Patient Reported Outcomes and Minimum Clinically Important Difference Achievement Following Lumbar Decompression in Patients with Workers’ Compensation versus Private Insurance

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INTRODUCTION:
Studies have reported that workers' compensation (WC) is associated with poorer clinical outcomes following spinal surgical procedures. However, differences in patient reported outcomes following minimally invasive lumbar decompression (MIS LD) among patients with private insurance (PI) versus WC have not been well studied. We aim to evaluate the difference in patient reported postoperative outcomes between patients with private insurance versus workers' compensation following MIS LD.
METHODS: A prospectively maintained surgical database was retrospectively reviewed for lumbar procedures performed between November 2005 and March 2021. Inclusion criteria were set as primary MIS LD procedures. Patients undergoing a revision procedure, or surgery indicated for infectious, malignant, or traumatic etiologies were excluded. Patients with Medicaid or Medicare were excluded. Patients were divided into two groups by insurance variant: WC versus PI. Patient demographics, perioperative characteristics, and patient reported outcome measures (PROM) were collected. PROMs evaluated include Patient-Reported Outcome Measurement Information System Physical Function (PROMIS PF), Visual Analogue Scale (VAS) back, VAS leg, Oswestry Disability Index (ODI), 12-Item Short Form (SF-12) Mental Composite Score (MCS), and SF-12 Physical Composite Score (PCS), with values collected preoperatively and at several postoperative time points. PROM score changes from preoperative baseline were compared with established threshold values to assess the rate of minimum clinically important difference (MCID) achievement among patients with PI versus WC. Differences in mean PROM scores and delta values at each time point were evaluated using an unpaired Student's t-test. The impact of WC or PI status on MCID achievement was evaluated via chi-square analysis.
RESULTS: An initial 503 patients were eligible for this study with 164 patients in the WC group and 339 patients in the PI group. Following propensity score matching, a total of 169 patients were included with 135 PI and 34 WC. The final cohort had a mean age of 45.9 with the majority being male (69.2%). WC groups only demonstrated significant differences in mean delta SF-12 PCS and VAS back at 6-week and 12-week time points, and 6-week time point, respectively ($p \leq 0.044$, both). Mean PROMIS PF was significantly different between groups at the preoperative, 6-weeks, and 12-weeks ($p \leq 0.015$, all). Mean SF-12 PCS was significantly different between groups at the preoperative, 6-weeks, 12-weeks, 6-months, and 2-year time points ($p \leq 0.023$, all). Mean SF-12 MCS was significantly different between groups at the preoperative, 6-weeks, 12-weeks, and 2-year time points ($p \leq 0.019$, all). Mean ODI demonstrated differences at preoperative, 6-week, 12-week, and 6-month points ($p \leq 0.034$, all). Significant changes from preoperative PROMs were noted in WC patients for SF-12 PCS at 6-weeks and VAS back at 12-weeks ($p \leq 0.034$, all). Mean VAS back and leg demonstrated differences at 6-week and 12-weeks, and 6-week time points, respectively ($p \leq 0.017$, all). Additionally, WC patients had lower MCID achievement for PROMIS PF at 6- week and SF-12 PCS at 2-year time points, respectively $p \leq 0.049$, all), only.
DISCUSSION AND CONCLUSION:
In patients undergoing MIS LD procedures, WC patients reported significantly worse disability and pain at earlier postoperative time points when compared to PI patients. Additionally, WC patients had significantly different rates of MCID achievement for PROMIS-PF and SF-12 PCS but did not significantly differ from their PI patient counterparts in MCID achievement for other PROM outcomes. Further study needs to be conducted to explore this relationship.

Table 1. Matched Patient Demographics

Characteristic	Total (n=169)	Private Insurance (n=135)	Workers' Compensation (n=34)	*p-value
Age (mean ± SD, yr)	45.9 ± 13.2	45.9 ± 13.3	45.7 ±12.8	0.911
BMI (mean ± SD, kg/m^2)	29.7 ± 6.4	28.9 ± 6.3	32.6 ± 6.2	**0.003**
Gender				0.064
Female	30.8% (52)	34.1% (46)	17.7% (6)	
Male	69.2% (117)	65.9% (89)	82.4% (28)	
Ethnicity				**<0.001**
Caucasian	76.2% (128)	83.0% (112)	48.5% (16)	
African American	11.3% (19)	7.4% (10)	27.3% (9)	
Hispanic	8.3% (14)	5.2% (7)	21.2% (7)	
Asian	3.6% (6)	4.4% (6)	0.0% (0)	
Other	0.6% (1)	0.0% (0)	3.0% (1)	
Diabetic Status				0.757
Non-Diabetic	92.9% (157)	92.6% (125)	94.1% (32)	
Diabetic	7.1% (12)	12.1% (10)	5.9% (2)	
Smoking Status				0.063
Non-Smoker	79.3% (134)	82.2% (111)	67.7% (23)	
Smoker	20.7% (35)	17.8% (24)	32.4% (11)	
ASA Classification				0.090
1	43.2% (73)	45.9% (62)	32.3% (11)	
2	45.5% (77)	44.4% (60)	50.0% (17)	
3	11.2% (19)	9.6% (13)	17.6% (6)	
CCI Score (mean ± SD)	1.1 ± 1.5	1.1± 1.3	1.3 ± 2.2	0.459
Hypertension				0.060
Non-Hypertensive	79.3% (134)	82.2% (111)	67.7% (23)	
Hypertensive	20.7% (35)	17.8% (24)	32.4% (11)	

ASA = American Society of Anesthesiologists; CCI = Charlson Comorbidity Index; BMI = body mass index; SD= standard deviation
Matched on BMI, gender, ethnicity, preoperative PROM, smoking status, ASA, hypertension
*p-value calculated using chi-square test or student's t-test
Boldface indicates statistical significance

Table 2. Perioperative Characteristics

Characteristic	Total (n=169)	Private Insurance (n=135)	Workers' Compensation (n=34)	*p-value
Spinal Pathology				
HNP	86.1% (124)	87.9% (102)	78.6% (22)	0.199
Central Stenosis	88.9% (128)	88.8% (103)	89.3% (25)	0.941
Foraminal Stenosis	70.8% (102)	72.4% (84)	64.3% (18)	0.396
Number of Operative Levels				0.088
1-level	82.9% (117)	84.9% (96)	75.0% (21)	
2-levels	16.3% (23)	15.0% (17)	21.4% (6)	
≥3-levels	0.71% (1)	0.0% (0)	3.6% (1)	
Operative Time (Mean±SD; min)	43.6 ± 14.3	42.8 ± 13.8	46.8 ± 15.9	0.191
Estimated Blood Loss (Mean±SD; mL)	25.5 ± 5.8	25.5 ± 5.9	25.5 ± 5.2	0.988
Length of Stay (Mean±SD; hours)	5.7 ± 7.0	6.0 ± 7.0	4.69 ± 6.8	0.42
Day of Discharge				0.825
POD0	90.5% (114)	90.2% (92)	91.6% (22)	
POD1	9.5% (12)	9.8% (10)	8.3% (2)	

HNP = herniated nucleus pulposus; POD = postoperative day
*p-value calculated using chi-square test or student t-test
Boldface indicates statistical significance

Table 3. Mean Patient Reported Outcomes by Workers' Compensation Status

PROM	Private Insurance Mean ± SD	ΔMean ± SD	Workers' Compensation Mean ± SD	ΔMean ± SD	*p-value	†p-value
PROMIS PF						
Preoperative	32.1 ± 6.5	-	33.3 ± 4.4	-	-	**0.015**
6-weeks	42.9 ± 7.9	6.1 ± 8.8	34.6 ± 5.2	1.7 ± 3.9	0.070	**<0.001**
12-weeks	48.6 ± 10.0	11.0 ± 10.6	39.2 ± 8.3	7.0 ± 6.0	0.277	**0.010**
6-months	45.7 ± 10.7	8.2 ± 12.2	39.8 ± 7.8	6.7 ± 8.7	0.732	0.111
1-year	47.8 ± 11.2	10.7 ± 12.7	41.0 ± 9.4	8.6 ± 8.6	0.643	0.108
2-year	49.3 ± 6.4	12.3 ± 10.3	43.6 ± 12.9	10.8 ± 13.8	0.787	0.119
SF-12 PCS						
Preoperative	32.1 ± 7.8	-	27.9 ± 7.5	-	-	**0.014**
6-weeks	40.2 ± 9.5	8.3 ± 10.5	31.7 ± 8.2	2.9 ± 8.8	**0.030**	**<0.001**
12-weeks	43.4 ± 10.9	10.1 ± 12.8	31.9 ± 7.7	4.7 ± 7.2	0.163	**<0.001**
6-months	42.4 ± 11.8	8.8 ± 12.9	39.9 ± 7.2	5.4 ± 9.3	0.406	**0.014**
1-year	42.1 ± 11.0	9.8 ± 13.4	39.6 ± 11.9	13.2 ± 12.8	0.545	0.596
2-year	47.9 ± 7.9	15.1 ± 11.9	34.9± 17.7	10.9 ± 20.4	0.596	**0.023**
SF-12 MCS						
Preoperative	49.8 ± 11.6	-	44.4 ± 11.8	-	-	**<0.001**
6-weeks	55.2 ± 8.8	5.1 ± 11.0	47.4 ± 10.7	2.9 ± 7.8	0.389	**<0.001**
12-weeks	56.9 ± 8.1	6.6 ± 10.8	47.9 ± 12.9	2.3 ± 6.6	0.193	**0.003**
6-months	55.1 ± 8.5	7.3 ± 9.8	52.1 ± 10.8	4.4 ± 10.7	0.376	0.305
1-year	56.6 ± 8.3	7.3 ± 11.2	46.7 ± 13.4	5.1 ± 11.2	0.636	0.596
2-year	54.2 ± 9.9	2.4 ± 10.1	37.9 ± 19.4	4.4 ± 9.6	0.279	**0.019**
VAS Back						
Preoperative	5.8 ± 2.8	-	6.4 ± 2.6	-	-	0.265
6-weeks	2.4 ± 2.5	3.2 ± 3.5	4.0 ± 2.7	2.9 ± 2.9	0.725	**0.009**
12-weeks	2.1 ± 2.5	3.8 ± 3.4	4.6 ± 2.5	1.8 ± 3.2	**0.034**	**<0.001**
6-months	3.8 ± 3.5	2.6 ± 3.9	4.0 ± 1.9	2.7 ± 3.3	0.930	0.810
1-year	3.0 ± 2.9	3.1 ± 2.7	3.4 ± 3.2	3.6 ± 3.1	0.699	0.788
2-year	5.5 ± 2.2	2.2 ± 2.9	1.4 ± 2.4	4.3 ± 5.5	0.389	0.158
VAS Leg						
Preoperative	5.9 ± 2.7	-	6.0 ± 2.7	-	-	0.786
6-weeks	2.8 ± 2.8	3.2 ± 3.7	3.7 ± 4.0	2.4 ± 3.5	0.381	**0.017**
12-weeks	2.6 ± 2.7	3.2 ± 3.8	3.8 ± 3.3	1.9 ± 3.4	0.189	0.138
6-months	3.2 ± 3.5	2.7 ± 3.9	3.7 ± 2.5	1.9 ± 3.3	0.492	0.588
1-year	2.3 ± 2.6	2.8 ± 2.7	3.0 ± 3.9	3.4 ± 3.8	0.699	0.569
2-year	2.2 ± 1.7	2.9 ± 3.0	1.5 ± 2.6	4.7 ± 5.1	0.464	0.598
ODI						
Preoperative	39.9 ± 17.1	-	49.0 ± 17.2	-	-	**0.013**
6-weeks	21.2 ± 16.0	18.3 ± 19.1	37.8 ± 19.8	12.9 ± 15.7	0.242	**<0.001**
12-weeks	17.1 ± 18.2	22.1 ± 22.4	38.8 ± 18.9	12.4 ± 16.3	0.094	**<0.001**
6-months	21.9 ± 20.9	15.8 ± 23.9	34.3 ± 12.9	15.9 ± 18.7	0.986	**0.034**
1-year	18.9 ± 19.1	14.3 ± 23.9	34.8 ± 27.8	23.2 ± 22.2	0.384	0.109
2-year	14.5 ± 11.8	21.1 ± 16.9	14.0 ± 24.2	29.3 ± 47.7	0.619	0.955

*p-values calculated using unpaired Student's t-test to compare mean delta values
†p-values calculated using unpaired Student's t-test to compare mean PROM scores
Boldface indicates statistical significance

Table 4. Minimum Clinically Important Difference

PROM	Private Insurance %, (n=135)	Workers' Compensation %, (n=34)	*p-value
ODI			
6-weeks	72.5%	70.0%	0.824
12-weeks	73.2%	50.0%	0.067
6-months	63.9%	68.8%	0.734
1-year	58.8%	87.5%	0.152
2-year	81.8%	66.7%	0.571
Overall	77.6%	69.6%	0.414
PROMIS PF			
6-weeks	56.1%	21.4%	**0.016**
12-weeks	70.4%	55.6%	0.377
6-months	59.5%	50.0%	0.584
1-year	67.6%	66.7%	0.959
2-year	80.0%	60.0%	0.324
Overall	80.0%	83.3%	0.742
SF-12 PCS			
6-weeks	63.9%	52.4%	0.328
12-weeks	71.2%	50.0%	0.159
6-months	65.9%	54.6%	0.478
1-year	71.4%	71.4%	1.000
2-year	82.8%	33.3%	**0.049**
Overall	86.5%	72.7%	0.107
SF-12 MCS			
6-weeks	31.4%	19.1%	0.263
12-weeks	26.9%	8.3%	0.171
6-months	36.2%	27.3%	0.576
1-year	34.3%	28.6%	0.770
2-year	17.2%	0.00%	0.434
Overall	39.4%	40.9%	0.897
VAS Back			
6-weeks	56.1%	65.0%	0.464
12-weeks	64.2%	61.1%	0.817
6-months	47.2%	62.5%	0.309
1-year	64.7%	62.5%	0.915
2-year	54.6%	66.7%	0.707
Overall	63.2%	73.9%	0.329
VAS Leg			
6-weeks	34.7%	20.0%	0.200
12-weeks	30.2%	16.7%	0.263
6-months	36.1%	12.5%	0.083
1-year	17.7%	37.5%	0.278
2-year	43.4%	34.8%	0.448
Overall	69.5%	58.1%	0.281

*p-values calculated via chi square analysis
Boldface indicates statistical significance