

Comparison of titanium expandable pedicle screws versus standard pedicle screws in the treatment of osteoporotic spine: a clinical study.

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Introduction

Osteoporosis is a major global health problem. Due to increasing life expectancy, the number of elderly patients with osteoporosis affected by degenerative and traumatic spinal diseases is increased. Low bone quality in osteoporosis can reduce the strength of pedicle screw and negative bone remodelling can cause delayed bone fusion. Pedicle screw instrumentation of the osteoporotic spine carries an increased risk of screw loosening, pull-out and fixation failure. Our study aims to investigate the efficiency of expandable pedicle screws (Osseoscrew-Zodiac, Scient'x – Alphatec Spine) compared with standard titanium screws in osteoporotic spinal patients.

Methods

This is a prospective blinded randomized study. Inclusion criteria: Osteoporotic patients, age over 50 y.o.. All osteoporotic patients with degenerative and traumatic spinal diseases admitted in our department performed a preoperative spinal X-Ray and MRI/CT. Preoperative and postoperative clinical assessment of patients were based on VAS scale and Oswestry questionnaire. Group I: 25 patients treated with expandable pedicle screws. Group II: 25 patients treated with standard titanium pedicle screws. Postoperative radiological follow-up were performed at 3 days, 3, 6 and 12 months with CT and X-Ray.

Results

Group I: mean age 66 y.o. Levels treated: 10 lumbosacral, 11 lumbar and 4 thoracolumbar. Mean Preoperative VAS 84. There was no failure of the device, all the screws expanded in the vertebral body. Mean postoperative VAS 32. Complications: in one case CSF leak not related to the implant, treated with lumbar drain. Group II: mean age 62 y.o.. Levels treated 11 lumbo-sacral, 9 lumbar and 5 thoraco-lumbar. Mean preoperative VAS 81. Mean postoperative VAS 30. In one case screw breakage 4 months after surgery. We had two cases of screw loosening 8 and 10 months after surgery.

CT coronal image of the expandable screws



CT sagittal reconstruction of expandable screws



CT axial image of expandable screws



Conclusions

Expandable pedicle screws may improve pullout strength as compared to standard pedicle screws in osteoporotic patients with degenerative and traumatic spinal diseases. Osseoscrew expandable screws (Scient'x – Alphatec Spine) provide a significant stabilization in the osteoporotic spine because of its superior biomechanical properties. The energy required to fail the expanding screws is significantly greater than a standard screw, meaning there is greater holding power after experiencing cyclic loads. The increased fixation strength may prevent screw pull-out in osteoporotic patients and in pedicle screw revision surgery.

Learning Objectives

Spinal fixation with expandable screws in osteoporotic patients

References

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Intraoperative X-Ray of Osseoscrew expandable screws



T12 Osteoporotic fracture

