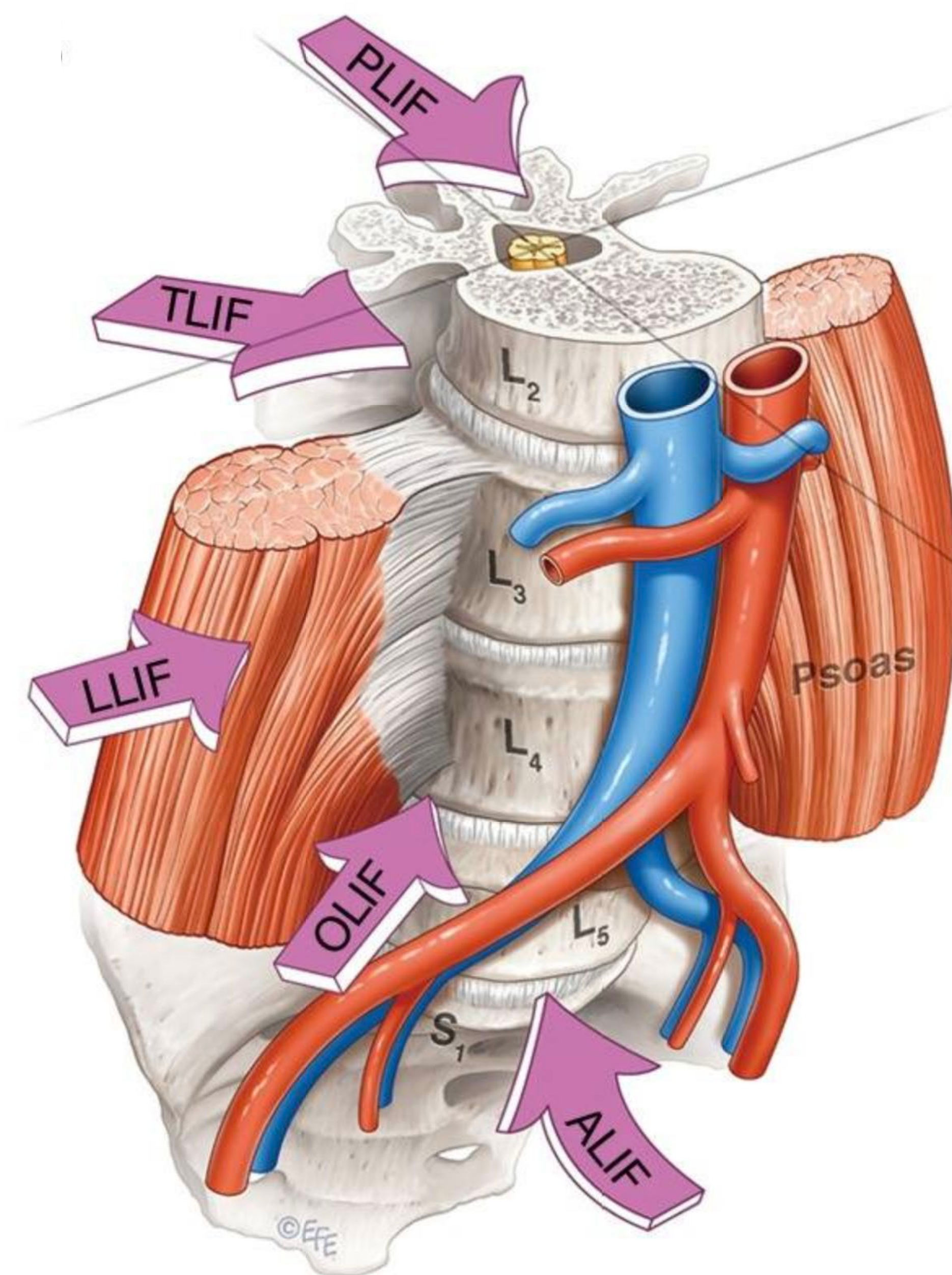


Comparison of Risk Factors for Short-Term Postoperative Pain Between Transforaminal and Anterior Lumbar Interbody Fusions

BACKGROUND

- The Anterior Lumbar Interbody Fusion (ALIF) via the transperitoneal approach has grown in popularity, allowing better disc space access and radiologic outcomes, while avoiding trauma to the paraspinal musculature involved with the transforaminal approach.^{1,2}
- Differences in anatomical access creates approach-specific complications, as ALIF has a higher risk of vascular injury, retrograde ejaculation, and ileus.³ TLIF has greater risk of unintended durotomy.⁴
- Greater age, BMI, and comorbidity profiles are risk factors for acute outcomes following ALIF.⁵
- Evidence remains inconsistent regarding differences in postoperative pain and how patient characteristics affect pain burden following each approach.

Figure 1. Anatomic Access in Lumbar Interbody Fusion Based on Approach



Mobbs et al. (2015)²

AIMS

Primary Aims: To compare postoperative inpatient pain metrics and patient-reported outcomes (PROs) between ALIF and TLIF and identify risk factors for increased pain burden.

Hypothesis: It was hypothesized that the ALIF approach may be associated with decreased postoperative pain compared to TLIF, and differences in anatomical access carry unique approach-specific risk factors for greater pain burden.

METHODS

- Inclusion:** Patients ages 18-89 who underwent 1- or 2-level ALIF or TLIF between January 2018 and December 2023 for a primary diagnosis of spinal stenosis, spondylolisthesis, or degenerative disc disease were included.
- Exclusion:** Minimally invasive TLIF and procedures performed for revision, extension, infection, or trauma.
- Outcomes:**
 - Daily maximum pain scores and morphine equivalent daily dose (MEDD)
 - 90-day postoperative Oswestry Disability Index (ODI)

Statistical Analysis

- Chi-square and Mann-Whitney U testing were used to determine differences in demographic and procedural variables
- Average morphine equivalent dosages, pain scores per day, and 90-day ODI were compared between groups via multivariate linear regression controlling for Charlson Comorbidity Index (CCI), Body Mass Index (BMI), age, primary diagnosis, and use of intraoperative neuromonitoring.
- Risk factor analysis was performed via binary logistic regression using a logit link and stepwise backward likelihood ratio was performed, incorporating age, gender, BMI, CCI, smoking status, primary diagnosis, IONM, number of spine levels fused, operative duration, length of stay, and all interaction terms between demographic variables.
- Adverse outcomes were defined as above the median for MEDD and pain scores and ODI >35.

Table 1: Demographic, Clinical, and Procedural Variables

		ALIF (n = 127)	TLIF (n = 503)	Total (n = 630)	
Variable		Mean±SD/Count (%)			Sig. (p)
Charlson Comorbidity Index		0.86 ± 1.03	2.42±1.41	2.02±1.49	<0.001
BMI		27.2 ± 4.2	30.2 ± 5.1	29.4 ± 5.1	<0.001
Age		48.5 ± 10.4	62.2 ± 12.4	58.6 ± 13.3	<0.001
Gender	Male	62 (48.8%)	231 (45.9%)	293 (46.5%)	0.559
	Female	65 (51.2%)	272 (54.1%)	337 (53.5%)	
Active Smoking Status		24 (18.9%)	72 (14.3%)	96 (15.2%)	0.199
Nerve Block Administered		4 (3.1%)	3 (0.6%)	7 (1.1%)	0.033
Intraoperative Neuromonitoring Utilization		38 (29.9%)	379 (78.6%)	417 (66.4%)	<0.001
Intraoperative Transfusion		1 (0.8%)	5 (1.0%)	6 (1.0%)	1.000
Diagnoses	Spinal Stenosis	24 (18.9%)	253 (50.3%)	277 (44.0%)	<0.001
	Spondylolisthesis	4 (3.1%)	119 (23.7%)	123 (19.5%)	
	Degenerative Disc Disease	99 (78%)	131 (26.0%)	230 (36.5%)	
Spine Level	1	99 (78.0%)	380 (75.5%)	479 (76.5%)	0.570
	2	28 (22.0%)	123 (24.5%)	151 (23.5%)	
Preoperative Oswestry Disability Index		0.51 ± 0.17	0.48 ± 0.16	0.49 ± 0.19	0.277

RESULTS

- ALIF was associated with a 6.6 mg/day decrease in MEDD. Pain scores and ODI at 90 days postoperatively were comparable between groups. Both groups had a statistically significant improvement in ODI at 90 days compared to preoperative scores.

Table 2: Multivariable Linear Regression Analysis of Postoperative Pain

Outcome	Sig. (p)	Beta	95% Confidence Interval	
			Lower Bound	Upper Bound
Length of Hospital Stay (Hours)	0.060	15.436	-35.689	53.740
Average Daily Max Pain Score	0.970	0.008	-0.420	0.436
MEDD	0.002	-6.624	-10.714	-2.533
90-Day Postoperative ODI	0.395	0.039	-0.051	0.128

- Male were associated with higher postoperative pain and MEDD in the ALIF group only. Older age was associated with adverse ODI at 90 days in the ALIF group only. Active smoking status was a predictor of higher pain in the TLIF group only. Higher CCI was significantly associated with higher pain in the ALIF group and lower pain in the TLIF group. Older females were associated with more pain in both TLIF and ALIF groups. All models showed good distinction between outcomes (AUC > 0.719)

Figure 2: Risk Factor Analysis in ALIF Patients

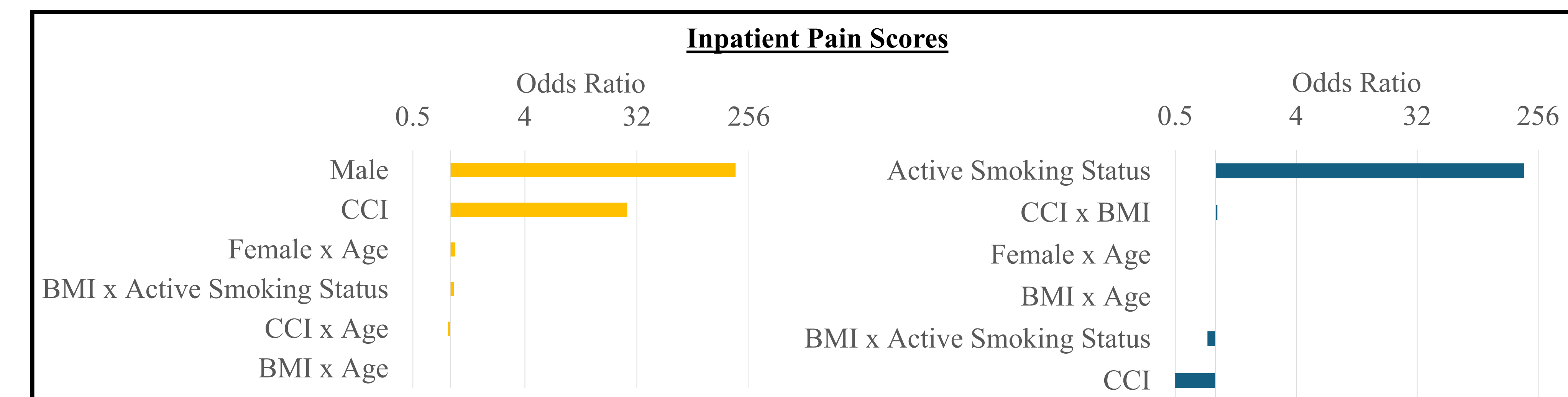
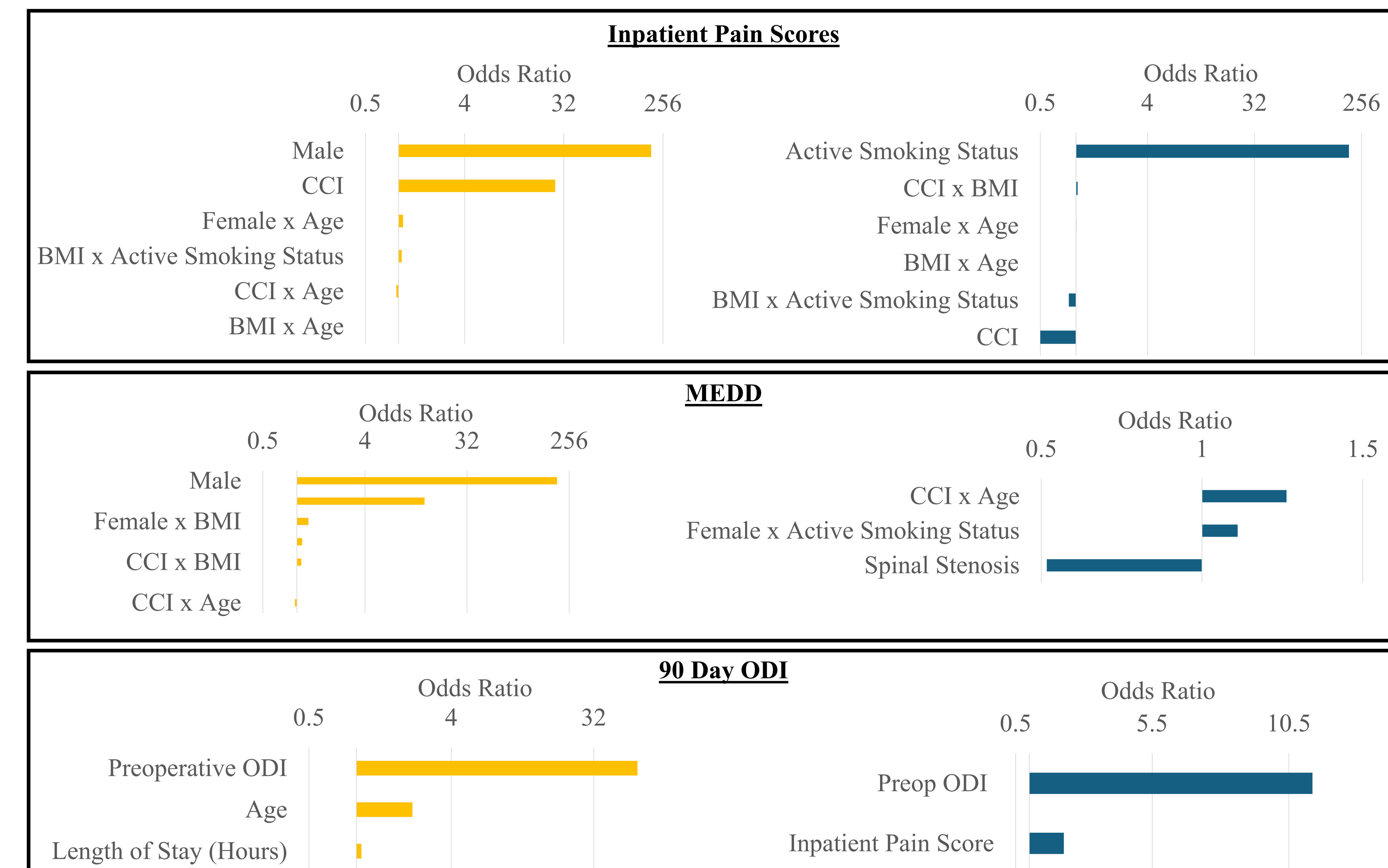


Figure 3: Risk Factor Analysis in TLIF Patients



CONCLUSIONS

- ALIF was independently associated with lower inpatient opioid use. In ALIF patients,
- Male gender predicted significantly higher pain and opioid use in the ALIF group.
- Patients with more comorbidities presented higher risk of increased pain in the following ALIF, but decreased risk in following TLIF.
- Older patients were more likely to report adverse ODI scores in ALIF group only.
- ALIF and TLIF approach interact differently with patient characteristics**, portraying unique risk profiles for postoperative pain.

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