

## Introduction

- Spinal epidural abscess (SEA) is a highly morbid condition typically presenting with back pain, fever, and neurologic deficits.
- At present, the ideal surgical strategy – laminectomy with or without fusion – remains elusive.
- In this study we compare the surgical profile of risk factors and perioperative complications for laminectomy and laminectomy with fusion procedures in the treatment of SEA.

## Methods

- 30-day outcomes such as reoperation and readmission following laminectomy and laminectomy with fusion in patients with SEA were investigated utilizing the American College of Surgeons National Quality Improvement Program database.
- Demographics and clinical risk factors were collected, and propensity matching was performed to account for differences in risk profiles between the groups.

**Table 1: Demographics of patients undergoing 1-2 level laminectomy or fusion surgical procedures for epidural abscess**

Pre-Operative factors	Total	Procedure		P value
		Laminectomy	Fusion	
Total patients	738	608 (82.4%)	130 (17.6%)	
Sex				
Male	460 (62.3%)	381 (62.7%)	79 (60.8%)	0.69
Female	278 (37.7%)	227 (37.3%)	51 (39.2%)	
Race*				
Black	76 (10.3%)	65 (10.7%)	11 (8.5%)	0.59
White	573 (77.6%)	472 (77.6%)	101 (77.7%)	
Other	31 (4.2%)	24 (3.9%)	7 (5.4%)	
Age				
Mean (SD)	58 (13.11)	58 (13.43)	58 (11.51)	0.78
16-35	37 (5%)	34 (5.6%)	3 (2.3%)	
35-55	238 (32.2%)	196 (32.2%)	42 (32.3%)	
55-75	388 (52.6%)	313 (51.5%)	75 (48%)	
75-100	75 (10.2%)	65 (10.7%)	10 (16%)	
Functional status**				
Independent	625 (84.7%)	521 (85.7%)	104 (80%)	0.11
Partially/Totally Dependent	109 (14.8%)	84 (13.8%)	25 (19.2%)	
ASA classification				
1-2	114 (15.4%)	106 (17.4%)	8 (6.2%)	<0.01
3-5	624 (84.6%)	502 (82.6%)	122 (93.8%)	

## Results

- 738 patients were studied (608 laminectomy alone, 130 fusion).
- The fusion population experienced significantly greater rate of return to the operating room (odds ratio (OR) 1.892), with the difference primarily accounted for by cervical spine operations.
- Additionally, fusion patients had significantly greater rates of blood transfusion.
- Infection was the most common reason for reoperation in both populations.

**Table 2: Post-operative complications for patients undergoing 1-2 level laminectomy or fusion**

Postoperative complication	Total	Laminectomy	Fusion	Univariate	Multivariate
				P value	Odds Ratio (95% CI) P value
Return to OR	105 (14.2%)	74 (12.2%)	31 (23.8%)	0.005	1.892 (1.158-3.092) 0.01
Cervical	38 (5.1%)	21 (16.2%)	17 (2.8%)		2.322 (1.115-4.837) 0.02
Thoracic	10 (1.3%)	2 (1.5%)	8 (1.3%)		2.05 (0.377-11.158) 0.41
Lumbar	57 (7.7%)	8 (6.2%)	49 (8.1%)		1.67 (0.732-3.813) 0.22
Readmission*	96 (13.0%)	79 (13.0%)	17 (13.1%)	0.99	
Death (30 days)	30 (4.1%)	24 (4.0%)	6 (4.6%)	0.73	
Bleeding Requiring Transfusion	129 (17.5%)	88 (14.5%)	41 (31.5%)	< 0.0001	2.487 (1.584-3.903) < 0.0001
Ventilator >48 hours	53 (7.2%)	39 (6.4%)	14 (10.8%)	0.0809	

**Table 3: Reasons for Reoperation**

Reason for Reoperation	Laminectomy			Fusion				
	CPT	n	% of Reoperations	CPT	n	% of Reoperations		
Infection, Incision-Drainage, Excision	10140, 10180, 11043, 11044, 22015, 63265, 63266, 63267, 63271	22	31.9	3.9	10060, 11043, 22010, 62272, 63267	5	17.2	4.1
Decompression	63001, 63005, 63030, 63040, 63047, 63081	11	15.9	2.0	63042, 63047, 63051, 63081	4	13.8	3.3
Arthrodesis	22551, 22819	2	2.9	0.4	22551, 22554	3	10.3	2.5
Other	22830, 64999	2	2.9	0.4	228999	1	3.4	0.8
Unrelated/Unknown		32	46.4	5.7		16	55.2	13.2
<b>Total</b>		<b>69</b>	<b>100</b>	<b>12.4</b>		<b>29</b>	<b>100</b>	<b>23.9</b>

\* as a proportion of available data (n=560)  
 \*\* as a proportion of available data (n=121)

## Learning Objectives

- 1) Identify and compare outcomes for patients undergoing laminectomy and laminectomy for fusion for spinal epidural abscesses (SEA).
- 2) Characterize risk factors for reoperation in patients with SEA and identify the most common reasons for reoperation.
- 3) Recognize the added short-term risk from fusion for SEA, and weigh this hazard against the benefit of added stability.

## Conclusions

- Both laminectomy and laminectomy with fusion effectively treat SEA, but addition of fusion is associated with significantly higher rates of transfusion and perioperative return to the operating room.
- In operative situations where either procedure is reasonable, surgeons should consider that fusion nearly doubles the odds of reoperation in the short-term, and weigh this risk against the benefit of added stability.

## References

1. Arko L, Quach E, Nguyen V, et al. Medical and surgical management of spinal epidural abscess: a systematic review. Neurosurg Focus 2014;37:E4.
2. Lohr M, Reithmeier T, Ernestus R-I, et al. Spinal epidural abscess: prognostic factors and comparison of different surgical treatment strategies. Acta Neurochir (Wien) 2005;147:159-66; discussion 166.
3. Abduljabbar FH, Teles AR, Bokhari R, et al. Laminectomy with or Without Fusion to Manage Degenerative Cervical Myelopathy. Neurosurg Clin N Am 2018;29:91-105.
4. Anderson PA, Matz PG, Groff MW, et al. Laminectomy and fusion for the treatment of cervical degenerative myelopathy. J Neurosurg Spine 2009;11:150-6.
5. Ghogawala Z, Dziura J, Butler WE, et al. Laminectomy plus Fusion versus Laminectomy Alone for Lumbar Spondylolisthesis. N Engl J Med 2016;374:1424-34.
6. Shiloach M, Frencher SK, Steeger JE, et al. Toward robust information: data quality and inter-rater reliability in the American College of Surgeons National Surgical Quality Improvement Program. J Am Coll Surg 2010;210:6-16.
7. Baker AS, Ojemann RG, Swartz MN, et al. Spinal epidural abscess. N Engl J Med 1975;293:463-8.
8. Shweikeh F, Saeed K, Bukavina L, et al. An institutional series and contemporary review of bacterial spinal epidural abscess: current status and future directions. Neurosurg Focus 2014;37:E9.
9. Sciubba DM, Chaichana KL, Woodworth GF, et al. Factors associated with cervical instability requiring fusion after cervical laminectomy for intradural tumor resection. J Neurosurg Spine 2008;8:413-9.
10. Bydon M, Macki M, De la Garza-Ramos R, et al. Smoking as an independent predictor of reoperation after lumbar laminectomy: a study of 500 cases. J Neurosurg Spine 2015;22:288-93.
11. Bydon M, De la Garza-Ramos R, Abt NB, et al. Impact of smoking on complication and pseudarthrosis rates after single- and 2-level posterolateral fusion of the lumbar spine. Spine 2014;39:1765-70.