Results of Minimally Invasive Decompression Compared with Traditional Microlumbar Discectomy and Open Laminectomy

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INTRODUCTION: Lumbar herniated disc and lumbar central stenosis are among the most common pathology requiring spine surgery, and there has been a shift toward minimally invasive methods (MIS) in recent years. Very few comparative studies with homogenous cohorts of patients and long-term follow up have been performed. In this regard, we sought to evaluate the impact of performing decompression with MIS technique versus standard open, in the setting of microdiscectomy and laminectomy procedures.

METHODS: A total of 460 patients ≥ 18 years of age who underwent primary micro lumbar discectomy (MLD) or lumbar laminectomy, using MIS or standard open technique, with 2-year follow up. Retrospective review at a single institution. Outcomes assessed include 90-day perioperative complications, unplanned return to OR, and two-year revision rates.

RESULTS: The 460 patients in this cohort underwent: 202 open laminectomies (age 66.7±12.5 BMI 29.3±5.8), 36 MIS laminectomies (age 63.8±13.1, BMI 28.8±4.7), 180 Open MLD (age 46.1±15.2, BMI 27.9±4.7), and 42 MIS MLD (age 49.6±15.1, BMI 28.0±6.0). The MIS MLD group had significant greater operative time (89.2 vs. 74.3 min, p=.004) and higher rate of 90 day return to OR (2.4% vs. 0%, p=.038) compared to open MLD. There were no significant differences in the rate of complications or unplanned return to the OR between the MIS and open laminectomy groups. There were no significant differences between the MIS and open technique for MLD and laminectomy with regard to estimated blood loss, length of stay, and surgical site infection rates. There were no significant differences in intraoperative complication rates, complications explored included: durotomy, neuro-monitoring disturbances, traumatic blood loss, and fractures. Nor were there differences in postoperative complication rates, which included acute postoperative neurological weakness, cardiac, neurological, pulmonary, urinary, deep vein thrombosis or pulmonary embolism, or ileus. At two-year follow up, no differences were seen in revision surgery rates between any of the cohorts.

DISCUSSION AND CONCLUSION: We report increased operative time and higher rate of unplanned return to the OR at 90 days after MIS MLD compared with open MLD. There was no difference seen in complication rates between the MIS and open laminectomy groups, suggesting that the techniques may be equivalent. At long-term follow up, there was no effect on revision rates by technique utilized, MIS or open, for either MLD or laminectomy.

Table 1: Outcomes in patients undergoing Minimally Invasive versus Open Surgery (Laminectomy and Micro-Lumbar Discectomy)

		Open Laminectomy (n=202)	**MIS Laminectomy** (n=36)	p-value	**Open Micro-Lumbar Discectomy** (n=180)	**MIS Micro-Lumbar Discectomy** (n=42)	p-value
Demographics	Age (years)	66.69 ± 12.474	63.83 ± 13.107	0.211	46.13 ± 15.249	49.61 ± 15.124	0.188
	Gender (Female)	75 (37.3%)	15 (41.7%)	0.620	68 (37.8%)	13 (31.0%)	0.408
	Charlson Comorbidity Index (CCI)	3.224 ± 2.004	3.361 ± 2.057	0.707	1.128 ± 1.638	1.214 ± 1.298	0.750
	BMI (kg/m^2)	29.297 ± 5.837	28.758 ± 4.650	0.596	27.885 ± 4.691	27.989 ± 5.950	0.903
	Levels Treated	1.99 ± 1.030	1.36 ± 0.683	**<.001**	1.04 ± 0.221	1.07 ± 0.261	0.412
Surgical Characteristics	Operative Time (min)	152.62 ± 64.962	152.14 ± 74.552	0.955	74.29 ± 28.513	89.24 ± 37.336	**0.004**
	Estimated Blood Loss (mL)	140.28 ± 195.938	104.29 ± 255.090	0.342	32.01 ± 57.063	31.28 ± 31.658	0.939
	Durotomy	15 (7.5%)	6 (16.7%)	0.074	7 (3.9%)	0 (0%)	0.194
	Length of Stay (Days)	2.662 ± 7.087	1.713 ± 2.374	0.454	.462 ± .941	.514 ± .735	0.739
	Intra-Operative Complications	11 (5.5%)	3 (8.3%)	0.503	5 (2.8%)	0 (0%)	0.275
	Post-Operative Complications	27 (13.4%)	6 (16.7%)	0.606	5 (2.8%)	3 (7.1%)	0.172
	Surgical Site Infection (SSI)	5 (2.5%)	1 (2.8%)	0.919	2 (1.1%)	0 (0%)	0.493
	Return to OR within 30 Days	3 (1.5%)	1 (2.8%)	0.581	1 (0.6%)	0 (0%)	0.628
	Return to OR within 90 Days	3 (1.5%)	0 (0%)	0.461	0 (0%)	1 (2.4%)	**0.038**
	Return to OR within 2 years	11 (5.45%)	1 (2.8%)	0.501	20 (11.1%)	8 (19.04%)	0.163

*Levels treated defined as number of levels with laminectomy performed or intervertebral levels with microdiscectomy performed.