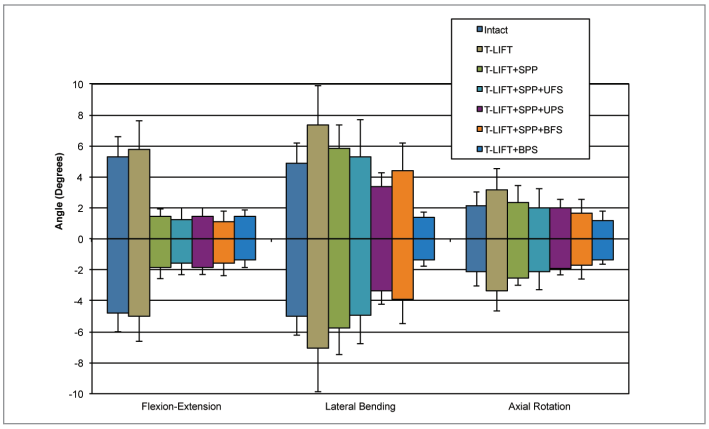
Biomechanics of Constructs Utilizing Pedicle Screws, Facet Screws and Spinous Process Plates after TLIF*

Kingsley R. Chin, M.D., *Institute for Modern and Innovative Surgery, Fort Lauderdale, FL*
L. Perez-Orribo, *Barrow Neurological Institute, Phoenix, AZ*
Philip M. Reyes, BSE, *Barrow Neurological Institute, Phoenix, AZ*
Anna G.U. Sawa, M.S., *Barrow Neurological Institute, Phoenix, AZ*
Steven C. Anagnost, M.D., *The Orthopaedic Center, Tulsa, OK*
Vivek P. Kushwaha, M.D., *Houston Orthopedic and Spine Hospital, Houston, TX*
Josue P. Gabriel, M.D., *St. Anthony's Memorial Hospital, Effingham, IL*
S. Craig Meyer, M.D., *Columbia Orthopaedic Group, Columbia, MO*
Carl A.R. Bruce, M.D., *Univeristy Hospital of the West Indies, Kingston, Jamaica*
Warren D. Yu, M.D., *George Washington University Hospital, Washington DC*
Neil R. Crawford, Ph.D., *Barrow Neurological Institute, Phoenix, AZ*

Research Performed At:
Barrow Neurological Institute, Spinal Biomechanics, Phoenix, AZ 85013

Principal Investigator:
Neil R. Crawford, Ph.D.

Co-Investigator:
Kingsley R. Chin, M.D.
Institute for Modern and Innovative Surgery, Fort Lauderdale, FL 33311



Background Context

After transforaminal lumbar interbody fixation (T-LIFT), several options exist for augmentation to provide a stable fusion construct. Some of these options are application of spinous process plate (SPP), pedicle screws and rods (PS), and/or transfacet pedicle screws (FS).

Purpose

The purpose of this study was to quantify and compare the stabilizing potential at L4-L5 after T-LIFT of constructs that include PS, FS, and SPP fixation.

Study Design/Setting

Nondestructive repeated-measures in vitro flexibility test comparing stability of several constructs.

Patient Sample

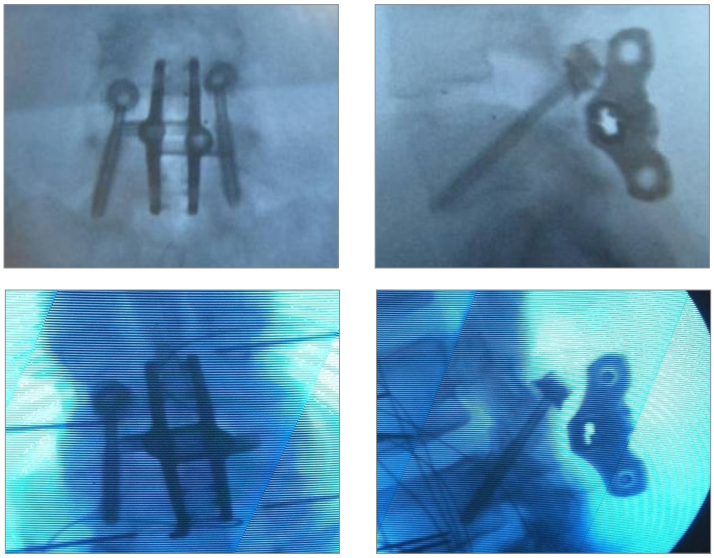
Fourteen human cadaveric L3-S1 specimens were studied, with procedures performed at L4-L5.

Outcome Measures

Range of motion (ROM) at L4-L5 was quantified during flexion, extension, axial rotation, and lateral bending.

Methods

In each specimen, nonconstraining nondestructive pure moments (7.5 Nm maximum) were applied while recording 3D specimen motion optoelectronically. Specimens in Group 1 (N=7) were tested (A) intact, (B) after T-LIFT, (C) after T-LIFT+BFS, (D) after T-LIFT+SPP+unilateral FS (UFS), and (E) after T-LIFT+SPP+bilateral FS (BFS). Specimens in Group 2 (N=7) were tested (A) intact, (B) after T-LIFT,



(C) after T-LIFT+SPP, (D) after T-LIFT+SPP+unilateral PS (UPS), and (E) after T-LIFT+bilateral PS (BPS).

Results

During flexion and extension, all constructs that included FS, PS, or SPP significantly reduced the ROM relative to the intact condition ($p<0.001$, ANOVA/Holm-Sidak). However, during lateral bending, only T-LIFT+BPS significantly reduced the ROM relative to intact ($p<0.001$), and during axial rotation, no construct reduced ROM to significantly less than intact ($p>0.06$). T-LIFT+BPS allowed significantly smaller ROM than any other construct during lateral bending ($p<0.04$). During axial rotation, constructs utilizing PS-rod fixation did not allow significantly different ROM than constructs utilizing FS.

Discussion & Conclusion

It was found that, after T-LIFT, comparable fixation was obtained by constructs utilizing SPP+UFS, SPP+UPS, and SPP+BFS. A construct of T-LIFT+SPP+BPS provided the best stability in all directions of loading, especially lateral bending.

References

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**Pending Publication*

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