

Cadaveric Biomechanical Comparison of the FacetFuse Transfacet Pedicle Screw versus Pedicle Screws in the Upper Lumbar Spine*

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Background Context

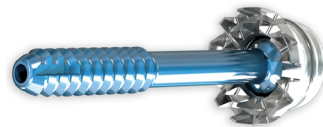
There is concern that facet screws are not anatomically optimal in the upper lumbar spine partly due to the narrowed lamina-facet distance. No previous research has studied the effectiveness of transfacet pedicle screws (FF) in the upper lumbar region (L1-2 or L2-3) compared to pedicle screw-rod fixation (PS) in this region.

Purpose

The goal of this *in vitro* study was to compare the feasibility, stability, and resistance to loosening following cyclic loading offered by FF versus PS at L1-2 or L2-3, with or without interbody fixation present.

Study Design/Setting

Non-paired and paired comparisons of motion in cadaveric specimens instrumented with FF or PS.



FacetFuse MIS Screw System
 (SpineFrontier, Inc.) MA, USA

Patient Sample

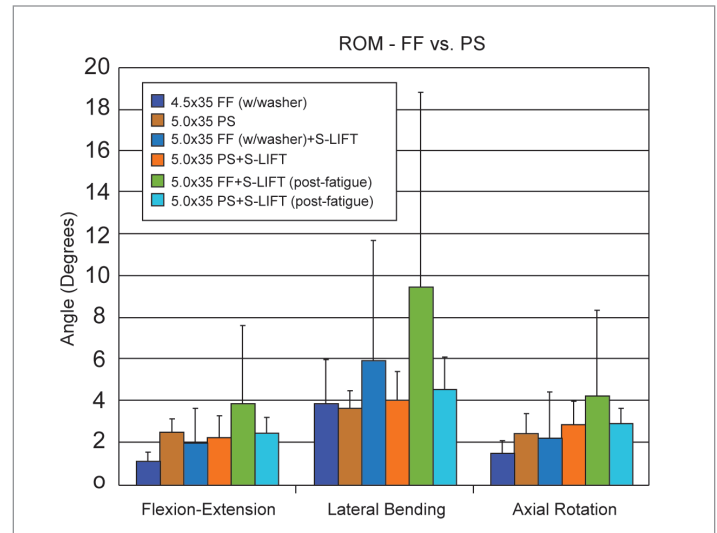
Nine human cadaveric T12-S1 specimens were studied. Data were obtained for 12 motion segments (L1-2 or L2-3) instrumented with either FF or PS.

Outcome Measures

Range of motion during flexion, extension, axial rotation, and lateral bending were compared in multiple conditions and between groups.

Methods

Specimen flexibility was tested by applying nonconstraining nondestructive pure moments (7.5 Nm maximum) while recording specimen motion optoelectronically in 3D. Specimens were tested (A) intact, (B) after inserting 4.0x35mm facet screws with washer or PS at L1-2 or L2-3, (C) after trans-psoas interbody fixation (S-LIFT), leaving screws still in place, (D) after 4000 cycles of fatigue applied in each plane of motion.



Results

Without interbody fixation, FF allowed slightly smaller ROM than PS during flexion-extension ($p=0.002$) and axial rotation ($p=0.07$), but not during lateral bending ($p=0.80$). With S-LIFT, differences between FF and PS were smaller. Fatigue caused greater increases in FF ROM than in PS ROM, with inconsistency in the degree of loosening (large standard deviations) in the FF group.

Discussion & Conclusion

In the upper lumbar spine, FF provides good immediate postoperative resistance to flexion-extension and axial rotation, comparable to stability achieved by PS. FF in this region appears more susceptible to loosening following cyclic loading versus pedicle screws, likely due to discernible difficulty in the upper lumbar region in precise screw positioning.

References

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*Pending Publication



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