the mechanism of the injury is still unclear. To our knowledge, only 11 patients with this fracture have been reported. This report discusses the characteristics of the pathological condition of this fracture and its treatment with a review of the literature.

Case report

The patient was a 68-year-old male lumberman. While he was cutting trees down in the mountain, a tree (about 30 m tall) fell toward his back, and he tried to run away and fell to the ground. The tree fell on his left abdominal-gluteal area, and he sustained injury. He had lumbar and gluteal pain and a feeling of strangulation in the lower abdomen, could not stand, and was transported to our department. His history was unremarkable except for hypertension.

On admission, he was conscious and had only an abrasion in the left lumbar area and no injury to the skin. Neurological examination showed decreased muscle power of the left iliopsoas muscle and quadriceps muscle due to pain but normal sensation and deep tendon reflexes in the lower limbs. Radiographic examination revealed a midline longitudinal fracture of the sacrum, symphysial separation, fracture of the left pubic bone, and fracture of the left coxa (Fig. 1a). The symphysial separation was less than 1.5 cm, and neither rotational nor longitudinal instability was observed at radiographic examination and manual tests. Computed tomography (CT) showed the sacral
fracture line that was located almost on the midline, not passing through the sacral hiatus, and the absence of protrusion of bone fragments into the vertebral canal (Fig. 1b). The fractures of the ischial bone and coxa were only negligibly displaced. Magnetic resonance imaging (MRI) showed a hematoma on the ventral side of the sacrum but no definite nerve compression findings.

Due to the absence of neurological deficits, symphysial separation of less than 1.5 cm, negligible displacement of the ischial and coxal bones, and the absence of rotational or longitudinal instability, bed rest as conservative treatment was prescribed for 4 weeks. Standing training using a tilt table was initiated 5 weeks after

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**Fig. 1a, b** Diagnostic images of a man with a midline longitudinal fracture of the sacrum due to a falling tree, at admission. a Anteroposterior radiograph showing the midline longitudinal fracture (large arrowheads), the diastasis pubis (arrows), and fracture of the left coxal and ischial bones (small arrowheads). b Axial computed tomograph showing midline longitudinal fracture (arrows), and ossification of sacrospinal ligament (white arrowheads)

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**Fig. 2a, b** Anteroposterior radiographs 6 weeks after trauma. a At the prone position, the longitudinal fracture of the sacrum is closed (arrowheads) and the symphysis pubis diastasis is open (arrow). b In the standing position, the longitudinal fracture of the sacrum is open (arrowheads) and the symphysis pubis diastasis is closed (arrow)

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**Fig. 3** Postoperative anteroposterior radiograph showing reduction of displacement and fixation with interiliac screws (for the longitudinal fracture of the sacrum) and the plate (for the symphysis pubis diastasis)