Pain and Functional Outcomes After Incidental Durotomy in Lumbar Spine Surgery: A Propensity Matched Prospective, Multi-Institutional Longitudinal Study of 1,741 Patients

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Introduction

Incidental durotomies are a frequent complication during spinal surgery, with a reported incidence ranging from 1% to 17%. Despite the frequency of spinal surgery and the concomitant high incidence of durotomy, there is a paucity of studies assessing the effect of incidental durotomies on long-term patient reported outcomes.

Methods

A nationwide, multi-institutional, prospective spine outcomes registry was utilized for this study. In total, 1,741 patients were included; a total of 70 (4.02%) patients with incidental durotomies were compared with a control group (n=1671). Patients completed the Oswestry Disability Index (ODI) questionnaire and back and leg pain numerical rating scores before surgery, then at 3, 6, 12, and 24 months after surgery. One- and two-year patient reported outcomes and complication rates were compared between both patient cohorts. Propensity score modeling produced a matched cohort balanced on age, gender, comorbidities, and other relevant surgical factors.

Results

Both cohorts were similar at baseline, Table 1. Statistically significant improvements from baseline were observed in both cohorts in all patient reported outcome measures(ODI,VAS-LP, VAS-BP). Both durotomy and control cohorts demonstrated similar 2-year improvement in VAS for back pain/leg pain, and Oswestry Disability Index. In the propensity matched cohort analysis, similar 2-year improvement in all outcome metrics was observed in both patients cohorts.

Conclusions

Our study suggest that incidental durotomy during index spine surgery was not associated with inferior long-term outcomes. Compared with the control group, patients in the durotomy cohort reported similar clinical benefit after lumbar spine surgery, with no observed difference in the extent of pain and functional improvement.

Table 1: Baseline characteristics of patients in the durotomy and control cohorts. Both cohorts were matched at baseline.

	Durotomy Cohort (n=70)	Control Cohort (n=1641)	P=value
Patient Age(years)	60.36 ± 14.25	56.14 ± 12.96	0.042
BMI(Kg/m2)	29.52 ± 5.37	32.54 ± 6.79	0.080
Male(%)	42.85	43.80	0.560
Indication for Surgery(%)			
Degenerative Disc Disease (DDD)	52.85	59.80	0.891
Spondylolisthesis	42.85	36.46	0.423
Surgical Levels(n,%)			
L1 – L2	26(37.14)	252(15.16)	0.001
L2 – L3	26(37.14)	335(20.15)	0.011
L3 – L4	41(58.57)	481(28.94)	0.007
L4 – L5	62(88.57)	1082(65.10)	0.005
L5 – L1	32(45.71)	734(44.16)	0.898
Pre-Op PRO			
BP-VAS	7.47 ± 2.14	7.27 ± 3.52	0.560
LP-VAS	7.04 ± 2.69	6.90 ± 2.64	0.679
ODI	47.59 ± 14.89	48.47 ± 16.27	0.639

Values given as Mean ± standard deviation. PRO- patient reported outcomes, VAS-Visual Analog Pain Score, ODI-Oswestry Disability Index.

Table 2: Cohort-specific post-operative complication rates.

	Durotomy Cohort (n=70)	Control Cohort (n=1641)	P=value
SSI(%)	2(2.85)	13(0.78)	0.320
Spinal Cord/Nerve Root Injury(%)	1(1.42)	12(0.72)	0.658
Return to OR(%)	1(1.42)	26(1.56)	0.853
PE/DVT(%)	0(0.00)	6(0.36)	**0.014**
Hardware Failure(%)	0(0.00)	10(0.60)	**0.001**
Non-Union(%)	0(0.00)	6(0.36)	**0.014**
ASD(%)	0(0.00)	6(0.36)	**0.014**

Values significant at the p<0.05 level are in bold. PE-Pulmonary Embolism, DVT- Deep venous Thrombosis, ASD-Adjacent Segment Disease.

Overall, the perioperative and post-operative complication rate appears to be higher in the control cohort.

Figure 1: Patient Reported Outcomes Over a Two-Year Follow Up; there was no difference between durotomy and control groups in back pain (BP-VAS), leg pain (LP-VAS), or disability (ODI) at baseline, one, and two-year follow up

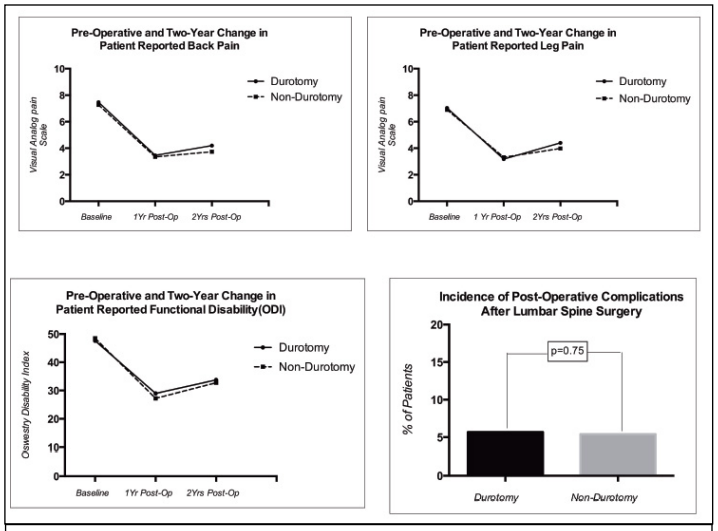

Table 4: In a propensity matched cohort analysis, a similar improvement in reported pain (VAS-BP, VAS-LP) and disability (Oswestry Disability Index; ODI) was observed after index spine surgery.

	Durotomy Cohort (n=70)	Control Cohort (n=140)	P=value
One year change			
BP-VAS	4.01 ± 3.15	3.79 ± 2.95	0.509
LP-VAS	3.86 ± 3.91	3.87 ± 3.73	0.987
ODI	18.60 ± 20.45	19.67 ± 20.09	0.718
Two year change			
BP-VAS	3.27 ± 3.48	3.92 ± 2.78	0.401
LP-VAS	2.64 ± 3.97	3.07 ± 4.03	0.457
ODI	13.80 ± 17.96	12.83 ± 18.18	0.712

Values given as Mean ± standard deviation. VAS-Visual Analog Pain Score, ODI-Oswestry Disability Index.

There was no statistically significant difference in the extent of post-operative pain and functional improvement, two-years after index lumbar spine surgery in both cohorts.