# Pedicle screw motion in the osteoporotic spine after augmentation with laminar hooks, sublaminar wires, or calcium phosphate cement: a comparative analysis.

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STUDY DESIGN: A biomechanical study addressing the motion of pedicle screws in a human cadaveric, osteoporotic spine model. OBJECTIVES: To compare the fixation of pedicle screws in an osteoporotic spine model after augmentation with laminar hooks, sublaminar wires, or calcium phosphate cement and to determine the kinematic patterns of these screws. SUMMARY OF BACKGROUND DATA: Numerous techniques exist for improving the quality of fixation within the osteoporotic spine, including supplementing the construct with laminar hooks, sublaminar wires, or calcium phosphate cement. Direct comparisons of these practices, however, are lacking. METHODS.: Twenty-four cadaveric lumbar vertebrae were instrumented with a pedicle screw and rod construct augmented with laminar hooks, sublaminar wires, or calcium phosphate cement. The screws were tested cyclically with physiologic loads. Rigid body motions of the screws were measured using an optoelectronic camera system, and the motion at the screw tip and at the screw head were calculated. Screw motions were compared using nonparametric paired statistical analysis. RESULTS: Between augmentation groups, there were no significant differences in the magnitude of motion at the screw head and at the screw tip. After calcium phosphate cement supplementation, screw motion was predominantly rotational in nature, whereas rigid body translation of the screw was more common with sublaminar wires or laminar hooks.

CONCLUSIONS: The three augmentation techniques were similar in their ability to enhance the rigidity of fixation of the pedicle screws. Differences did exist, however, in the patterns of pedicle screw motion, with the calcium phosphate cement augmentation resulting in less rigid body translation than the other two techniques.
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