Improved Accuracy and Safety of Intracorporeal \ Transpedicular Bone Grafting - using Contrast Impregnated Bone: A Case Report

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ABSTRACT

A method of transpedicular bone grafting using contrast impregnated bone to improve the visualization of bone graft on the image intensifier is reported. A 36-year-old man who had sustained a traumatic burst fracture of T12 vertebra, with Load-Sharing Classification (LSC) score of 8, was treated with posterior short segment fusion from T11 to L1 with transpedicular bone graft of T12 vertebra. We were able to correct the kyphotic end plate angle (EPA) from 19° to 1.4°. Anterior bone graft augmentation was achieved with contrast enhanced transpedicular bone grafts. At six months follow up, CT scan showed good bony integration of the anterior column with EPA of 4.5° and two years later, radiographs showed EPA of 7.6°.

Key Words: Spinal fractures, operative surgical procedure, bone transplantation, contrast media

INTRODUCTION

Classically, anterior column reconstruction is done through an anterior approach. Transpedicular bone grafting augments the anterior column through a posterior approach and this allows posterior instrumentation and fusion to be performed through a single posterior incision. Despite the recent encouraging results, there are doubts about the efficacy of the transpedicular bone grafting techniques which have led to failures in maintaining the reduction and complications of internal fixation. However, the usage of bone graft substitutes which are radio-opaque to augment the anterior column have been reported to be successful. Therefore, we postulate that the previous failures in transpedicular bone grafting may be due to the lack of clear visualization of bone grafts inserted. To improve the visualization of transpedicular bone grafting, bone was mixed with contrast before impregnation.

CASE REPORT

A 36-year-old man had sustained a T12 burst fracture after a motor vehicle accident. He had no neurological deficit and had no injury to other parts of his body. A computed tomography (CT) scan revealed burst fracture with moderate involvement of (2 point), wide displacement of bone fragment (3 points) and with more than 10° kyphosis (3 points). The radiological score of his fracture based on Load-Sharing Classification (LSC) was 8 (Figure 1). He was treated surgically with short segment posterior instrumentation from T11 to L1 with T12 transpedicular bone grafting.

The patient was operated prone on a Jackson table with standard posterior subperiosteal approach. Monoaxial pedicle screws (Medtronic, Legacy) were used. All four screws were inserted and placed parallel to the vertebral endplates. A straight rod and a temporary curved offset rod were placed to allow access to the pedicle of the fractured vertebrae (Figure 2a). Reduction of the fractured vertebra was achieved by anterior column height restoration through the tightening of the monoaxial pedicle screws on rod and eversion of the pedicle screw sleeves which would recreate a parallel endplates above and below the fracture. The height of the middle column was maintained by applying a distraction force between the two monoaxial pedicle screws. A pedicle entry was created on the fracture level and the entry tunnel was widened by a size 7.0mm pedicle screw. Using a pedicle probe, bony fragments of the fractured vertebrae were impacted against the endplates, reducing the vertebral further as well as creating a cavity in the center for bone grafting - (Figure 2b & 2c). Bone grafts were harvested from the posterior iliac crest, morcellized and mixed with 2mls of water soluble radio-opaque agent (Ultraplast, Iopromide 300mg/ml). The bone grafts were then inserted into a 1ml insulin injection syringes with a diameter of 4.7mm. The ends of these syringes were cut away to allow smooth delivery of the bone grafts. The plunger tip was and must be removed to avoid being dislodged into the anterior vertebral body defect. With these 1ml syringes, 3 to 4mls.