

The Impact of Hyperlipidemia on Postoperative Outcomes and Healthcare Utilization Following Lumbar Fusion

Carson Cummings¹, Sarah Meng¹, Luke Cotton¹, Adelin Tulcan², David Cheng¹, Joel D. Carson¹, Vahe Yacoubian², Gideon Harianja², Muhammad Abd El Barr³, Melissa Erickson³, Olumide Danisa³

¹Loma Linda University School of Medicine, Loma Linda, CA, USA

²Department of Orthopaedic Surgery, Loma Linda University Health System, Loma Linda, CA, USA.

³Department of Orthopaedic and Neurological Surgery, Duke University Health System, Durham, NC, USA. ccummings@students.llu.edu

Disclosures: C. Cummings (N), S. Meng (N), L. Cotton (N), A. Tulcan (N), D. Cheng (N), J.D. Carson (N), V. Yacoubian (N), G. Harianja (N), M. Erickson (3B; Johnson & Johnson, Globus, NuVasive, Medtronic. 4; Restor3D. 5; Globus, NuVasive, Alphatec, Medtronic) (N), M. Abd El Barr (3B; TrackX, Spinal Elements, Globus, Brainlab), O. Danisa (8; NASSJ, SpineLine. 9; ABOS examiner).

INTRODUCTION: Hyperlipidemia (HLD) affects over 93 million adults in the United States and is associated with vascular compromise, impaired bone integrity, and adverse surgical outcomes. In spine surgery, HLD has been linked to increased pseudarthrosis risk and higher rates of wound, infectious, and cardiovascular complications. However, its impact on broader perioperative outcomes such as emergency department (ED) visits, readmissions, and length of stay (LOS) following lumbar fusion remains poorly defined. This study aimed to evaluate the association between HLD and medical, surgical, and utilization outcomes after lumbar fusion. The authors hypothesized that patients with HLD would be associated with increased surgical complications, higher utilization rates, and earlier occurrence of adverse events following lumbar fusion.

METHODS: A retrospective review was conducted of adult patients (18–85 years) who underwent lumbar fusion at L1–L5 for degenerative or traumatic indications between January 2013 and July 2024 at a single academic center. Patients with spinal infection, malignancy, inflammatory/rheumatologic disease, prior failed fusion, or pregnancy were excluded. Procedures included ALIF, OLIF, DLIF, TLIF, and PLIF. Patients were stratified by the presence of hyperlipidemia at the time of surgery. Medical and surgical complications, ED visits, readmissions, revisions, and postoperative length of stay were recorded. Outcomes were assessed at 30 and 90 days, with revisions/readmissions tracked for one year. Multivariable Firth logistic and Cox regression models adjusted for demographic and clinical covariates; significance was defined as $p \leq 0.05$.

RESULTS: The cohort comprised 413 patients (45.0% male, 55.0% female), of whom 139 (33.7%) had HLD. HLD was associated with higher surgical complication rates at 30 days (11.5% vs. 6.6%, $p = 0.04$) and 90 days (17.3% vs. 9.1%, $p = 0.02$), primarily due to wound complications at both 30 days (5.0% vs. 2.2%, $p = 0.02$) and 90 days (7.2% vs. 4.0%, $p = 0.05$). ED visits were more frequent at 90 days (20.1% vs. 12.4%, $p = 0.02$). Time-to-event analysis revealed that surgical complications occurred sooner in the HLD group (median, 42 vs. 54 days; $p = 0.02$). Wound complications occurred at a median of 27 days versus 31 days ($p = 0.05$), and ED visits occurred sooner (median, 23 days versus 31 days, $p = 0.01$). Medical complications, revisions, readmissions, and median LOS (4 vs. 3 days, $p = 0.63$) were not significantly different, though numerical trends favored the non-HLD group.

DISCUSSION: HLD was associated with higher odds of early surgical complications, particularly wound complications, as well as increased ED utilization following lumbar fusion. These associations persisted after adjustment for demographic and clinical factors and were accompanied by earlier occurrence of complications and healthcare utilization events. While medical complications, revisions, readmissions, and LOS did not differ significantly, observed numerical trends suggest that HLD may contribute to a broader perioperative risk profile. The findings align with prior reports linking HLD to impaired wound healing in spine surgery and expand existing knowledge by demonstrating its impact on ED visits and timing of adverse events.

SIGNIFICANCE/CLINICAL RELEVANCE: HLD is a modifiable metabolic condition associated with a higher risk and earlier onset of surgical complications, revisions, and ED visits after lumbar fusion. These findings underscore the importance of targeted preoperative optimization and counseling for this patient population.

TABLES:

Table 1. Adjusted Odds Ratios for 90-Day and 1-Year Postoperative Outcomes in Lumbar Fusion Patients With vs. Without Hyperlipidemia

Postoperative Outcome	non-HLD	HLD	p-value
90-Day Surgical poor outcomes, n (%)			
All surgical complications	25 (9.1%)	24 (17.3%)	0.02
Wound complications	11 (4%)	10 (7.2%)	0.05
Neurological complications	7 (2.6%)	5 (3.6%)	0.57
Surgery site infections	10 (3.6%)	4 (2.9%)	0.79
90-Day Medical poor outcomes, n (%)			
All medical complications	15 (5.5%)	8 (5.8%)	0.71
Cardiovascular complications	6 (2.2%)	4 (2.9%)	0.90
Pulmonary complications	0 (0%)	1 (0.7%)	0.68
Renal/urinary complications	7 (2.6%)	2 (1.4%)	0.34
Gastrointestinal complications	2 (0.7%)	3 (2.2%)	0.88
90-Day ED Visits, n (%)			
ED visits	34 (12.4%)	28 (20.1%)	0.02
ED visits for pain	15 (5.5%)	12 (8.6%)	0.16
1-Year Revision and Readmissions, n (%)			
Revision surgeries	22 (8%)	22 (15.8%)	0.13
Readmissions	40 (14.6%)	31 (22.3%)	0.19
Surgical readmissions	30 (10.9%)	24 (17.3%)	0.16
Medical readmissions	10 (3.6%)	7 (5%)	0.92

Table 2. Median Days to Postoperative Complications, ED Visits, and Readmissions in Lumbar Fusion Patients With vs. Without Hyperlipidemia

Postoperative Outcome	non-HLD Days	HLD Days	p-value
90-Day Surgical poor outcomes, n (%)			
All surgical complications	42	54	0.02
Wound complications	31	27	0.05
Neurological complications	17	85	NA*
Surgery site infection	29	29	0.82
90-Day Medical poor outcomes, n (%)			
All medical complications	23	21.5	NA*
Cardiovascular complications	23	10	NA*
Pulmonary complications	NA*	NA*	NA*
Renal/urinary complications	6	83	0.32
Gastrointestinal complications	44	35	0.75
90-Day ED Visits, n (%)			
ED visit	31	23	0.01
ED for pain	37	20.5	0.13
1-year Revisions and Readmissions n (%)			
Revision surgery	210	126	0.13
Readmissions	98	112	NA*
Surgical readmissions	113.5	119	NA*
Medical readmissions	6.5	49	0.98

*Indicates too few events for analysis