Comparative Effectiveness between Primary and Revision Foraminotomy for the Treatment of Lumbar Foraminal Stenosis

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Introduction

Foraminotomy has demonstrated clinical benefit for the management of lumbar foraminal stenosis (LFS). Although many patients undergo multiple foraminotomies, there is little data comparing primary foraminotomy (PF) and revision foraminotomy (RF) in terms of cost and quality of life (QOL) outcomes.

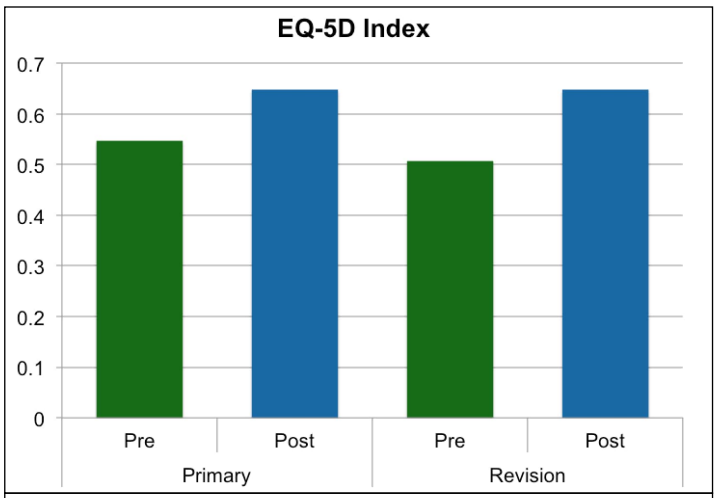
Methods

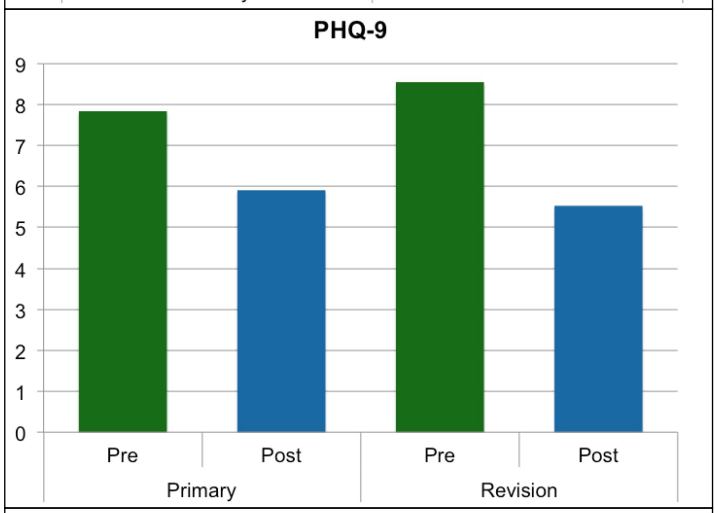
A retrospective cohort study was conducted among patients undergoing foraminotomy for LFS. QOL instruments (EQ-5D, PDQ, and PHQ-9) were prospectively collected between 2008 and 2016. Outcome measures included improvement in postoperative QOL, cost, and QOL minimum clinically important difference (MCID).

Results

579 procedures were eligible – 476 (82%) PF and 103 (18%) RF. A significantly higher proportion of males underwent RF than PF and PF was done on a significantly higher number of vertebral levels. Preoperatively, mean PDQ-Functional scores (50 vs. 54, p=0.04), demonstrated significantly poorer QOL in the RF cohort. Postoperatively, EQ-5D index showed significant improvement in both the PF (0.547 to 0.648, p<0.0001) and the RF (0.507 to 0.648, p<0.0001) cohorts. Similarly, total PHQ-9 improved significantly in the PF cohort (7.84 to 5.91, p<0.001) and in the RF cohort (8.55 to 5.53, p=0.02), as did total PDQ (PF: 77 to 63, p<0.0001; RF: 85 to 70, p=0.04). QOL scores were also compared between groups preoperatively and postoperatively. The only significant difference between PF and RF was observed in preoperative PDQ-Functional score (50 vs. 54, p=0.04). The proportion of patients achieving an MCID was not significantly associated with cohort. Finally, perioperative cost did not differ significantly between cohorts.

Conclusions





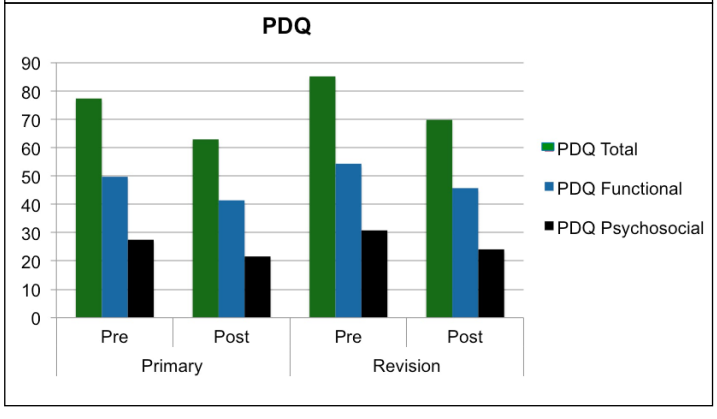


Table 1. Patient Characteristics

Characteristic	Primary	Revision	*p*-value
N	476	103	
Male	282 (59%)	73 (71%)	0.03*
Age at Surgery (years)	63.8 ± 11.0	62.6 ± 10.6	0.35
Race			0.80
White	427 (90%)	93 (90%)	
Black	38 (8%)	9 (9%)	
Other	11 (2%)	1 (1%)	
Marital Status			0.28
Single	53 (11%)	9 (9%)	
Married	335 (70%)	83 (81%	
Divorced	51 (11%)	6 (6%)	
Widowed	34 (7%)	5 (5%)	
Unknown	3 (1%)	0 (0%)	
CCI	1.0 ± 1.5	1.1 ± 1.6	0.55
CCI ≥ 2	125 (26%)	29 (28%)	0.69
Number of Vertebral Levels	2.2 ± 1.0	2.0 ± 0.9	0.04*
Length of Stay (days)	3.7 ± 4.6	4.0 ± 4.1	0.63
Follow-Up (months)	17.5 ± 17.7	18.4 ± 17.7	0.71
Perioperative Costs ($)	3,860 ± 4,576	3,181 ± 4,382	0.17

N, Number. Continuous variables reported as mean ± standard deviation; categorical variables reported as count (percent).
*Statistically significant, $p<0.05$

Table 2. Unadjusted Quality of Life Outcomes

Characteristic	Primary	*p*-value†	Revision	*p*-value†	OR [95% CI]	*p*-value‡
EQ-5D Index						
Preoperative	0.547 ± 0.221		0.507 ± 0.188			0.16
Postoperative	0.648 ± 0.202	< 0.0001*	0.648 ± 0.180	< 0.0001*		0.99
PDQ-Function						
Preoperative	49.7 ± 18.3		54.3 ± 18.5			0.04*
Postoperative	41.4 ± 21.8	< 0.0001*	45.7 ± 19.2	< 0.0001*		0.13
PDQ-Psychosocial						
Preoperative	27.5 ± 14.1		30.8 ± 14.6			0.10
Postoperative	21.6 ± 14.3	0.03*	24.1 ± 16.2	0.17		0.21
PDQ-Total						
Preoperative	77.3 ± 30.4		85.1 ± 31.4			0.07
Postoperative	62.9 ± 34.6	< 0.0001*	69.8 ± 32.8	0.04*		0.14
PHQ-9						
Preoperative	7.84 ± 6.63		8.55 ± 5.99			0.45
Postoperative	5.91 ± 5.50	< 0.001*	5.53 ± 5.97	0.02*		0.63
MCID						
EQ-5D	91 47%		19 59%		1.64 [0.77-3.50]	0.25
PDQ	83 42%		9 30%		0.58 [0.25-1.34]	0.14
PHQ-9	46 25%		6 21%		0.80 [0.31-2.10]	0.42

EQ, EuroQol; MCID, minimal clinically important difference; EQ-5D, EuroQol 5-Dimensions; PDQ, Pain Disability Questionnaire; PHQ-9, Patient Health Questionnaire 9. *Statistically significant: $p<0.05$.
Continuous variables reported as mean ± standard deviation; categorical variables reported as count (percent).
†Paired t-tests used for intra-cohort comparisons of continuous variables.
‡t-tests for continuous variables and chi-squared tests used for inter-cohort comparisons for categorical variables.

Table 3. Patient Costs

Characteristic	Primary	Revision	*p*-value
N	476	103	
30-Day Pre-Admit Costs ($)	3,860 ± 4,576	3,181 ± 4,382	0.17
Cost of Admission ($)	13,383 ± 8,737	13,595 ± 8,253	0.82
365-Day Follow-up Costs ($)	10,530 ± 18,177	13,615 ± 28,287	0.16
Total Costs ($)	27,773 ± 21,401	30,391 ± 32,609	0.31

N, Number. Continuous variables reported as mean ± standard deviation. *Statistically significant, $p<0.05$

References

1. Quan H, Sundararajan V, Halfon P, Fong A, Burnand B, Luthi JC, Saunders LD, Beck CA, Feasby TE, Ghali WA. Coding Algorithms for Defining Comorbidities in ICD-9-CM and ICD-10 Administrative Data.
2. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. Med Care 2003;41:582-92.
3. Parker SL, Godil SS, Shau DN, Mendenhall SK, McGirt MJ. Assessment of the minimum clinically important difference in pain, disability, and quality of life after anterior cervical discectomy and fusion: clinical article. J Neurosurg Spine 2013; 18:154-60.
4. Löwe B, Unützer J, Callahan CM, Perkins AJ, Kroenke K. Monitoring depression treatment outcomes with the patient health questionnaire-9. Med Care 2004;42:1194–201.
5. Wilson H. Minimum clinical important differences of health outcomes in a chronic pain population: Are they predictive of poor outcomes? University of Texas at Arlington, 2007.