Ilizarov external fixator for burst fracture of the lumbar spine: a case report

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ABSTRACT

A 50-year-old man presented with severe back pain and tenderness throughout the lumbar area after falling from a ladder. He had an unstable type-B burst fracture, with a spinal canal narrowing of 36% and an anterior height loss of 65%. His lower-limb neurological function was intact. An Ilizarov external spinal fixator was used; the pedicular half pins were inserted into the bilateral T11, T12, L2, and L3 pedicles; bilateral pedicular half pins were fixed at each level with external plates and rods. Postoperatively, the patient had a lordosis of 2º and was able to walk 7 days later. The external fixator was removed at 10 weeks. Six years and 10 months after surgery, the patient had a kyphosis of 19º that did not affect his activities of daily living.

Key words: external fixators; Ilizarov technique; lumbar vertebrae; spinal fractures

INTRODUCTION

The Ilizarov external fixator was developed in the 1970s and has become a popular treatment option for fractures, leg length discrepancies, deformities, non-union, tumours, and osteomyelitis.1–3 It is widely used for spinal disease in Russia. We present a case of burst fracture of the lumbar spine with no neurological deficit treated with an Ilizarov external spinal fixator (Fig. 1).

CASE REPORT

In September 1999, a 50-year-old man presented with severe back pain and tenderness throughout the lumbar area after falling from a ladder. His lower-limb neurological function was normal (Frankel grade E). Radiography showed collapse of the L1 vertebral body with a kyphosis of 37º (Fig. 2). Computed tomography revealed a laminar fracture and collapse of 3 vertebrae (Fig. 3). It was an unstable type-B burst fracture according to the Denis classification.4 He...
had a 36% narrowing to his spinal canal and a 65% anterior height loss.

The fractures were reduced with the patient in a prone position under general anaesthesia. An Ilizarov external spinal fixator was used; pedicular half pins were inserted into the bilateral T11, T12, L2, and L3 pedicles under an image intensifier; bilateral pedicular half pins were fixed at each level with external plates and rods. The alignment was corrected by compressing and distracting the rods under an image intensifier (Fig. 4).

Postoperatively, the patient had a lordosis of 2° with no neurological deterioration. His pain was relieved on day 1, he could sit down by day 3, and could stand and walk with support on day 7. At week 7, the pedicular half pins were removed and a lumbar brace was used until week 12. At week 10, all the remaining half pins were removed (Fig. 5a). At the 7-month follow-up, the patient had no pain or tenderness and could walk without problems. The kyphosis deteriorated gradually, however, and was 14° at the 7-month follow-up (Fig. 5b); by the 6.8-year follow-up it was 19° (Fig. 5c).

**DISCUSSION**

Burst fractures of the thoracolumbar spine account for approximately 45% of all major thoracolumbar trauma. At least 50% of such patients are neurologically intact.5 There is controversy over
whether surgical or conservative treatment is more effective for such fractures.\textsuperscript{6–8} Conservative treatment (casting or bracing) requires patients to remain in bed for a long period and limits their activities of daily living, whereas surgical treatment is highly invasive. It is recommended that unstable burst fractures of the thoracolumbar spine with associated posterior ligamentous complex injuries or severe collapse of the vertebral body or severe kyphosis be treated surgically.\textsuperscript{9}

Some authors define fractures with a kyphosis of $<35^\circ$ and an anterior height loss of $<60\%$ as stable.\textsuperscript{8} Others define fractures with no neurological deficit, a kyphosis of $<30^\circ$, and an anterior height loss of $<50\%$ as stable.\textsuperscript{6} Others consider all burst fractures unstable and recommend surgical treatment in all cases.\textsuperscript{10} Conservative and surgical management of patients with stable burst fractures have yielded similar long-term results.\textsuperscript{5,11,12} Our patient was a candidate for surgery because he had a kyphosis of $37^\circ$ and an anterior height loss of $65\%$.

Thoracolumbar burst fractures can be treated surgically using either an anterior or posterior approach, or by percutaneous vertebroplasty with polymethyl methacrylate or cement.\textsuperscript{6,13,14} External fixation, midway between conservative and operative treatment, is widely used for treatment of injuries to the limbs.\textsuperscript{1–3} Good clinical results have been reported after external fixation for spinal fractures, pyogenic spondylitis of the thoracolumbar spine,\textsuperscript{15} and for unstable spondylosis,\textsuperscript{16–18} in which the external fixator has been used temporarily to allow assessment of the levels to be fused.

Use of external fixation to treat thoracolumbar burst fractures has some disadvantages; it cannot decompress the spinal canal and allow bone grafting, there is a risk of pin damage and a loss of correction after hardware removal, and it causes discomfort in activities of daily living (e.g. patients cannot lie on their back). A bed with a hole was therefore devised (Fig. 6). Nonetheless, the Ilizarov external fixation is less invasive than the anterior or posterior procedures, less damaging to soft tissue, allows easier removal of the hardware (no anaesthesia is needed), and is capable of correcting the kyphosis after surgery. Patients can leave bed earlier than those who underwent conservative treatment (one day vs 3–4 weeks). Conservative treatment for an unstable burst fracture may also risk late neurological deterioration.\textsuperscript{19}

In our patient, there was a loss of the correction angle after hardware removal, due to the patient’s demand for early removal despite our advice that it should be applied for a few more weeks. External fixation is an option for patients with multiple injuries who are unfit for invasive surgery, and for those who prefer less invasive treatment. It should not be considered a routine treatment for this condition, as the external fixator protrudes from the skin, causing difficulties with activities of daily living, and patients may risk a loss of the correction angle.

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**Figure 5** Follow-up radiographs (a) after the hardware removal, (b) at 7 months, and (c) at 6 years and 10 months.

**Figure 6** The special bed with a hole for the patient with the external fixator.
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