



Contents lists available at ScienceDirect

Journal of Clinical Neuroscience

journal homepage: [www.elsevier.com/locate/jocn](http://www.elsevier.com/locate/jocn)

Clinical commentary

## Outcomes of cervical laminoplasty—Population-level analysis of a national longitudinal database

Anand Veeravagu, Tej D. Azad, Michael Zhang, Amy Li, Arjun V. Pendharkar, John K. Ratliff, Lawrence M. Shuer\*

Department of Neurosurgery, Stanford University School of Medicine, Palo Alto, CA, United States

### ARTICLE INFO

#### Article history:

Received 1 July 2017

Accepted 23 October 2017

Available online xxxx

#### Keywords:

Laminoplasty

Cervical spondylotic myelopathy

Decompression

Complications

MarketScan

### ABSTRACT

**Objective:** Cervical laminoplasty is an important alternative to laminectomy in decompressing of the cervical spine. Further evidence to assess the utility of laminoplasty is required. We examine outcomes of cervical laminoplasty via a population level analysis in the United States.

**Methods:** We performed a population-level analysis using the national MarketScan longitudinal database to analyze outcomes and costs of cervical laminoplasty between 2007 and 2014. Outcomes included post-operative complications, revision rates, and functional outcomes.

**Results:** Using a national administrative database, we identified 2613 patients (65.6% male, mean 58.5 years) who underwent cervical laminoplasty. Mean length of stay was  $3.1 \pm 2.8$  days and mean follow-up was  $795.5 \pm 670.6$  days. The overall complication rate was 22.5% (N = 587), 30-day readmission rate was 7.5% (N = 195), and mortality rate was 0.08% (N = 2, elderly patients only). The complication rate was significantly increased in elderly patients (age >65 years) compared to non-elderly patients (OR 0.751,  $p < .01$ ). The use of intraoperative neuromonitoring (IONM) during the cervical laminoplasty procedure did not significantly impact outcomes. The overall re-operation rate after the initial procedure was 10.9%. Total costs of cervical laminoplasty were mainly driven by hospital charges with physician-related payments comprising a small amount.

**Conclusions:** Our national analysis of cervical laminoplasty found the procedure to be clinically effective with low complication rates and postoperative symptomatic improvement.

© 2017 Elsevier Ltd. All rights reserved.

### 1. Introduction

Cervical spondylotic myelopathy (CSM) is a frequent cause of spinal cord dysfunction as well as the most common myelopathy in adults over 55 years [1]. As the number of elderly Americans continues to grow, it is likely that the incidence of CSM will increase. Symptoms often begin insidiously and progress over time; they include pain in the neck or shoulder, paresthesia in the arms with complaints of inhibited fine motor control in the hands, and gait disturbance [2]. Due to the subtlety of early CSM, many patients suffer from worsening neurologic deficit before seeking treatment. A 2013 study by Behrbalk et al. retrospectively reviewed 42 patient records and found a mean time delay from initiation of symptoms to diagnosis of over 2 years [3].

Since its development in the 1970s, cervical laminoplasty was offered as an alternative to laminectomy in decompressing the cervical spine [4–6]. The literature suggests laminoplasty to be an effective treatment specifically for CSM [5,7–9]. However, the benefit of cervical laminoplasty over laminectomy remains controversial. While dural expansion and spinal cord decompression is achieved without complete removal of the lamina in laminoplasty (unlike laminectomy), the procedure is contraindicated in patients with significant kyphosis and spinal instability. A systematic review by Yoon et al. comparing the effectiveness and safety of cervical laminoplasty versus laminectomy for treatment of CSM found only low-quality evidence supporting the superiority of one procedure over the other [10].

Though the benefit of laminoplasty over laminectomy, or laminectomy over laminoplasty, is unclear, there is undoubtedly a growing need for effective treatment for patients with cervical stenosis. We examined the complications and costs associated with the cervical laminoplasty procedure on a population level using a national longitudinal claims database.

\* Corresponding author at: Department of Neurosurgery, Stanford University Medical Center, 300 Pasteur Drive A301, MC 5325, Stanford, CA 94305-5327, United States.

E-mail address: [lshuer@stanford.edu](mailto:lshuer@stanford.edu) (L.M. Shuer).

## 2. Methods

A retrospective analysis of the complications and costs of cervical laminoplasty was performed to analyze the outcomes of the procedure on a population level. We examined outcomes at the index admission, 30 days post-discharge, and at long term time points (one, two, and beyond two years) using the Thomson Reuters MarketScan Commercial Claims and Encounters and Medicare Supplemental databases, administered by Truven Health Analytics. The MarketScan database is comprised of data that includes inpatient admission records and outpatient services from over 100 payers in the United States.

### 2.1. MarketScan cohort definition

MarketScan data for the years 2007–2014 were accessed using SAS software (version 9.3; SAS Institute, Inc., Cary, NC, USA). Cervical laminoplasty procedures were identified using CPT codes 63050 and 63051. We found 2613 patients eligible for analysis.

### 2.2. MarketScan variables and outcomes

Patient characteristics of age, gender, comorbidities, geographic region, and insurance plan type were identified from the database. Outcomes were determined on an inpatient and outpatient basis. Inpatient outcomes included length of stay (LOS) and related costs consisting of physician and hospital payments. Postoperative outcomes were analyzed for the occurrence and type(s) of complications after cervical laminoplasty. We further analyzed the use of intraoperative monitoring (IONM, ICD-9 codes 95940, 95941, and 95920) and its effects on outcomes.

## 3. Results

### 3.1. Population characteristics

During the 2007–2014 study period in the MarketScan national database, we identified 2613 patients who underwent cervical laminoplasty. The population consisted of 1714 males (65.6%) and 899 females (34.4%). The mean age was 58.5 years (SD 11.4) in which 74.4% (N = 1944) were younger than 65 years. The patient population resides in the following geographical distribution in the United States: South (N = 856, 32.8%), North Central (N = 665, 25.5%), West (N = 609, 23.1%), and Northeast (N = 415, 15.9%).

Patient comorbidities assessed prior the cervical laminoplasty procedure included osteoporosis (N = 407, 15.6%), hypertension (N = 1142, 43.7%), COPD (N = 508, 19.4%), diabetes (N = 606, 23.2%), tobacco use (N = 304, 11.6%), congestive heart failure (N = 107, 4.1%), myocardial infarction (N = 119, 4.6%), and obesity (N = 259, 9.9%).

When examining the diagnosis codes, CSM (ICD-9 721.1) was the most frequent primary indication for a cervical laminoplasty in the patient population (N = 1370, 52.43%). This was followed by spinal stenosis in the cervical region (ICD-9 723.0, N = 505, 19.33%), intervertebral disc disorder with myelopathy-cervical region (ICD-9 722.71, N = 278, 10.64%), cervical spondylosis without myelopathy (ICD-9 721.0, N = 122, 4.67%), displacement of cervical intervertebral disc without myelopathy (ICD-9 722.0, N = 49, 1.88%), and degeneration of cervical intervertebral disc (ICD-9 722.4, N = 33, 1.26%).

The mean LOS for the index hospitalization was 3.1 days (SD 2.8) and the mean follow-up was 795.5 days (SD 670.6) (Table 1).

**Table 1**

Demographics of population level study of patients undergoing cervical laminoplasty.

	N	%
<i>Laminoplasty</i>		
Total	2613	100.0
<i>Sex</i>		
Female	899	34.4
Male	1714	65.6
<i>Elderly (&gt;65)</i>		
No	1944	74.4
Yes	669	25.6
<i>Year</i>		
2007	177	6.8
2008	320	12.3
2009	344	13.2
2010	339	13.0
2011	416	15.9
2012	351	13.4
2013	317	12.1
2014	349	12.4
Age, mean (SD)	58.5 (11.4)	
Follow up, mean (SD)	795.5 (670.6)	
Length of stay, mean (SD)	3.1 (2.8)	
<i>Index Payments</i>		
Hospital, mean (SD)	\$25,275.83 (44,385.58)	
Physician, mean (SD)	\$4,962.91 (7,919.58)	
Total, mean (SD)	\$33,489.85 (48,161.95)	
<i>Region</i>		
Northeast	415	15.9
North Central	665	25.5
South	856	32.8
West	609	23.1
Unknown	68	2.6
<i>Insurance plan type</i>		
Comprehensive	281	11.2
EPO	41	1.6
HMO	341	13.6
POS	175	7.0
PPO	1520	60.4
POS with capitation	13	0.5
CDHP	87	3.5
HDHP	57	2.3
Missing	98	3.75
<i>Comorbidities</i>		
Diagnosis		
Osteoporosis	407	15.6
Hypertension	1142	43.7
Chronic obstructive pulmonary disease	508	19.4
Diabetes	606	23.2
Tobacco use	304	11.6
Congestive Heart Failure	107	4.1
Myocardial Infarction	119	4.6
Obesity	259	9.9
<i>Indication</i>		
Diagnosis (ICD-9 code)		
Cervical spondylosis with myelopathy (721.1)	1370	52.4
Spinal stenosis in cervical region (723.0)	505	19.3
Intervertebral disc disorder with myelopathy, cervical region (722.71)	278	10.6
Cervical spondylosis without myelopathy (721.0)	122	4.7
Displacement of cervical intervertebral disc without myelopathy (722.0)	49	1.9
Degeneration of cervical intervertebral disc (722.4)	33	1.3

### 3.2. Postoperative complications

The complication rate following cervical laminoplasty was 22.5% (N = 587). Postoperative complications included dysrhythmia (N = 93, 3.6%), infections (N = 101, 3.87%), pulmonary issues

Download English Version:

<https://daneshyari.com/en/article/8685270>

Download Persian Version:

<https://daneshyari.com/article/8685270>

[Daneshyari.com](https://daneshyari.com)