

Time to Minimum Clinically Important Difference Achievement for Lumbar Decompression

Andrea Roca, Fatima Anwar, Vincent Federico¹, James Nie¹, Timothy J Hartman, Alexandra Loya, Srinath Medakkar, Omolabake Oyetayo², Eileen Zheng, Keith R. Macgregor², Dustin H Massel, Arash J Sayari, Kern Singh²
¹Rush University Medical Center, ²Midwest Orthopaedics At Rush

INTRODUCTION:

Few spine studies have examined factors associated with delayed time for minimum clinically important difference (MCID) achievement in patients undergoing lumbar decompression (LD). The purpose of the study is to examine factors associated with delayed time to achieve MCID in patients undergoing lumbar decompression for the Patient-Reported Outcomes (PROs) of Oswestry Disability Index (ODI), Visual Analog Scale (VAS) back, and VAS leg pain.

METHODS: Patients undergoing LD with preoperative and postoperative ODI, VAS back, and VAS leg scores were retrospectively reviewed from April 2016 to January 2021. MCID values from previously established studies were utilized to determine MCID achievement. Kaplan-Meier survival analysis determined the time to achieve MCID. Hazard ratios from multivariable Cox regression were utilized to determine the preoperative factors predictive of MCID achievement.

RESULTS: Three-hundred-forty-three patients were identified undergoing LD. Overall MCID achievement rates were 67.4% for ODI, 67.1% for VAS back, and 65.0% for VAS leg. The mean time in weeks for MCID achievement was 22.52±30.48 for ODI, 18.90±27.43 for VAS back, and 20.96±29.81 for VAS leg. Multivariable Cox regression revealed active smoker status, preoperative higher Patient-Reported Outcomes Measurement Information System Physical Function (PROMIS-PF), ODI, VAS Back, and VAS Leg (HR 1.03-2.14) as predictors of early MCID achievement, whereas an American Society of Anesthesiologist (ASA) classification of 2, Black ethnicity, workers' compensation, private insurance, and diagnosis of foraminal stenosis were predictors of late MCID achievement (HR 0.34-0.58).

DISCUSSION AND CONCLUSION: Most patients undergoing LD achieved MCID within 6 months of surgery. Significant factors for early MCID achievement were active smoking status and baseline PROs. Significant factors for late MCID achievement were ASA=2, Black ethnicity, type of insurance, and foraminal stenosis diagnosis. These factors may be considered by surgeons in patient expectations.

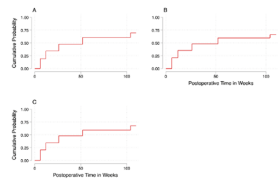


Fig 1. Kaplan-Meier survival curves of (A) ODI, (B) VAS Back, and (C) VAS Leg for time to MCID achievement. Overall, MCID achievement was (A) 67.4%, (B) 67.1%, and (C) 65.0% at the end of the 2-year postoperative time point. For ODI, 19.2% (60) of patients achieved MCID at the 6-week postoperative time point, 16.9% (58) at the 12-week, 18.3% (56) at the 6-month, 12.8% (44) at the 1-year, and 7.7% (27) at the 2-year postoperative time point. For VAS back, 21.6% (74) of patients achieved MCID at the 6-week postoperative time point, 16.0% (55) at the 12-week, 12.8% (44) at the 6-month, 10.5% (36) at the 1-year, and 6.1% (21) at the 2-year postoperative time point. For VAS leg, 21.6% (74) of patients achieved MCID at the 6-week postoperative time point, 14.3% (49) at the 12-week, 14.3% (49) at the 6-month, 11.1% (38) at the 1-year, and 7.0% (24) at the 2-year postoperative time point.

Table 1. Patient Demographics (N=343 patients)

Characteristic	Mean±SD or Percentage (N)
Age (years)	47.68±14.46
Female	28.3% (97)
BMI (kg/m ²)	29.45±6.19
Ethnicity	
Black	7.9% (27)
Asian	5.5% (19)
Hispanic	7.0% (24)
White	77.3% (265)
Other	2.3% (8)
Comorbidities	
Smoker	9.0% (31)
Hypertension	24.8% (85)
Diabetes	7.0% (24)

ASA Classification	Percentage (N)
One	36.9% (127)
Two	50.6% (174)
Three	12.2% (42)
CCI Score	1.38±1.67

Insurance Type	Percentage (N)
Medicare/Medicaid	5.0% (17)
Workers' Comp	15.2% (52)
Private	79.9% (274)

BMI = Body Mass Index; ASA = American Society of Anesthesiologists; CCI = Charlson Comorbidity Index; SD = Standard Deviations; N=patient count; Workers' Comp = workers' compensation

Table 2. Perioperative Characteristics

Characteristic	Mean±SD or Percentage (N)
Spinal Pathology	
Herniated disc	74.9% (257)
Central stenosis	87.8% (301)
Foraminal stenosis	62.4% (214)
Type of surgery	81.9% (281)
Index surgery	18.1% (62)
Revision surgery	18.1% (62)
Number of decompressed levels	
One	78.4% (269)
Two	17.8% (61)
Three	3.2% (11)
Four	0.6% (2)
Preoperative PROMs	
VAS Back	5.89±2.67
VAS Leg	6.03±2.69
PROMIS-PF	36.42±6.95
SF-12 PCS	31.96±7.99
ODI	40.89±18.15
SF-12 MCS	49.89±11.26
PHQ-9	5.53±5.49
Operative Time (min)	45.34±17.06
Estimated Blood Loss (ml)	26.72±9.62
Length of Stay (hours)	6.48±7.96
POD 0 VAS Pain	3.80±1.99
POD 0 Narcotic Consumption (OME)	20.12±17.40

N= Number of; POD = postoperative day; SD = standard deviation; VAS = Visual analog scale; OME = oral morphine equivalents; PROMIS = Patient-Reported Outcome Measures; PROMIS PF = Patient-Reported Outcome Measurement Information System Physical Function; SF-12 PCS = 12-item Short-Form Physical Component Score; ODI = Oswestry Disability Index; SF-12 MCS = 12-item Short-Form Mental Component Score; PHQ-9 = 9-item Patient Health Questionnaire.

Table 3. Multivariable Cox regression of factors affecting time to achieve MCID

Characteristic	HR (95% CI)	VAS Back HR (95% CI)	VAS Leg HR (95% CI)
ASA=2	0.70 (0.50-0.99)		
Active Smoker	2.14 (1.28-3.57)*		
Black ethnicity	0.40 (0.25-0.63)*		
Insurance Type			
Workers' Compensation	0.40 (0.18-0.90)	0.34 (0.16-0.70)*	
Private Insurance	0.40 (0.24-0.60)*		
Preoperative PROMs			
VAS Back	1.31 (1.22-1.40)*		
VAS Leg		1.21 (1.14-1.30)*	
PROMIS-PF	1.03 (1.01-1.06)		
ODI	1.03 (1.02-1.04)*		
Diagnosis of foraminal stenosis	0.58 (0.35-0.95)*		

Following variables insignificant on Cox regression and excluded from the table: age, BMI, ASA of 1 and 3, hypertension, diabetes, chronic kidney disease, chronic obstructive pulmonary disease, chronic liver disease, chronic renal disease, chronic heart failure, chronic lung disease, chronic pain, chronic depression, chronic anxiety, chronic stress, chronic fatigue, chronic insomnia, chronic headache, chronic dizziness, chronic vertigo, chronic tinnitus, chronic hearing loss, chronic vision loss, chronic hearing loss, chronic vision loss, chronic hearing loss, chronic vision loss.

ODI = Oswestry Disability Index; VAS = Visual Analog Scale; ASA = American Society of Anesthesiologists; PROMIS-PF = Patient-Reported Outcome Measurement Information System Physical Function.

*HR=95% CI=95% Confidence Interval; Empty entries indicate non-significant values.