

Comparison of Technical Outcomes in Instrumented Posterolateral Fusion (PLF) with and without Transforaminal Lumbar Interbody Fusion (TLIF) performed using Silicon Nitride cages

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Background: Posterior lumbar fusion is performed for lumbar degeneration that leads to spinal stenosis and spondylolisthesis. Two common approaches include PLF and TLIF, with a current lack of consensus as to the superior approach. The objective of this study is to compare fusion rates, spinal parameters and complications for both surgical approaches using the silicon nitride cage (Si_3N_4). Our hypothesis is TLIF with a Si_3N_4 cage will have higher fusion rates, improved technical outcomes and fewer complications when compared to PLF alone. The Si_3N_4 cage has advantageous surface properties compared to other interbody cages, promoting theoretically higher fusion rates for TLIF procedures.

Methods: A retrospective chart review of 102 spinal fusion patients (PLF=17, TLIF=85) was performed. One spine surgeon performed the fusions and reviewed pre-operative and post-operative radiographs. Measurable outcomes included fusion rates, surgical complications and pelvic/spinal radiographic parameters. Radiographic parameters included restoration of lumbar lordosis (LL), segmental lordosis (SL), pelvic incidence (PI), pelvic tilt (PT), disc height (DH) and foraminal height (FH). Patients who had ≥ 1 year follow up radiographs were included in analysis (PLF=16, TLIF=48).

Results: TLIF patients with a Si_3N_4 cage had improved fusion rates (PLF=81.8%, TLIF=100% $p=0.003$), lumbar lordosis (PLF=-4.38° TLIF=3.15° $p=0.001$), disc height (PLF=0.55mm, TLIF=4.61mm $p<0.001$), foraminal height (PLF=-0.05mm, TLIF=2.41mm $p=0.036$) and a lower incidence of PI-LL mismatch (PLF=46.15%, TLIF=7.5% $p=0.004$). No statistically significant difference was found for surgical complications (PLF=11.1%, TLIF=17.6%) or segmental lordosis (PLF=-1.00mm, TLIF=1.17mm). An age difference of statistical significance was also found between the two patient populations (PLF=61.9, TLIF=54.1 $p=0.018$).

Conclusion: Despite the difference in age between the procedure groups, TLIF with a Si_3N_4 cage proved to be superior in fusion rates, lumbar lordosis, PI-LL mismatch, disc height and foraminal height restoration.