Elevated Risk of Radicular Pain and Sensory Deficit with ALIF Compared to TLIF at L5-S1

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INTRODUCTION:

L5/S1 interbody fusions can result in postoperative neurological complications partially due to nerve root crowding in this region. The mechanism of such complications is dependent on the performed lumbar interbody fusion approach. ALIF, for example, could lead to nerve root injuries as a result of stretch neuropraxia or compression of the nerve root. TLIF, on the other hand, is a newer alternative with similar fusion rates that could circumvent these specific complication mechanisms. However, similar complications may still occur due to direct retraction or mechanical irritation. Studies comparing differences in the rate of postoperative neurological deficits between ALIF and TLIF remain scarce.

METHODS:

728 patients who underwent single-level L5-S1 ALIF or TLIF were included (310 ALIF and 418 TLIF). The rates of neurological deficits were retrospectively reviewed and compared between approaches. T-tests and χ^2 tests were used to analyze differences in outcomes with significance set at $p<0.05$.

RESULTS:

Initial demographic analyses revealed significantly higher age, smoking and BMI in the TLIF group compared to the ALIF group. Propensity score matching (PSM) was utilized to control for these variables, which resulted in 556 total patients (278 ALIF and 278 TLIF). The rate of any neurological deficit was the compared and found to be significantly higher in ALIF compared to TLIF (p=0.019). Within neurological deficits, radicular pain was significantly higher in ALIF (p=0.030), although there was not specific distribution found to be driving these results. S1 sensory deficits also proved to be significantly higher in the ALIF group (p=0.045). The rate motor deficits was not significantly different between groups.

DISCUSSION AND CONCLUSION:

There is a significantly higher risk of overall postoperative neurological deficits in ALIF as opposed to TLIF, which is mostly driven by significantly higher rates of radicular pain and S1 sensory deficits. Motor deficits, on the other hand, were not found to be significantly different between approaches. Additional studies are required in order to completely elucidate neurological deficit risk factors, which could include preoperative radiological analyses. Present and future findings could prompt surgeons to exercise caution when choosing between approaches.

TABLE 1: Comparison of Demographics Between Patients Undergoing One-Level ALIF or TLIF

	ALIF (n=278)	TLIF (n=278)	p value
Age	50.2±13.7	50.8±14.9	0.614
Body Mass Index (BMI)	28.5±5.7	28.5±5.2	0.908
Gender (% female)	139 (50.0%)	120 (43.3%)	0.115
Smoking	25 (9.0%)	22 (7.9%)	0.647

TABLE 2: Comparison of Postoperative Neurologic Complications Between Patients Undergoing One-Level ALIF or TLIF

	ALIF (n=278)	TLIF (n=278)	p value
Neurological Deficit	17 (6.1%)	6 (2.2%)	**0.019**
Radicular Pain	11 (4.0%)	3 (1.1%)	**0.030**
L4	1 (0.4%)	0 (0.0%)	0.317
L5	3 (1.1%)	2 (0.7%)	0.653
S1	3 (1.1%)	1 (0.4%)	*0.316*
Unspecified Distribution	6 (2.2%)	0 (0.0%)	**0.014**
Sensory Deficit	6 (2.2%)	3 (1.1%)	0.313
L4	2 (0.7%)	3 (1.1%)	0.653
L5	4 (1.4%)	2 (0.7%)	0.412
S1	4 (1.4%)	0 (0.0%)	**0.045**
Unspecified Distribution	1 (0.4%)	1 (0.4%)	1.000
Motor Deficit	6 (2.2%)	2 (0.7%)	0.154
L4 (TA)	4 (1.4%)	1 (0.4%)	0.178
Average Score Decrease	1.50±1.00	1.00±0.00	0.685
L5 (EHL)	5 (1.8%)	2 (0.7%)	0.254
Average Score Decrease	1.6±0.89	2.50±2.12	0.426
S1 (GSC)	2 (0.7%)	1 (0.4%)	0.563
Average Score Decrease	0.67±0.58	1.00±0.00	0.667
Average Time for Resolution (days)	294.6±583.7	197.4±178.9	0.723
Return to OR in 30 Days	9 (3.2%)	4 (1.4%)	0.161
Return to OR in 90 Days	11 (4.0%)	7 (2.5%)	0.338

EHL = extensor hallucis longus; TA = tibialis anterior; GSC = gastrocsoleus complex