



Risk Factors for Reoperation in the Surgical Management of Lumbar Adjacent Segment Disease

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Introduction

Adjacent segment disease (ASD) occurs in up to 18.5% of patients who undergo lumbar spinal fusion (Park et al). When conservative treatment fails, surgery is indicated in the management of ASD. Surgical treatment usually involves decompression of the symptomatic adjacent segment(s) with extension of the index fusion (Chen et al, Adogwa et al). Few studies have reported long-term outcomes following the first revision surgery for ASD, and the reoperation rate is not well-characterized. Furthermore, risk factors for additional surgery after the first revision procedure for ASD have not been investigated. The goal of this study was to determine the reoperation rate following the first revision procedure for lumbar ASD and identify risk factors for additional surgery in a cohort of patients who underwent surgery for lumbar ASD.

Methods

A retrospective analysis of a consecutive series of 84 procedures for adjacent segment disease in the lumbar spine by three surgeons at the author's institution was performed. Preoperative and postoperative data were collected from electronic medical records. The odds of requiring additional surgery based on gender, tobacco use, location of adjacent segment pathology after the index fusion, instrumentation of the first revision surgery, decompression versus fusion in the first revision surgery, and history of spinal trauma prior to the index fusion were determined.

Results

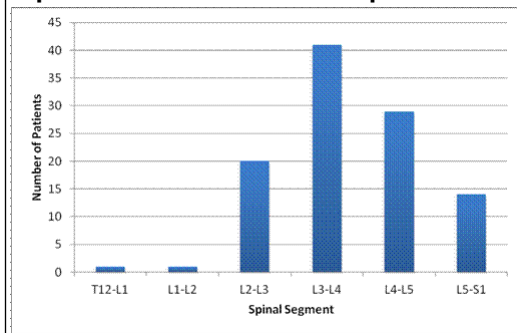
Patient demographics and the type of surgery for the first revision operation is listed in Table 1.

Table 1: Patient Demographics and Revision Procedures

Patient characteristics	Total	First revision procedure	Total
Male	39 (46.4%)	Discectomy	4
Female	45 (53.6%)	Hemilaminectomy	1
Mean Age at Time of First Revision Operation (Range)	58.786 (33-79)	Hemilaminotomy	12
Diabetes	8 (9.52%)	Laminectomy	20
Hypertension	35 (41.7%)	Laminotomy	1
Osteopenia/osteoporosis	7 (8.3%)	Dynamic fusion	7
Scoliosis	1 (1.2%)	Posterolateral fusion	36
Ehler-Danlos syndrome	1 (1.2%)	Posterior lumbar interbody fusion	3
Mean follow-up time	61.3 months		

As shown in Figure 1, L3-L4 was the most commonly affected segment in the lumbar spine at the time of the first revision procedure, followed by L4-L5.

Figure 1 : Distribution of segments with ASD across 84 patients at the time of the first revision procedure. 21 procedures included multiple levels.



A total of 14 (16.7%) patients required additional surgery after the first revision procedure for ASD. As shown in Figure 2, L3-L4 was the most commonly affected segment to require additional surgery.

Figure 2: Distribution of segments with ASD after the first revision surgery across 14 patients, 4 patients had multiple levels involved

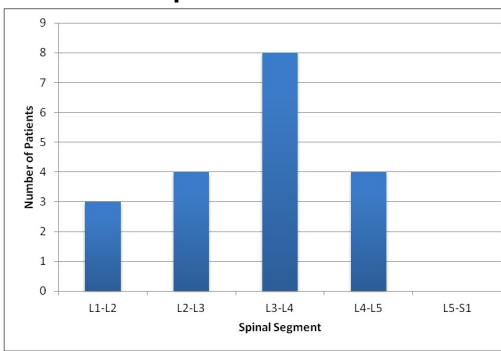


Table 2: Risk Factors for Additional Surgery after the first Revision Surgery for ASD

Risk Factor	Required Additional Surgery	No Additional Surgery	Odds Ratio	95% CI	P Value
Gender:					
Men	9	30	2.40	0.729 to 7.900	0.150
Women	5	40			
Tobacco Use:					
Smoker	6	26	1.32	0.398 to 4.365	0.651
Non-smoker	7	40			
Proximal vs Distal ASD:					
Proximal	12	53	3.17	0.379 to 26.497	0.287
Distal	1	14			
Instrumentation:					
Soft Fusion	3	11	1.47	0.348 to 6.241	0.599
Instrumented Fusion	10	54			
Decompression vs Fusion:					
Decompression	10	28	3.75	1.070 to 13.145	0.039
Fusion	4	42			
History of Spinal trauma:					
Injury	6	12	3.56	1.043 to 12.164	0.043
No Injury	8	57			

Table 2 shows the risk factor analysis for reoperation after the first revision surgery. Patients who underwent decompression without fusion for the first revision procedure were at an increased risk of requiring a second revision procedure (OR = 3.75, 95% CI: 1.07 - 13.15) compared to those who initially underwent decompression with extension of index fusion. Those with a history of spinal trauma prior to their index fusion were also at an increased risk (3.56, 95% CI: 1.04 - 12.16).

Conclusions

ASD has received heightened awareness as a significant long-term complication of lumbar spinal fusion (Park et al, Riew et al). Therefore, appropriate treatment of spine pathology both prior to and after the development of lumbar ASD should be carefully considered, and patient selection should be optimized to reduce the need for additional procedures. We found the reoperation rate following the first revision procedure for lumbar ASD to be 16.7%. History of spinal trauma and performing a decompression adjacent to an index fusion without extension of the fusion were associated with an increased need for additional surgery.

References

- Park P, Garton HJ, Gala VC, Hoff JT, McGillicuddy JE. Adjacent segment disease after lumbar or lumbosacral fusion: review of the literature. *Spine*. 2004;17:1938-1944.
- Chen WJ, Lai PL, Niu CC, Chen LH, Fu TS, Wong CB. Surgical treatment of adjacent instability after lumbar spine fusion. *Spine*. 2001;15:E519-524.
- Adogwa O, Parker SL, Mendenhall SK, Shau DN, Aaronson O, Cheng J, Devin CJ, McGirt MJ. Laminectomy and Extension of Instrumented Fusion Improves 2-Year Pain, Disability, and Quality of Life in Patients with Adjacent Segment Disease: Defining the Long-Term Effectiveness of Surgery. *World Neurosurg*. 2011.
- Riew KD, Norvell DC, Chapman JR, et al. Introduction/summary statement: adjacent segment pathology. *Spine*. 2012;37: S1 - 7.