Database Analysis Comparing Incidence and Complication Rates Between Inpatient and Outpatient Laminotomies for Lumbar Disc Herniation

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INTRODUCTION: Lumbar disc herniation (LDH) is an increasingly common condition among the aging U.S. population that is characterized with disabling pain and loss of neurological function. While most patients recover without surgery, some require operative intervention. The epidemiology and trends of laminotomy for LDH have not been recently studied, and current practice patterns might be different from historical norms. This study aimed to investigate the trends of inpatient and outpatient laminotomies for LDH and compare complication rates between these two sites of service.

METHODS: A large, national de-identified database was utilized to identify patients ≥18 who underwent a laminotomy for LDH between 2009 and 2019. Two cohorts were created based on site of surgery: inpatient vs. outpatient. The outpatient cohort was defined in the database as procedures performed in ambulatory surgery centers or facilities where hospitalization or institutionalization was not required. Epidemiologic analyses for these cohorts were performed by demographics. Patients in both groups were then 1:1 propensity-score matched based on age, sex, insurance type, and Charlson Comorbidity Index (CCI). 90-day postoperative complications were compared between cohorts utilizing multivariate logistic regression.

RESULTS: A total of 155,610 LDH patients were initially queried, with 71,502 patients matched by site of service. The average incidence of laminotomy for LDH was 16.5 per 10,000 persons-years. Although this trend has not changed from 2009 to 2019, the proportion of outpatient laminotomies significantly increased (Figure 1). Outpatient laminotomies were more common among younger patients with an average CCI score of 0.78, which was significantly lower than that of patients who underwent an inpatient laminotomy for LDH (1.02 CCI score; p<0.001). Patients with inpatient laminotomies developed significantly higher rates of surgical site infections (Odds Ratio [OR] 1.53, p<0.001), sepsis (OR 1.93, p<0.001), venous thromboembolism (VTE) (OR 2.23, p<0.001), wound disruption (OR 1.93, p<0.001), hematoma (1.58, p<0.001), urinary tract infection (UTI) (OR 1.62, p<0.001), acute kidney injury (AKI) (OR 2.62, p<0.001), atrial fibrillation (OR 1.50, p<0.001), dural tears (OR 2.60, p<0.001), and neurogenic urinary retention (OR 2.19, p<0.001), even when controlling for age, insurance status, sex, and CCI (Table 1).

DISCUSSION: The incidence of laminotomy for LDH in our study is greater than previous data[1], which has historically been limited to the inpatient setting. For treatment, our study demonstrated a trend towards outpatient procedures, which aligns with existing literature for various other spinal procedures. Notably, patients who underwent outpatient laminotomies were younger and with fewer comorbidities, whereas even when controlling for confounders, patients requiring inpatient procedures had higher rates of postoperative complications. While the comorbidity burden between cohorts likely plays a role in the differences in complication rates, other factors may also contribute to these findings, such as decreased mobilization postoperatively, increased rates of urinary catheterization, and greater exposure to pathogens all within the inpatient hospital setting. As a result, surgeons should consider individual risk factors and comorbidities when determining treatment trajectories for patients undergoing laminotomy for LDH, carefully evaluating the risk of complication as a result of the patient comorbidity profile versus the site of surgery itself.

REFERENCES: 1. Walcott BP, Hanak BW, Caracci JR, et al. Trends in inpatient setting laminectomy for excision of herniated intervertebral disc: Population-based estimates from the US nationwide inpatient sample. *Surg Neurol Int*. Jan 24 2011;2:7. doi:10.4103/2152-7806.76144

SIGNIFICANCE/CLINICAL RELEVANCE: Our study demonstrates that the use of laminotomy has continued to remain a stable treatment for lumbar disc herniation over the past ten years, yet there has been a shift in practice favoring outpatient utilization of these procedures. This shift has been associated with a significant reduction in several common postoperative complications compared to inpatient procedures. Clinicians can utilize these results in conjunction with individual risk factors and comorbidities to determine treatment trajectories for patients and identify patients that need closer surveillance after surgery.

IMAGES AND TABLES:

Figure 1.

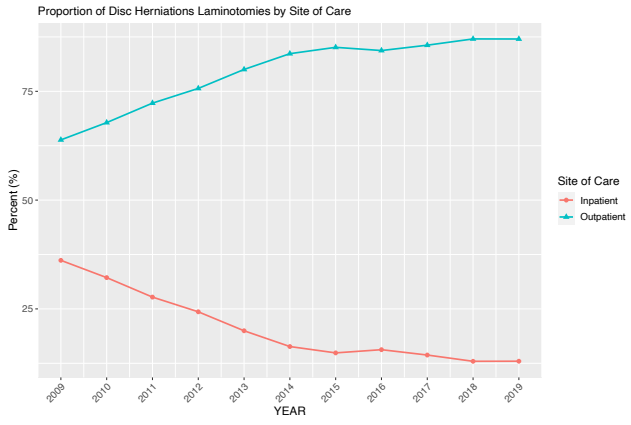

Table 1.

Table Univariate and Multivariate Analyses of 90-Day Complication Rates Between Inpatient vs. Outpatient Laminotomies for Lumbar Disc Herniation - controlled by age, sex, comorbidities, insurance type, and geographic region

90-Day Complication	Univariate			Multivariate (Reference group – Outpatient)		
	Inpatient %	Outpatient %	p-value	Inpatient Odds Ratio	95% CI	p-value
Surgical Site Infection	3.23%	2.10%	**<0.001**	1.53	1.39 - 1.68	**<0.001**
Sepsis	0.46%	0.23%	**<0.001**	1.93	1.48 - 2.51	**<0.001**
Nerve Injury	0.02%	0.02%	0.44	1.54	0.55 - 4.36	0.41
VTE	2.31%	1.07%	**<0.001**	2.23	1.97 - 2.53	**<0.001**
Wound Disruption	0.93%	0.47%	**<0.001**	1.93	1.60 - 2.32	**<0.001**
Hematoma	1.30%	0.81%	**<0.001**	1.58	1.36 - 1.83	**<0.001**
UTI	4.37%	2.75%	**<0.001**	1.62	1.49 - 1.76	**<0.001**
AKI	0.89%	0.34%	**<0.001**	2.62	2.12 - 3.23	**<0.001**
Atrial Fibrillation	1.63%	1.19%	**<0.001**	1.5	1.27 - 1.76	**<0.001**
Dural Tear	2.24%	0.87%	**<0.001**	2.6	2.28 - 2.97	**<0.001**
Urinary Retention	3.30%	1.55%	**<0.001**	2.19	1.97 - 2.42	**<0.001**
Revision Surgery	1.78%	2.08%	**0.003**	0.86	0.77 - 0.96	**0.005**
Hospital Readmission	7.74%	4.58%	**<0.001**	1.72	1.62 - 1.83	**<0.001**