POSTER 5

ASSESMENT OF CEMENT AUGMENTATION AND SCREW TRAJECTORY ON PEDICLE SCREW FIXATION IN OSTEOPOROTIC VERTEBRAE

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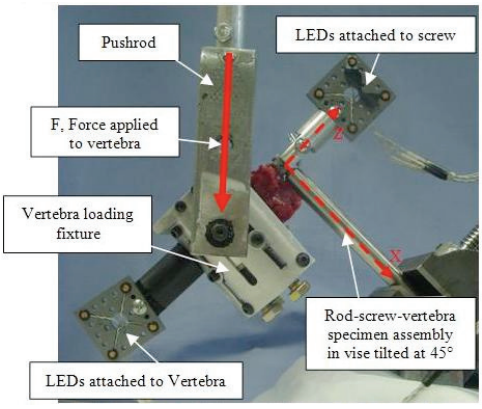
Introduction

Internal fixation of osteoporotic spines for fracture or deformity is currently difficult, owing to failure at the bone-implant interface. This study aims to ascertain whether pedicle screw trajectory and pedicle cortex retention can independently significantly affect fixation strength in osteoporotic vertebrae.

Materials and Methods

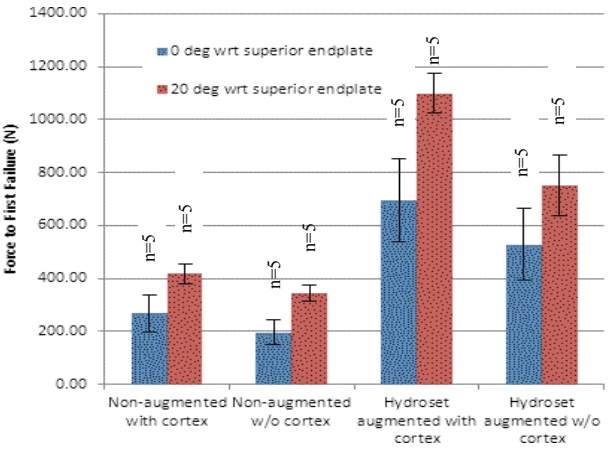
Pedicle screws were inserted at angles of 0° and 20° to the superior vertebral endplate in human osteoporotic thoracolumbar vertebrae. Screws in each group were augmented with calcium phosphate bone cement. A combined flexion moment and pull-out load was applied to simulate physiologic demands on screw purchase, and displacements were measured using an optical tracking system.



Testing apparatus

Results

Initial failure load was significantly higher ($p<0.05$) with cement augmentation. Screw insertion at a 20° angle to the superior endplate independently increased ($p<0.05$) initial failure load. Retention of the dorsal vertebral cortex independently significantly increased ($p<0.05$) initial failure load.



Effects of cement augmentation, screw angulation, and cortex retention

Discussion

Our protocol and apparatus produced screw failure that demonstrated a combination of toggle-migration and pullout similar to that seen clinically. Cement augmentation and angulation of pedicle screws toward the superior endplate can both independently improve internal fixation in osteoporotic vertebrae.

Acknowledgements

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