Retropharyngeal Hematoma Following Anterior Cervical Discectomy and Fusion: Identifying Risk to Prevent a Life-Threatening Complication

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INTRODUCTION:

Anterior cervical discectomy and fusion (ACDF) is a widely performed surgical procedure for cervical myelopathy and/or radiculopathy. Due to its low complication rate, many surgeons perform ACDF in outpatient settings. However, retropharyngeal hematoma, while rare, remains a feared complication due to its potential to rapidly cause airway obstruction. Prior studies have been limited to single-institution cohorts with small sample sizes. Given its rarity, single-center data may not accurately estimate its true incidence or comprehensively identify independent risk factors. This study aims to determine the incidence and independent predictors of retropharyngeal hematoma causing airway obstruction following ACDF.

METHODS:

The PearlDiver national database was queried for patients who underwent one- to four-level ACDF from 2010 to 2022. Exclusion criteria included circumferential cervical fusions and patients with indications for malignancy, trauma, or infection. Patients were stratified based on the presence of a retropharyngeal hematoma causing airway obstruction within seven days of surgery. Differences in patient demographics and comorbidities were assessed using descriptive statistics. Multivariable regression analyses were performed to identify independent predictors.

RESULTS:

A total of 430,542 patients who underwent ACDF were identified, of whom 140 (0.03%) developed retropharyngeal hematoma leading to acute airway obstruction. The hematoma cohort was older (57.06±10.75 years vs. 55.14±11.63 years, p<0.05) and had a higher elixhauser comorbidity index (ECI) (5.99±4.40 vs. 3.75±3.37; p<0.001) with a greater proportion of males (65.0% vs. 45.81%; p<0.001) (Table 1). Patients most frequently presented within one day of surgery (45 patients, 32.14%). The mean time from ACDF to hematoma presentation was 2.82±2.06 days (Figure 1). 57 cases (40.71%) were classified as readmissions, while 83 (59.29%) represented extended initial hospitalizations. Multivariable regression analysis identified independent predictors of retropharyngeal hematoma, including ossified posterior longitudinal ligament (OPLL) (aOR: 8.07, [1.98-21.44], p<0.001), male gender (aOR: 2.30, [1.63-3.28], p<0.001), hypertension (aOR: 1.67, [1.08-2.64], p<0.05), viral hepatitis (aOR: 1.57 [1.05-2.32], p<0.05), and ECI (aOR: 1.14, [1.09-1.18], p<0.001) (Figure 2).

DISCUSSION AND CONCLUSION:

This study identified a 0.03% incidence of retropharyngeal hematoma leading to acute airway obstruction and several independent predictors, including ECI, male gender, hypertension, viral hepatitis, and OPLL. While the low incidence may further support the safety of outpatient ACDF, surgeons should carefully consider overnight observation in patients with these risk factors. Further research is needed to develop evidence-based risk mitigation protocols to further decrease its incidence.

Figure 1: Time from ACDF to Retropharyngeal Hematoma Presentation

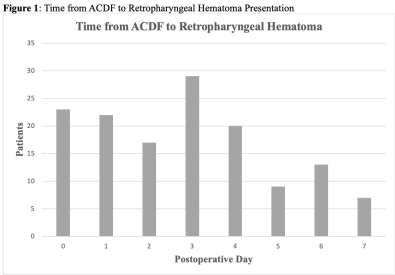
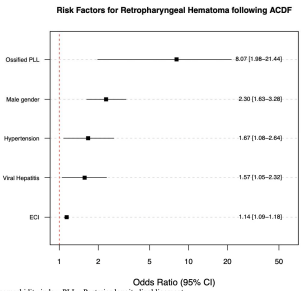


Figure 2: Predictors of Retropharyngeal Hematoma following ACDF



ECI= Elixhauser comorbidity index. PLL= Posterior longitudinal ligament

Demographic	No Hematoma	Hematoma	p-value
n	430,402 (99.97%)	140 (0.03%)	
Age (Years)	55.14±11.63	57.06±10.75	**p<0.05**
ECI	3.75±3.37	5.99±4.40	**p<0.001**
Male	197,184 (45.81%)	91 (65.0%)	**p<0.001**
Female	233,218 (54.19%)	49 (35.0%)	**p<0.001**
Tobacco Use	219,957 (51.11%)	87 (62.14%)	**p<0.05**
Comorbidity			
Coagulopathy	48,087 (11.17%)	39 (27.86%)	**p<0.001**
Hypertension	311,336 (72.34%)	129 (92.14%)	**p<0.001**
Coronary Artery Disease	119,296 (27.72%)	63 (45.0%)	**p<0.001**
Alcohol Abuse	42,133 (9.79%)	23 (16.43%)	**p<0.05**
Deficiency Anemia	147,877 (34.36%)	76 (54.29%)	**p<0.001**
Obesity	187,161 (43.49%)	81 (57.86%)	**p<0.001**
CKD	57,581 (13.38%)	44 (31.42%)	**p<0.001**
Liver Disease	89,973 (20.90%)	51 (36.43%)	**p<0.001**
Diabetes	102,557 (23.83%)	48 (34.29%)	**p<0.01**
Viral Hepatitis	95,581 (22.21%)	57 (40.71%)	**p<0.001**
Ossified PLL	912 (0.21%)	*	**p<0.001**
Preoperative Anticoagulation	115,823 (26.91%)	59 (42.14%)	**p<0.001**
Number of Levels			
One-Level ACDF	275,306 (63.96%)	86 (61.14%)	0.59
Two-Level ACDF	69,404 (16.13%)	28 (20.0%)	0.26
Three-Level ACDF	82,591 (19.19%)	24 (17.14%)	0.61
Four-Level ACDF	138 (0.03%)	*	0.62

Table 1. Demographic and Comorbidity Differences.

ECI= Elixhauser comorbidity index. PLL= Posterior longitudinal ligament. p<0.05 is considered statistically significant
*=<11 cases