

Novel Extreme Lateral Foraminal Approach with Spinal Navigation for Far Lateral Discectomy and Foraminal Stenosis

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Introduction

Far lateral lumbar disc herniations have historically been difficult to treat with generally worse outcomes than intra-canal disc herniations. A novel technique is described in which an extreme lateral (5-10cm from midline) foraminal approach is used in combination with spinal navigation in order to more effectively and efficiently decompress the spinal nerve root and relieve foraminal stenosis.

Methods

30 patients were identified in the EMR that had undergone a far lateral discectomy using spinal navigation. Demographic data, EBL and operative time, and outcome data were collected from the EMR. All operations were performed at the same hospital by the same surgeon. There were no complications with any case. All patients were treated as outpatients with none staying overnight in the hospital.

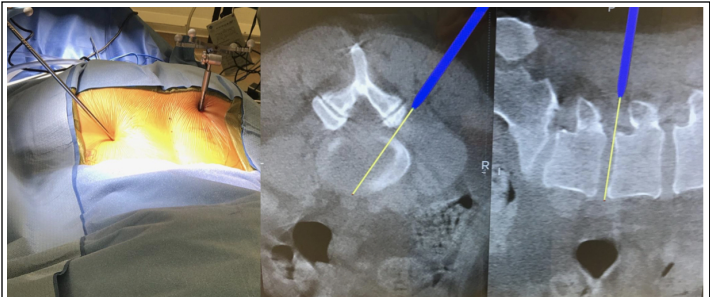


Figure 1. Placement of probe shown on body, as well as navigated projection from intraoperative CT scan.



Figure 2. A) Drill bit placed over SAP of facet, prior to removal of bone or ligament. B) Disc fragment shown after removal of ligament and small portion of SAP. C) Decompressed nerve root.

Results

EBL was found to be 9.7 mL, and average operative time was found to be 81 minutes, including time of intraoperative O-arm scan. Using Modified Macnab Criteria, 26 of 30 patients had excellent outcomes, 2 had good outcomes. There was also one fair and one poor outcome.

	XLMD	Meta-analysis of MIS techniques
EBL (mL)	9.7	39.8
Operative Time (minutes)	81	n/a
Excellent/ Good outcomes rate	94.4%	91.9%
Fair/Poor outcome Incidence	0.06	0.06
Reoperation Rate	0.0	0.04

Table 1. XLMD compared to all MIS techniques for far lateral discectomy included in study by Akinduro et al. 2017 (Akinduro, Oluwaseun O., Panagiotis Kerezoudis, Mohammed Ali Alvi, Jang W. Yoon, Jamachi Eluchie, M. Hassan Murad, Zhen Wang, Selby G. Chen, and Mohamad Bydon. "Open Versus Minimally Invasive Surgery for Extraforaminal Lumbar Disk Herniation: A Systematic Review and Meta-Analysis." *World Neurosurgery* 108 (12 2017). doi:10.1016/j.wneu.2017.08.025.)

	XLMD	Ryang (2007)	Voyadzis (2010)
No. of patients	30	15	20
Avg. EBL (mL)	9.7	< 20	31
No. of patients with Length of stay (LOS) >1 day	0	n/a; Median LOS: 4 days, range: 3-10 days	4
Avg. Operative time (min)	81	75	82
Percent Excellent Outcome **	87.7	40	70
Percent Good Outcome	6.7	53	30
Percent Fair Outcome	3.3	7	0
Percent Poor Outcome	3.3	0	0

Table 2. XLMD versus two similar (tubular, microscopic) MIS techniques found in the meta analysis by Akinduro. Relative risk for XLMD vs. Ryang is 0.09 with (95% CI 0.02-0.37), and XLMD vs. Voyadzis is 0.25 (95% CI 0.07-0.91) Ryang, Y., M. Oertel, L. Mayfrank, J. Gilsbach, and V. Rohde. "Transmuscular Trocar Technique - Minimal Access Spine Surgery for Far Lateral Lumbar Disc Herniations." *Min - Minimally Invasive Neurosurgery* 50, no. 5 (10 2007): 304-07. doi:10.1055/s-2007-990292.; Voyadzis, J.-M., V. C. Gala, F. A. Sandhu, and R. G. Fessler. "Minimally Invasive Approach for Far Lateral Disc Herniations: Results from 20 Patients." *Min - Minimally Invasive Neurosurgery* 53, no. 03 (06 2010): 122-26. doi:10.1055/s-0030-1249102.

Conclusions

For patients with lumbar far lateral disc herniation and foraminal stenosis, intraoperative navigation used in concert with preoperative MRI can provide a surgeon with visualization of the foraminal trajectory and disc herniation required to more effectively and more efficiently decompress the nerve root, leading to better patient outcomes and decreased effective operative time.

Discussion

Outcomes for far lateral lumbar microdiscectomy have long lagged behind similar procedures for intracanal disc herniations.

The lumbar spinal segment is defined by a central and lateral zone. The lateral zone consists of three regions: the subarticular, foraminal and extraforaminal regions. The foraminal region has also been described by Macnab as the "Hidden Zone." Earlier described surgical techniques for this procedure begins with a skin incision approximately 1.5 cm lateral to midline. This allows the surgeon to address the extraforaminal region directly but only the lateral most portion of Macnab's hidden zone of the foraminal section and does not allow for direct visualization of the subarticular region.

Other studies have shown that applying lessons learned from procedures for intracanal disc herniations, i.e. the use of microscopic, endoscopic or tubular methods, have improved far lateral discectomy outcomes. Others have tried to move there approaches lateral (1.5-5cm from midline) However, outcomes have not risen to the same level as outcomes for procedures for intracanal disc herniations

This new approach allows for direct visualization and if required decompression of all three of Macnab's zones, ensuring complete decompression of the exiting nerve root due to far lateral disc herniation and/or foraminal stenosis.