

# Extraforaminal Lumbar Disk Herniation: Open versus Minimally Invasive Surgery A Systematic Review and Meta-analysis

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#### Introduction

Far lateral disk herniation accounts for 3-11% of all disk herniations. Despite the heterogeneity of spinal procedures, there is a paucity of literature comparing the outcomes from different surgical approaches.

### Methods

We performed a systematic review and metaanalysis of all publications, examining literature available for extraforaminal disk herniations. Articles were limited to full text articles involving humans published in English, which resulted in 205 articles that were reviewed for inclusion. We excluded studies with less than 8 patients, thoracic disk herniation, imaging studies, cadaveric studies, articles in which the extraforaminal patients were not analyzed separately, and articles with only paramedian or intraforaminal herniation patients.

### Results

There was an increased incidence of poor MacNab criteria outcomes for the OS group compared to the MIS group, but the difference was not statistically significant (OS: 0.14, MIS:0.06; p=0.237). The OS group had higher estimated blood loss (WMD: 38.6 mL), longer operative time (WMD: 12.2 minutes), longer hospital stay (WMD: 30.3hours), and longer return to work time (WMD: 3.3 weeks). Tubular microscopic studies had lower incidence of reoperation than both percutaneous endoscopic (PED: 0.06, TM: 0.01; p=0.01) and microendoscopic (ME: 0.05, TM: 0.01; p=0.03). The minimally invasive (MIS) group (tubular microscopic, percutaneous endoscopic & microendoscopic) showed no significant difference from open surgical (OS) group in the incidence of complications (OS: 0.01, MIS: 0.01; p=0.971) or re -operation (OS: 0.04, MIS: 0.03; p=0.382).

### Conclusions

Our study found that MIS procedures for extraforaminal disk herniations are associated with a similar incidence of complications and reoperation but lower EBL, shorter operative time, longer hospital stay, and longer return to work time. Tubular microscopic procedures have the lowest re-operation rate of MIS procedures and micro-endoscopic procedures had the longest operative time. Spine surgeons should be aware of potential differences in patient outcomes when selecting one technique vs. others.

Name	Event	Sample	ES (95% CI)
Tubular Microscopic			
Peltier et al, 2013	0	46 <b>•</b>	0.00 (0.00, 0.08
Eicker et al, 2013	2	51	0.04 (0.01, 0.13
Berra et al, 2010	0	) •	0.00 (0.00, 0.30
/oyadzis et al, 2010	0	•	0.00 (0.00, 0.16
Salame et al, 2009	1	31 —	0.03 (0.01, 0.16
Ryang et al, 2007	0	5 •	0.00 (0.00, 0.20
Greiner-Perth et al, 200	)21	5	0.07 (0.01, 0.30
'ue et al (c), 2012	0	4 •	0.00 (0.00, 0.22
Subtotal (I^2 = 0.00%,	p = 0.76)	$\diamond$	0.01 (0.00, 0.03
Percutaneous Endosco	pic		
iao et al. 2013	0	5 •	0.00 (0.00, 0.20
ubbers et al, 2012	2	•	0.09 (0.03, 0.28
Sasani et al. 2007	5	6 <b>—</b>	0.08 (0.03, 0.1
lang et al. 2006	3	•	0.09 (0.03, 0.2)
Choi et al. 2007	2	1	0.05 (0.01, 0.1)
_ew et al, 2001	5	7 •	0.11 (0.05, 0.2
Foley et al, 1999	0	1 •	0.00 (0.00, 0.20
Subtotal (I^2 = 0.00%,	p = 0.71)	$\sim$	0.06 (0.03, 0.10
Micro-endoscopic			
Yue et al. 2014	0	5 •	0.00 (0.00, 0.20
Yoshimoto et al. 2014	5		• 0.21 (0.09, 0.40
Yue et ala. 2012	1	25 <b>•</b>	0.04 (0.01, 0.20
rue et alb, 2012	0	3 •	0.00 (0.00, 0.23
Doi et al. 2011	2	7 *	→ 0.12 (0.03, 0.34
Cervellini et al. 2005	0	7	- 0.00 (0.00, 0.18
Suess et al. 2005	2		0.08 (0.02, 0.25
Subtotal (I^2 = 37.66%	p = 0.14	$\leq$	0.05 (0.01, 0.12
		0 .05 .1 .15	.2 .25 .3

## Learning Objectives

The authors should be discuss the different surgical techniques available for the treatment of far lateral disc herniations and describe the shortand long- term outcomes associated with each.