# Symptomatic Epidural Hematoma Following One vs. Multi-Level Unilateral Laminotomy for Bilateral Decompression: A Retrospective Analysis

Henry Avetisian, Rakhi Banerjee, Jordan Gasho, Pranit Kumaran, Justin Zheng, Aidan R Lindgren, Atishay Mathur[1], William James Karakash, Marc Aaron Abdou, Mirbahador Athari[1], Matthew Gallo, Dil Patel, Jeffrey C Wang, Raymond J Hah, Ram Alluri

[1]Department of Orthopaedic Surgery

INTRODUCTION:

Unilateral laminotomy for bilateral decompression (ULBD) using a tubular retractor system has become a widely adopted method to decompress both sides of the spinal canal through a unilateral or "over the top" approach. While generally safe and commonly performed in the outpatient setting, epidural hematoma (EDH) remains a potential complication. If untreated, EDH can lead to permanent neurologic deficits. With the growing adoption of MIS techniques for bilateral decompressions, the specific incidence of symptomatic EDH in this patient population remains to be reported. This study aims to determine the incidence of symptomatic epidural hematoma (EDH) following one- versus multi-level unilateral laminotomy for bilateral decompression (ULBD), evaluate short-term outcomes and management strategies, and identify independent predictors.

METHODS:

A retrospective review was conducted of patients who underwent ULBD for lumbar stenosis at a single academic institution from 2010 to 2024. Patients were stratified by the presence of symptomatic EDH, confirmed on MRI demonstrating thecal sac compression. Descriptive statistics compared demographics between cohorts, and multivariable logistic regression identified independent predictors of EDH.

RESULTS:

A total of 462 patients were included; 24 (5.19%) developed symptomatic EDH. The incidence was higher in multilevel procedures compared to one-level, though not statistically significant (5.88% vs. 4.73%, p=0.583). All patients presented with radiculopathy; 50% had new neurologic deficits, and 58.3% required surgical evacuation. The average time from surgery to symptom onset was 9.79±15.22 days (range: 1-42 days), with 37.5% presenting on postoperative day one. Among those who underwent surgical evacuation, the average time from symptom onset to decompression was 4.61±6.79 days. All patients experienced symptom resolution with no permanent deficits. Independent predictors of EDH included obesity (aOR: 4.19), coronary artery disease (CAD) (aOR: 2.70), higher American Society of Anesthesiologist (ASA) score (aOR: 2.46), and increased BMI (aOR: 1.07) (all p<0.05)(Table 1).

DISCUSSION AND CONCLUSION:

This study identified a 5.19% incidence of symptomatic EDH following ULBD, with a higher raw incidence observed in multilevel procedures. Independent predictors included obesity, CAD, higher ASA score, and increased BMI. Drain placement and overnight admission should be considered for patients with elevated risk, particularly those with these identified comorbidities. Most patients presented on postoperative day one and required surgical evacuation, with no cases of permanent neurologic sequelae. Prospective studies are needed to further define risk mitigation strategies and to identify which patients may be safely managed with conservative treatment for this complication.

**Table 1**. Predictors of Symptomatic Epidural Hematoma

| | OR | 95% CI | p-value | OR | 95% CI | p-value |
|---|---|---|---|---|---|---|
| **Demographic** | **Univariate** | | | **Multivariable** | | |
| Age | 1.00 | 0.96-1.04 | 0.919 | 1.22 | 0.64-2.32 | 0.548 |
| Female | 0.51 | 0.20-1.30 | 0.157 | 0.51 | 0.20-1.32 | 0.167 |
| **ASA** | 2.47 | 1.06-5.75 | **0.036** | 2.46 | 1.06-5.74 | **0.037** |
| **Body Mass Index** | 1.07 | 1.01-1.14 | **0.026** | 1.07 | 1.01-1.14 | **0.023** |
| Tobacco Use | 1.23 | 0.41-3.71 | 0.718 | 1.24 | 0.41-3.76 | 0.703 |
| **Comorbidities** | | | | | | |
| **Obesity** | 4.13 | 1.76-9.69 | **<0.001** | 4.19 | 1.79-9.84 | **<0.001** |
| Diabetes | 2.05 | 0.85-4.94 | 0.111 | 2.01 | 0.83-4.87 | 0.122 |
| Hypertension | 1.53 | 0.62-3.77 | 0.354 | 1.50 | 0.61-3.71 | 0.379 |
| **CAD** | 2.75 | 1.09-6.91 | **0.032** | 2.70 | 1.07-6.82 | **0.036** |
| **Surgical Variables** | | | | | | |
| Drain Placement | 0.52 | 0.17-1.56 | 0.244 | 0.52 | 0.17-1.56 | 0.245 |
| Anticoagulation Use | 1.47 | 0.59-3.64 | 0.410 | 1.42 | 0.57-3.56 | 0.450 |
| Revision Decompression | 1.52 | 0.19-12.21 | 0.693 | 1.41 | 0.17-11.49 | 0.748 |
| Intraoperative Durotomy | 1.81 | 0.51-6.39 | 0.358 | 1.72 | 0.48-6.16 | 0.408 |
| Two-Level | 1.16 | 0.50-2.72 | 0.726 | - | - | - |
| Three-Level | 1.38 | 0.31-6.20 | 0.671 | - | - | - |

ASA= American Society of Anesthesiologist. P<0.05 is considered statistically significant