A Clinical Comparison of Perioperative Outcomes and Complications with Biportal Endoscopic and Open Lumbar Laminectomy using an Early Recovery After Surgery (ERAS) Protocol.

Thomas Olson¹, Alexis Cheney, Jordan Holler, Jeannie Yoojin Park, Alexander Upfill-Brown², Don Young Park³ ¹UCLA Orthopaedic Surgery, ²David Geffen School of Medicine At UCLA, ³UC Irvine Department of Orthopaedic Surgery INTRODUCTION: Biportal spinal endoscopy is an ultra-minimally invasive technique that has been successfully utilized to treat lumbar spinal stenosis. Early recovery after surgery (ERAS) protocols can standardize surgeries to reduce postoperative pain and complications and enhance early recovery. This study compares the perioperative outcomes and complications of biportal endoscopic and open laminectomy for one- and two-level lumbar stenosis using an ERAS protocol.

METHODS: A retrospective analysis was conducted on 94 patients who underwent one- or two-level lumbar surgeries for the diagnosis of lumbar central stenosis. Trauma, tumor, infection, and revision cases were excluded. The cohort included 44 endoscopic and 50 open cases between October 2021 and January 2024 with minimum three months of follow up. These were performed at a single academic institution by fellowship-trained spine surgeons. ERAS protocol emphasized a standardized multimodal care pathway in the perioperative period for all surgeries. Patient demographics, surgical outcomes, and postoperative complications were compared.

RESULTS: The demographic characteristics, including age, sex, BMI, ASA score, and Charlson Comorbidity Index, were statistically similar across the groups. The distribution of single versus two-level surgeries and the specific levels addressed were comparable. Open procedures had a significantly longer length of stay (mean 2.0 days) compared to endoscopic (1.1 days) procedures (p=0.0405). Endoscopic surgeries had significantly greater same-day discharges (39% v. 16%, p=0.0132). There was no significant difference in surgical duration or perioperative narcotic use among the groups. Estimated blood loss (EBL) was significantly higher in open procedures (mean 97 mL) compared endoscopic (7 mL) procedures (p<0.0001). Drain use was shorter in duration with lower total output in endoscopic cases versus open (p<0.0001). Endoscopic procedures had a significantly higher rate of dural tears (20%) compared to open (6%) (p=0.0361). Open laminectomies had a significantly higher rate of dural tears (20%) compared to endoscopic (2%) procedures (p=0.0076). There was one case of superficial infection and 2 cases of revision surgeries with open cases versus none with endoscopic cases.

DISCUSSION AND CONCLUSION: When comparing similar patients undergoing one- and two-level lumbar laminectomy utilizing an ERAS protocol, biportal endoscopic techniques are associated with shorter hospital stays, lower EBL, and fewer complications such as dural tears compared to open laminectomy. These findings support the effectiveness, safety, and accelerated recovery with the biportal endoscopic technique for the treatment of lumbar stenosis.

Variable	Statistic	Endescopic	Open	Total	P-Value
		(n=44)	(n=50)	(n=54)	
Female	N (%)	16 (36%)	14 (28%)	30 (31%)	0.3855
Age (yrs)	Mean (SD)	70.3 (9.6)	73.9 (8.9)	72.2 (9.4)	0.0624
BMI (kg/m ²)	Mean (SD)	29.1 (4.3)	28.2 (5.0)	28.6 (4.7)	0.3552
ASA score	Mean (SD)	2.7 (0.5)	2.7 (0.5)	2.7 (0.5)	0.9999
Charlson Comorbidity Index	Mean (SD)	3.4 (1.6)	3.6 (1.4)	3.5 (1.5)	0.5196
Fable 2 - Operative I	evels				
Variable		Endoscopic	Open	Total	P-value
		(n=44)	(17-50)	(n=94)	
Number of Levels*	I Level	31 (71%)	34 (68%)	65 (69%i)	0.7973
	2 Levels	13 (29%)	16 (32%)	29 (31%)	
Levels Addressed*	1.1.1.2	2 (4%)	37555	5 (456)	0.0376
	L2-L3	6(11%)	7(11%)	13 (11%)	
	L3-L4	15 (20%)	27(41%)	42 (34%)	
	L4-L5	27 (47%)	29(64%)	55 (46%)	
	L5-81	7 (12%)	0(0%)	7(6%)	
respectiv Table 3 – Perioperati Variable	ty. 123 levels were ve Variables Statistic	Endoscopi	ll potients.	Total	P-Valo
		(n=44)	(n=50)	(n=94)	
Outpatient Procedure	N (%)	17 (39%)	8 (16%)	25 (30%)	0.0132
	Mean (SD)	1.1(1.3)	2.0 (2.6)	1.6(2.1)	0.0405
Length of Stay (days)	Concert Concert				
Length of Stay (days) Surgical Duration (min) Intraorerative Narcotic	Mean (SD)	144 (51)	145 (53)	145 (52)	0.9262
Length of Stay (days) Surgical Duration (min) Intrioperative Narcotic Requirement (MME) Postcoerative Narcotic	Mean (SD)	144 (51) 42 (22)	145 (53) 42 (23)	145 (52) 41 (23)	0.9262

Variable	Statistic	Endoscopic (n=44)	Open (n=50)	Total (n=24)	P-Value
(nL)	Mean (SD)	7 (24)	97(19)	55 (SO)	<0.0001
Drain Utilization	N (%)	44 (100%)	27 (54%)	71 (76%)	<0.0001
Deain Duration (days)	Mean (SD)	0.9(0.8)	2.3(1.3)	1.4 (1.1)	<0.0001
Total Drain Outrot (mL)	Mean (SD)	95(97)	237 (214)	148 (198)	<0.0001
able 5 - Complications					
able 5 – Complication	End	oscopic	Open	Total	P-value
able 5 – Complications Complication	End (n	oscopic (=44)	Open (n=50)	Total (n=94)	P-value
'able 5 – Complication Complication Postoperative Radiculitis	i End (n 9 (escopic (**44) (20%6)	Open (n=50) 3 (6%)	Total (n=94) 12 (13%)	P-value 0.0361
able 5 – Complications Complication Postoperative Radiculitis Postoperative Weakness	End (n 9 (2	oscopic (*44) (20%) (5%)	Open (n=50) 3 (6%) 3 (6%)	Total (n=94) 12 (13%) 5 (5%)	P-value 0.0361 0.7542
'able 5 – Complications Complication Postoperative Radiculitis Postoperative Weakness Daral Tear	End (n 9 (2 1	escopic (*44) (20%) (2%) (2%)	Open (8=50) 3 (6%) 3 (6%) 10 (20%)	Total (n°94) 12 (13%) 5 (5%) 11 (12%)	P-value 0.0361 0.7542 0.0076
'able 5 – Complication Complication Postoperative Radiculitis Postoperative Weakness Daral Tear Blood Transfusion	i (n 9 (2 1 0	escopic (*44) (20%) (2%) (2%) ((%)	Open (8=50) 3 (6%) 3 (6%) 10 (20%) 0 (0%)	Total (n°94) 12 (13%) 5 (5%) 11 (12%) 0 (0%)	P-value 0.0361 0.7542 0.0076 N/A
able 5 – Complications Complication Postoperative Radiculitis Postoperative Weakness Daral Tear Blood Transfusion Superficial Infection	i (n 9 (2 1 0 0 0	escopic (*44) (20%) (2%) (2%) (2%) (0%)	Open (n=50) 3 (6%) 0 (20%) 0 (0%) 1 (2%)	Total (n=94) 12(13%) 5(5%) 11(12%) 0(0%) 1(15)	P-value 0.0361 0.7542 0.0076 N/A 0.3457