Reoperation Rates Due to Adjacent Segment Disease following Primary 1-2 level Minimally Invasive versus Open Transforaminal Lumbar Interbody Fusion

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INTRODUCTION:

Adjacent segment disease (ASD) is a common concern following transforaminal lumbar interbody fusion surgery (TLIF) due to the surgical disruption of the paraspinal and ligamentous structures of the lumbar spine, which may compromise lumbar stability in the years following surgery. Minimally invasive (MIS) TLIF theoretically reduces surgical instability and may consequently lower reoperation rates due to ASD. To date, few prior studies have evaluated the incidence of reoperation due to symptomatic ASD between open and minimally invasive TLIFs, and existing literature on differences in reoperation rates between groups remains controversial. We set out to investigate the effect of the approach of the TLIF (open vs. MIS) on reoperation rates due to symptomatic ASD at mid-term follow up (2-4 years).

METHODS:

A retrospective, observational study examined patients who underwent 1 or 2 level primary TLIF at an academic orthopaedic hospital between 2013-2019, who had 2, 3, and/or 4-year follow ups. Patients were separated according to open vs. MIS TLIF surgical approach. Exclusion criteria included patients with prior lumbar fusion, or revision due to neoplasm or trauma. Patients who underwent revision due to ASD only were included in the study. Patient demographics including age, sex, BMI, smoking status, race, CCI, workers' compensation, and no fault were included and compared. Mann Whitney U test was conducted for continuous data, Fisher's exact test for categorical, and binary logistic regression was used to determine independent predictors of revision rates.

RESULTS:

In total, 237 TLIF met inclusion criteria (Table 1); 101 MIS and 136 open TLIF were identified with 2 year follow up, 50 MIS and 73 open TLIF had 3 year follow up, and 29 MIS and 50 open TLIF had 4 year follow up. There was a significant difference in revision rates between MIS and open TLIFs at 2 (5.8% vs. 15.4%, p=0.021) and 3 (8% vs. 23.2%, p=0.03) year follow up, with open TLIFs demonstrating higher revision rates. Demographic differences between MIS and open TLIFs included age at 2 (57.9 vs. 63, p=0.0003) and 3 (58.4 vs. 64, p=0.0091) year follow up, with open TLIF patients being older, as well as smoking status (20 vs. 9, p=0.01) at 2 year follow up, with MIS patients having a larger proportion of patients who smoke. There were no significant differences between the cohorts with respect to race, BMI, CCI, and sex. Workers compensation and no fault populations were not found to be an independent predictor of reoperation rates on binary logistic regression at 2-year (p=0.998) and 3-year (0.976) follow up.

DISCUSSION AND CONCLUSION:

Open TLIF was found to have a significantly higher rate of reoperation due to ASD than their MIS counterpart. Our analysis demonstrated that surgical approach was an independent predictor of reoperation rates across demographic variations.

	Two year Follow-up			Three year Follow-up			Four year Follow-up		
	MIS	Open	P-value	MIS	Open	P-value	MIS	Open	P-value
Number of patients	101	136		50	73		29	50	
Revision Rate	6 (5.8%)	21 (15.4%)	**0.021**	4 (8%)	17 (23.2%)	**0.03**	5 (17.2%)	17 (34%)	0.1265
Age	57.9	62.99	**0.0003**	58.4	64.0	**0.0091**	59.0	60.9	0.49
Sex (female %)	58.80%	52.20%	35.00%	50.00%	61.6%	0.27	44.80%	50.00%	0.82
CCI	0.54	0.83	0.16	0.66	0.75	0.88	0.44	0.78	0.44
Current smoker	20	9	**0.01**	9	7	0.29	9	7	0.17
BMI	29.7	28.9	0.62	28.9	28.3	0.82	29.0	29.3	0.8
Race (White, African American, Asian, Other)	67/17/3/13	86/20/15/13	0.051	32/9/3/6	43/14/9/6	0.76	22/3/0/4	43/14/9/6	0.09