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Vertebral body compression fracture after removal of pedicle screws: a report of two cases

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Abstract While the risks of pedicle screw insertion are well established, there is a paucity of reports on complications associated with implant removal. We report two cases of acute osteoporotic vertebral compression fractures of the instrumented vertebral body adjacent to the fractured vertebra due to removal of pedicle screws in two female patients previously treated for vertebral lumbar burst fractures. Both patients had experienced only mild occasional pain at the thoracolumbar junction prior to the removal of the implants. In the formerly almost asymptomatic indi-

viduals, the acute osteoporotic fractures led to persistent severe back pain despite prolonged intensive treatment. Patients must be thoroughly informed of the rare but potential risks of spinal implant removal, particularly in cases of osteoporosis. We therefore do not recommend removal of spinal implants unless there are clear clinical indications for implant removal.

Keywords Complication · Pedicle screw fixation · Compression fracture · Osteoporosis

Introduction

In the treatment of thoracolumbar fractures, pedicle screw fixation has become an established and well-accepted surgical procedure [1, 4, 6, 15]. The major concern with pedicle screw fixation was related to the safety of these devices. The risks associated with the use of pedicle screws, such as neurological problems, dural laceration, screw and rod breakage, screw loosening, and loss of correction due to implant failure, are well established and have been extensively reviewed [1, 7, 14]. However, there is a paucity of reports on the complication potential of implant removal of pedicle screw systems [13].

We report two cases of acute osteoporotic vertebral body compression fractures adjacent to the fractured vertebra due to the removal of a pedicle screw system in two female patients previously treated for vertebral burst fractures.

Case reports

Case 1

A 53-year-old woman sustained a L1 vertebral burst fracture in a car accident that was treated with an AO internal fixator and posterolateral fusion from T12 to L2. Eighteen months after the surgical treatment of the vertebral fracture elective surgery was done to remove the internal fixator, because the patient suffered from local discomfort presumably due to mechanical irritation. The preoperative radiographs showed no signs of implant failure or implant loosening. The fracture was consolidated in a correct anatomical alignment. Mild osteopenia of the thoracolumbar spine was evident in retrospect. There were no intraoperative complications noted at the removal of the spinal implant. Solid fusion from T12 to L2 was verified by manual intraoperative testing. Ambulation of the patient was allowed on the 1st postoperative day. On the 3rd postoperative day the patient experienced a sharp pain in the upper lumbar spine while walking. Subsequent radiographs demonstrated an acute T12 compression fracture with a kyphotic deformity of 28° (Fig. 1) and decreased mineral density of the thoracolumbar vertebrae. Highly precise peripheral measurements of quantitative computed tomography [5] for the evaluation of bone density showed marked osteoporosis with decreased density of the cortical (62%) and cancellous (72%) bone.

Fig. 1 A A 53-year-old female patient with a L1 burst fracture. B Fracture treatment with an AO internal fixator T12–L2. C Acute T12 compression fracture with a kyphotic deformity of 28°, 3 days after implant removal

The fracture was treated non-operatively with analgesics and a brace, because the patient refused an additional surgical intervention. Although the fracture healed without further progression of the kyphotic deformity, the patient continued to suffer from persistent severe back pain.

Case 2

A 62-year-old patient sustained a L2 burst fracture that was treated with an internal fixator and posterolateral fusion from L1 to L3. Because of mild occasional back pain due to putative local irritation by the spinal implant, the patient desired implant removal. The internal fixator was removed 12 months after stabilization of the fracture.

Preoperative radiographs showed a healed L2 vertebral body fracture without any signs of implant failure or loosening. Solid fusion of L1–L3 was demonstrated by manual testing intraoperatively. There were no intraoperative complications noted while removing the implant. On the 2nd postoperative day, the patient experienced acute back pain while walking. Standard radiographs demonstrated an acute L1 compression fracture with a kyphotic deformity of 22° (Fig. 2). Highly precise peripheral measurements of quantitative computed tomography for the evaluation of bone density showed severe osteoporosis with decreased cortical (95%) and cancellous (26%) bone density. Non-operative treatment was suggested without bracing. Follow-up radiographs showed that the fracture had uneventfully healed, but the patient complained of substantially increased back pain as compared to her preoperative status.

Fig. 2 A A 62-year-old female patient with a L2 burst fracture. B Postoperative radiograph after fracture treatment with an internal fixator L1–L3. C Acute L1 compression fracture with a kyphotic deformity of 22°, 2 days after implant removal

Discussion

The treatment of thoracolumbar burst fractures with pedicle screw fixation is an effective procedure which provides favorable clinical results [1, 4, 6, 15]. Numerous papers have reported on the hazards and potential complications associated with pedicle screw insertions, but complications in conjunction with implant removal are rarely reported [13]. Vanichkachorn et al. [13] report one case of potential large vessel injury during the removal of a broken pedicle screw. They conclude that routine removal of pedicle screws, especially screw fragments is not indicated and may result in rare but significant complications.

Debate is continuing on the need for a routine implant removal in general fracture care [2, 3, 9, 12]. The concerns with regard to retained implants have been summarized by Bostman and Pihlajamaki [2] as late infection, metal toxicity, metal hypersensitivity, corrosion, potential neoplasia and stress-shielding-related osteopenia. Of these possible complications, the most important concern is the stress-shielding effect of rigid implants. Previous studies have reported that vertebral body osteopenia may occur as a result of an instrumented spinal fusion [10, 11]. Both of our cases involved patients who suffered from general osteoporosis, which obviously is unrelated to the implant. However, the secondary fracture occurred at the level of the previously instrumented vertebra. We assume that the subcortical substance defect of the screw tracks was an important contributing factor to the additional

weakening of the osteoporotic vertebral bodies. Similar to complications associated with pedicle screw insertion, the complication reported in our cases is not directly related to the implant. Rather, it is related to an inappropriate indication with regard to implant removal in almost asymptomatic patients suffering from general osteopenia/osteoporosis.

Following implant removal, both patients suffered from considerably more pain as compared to their preoperative status, and stated that their situation had been substantially worsened by the procedure. However, we acknowledge the fact that surgery was suggested in Case 1 (28° of kyphosis) but was refused by the patient. Today, we would consider percutaneous vertebroplasty with PMMA or a kyphoplasty [8] as a minimally invasive treatment option, but this had not been introduced in our service at that time.

Patients often desire implant removal because of mild local discomfort, presumably due to mechanical tissue irritation or simply because they no longer want to have metallic implants. Our report highlights the pitfalls of implant removal in cases where only a questionable indication is present. Anecdotal experience also indicates that mild back pain often persists despite implant removal. Patients must be thoroughly informed of the rare but potential risks of implant removal, particularly if they have osteoporosis. We therefore do not recommend removal of spinal implants unless there are clear clinical indications for their removal.

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