

Time to Improvement for Post-Operative Symptoms for Cervical Myelopathy: A Retrospective Analysis

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INTRODUCTION: Cervical myelopathy (CM) is a common, progressive spinal disorder that involves spinal cord compression and a wide variety of symptoms that differ among individuals. Common symptoms include numbness, extremity weakness, loss of balance, and gait instability. Decompression surgeries are commonly used for the treatment of cervical myelopathy with varying outcomes. Understanding time to improvement for the symptoms of cervical myelopathy after surgery can help guide clinician care, manage patient expectations, and improve overall outcomes.

METHODS: Study design was a retrospective chart review with a total sample size of 180 patients. All patients had a clinical presentation of cervical myelopathy, had imaging demonstrating cervical stenosis, and received corrective surgery. The data was collected from one hospital system with surgeries performed by both orthopaedic and neurosurgeons. Data recorded included age, smoking status, co-morbidities, duration of pre-operative symptoms, and post-operative days until improvement in numbness, upper extremity strength, and balance.

RESULTS:

There was a marginally significant association with time to improvement for numbness ($p=0.053$) after surgery correlated to patient age. The average days until improvement in numbness for patients older than 60 years old is significantly longer than those younger than 60 years old (99.3 days versus 60.2 days). There was no significant correlation between time to improvement in numbness with pre-operative duration of symptoms, smoking status, or presence of diabetes. There was no correlation between time to improvement in strength or balance with other recorded variables. The mean \pm standard deviation for days until improvement in numbness, upper extremity strength, and balance was 84.46 ± 94.40 , 50.63 ± 42.76 , and 60.40 ± 69.92 days, respectively.

DISCUSSION AND CONCLUSION: Longer time to improvement in post-operative numbness is correlated with patient age after surgery for CM. No correlation with strength or balance improvement times were found.

TABLE 1. Descriptive Summary

Outcome	n	Mean (SD)	Median	Range
Age	180	65.69 (9.20)	65	[43, 93]
Smoking (%)	179			
Never	88	(49.16)		
Previous	53	(29.61)		
Current	38	(21.23)		
Diabetes (%)	180			
No	137	(76.11)		
Yes	43	(23.89)		
Duration of Pre-op Symptoms	140	625.91 (982.02)	270	[10, 6840]
Post-op Days Until Improvement in Numbness	118	84.46 (94.40)	40.5	[6, 417]
Post-op Days Until Improvement in UE Motor	101	50.63 (42.76)	36	[6, 216]
Post-op Days Until Improvement in Balance	114	60.40 (69.92)	32.5	[12, 377]

TABLE 2. The association of the continuous post-op improvement with demographic, age, smoking, diabetes, and duration of pre-operative symptoms

Outcome	Age		Smoking		Diabetes		Duration of Pre-Symptoms	
	≤ 60	> 60	Never	Previous	Current	No	Yes	P
n	50	130	88	53	38	137	43	
Days Until Improve	60.2	99.3	59.8	61.2	63.0	67.9	69.4	0.041
Numbness	0.25	0.19	0.02	0.02	0.04	0.05	0.04	0.289
Upper Extremity Strength	55.9	47.6	0.18	0.2	0.13	0.27	0.13	0.239
Balance	61.5	60.9	0.13	0.16	0.19	0.19	0.29	0.108
Days Until Improve	47.5	57.8	0.55	0.51	0.44	0.59	0.53	0.60
Balance	64.5	66.3	0.2	0.22	0.24	0.24	0.23	0.575

The association between the continuous outcome variable and a categorical exposure variable is by the two sample t-test if there are two categories, or by one-way ANOVA if there are more than two categories. Only age of the exposure had a marginally significant association with numbness ($p=0.041$), without correction for multiple testing. In the average days until improve in numbness for patients > 60 years old are significantly longer than those ≤ 60 years old (99.3 vs 60.2 days).

TABLE 3. The association between pre-op characteristics (age, smoking, diabetes, and duration of pre-op symptoms) and post-op improvement in numbness, strength, and balance

Outcome	Age		Smoking		Diabetes		Duration of Pre-Symptoms	
	≤ 60	> 60	Never	Previous	Current	No	Yes	P
n	50	130	88	53	38	137	43	
Days Until Improve	60.2	99.3	59.8	61.2	63.0	67.9	69.4	0.041
Numbness	0.25	0.19	0.02	0.02	0.04	0.05	0.04	0.289
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Days Until Improve	47.5	57.8	0.55	0.51	0.44	0.59	0.53	0.60
Balance	64.5	66.3	0.2	0.22	0.24	0.24	0.23	0.575

The association between the categorical outcome variable and a categorical exposure variable is by simple logistic regression, and the significance is by likelihood ratio test to compare the model with the exposure and without the exposure. We used two models, 30 days and 90 days, to compare outcome variable respectively, which had almost same time to improvement and long-term improvement respectively.

- Using 30 days post-op as the cutoff of the outcome
- The upper half of Table 3 are the results of the short-term improvement.
- Using 90 days post-op as the cutoff of the outcome
- The lower half of Table 3 are the results of the long-term improvement.

No significant associations were identified.