

Self-harm after Lumbar Fusion: Incidence of and Risk-Factors for a Rare but Potentially Devastating Complication

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INTRODUCTION:

To date, studies of mental health in lumbar fusion patients fall largely into two categories: a) the impact of mental health comorbidities on postoperative outcomes and b) the changes in mental health that occur after surgery. Unfortunately, some lumbar fusion patients will experience psychological distress and a deterioration of mental health postoperatively. At the extreme, these changes can lead to self-harm and suicide. Investigation into these outcomes among patients undergoing elective spine surgery is rare, although the topic has been more frequently studied in spinal cord injury populations. The purpose of this study was to evaluate the incidence of self-harm within one-year of elective lumbar fusion procedures and to identify risk-factors for self-harm events using a large national database. These findings may help spine surgeons identify patients at risk for self-harm during recovery to target prevention and early treatment strategies.

METHODS:

The PearlDiver Mariner 170 dataset was retrospectively analyzed. The database contains claims records from over 170 million patients across all-payers including commercial, Medicare, Medicaid, and self-pay from 2010 to April 30, 2023. Patients undergoing 1 to 3 level posterior lumbar fusion (CPT codes 22612 or 22630) were included. All included patients were active in the database for 6 months prior to and 1-year after surgery. For patients with multiple fusion procedures during the study period, only the first surgery was included. Patients undergoing anterior fusion, combined anterior/posterior fusions, 4+ level fusion, and surgery for cancer, infection, or trauma were excluded. Patients with a history of self-harm prior to surgery were also excluded. Descriptive statistics were used to assess the rates of self-harm, complications, and reoperations for the study population. Univariate analyses, including Chi-square and 2-sided independent samples t-tests were performed to compare demographics and comorbidities between the no self-harm and self-harm groups. Multivariable logistic regression was performed to assess independent risk factors for self-harm. All statistical analysis was performed within the PearlDiver platform using R (R Studio PBC, Boston, MA). Statistical significance was assessed at $p < 0.05$.

RESULTS:

In total, 138,223 patients were included in the study. The incidence of self-harm within 1-year of lumbar fusion was 0.40% (549 patients). In comparison to patients without a self-harm event, patients committing self-harm were younger, had higher Charlson Comorbidity Index (CCI) scores (indicating greater comorbidity burden), and a higher prevalence of obesity, alcohol use disorders, anxiety disorders, depression, chronic obstructive pulmonary disease (COPD), tobacco use, and preoperative opioid use (Table 1).

In the multivariable logistic regression model, younger age (OR=0.95 per 1-year increase, $p < 0.001$), male sex (OR=1.37, $p < 0.001$), and higher CCI scores (OR=1.06 per 1-point increase, $p = 0.020$) were risk factors for self-harm. Specific comorbidities associated with increased risk for self-harm included alcohol use disorder, anxiety disorders, depression, tobacco use, and preoperative opioid use (all $p < 0.001$). The strongest associations between comorbidity and self-harm were seen for depression (OR=2.68), anxiety (OR=2.03), and alcohol use disorder (OR=1.89) (Table 2). In patients with a self-harm event, the most common diagnoses were suicidal ideations (473, 86.2%), intentional poisoning by drugs (benzodiazepines or unspecified, 37, 6.7%), and suicide attempt (28, 5.1%).

For the full study population, the overall complication rate was 19.8% and reoperation rate was 5.3% within 1-year postoperatively. Of the complications and reoperations assessed, self-harm had the lowest incidence. The most common complications observed were urinary tract infection (9.6%) and pneumonia (3.1%), while the least common were dural tear (0.6%) and pulmonary embolism (0.7%). The most common reoperation performed was decompression without fusion (2.6%) (Table 3).

DISCUSSION AND CONCLUSION:

Self-harm is a rare, yet understudied potential complication of lumbar fusion procedures. In this national database study, the incidence of self-harm was 0.4% in the year following elective lumbar fusion. While some risk factors for self-harm are non-modifiable, other behavioral and mental health comorbidities may serve to flag patients as targets for early preventive intervention. In high-risk patients, spine surgeons should actively screen for deterioration of mental health status postoperatively and develop protocols for addressing signs of psychological distress potentially leading to self-harm during recovery.

Table 1. Demographics and Comorbidities

Demographics and Comorbidities	No Self-Harm (n=137,674)	Self-Harm (n=549)	P-Value
Age	59.9 ± 12.8	50.3 ± 13.2	<0.001
Gender			0.288
Male	56,729 (41.2)	239 (43.5)	
Female	80,945 (58.8)	310 (56.5)	
CCI Score	1.7 ± 2.0	2.1 ± 2.2	<0.001
Obesity	31,230 (22.7)	155 (28.2)	0.002
Alcohol Disorders	4,028 (2.9)	62 (11.3)	<0.001
Anxiety Disorders	32,758 (23.8)	310 (56.5)	<0.001
Depression	35,492 (25.8)	336 (61.2)	<0.001
Cardiac Disorders	35,580 (25.8)	182 (33.2)	0.351
CHF	6,323 (4.6)	28 (5.1)	0.642
CKD	10,009 (7.3)	38 (6.9)	0.817
COPD	13,756 (10.0)	87 (15.8)	<0.001
CVD	4,341 (3.2)	21 (3.8)	0.437
Diabetes	35,373 (25.7)	144 (26.2)	0.812
HTN	83,068 (60.3)	301 (54.8)	0.010
Osteoporosis	11,545 (8.4)	36 (6.6)	0.143
RA	7,673 (5.6)	40 (7.3)	0.099
Tobacco Use	34,478 (25.0)	257 (46.8)	<0.001
Preop. Opioid Use	82,697 (60.1)	405 (73.8)	<0.001

Table 2. Risk Factors for Postoperative Self-Harm

Independent Variable	Odds Ratio	95% CI	P-Value
Age	0.95	0.94 to 0.96	<0.001
Male	1.37	1.15 to 1.63	<0.001
CCI Score	1.06	1.01 to 1.11	0.020
Obesity	0.84	0.68 to 1.02	0.087
Alcohol Disorders	1.89	1.41 to 2.48	<0.001
Anxiety Disorders	2.03	1.66 to 2.48	<0.001
Depression	2.68	2.18 to 3.29	<0.001
Cardiac Disorders	0.87	0.71 to 1.06	0.173
CHF	1.03	0.87 to 1.54	0.887
CKD	1.05	0.72 to 1.51	0.787
COPD	1.13	0.87 to 1.46	0.345
CVD	0.96	0.59 to 1.49	0.878
Diabetes	1.15	0.91 to 1.43	0.236
HTN	0.86	0.70 to 1.06	0.149
Osteoporosis	1.04	0.72 to 1.46	0.824
RA	1.22	0.86 to 1.67	0.243
Tobacco Use	1.41	1.17 to 1.70	<0.001
Preop. Opioid Use	1.46	1.21 to 1.77	<0.001

Table 3. Overall Rates of 1-Year Outcomes

Outcome	Population (n=138,223)
Medical/Surgical Complication	27,348 (19.8)
Wound Disruption	1,943 (1.4)
SSI	3,855 (2.8)
Hematoma/Hemorrhage	2,244 (1.6)
Hardware Complication	1,963 (1.4)
Dural Tear	883 (0.6)
MI	1,272 (0.9)
Sepsis/SIRS	2,288 (1.7)
PE	952 (0.7)
DVT	2,106 (1.5)
Pneumonia	4,351 (3.1)
Respiratory Failure	3,052 (2.2)
UTI	13,229 (9.6)
Reoperation	7,335 (5.3)
Decompression	3,587 (2.6)
Fusion	2,285 (1.7)
I&D	1,158 (0.8)
Exploration	1,220 (0.9)
Hardware Removal	1,445 (1.0)
Self-Harm	549 (0.4)