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An Acute Biomechanical Study of Plate-cage Fixation for OLIF

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Introduction

Oblique lumbar interbody fusion (OLIF) utilizes a surgical path to the disc space anterior to the psoas muscle and lateral to the great vessels to avoid iatrogenic injury to the psoas muscle and lumbar plexus. This minimally invasive technique typically allows for narrow or wide intervertebral cages. **The objective of this study was to assess the cadaveric biomechanical stability afforded by an OLIF approach as a function of cage size and the use of supplemental fixation with anterior plates or posterior pedicle screws and rods.**

Methods

Sixteen human cadaveric lumbar (L1-L5, 43.8 +/- 9.75 yrs.; 0.87 +/- 0.20 gHA/cm2) spine sections were utilized in this project. The spines were tested using a standard kinetic protocol in flexion-extension, right-left lateral bending, and axial rotation to +/- 6 N-m . Wide (27 mm) and narrower (20 mm) cages (OLIF-25, Medtronic, Memphis, TN) were placed in the L3-L4 intervertebral space and tested:

(1) **Intact** (i.e., no surgical intervention)
(2) **Cage** only (wide or narrow),
(3) **2-hole plate** with cage (plate location was varied between lateral and oblique),
(4) **4-hole plate** with cage (plate location was varied between lateral and oblique);
(5) **Bilateral pedicle screws**.

Results

The instrumented spines demonstrated significantly ($p<0.03$) reduced flexion-extension and lateral bending range-of-motion (ROM) as compared to intact. The narrower cage delivered equivalent ($p>0.05$) flexion-extension ROM at the implanted level as compared to the wider cage. The addition of bilateral pedicle screws and rods to the narrower cage alone did not produce significant reductions in flexion-extension or lateral bending ROM. The constructs with a 4-hole plate produced insignificant reductions in flexion-extension ($p>0.19$) as compared to the 2-hole plate variants. Plate placement (lateral vs oblique) did not result in significant changes to the flexion-extension, lateral bending, or axial rotation ROM. There were no statistically significant changes in adjacent (L2-L3) segment motion as compared to the intact condition.

Conclusions

The data indicate that the OLIF approach provides equivalent acute stability as compared to current anterior and posterior instrumentation strategies, and, therefore, should be considered as a technique for obtaining solid spinal fixation.

Learning Objectives

Participants should be able to understand the biomechanical effects associated with supplemental fixation when utilizing an OLIF technique.