Anterior Spinal Fusion Surgery Associated with Lower Risk of Stroke, Pneumonia, and Infection Compared to Posterior Spinal Fusion Surgery

Comron Saifi[1], Leland Mccluskey[2], Ivan Angelov, Victor James Wu, Sanchita S Gupta, Mathew Cyriac
[1]Houston Methodist, [2]Tulane University

INTRODUCTION:

The question of approach to lumbar fusion is debated amongst spine surgeons. While prior studies have shown slight differences in outcomes, the majority of studies have concluded that both approaches have similar fusion rates and clinical outcomes. To get a more complete picture of the advantages and disadvantages of each approach, postoperative complications must also be investigated. This retrospective cohort study compared the 30 and 90-day postoperative complications between an anterior vs. posterior approach to lumbar interbody fusion (LIF) in 2010-2018 utilizing the largest sample to date of direct patient outcomes from a mixed private and public payer database.

METHODS:

The MSpine database by PearlDiver was queried using ICD-9, ICD-10, and CPT codes to identify patients who had undergone single-level anterior or posterior lumbar interbody fusion surgery. 30 and 90-day readmission rates, ileus, lower extremity DVT, infection, pneumonia, and stroke were used to compare post-operative complications of an anterior vs. posterior approach.

RESULTS:

112,023 patients were included in this study, with 38,529 (34.4%) in the anterior group (ALIF/LLIF) and 73,494 (65.6%) in the posterior group (PLIF/TLIF). At both 30 and 90-days postoperative, patients undergoing an anterior approach to lumbar interbody fusion had a higher odds ratio of lower extremity DVT (30-day OR: 1.19, 90-day OR: 1.16; P<0.05) and ileus complication (30-day OR: 1.87, P= <.05; 90-day OR: 1.81, P<.05). At both 30 and 90-days postoperative, patients undergoing a posterior approach had a higher odds ratio of stroke (30-day: OR: 0.79, 90-day OR: 0.87; P<0.05), transfusion (30-day OR: 0.66, 90-day OR: 0.69; P<.05), infection (30-day OR: 0.88, 90-day OR: 0.91; P <.05), and pneumonia complication (30-day OR: 0.85, 90-day OR: 0.90; P<.05). There was no statistically significant difference in myocardial infarction or pulmonary embolism between both approaches at 30 and 90-days postoperative.

Table 1: Patient Characteristics/Comorbidities of ALIF/LLIF and PLIF/TLIF Groups
Table 2: Odds of 30-Day Complications in ALIF/LLIF Compared with PLIF/TLIF Group Adjusted for with CCI, Age, and Sex
Table 3: Odds of 90- Day Complications in ALIF/LLIF Compared with PLIF/TLIF Group Adjusted for with CCI, Age, and Sex

DISCUSSION AND CONCLUSION:

This study found differences in postoperative complications between anterior and posterior approaches at 30 and 90-days where other studies have not, secondary to not having enough statistical power and consequent probability of type II errors. These statistically powered findings identified specific risk factors for each approach to lumbar fusion, which can help inform surgeon treatment decisions for patient profiles. Specifically, the findings suggested that patients with high risk for stroke, pneumonia, and infection, or patients with a high likelihood of requiring postoperative transfusion, may benefit from using the anterior approach to lumbar interbody fusion. Conversely, patients with a high risk for developing lower extremity DVT may benefit from using the posterior approach. There was no difference in odds of developing postoperative pulmonary embolism or myocardial infarction between both approaches.

	ALIF/LLIF		PLIF/TLIF		
	N	%	N	%	
Demographics					
Male Sex	15,293	39.69%	29,946	40.75%	P <0.05
Average Age	53.877		57.718		P <0.05
Comorbidities					
Congestive Heart Failure (CHF)	1,354	3.51%	3,107	4.23%	P <0.05
Peripheral Vascular Disease (PVD)	2,523	6.55%	6,772	9.21%	P <0.05
Chronic Pulmonary Disease (COPD)	9,415	24.44 %	18,061	24.57%	P= 0.608
Chronic Kidney Disease	1,807	4.69%	4,362	5.94%	P <0.05
Diabetes Mellitus	9,754	25.32%	21,790	29.65%	P <0.05
Liver disease	3,030	7.86 %	5,672	7.72%	P = 0.224
Smoking	9,241	23.98%	17,287	23.52%	P <0.05
Obesity	7,664	19.89%	14,898	20.27%	P = 0.203

30 Day Complication	**OR**	**95%**	**P**
Ileus	1.87	1.65 - 2.12	P= <.05
Lower Extremity DVT	1.19	1.07 -1.34	P <0.05
Transfusion	0.66	0.57-0.77	P <0.05
Infection	0.88	0.81-0.97	P <0.05
Stroke	0.79	0.67- 0.92	P <0.05
Myocardial infarction	0.80	0.62-1.04	P = 0.101
Pneumonia	0.85	0.76-0.96	P <0.05
Pulmonary Embolism	0.94	0.77-1.14	P = 0.525
Readmission Rate	1.12	1.06-1.18	P<0.05

90 Day Complication	**OR**	**95%**	**P**
Ileus	1.81	1.59- 2.04	P <0.05
Lower Extremity DVT	1.16	1.06-1.28	P <0.05
Transfusion	0.69	0.60 - 0.81	P <0.05
Infection	0.91	0.85-0.99	P <0.05
Stroke	0.87	0.77-0.97	P <0.05
MI	0.84	0.68-1.03	P = 0.094
Pneumonia	0.90	0.82-0.99	P <0.05
Pulmonary Embolism	0.91	0.77-1.07	P = 0.272
Readmission Rate	1.08	1.03-1.13	P<0.05