

**Incidence and Risk Factors for Postoperative Radiculitis after ALIF:
An Analysis of Spinopelvic Parameters and the GAP Score**

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Introduction

Anterior lumbar interbody fusion (ALIF) is an increasingly popular technique for lumbar fusion, generally considered safe but associated with a varying risk of neurological complications. Postoperative radiculitis, often overlooked, is a specific complication characterized by lower limb neuralgic pain without evidence of structural nerve damage. Although mechanical stretching during implant insertion and segmental lordosis correction are likely contributing factors, patient-specific lumbopelvic sagittal alignment variables that may influence its occurrence remain unclear. This study's primary goal is to determine the prevalence of postoperative radiculitis after ALIF and identify related patient-specific lumbopelvic sagittal alignment factors influencing its occurrence.

Materials and Methods

A retrospective review of our center’s database was conducted to investigate the occurrence of postoperative radiculitis following ALIF surgery performed at the L4-L5 or L5-S1 levels (stand-alone or with posterior instrumentation). 61 adult patients were included in the analysis. Exclusion criteria comprised prior surgery at the index level, incomplete medical records, and the development of radicular pain accompanied by lower limb motor weakness. Clinical parameters (Oswestry Disability Index), radiographic parameters (lumbopelvic sagittal alignment using GAP score parameters), and surgical factors (cage size and disc height modification) were evaluated and subsequently entered into a multivariable logistic regression analysis.

Results

Postoperative radiculitis occurred in 29.5% of patients, with symptoms primarily manifesting within the first six weeks following surgery and lasting up to six months. Patients in the PAIN group showed notable differences in pre- and postoperative GAP score parameters, specifically higher values for relative lumbar lordosis (RLL) and relative pelvic version (RPV). Furthermore, multivariable logistic regression identified postoperative RLL and the anterior disc height (ADH) ratio as the strongest predictors for the risk of developing radiculitis.

Conclusion

Excessive disk space enlargement during ALIF can lead to postoperative radiculitis, particularly in patients with pre-existing near-ideal lumbar alignment. To mitigate this iatrogenic complication in this patient group, the degree of correction must be individualized. This tailored approach should incorporate parameters from the GAP score and a careful assessment of the relationship between the anterior disk and the vertebral body.

Phase	Variable	Postoperative radiculitis		Mean Diff. (95% CI)	p-value
		No (N=43)	Yes (N=18)		
Preoperative	ODI	33.2 ± 19.8	32.0 ± 15.1	1.2 (-8.8 to 11.2)	0.812
	PI	50.8 ± 13.1	47.1 ± 11.1	3.7 (-3.0 to 10.4)	0.268
	PT	16.9 ± 10.7	11.7 ± 7.6	5.2 (0.35 to 10.13)	0.036*
	SS	33.6 ± 9.0	35.4 ± 9.0	-1.8 (-7.1 to 3.3)	0.464
	LL	49.7 ± 12.9	55.3 ± 12.8	-5.6 (-12.9 to 1.8)	0.135
	L4S1	29.1 ± 9.2	34.3 ± 7.2	-5.2 (-9.0 to 5.0)	0.054
	ADH ratio	0.2 ± 0.1	0.2 ± 0.1	0.0 (-0.04 to 0.05)	0.928
	PDH ratio	0.1 ± 0.0	0.1 ± 0.1	0.0 (-0.02 to 0.04)	0.470
	RLL	-10.7 ± 12.4	-2.9 ± 10.3	-7.8 (-14.1 to -1.6)	0.015*
	RPV	-5.4 ± 7.7	-1.3 ± 6.1	-4.1 (-5.4 to -1.3)	0.034*
Postoperative	LDI	59.4 ± 15.3	63.6 ± 11.9	-4.2 (-11.7 to 3.1)	0.248
	ODI	10.1 ± 11.1	14.7 ± 14.3	-4.6 (-11.0 to 2.0)	0.300
	PI	51.6 ± 12.7	52.1 ± 9.7	-0.5 (-6.0 to 5.6)	0.867
	PT	15.0 ± 10.3	10.6 ± 7.5	4.4 (-0.3 to 9.2)	0.066
	SS	36.7 ± 9.2	41.5 ± 9.1	-4.8 (-9.9 to 1.0)	0.161
	LL	54.8 ± 11.8	63.3 ± 13.7	-8.5 (-16.1 to -0.9)	0.028*
	L4S1	37.9 ± 7.4	45.5 ± 6.9	-7.6 (-11.6 to -3.5)	<0.001***
	ADH Ratio	0.5 ± 0.1	0.6 ± 0.1	-0.1 (-0.11 to -0.02)	0.003**
	PDH Ratio	0.2 ± 0.0	0.3 ± 0.1	-0.1 (-0.05 to 0.02)	0.337
	RLL	-5.7 ± 10.8	5.2 ± 11.9	-10.9 (-17.5 to -4.23)	0.002**
	RPV	-2.3 ± 8.5	4.7 ± 7.5	-7.0 (-11.5 to -2.6)	0.003**
	LDI	72.0 ± 21.7	73.4 ± 10.1	-1.4 (-9.5 to 6.8)	0.733

Values are presented as mean ± standard deviation. ODI: Oswestry Disability Index; PI: Pelvic Incidence; PT: Pelvic Tilt; SS: Sacral Slope; LL: Lumbar Lordosis; L4S1: L4-S1 Lordosis; ADH: Anterior Disc Height; PDH: Posterior Disc Height; RLL: Relative Lumbar Lordosis; RPV: Relative Pelvic Version; LDI: Lordosis Distribution Index. * p < 0.05, ** p < 0.01, *** p < 0.001.

Preoperative and Postoperative comparison between groups with (Yes) and without (No) postoperative radiculitis.