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Kyphoplasty: 2 years of experience in a neurosurgery department

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Abstract

Background: Kyphoplasty is a new technique to treat collapsed vertebral body (VB) fractures. The technique is very effective for achieving rapid pain relief, restoring bone height, and consequent vertebral realignment, and thus stabilization of the vertebra.

Methods: We reviewed 57 patients with vertebral compression fractures. All patients were neurologically intact and presented with severe low back pain or localized pain over the thoracolumbar region. Indications for kyphoplasty were osteoporotic and traumatic compression fractures, osteolytic tumor metastases, and aggressive hemangiomas without spinal canal compression.

Results: In 57 patients, 77 levels were treated. Follow-up was 6.5 months. Patients were evaluated with a visual analog scale (VAS) preoperatively and postoperatively. The mean preoperative VAS score was 91.08 for pain, whereas the mean postoperative VAS score was 11.22. Percentage of mean pain relief was 87.9% during the first 6 months of follow-up. We achieved a 43.6% improvement in the height of the compressed VB and 6.3° of improvement in the kyphotic angle. No serious complications occurred. Mean hospital stay was 24 hours.

Conclusions: Kyphoplasty carries significantly less morbidity than vertebroplasty or open surgery. Risk for embolization is low. Normal kyphotic angle can be restored or improved by this technique. In the hands of experienced surgeons, kyphoplasty is a safe and a minimally invasive technique for patients with neoplastic, traumatic, or osteoporotic lesions of the vertebra or sacrum.

Keywords: Kyphoplasty; Osteoporosis; Vertebral tumors; Vertebroplasty

1. Introduction

Developed in France in the late 1980s, percutaneous vertebroplasty involves injection of PMMA into a fractured VB. Recently, a modification of this technique, percutaneous balloon kyphoplasty, was developed by Mark Reilley [1,7,8]. Kyphoplasty involves inflation of a balloon within a collapsed VB to restore height and reduce kyphotic deformity before stabilization with PMMA. This new technique has been used for the treatment of osteoporotic compression fractures. It seems to be an effective way to stabilize compression fractures due to tumoral infiltration and reduce pain, thereby improving the quality of life in these patients. As many as 70% of patients with cancer and multiple myeloma initially present with osteolytic involvement of the spine. These lesions often lead to vertebral fractures and are associated with significant morbidity and mortality. The classic medical and surgical treatments for such spinal problems are often inadequate or too invasive for patients debilitated by cancer. In this technique, fracture of the VB is stabilized to decrease or eliminate pain and to prolong functional survival [5,8,12,13,16,17].

2. Materials and methods

Since June 2002, we have performed percutaneous balloon kyphoplasty to 77 vertebrae in 57 patients (19 men and 38 women; mean age, 67.5 years; range, 48-92 years) at Baskent University. All patients were neurologically intact and presented with severe low back or thoracic pain over the compressed vertebrae. Patients with osteoporotic compression fractures, traumatic compressions, and osteolytic vertebral tumors, including

Abbreviations: PMMA, polymethylmethacrylate; VAS, visual analog scale; VB, vertebral body.

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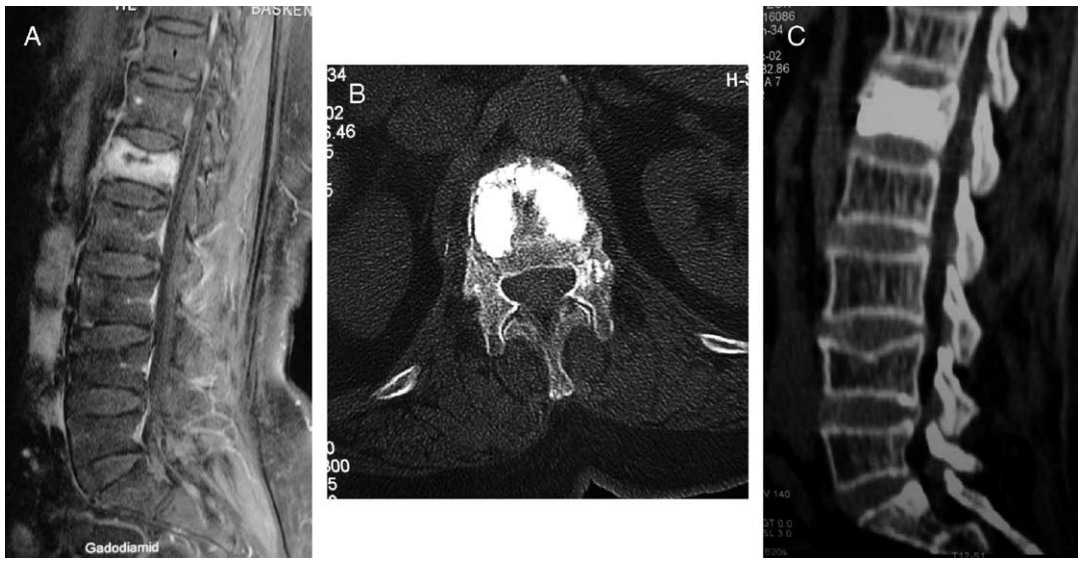

Fig. 1. A: Preoperative contrast-enhanced sagittal T1 magnetic resonance image showing the early phase of vertebral compression fracture at the first lumbar vertebra in a patient with severe back pain. Axial (B) and sagittal (C) computed tomography after kyphoplasty showing enhanced VB with PMMA.

various metastases, hemangiomas, and multiple myeloma, were included in the study. Patients with acute fractures as demonstrated on magnetic resonance imaging that were concordant with pain at the site of fracture were considered candidates for kyphoplasty (Fig. 1). Patients with osteoblastic tumors, vertebra plana, and compression fractures with spinal cord compression were excluded from the study. Patients with severe degeneration in whom the radiological landmarks were invisible and/or who had compression fractures of more than 3 months of duration also were excluded from the study and were treated by other techniques.

Percutaneous balloon kyphoplasty is performed under general anesthesia with the patient in the prone position. Fluoroscopic control is necessary to identify an extrapedicular or transpedicular entry point into the VB. After penetrating the VB, the vertebral balloon is inflated to restore the height of the compressed VB. Aspiration biopsy of the VB may be obtained if needed, especially in tumoral lesions. Filling the void in the VB with PMMA is the last step of this minimally invasive technique.

Postoperatively, all patients were mobilized on the same day, and the mean hospital stay was 24 hours. Mean follow-up was 6.5 months. Patients were evaluated using a VAS

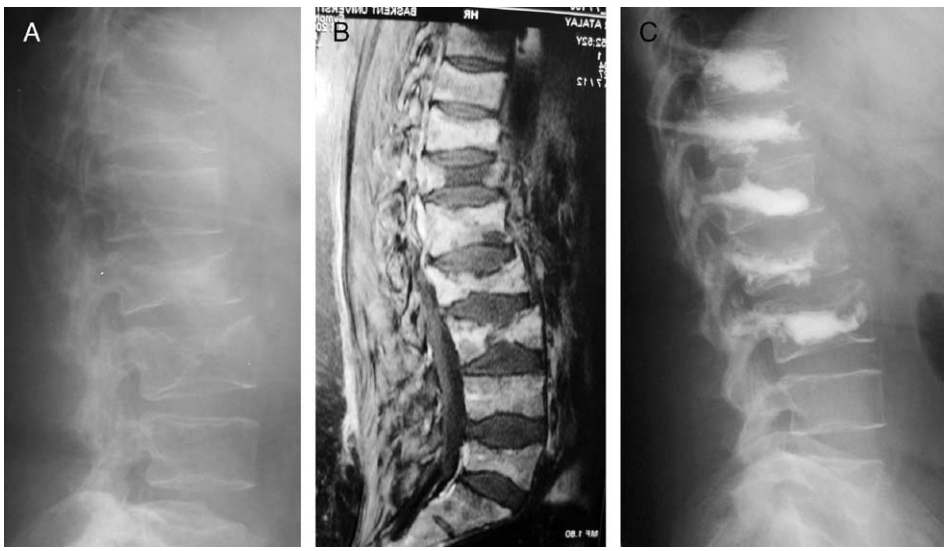

Fig. 2. An example of osteolytic vertebral metastasis: preoperative lateral x-ray showing 4 levels of vertebral compression fractures (L2, L3, T11, and T12) (A) and sagittal magnetic resonance image demonstrating edema at 5 segments (L1 through L3, T11, and T12) in a patient with multiple myeloma (B). C: Postoperative lateral x-ray revealing PMMA after kyphoplasty in 5 segments.