Biomechanics of Posterior Lumbar Fixation After Unilateral L4-5 Facetectomy and TLIF Cage*

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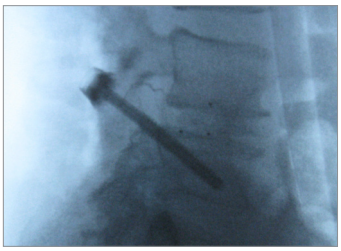
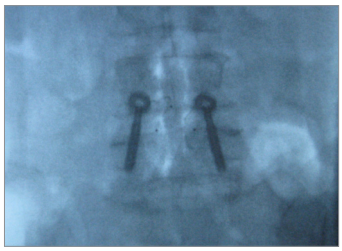
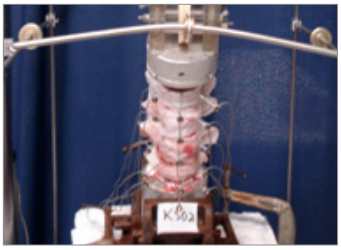
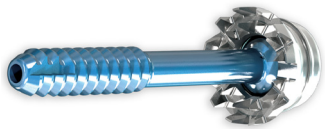
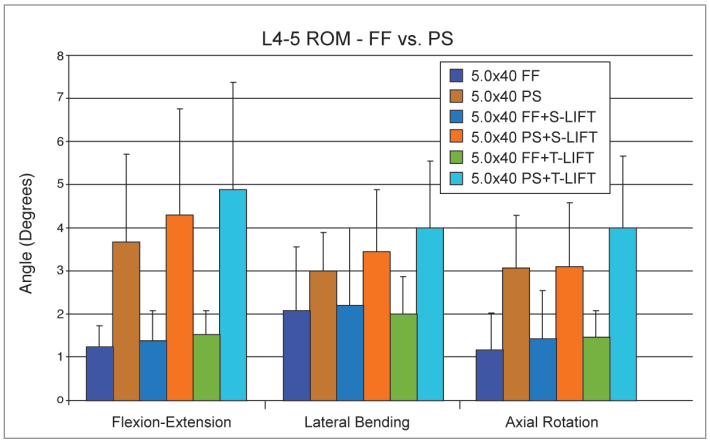








FacetFuse MIS Screw System
(SpineFrontier, Inc.) MA, USA



Background Context

No study has directly compared biomechanical stability offered by the same sized lumbar transfacet pedicular screw fixation (FF) to that of lumbar pedicle screw-rod fixation (PS) in the setting of intact disc as well as after placing a transforaminal (T-LIFT) or lateral (S-LIFT) interbody cage.

Purpose

The goal of this in vitro study was to quantify the stabilizing potential of FF versus PS with intact disc, after T-LIFT, and after S-LIFT (trans-psoas approach).

Study Design/Setting

Non-paired and paired comparison of motion in cadaveric specimens instrumented with FF or PS and in different states of interbody fixation.

Patient Sample

Ten human cadaveric L2-S1 specimens were studied, with motion assessed at L4-L5.

Outcome Measures

Ranges of motion (ROMs) during flexion, extension, axial rotation, and lateral bending were compared in multiple conditions. ROM was compared for corresponding conditions between groups using paired Student's t-tests.

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 applying FF or PS at L4-5 (disc intact), (C) after trans-psoas interbody fixation (S-LIFT) with FF or PS, (D) after T-LIFT with FF or PS.

Results

Greater ROM was allowed by PS than by FF with intact disc, S-LIFT, or T-LIFT during all loading modes, although statistical significance was not reached. In FF, lateral bending was the mode in which greatest ROM was allowed; in PS, flexion-extension was the mode in which greatest ROM was allowed.

Discussion & Conclusion

FF is a very effective method for limiting ROM at L4-5, comparing well to the immediate postoperative stability achieved by PS at this level within the range of loads studied and when used with intact disc or in conjunction with S-LIFT or T-LIFT. The FacetFuse device is an effective alternative to pedicle screws for L4-5 stability with or without interbody. There was a nonsignificant trend to greater motion with transforaminal interbody than without or with lateral interbody when using pedicle screws. The FacetFuse device limited motion relatively consistently for all conditions.

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**Pending Publication*

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