

Clinical and Radiographic Features that Distinguish Patients Undergoing Lumbar Pedicle Subtraction Osteotomy who attain Minimally Clinical Important Difference (MCID) in Functional Scores

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INTRODUCTION:

Factors associated with good outcomes in patients undergoing pedicle subtraction osteotomy (PSO) are not well established. We investigate the differences in patients that underwent PSO and were able to achieve minimally clinical importance difference in SRS-activity score by 2-years to those that did not.

METHODS:

A retrospective analysis of a prospective multicenter adult spinal deformity (ASD) database was performed. Patients that underwent lumbar PSO were divided into two groups, those that achieved MCID for SRS-activity at 2-years and those that did not. Demographic, surgical, radiographic, and PROM differences between the two cohorts were compared.

RESULTS:

A total of 135 patients that underwent PSO were identified. Forty-five patients did not meet MCID for SRS-activity score. Patients who attained MCID had more caudal PSO level on average (22.2 [L3] ± 0.9 vs. 21.8 [L3] ± 1.5, p=0.03) and higher Invasiveness Index (127±29 vs. 115±29 vs. p=0.02). In total, 23.8% of patients that did not meet MCID developed PJK compared to 4.9% of those that did (p=0.002). Patients that reached MCID had a lower CTPA, a marker of cervicothoracic deformity, at baseline (p=0.03) and at 2-year (p=0.02). No difference in PSO correction angle was observed (31±13 vs. 28±12, p=0.2) No differences in demographics or surgical characteristics were observed, including Age, Gender, BMI, osteoporosis, UIV, LIV, levels fused, PJK prophylaxis, or supplemental rod inclusion (p>0.05). Patients in the MCID cohort also had a lower baseline SRS-activity (2.5±0.8 vs. 2.8±0.9, p=0.03). MCID patients had greater 2-year HRQL scores and HRQL improvement (SRS-activity, SRS-pain, ODI, and SF36 PCS, p<0.001).

DISCUSSION AND CONCLUSION:

In patients undergoing lumbar PSO, higher surgical invasiveness and a more caudal PSO level were associated with attaining MCID in SRS-activity score. The MCID cohort had better improvements and 2-year HRQL across a wide range of parameters. Patients not attaining SRS activity MCID were associated with developing PJK.

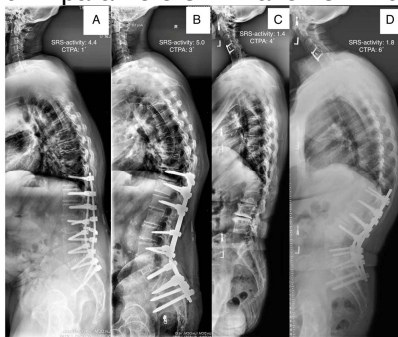


Table 1. Comparison of demographic differences between patients that met MCID for SRS-Activity at 2-years following PSO and those that did not.

	Did not meet MCID	Met MCID	P-value
N=135	45	90	
Sex (Female)	66.7%	68.9%	0.79
Age (years)	62.6 ± 10.9	63.9 ± 10.3	0.52
BMI (kg/m ²)	29.9 ± 6.6	29.9 ± 5.9	0.99
Smoking	2.0%	0.0%	0.15
Perivascular Disease	0.0%	3.3%	0.22
Hypertension	35.6%	44.4%	0.32
Diabetes	6.7%	2.9%	0.66
Drug/Alcohol abuse	2.2%	3.3%	0.72
Osteoporosis	15.6%	15.6%	1
Charlton Score	2.0 ± 2.1	1.8 ± 1.6	0.53
Prior Posterior Fusion	55.6%	71.0%	0.07
Prior LIV	16.8 ± 7.0 (110)	17.3 ± 4.5 (110)	0.88
Prior LIV	22.6 ± 5.8 (L4)	24.2 ± 3.6 (L5)	0.08

Table 2. Radiographic and quality of life comparison of patients that met MCID for SRS activity at 2-years following PSO vs. those who did not.

	Did not meet MCID	Met MCID	P-value
N=135	45	90	
SRS-Pain	2.8 ± 0.9	2.5 ± 0.8	0.85
SRS-Satisfaction	2.5 ± 1.2	2.6 ± 1.1	0.7
ODI	45.3 ± 17.6	51.0 ± 16.0	0.06
SF36 PCS	30.4 ± 9.3	27.7 ± 7.8	0.08
Frailty Index	3.9 ± 1.5	4.0 ± 1.4	0.47
Pelvic Tilt (°)	31.9 ± 9.7	32.2 ± 10.4	0.49
PL-L1 (°)	35.6 ± 16.5	36.6 ± 17.2	0.75
SVA (mm)	121.5 ± 62.5	142.3 ± 76.6	0.12
TPA (°)	34.1 ± 11.5	36.9 ± 12.8	0.22
CTPA (°)	24 ± 1.8	24 ± 1.8	0.89
PJK Angle (°)	7.1 ± 12.9	11.3 ± 14.4	0.19
SRS-Pain	2.8 ± 1.0	3.4 ± 1.1	0.001
SRS-Satisfaction	3.5 ± 1.1	4.2 ± 0.9	0.001
ODI	44.3 ± 20.2	29.5 ± 20.4	0.001
SF36 PCS	31.8 ± 10.2	38.6 ± 11.1	0.001
Frailty Index	3.6 ± 1.6	2.6 ± 1.6	0.001
Pelvic Tilt (°)	24.8 ± 10.7	23.8 ± 11.0	0.63
PL-L1 (°)	8.3 ± 13.4	6.0 ± 16.1	0.44
SVA (mm)	46.5 ± 53.0	45.7 ± 54.2	0.94
TPA (°)	21.4 ± 10.5	20.8 ± 11.4	0.78
CTPA (°)	4.3 ± 1.8	3.5 ± 1.8	0.02
PJK Angle (°)	14.5 ± 11.8	14.3 ± 10.3	0.91
Proximal Junctional Failure (PJK)	23.8%	4.9%	0.002
Revision for PJK within 90-days	14.9%	0%	0.044
Revision for PJK from 90-days to 2-years	15.6%	0%	0.044
Overall 2-year revision rate	33.3%	7.8%	0.001