

Delayed Ejaculation After Lumbar Spine Surgery: A Claims Database Analysis

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Abstract

Study Design: Retrospective cohort.

Objectives: Delayed ejaculation (DE) is a distressing condition characterized by a notable delay in ejaculation or complete inability to achieve ejaculation, and there are no existing reports of DE following lumbar spine surgery. Inspired by our institutional experience, we sought to assess national rates of DE following surgery of the lumbar spine.

Methods: We queried the Optum De-identified Clinformatics Database for adult men undergoing surgery of the lumbar spine between 2003 and 2017. The primary outcome was the development of DE within 2 years of surgery. Multivariable logistic regression was performed to identify factors associated with the development of DE.

Results: We identified 117 918 men who underwent 162 646 lumbar spine surgeries, including anterior lumbar interbody fusion (ALIF), posterior lumbar fusion (PLF), and more. The overall incidence of DE was 0.09%, with the highest rate among ALIF surgeries at 0.13%. In multivariable analysis, the odds of developing DE did not vary between anterior/lateral lumbar interbody fusion, PLF, and other spine surgeries. A history of tobacco smoking (OR = 1.47, 95% CI 1.00-2.16, $P = .05$) and obesity (OR = 1.56, 95% CI 1.00-2.44, $P = .05$) were associated with development of DE.

Conclusions: DE is a rare but distressing complication of thoracolumbar spine surgery, and patients should be queried for relevant symptoms at postoperative visits when indicated.

Keywords

delayed orgasm, thoracolumbar surgery, ejaculatory dysfunction, complications

Introduction

Delayed ejaculation (DE) is an understudied form of male sexual dysfunction that is estimated to affect 1% to 5% of men.¹ The hallmark of DE is an intravaginal ejaculatory latency time (IELT) that is beyond 25 to 30 minutes following intromission (2 standard deviations above the mean), as defined by The Third International Consultation on Sexual Medicine.² Like other disorders of sexual function, DE can be distressing to both affected men and their partners, resulting in sexual dissatisfaction and significant anxiety.³ Indeed, men with DE report reduced frequency of sexual intercourse, much like other disorders of ejaculatory function.³

The pathophysiology of ejaculatory disorders, including DE, is thought to be multifaceted with both organic and psychogenic factors.⁴ Any insult to the ejaculatory reflex pathway, involving both T10-L2 sympathetic innervation and L2-L4 somatic

innervation, may result in ejaculatory dysfunction.⁴ Unsurprisingly, then, neurological disorders and spinal injury, especially of the lumbar spine, are known to be associated with ejaculatory dysfunction.⁵ For example, retrograde ejaculation is a well-recognized complication following anterior surgery of the lumbar spine.^{6,7} Over the course of 18 months at our institution, we were referred 3 patients who had developed DE immediately after surgery of the lumbar spine. However, to the best of our knowledge, there are no existing reports of DE following spine

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Table 1. Year of Surgery and Age of Patients.

Characteristic	Total patients, n	ALIF/LLIF, n (%)	Combined posterior/posterolateral and interbody, n (%)	PLF, n (%)	Deformity, n (%)	Other, n (%)
Years						
2003-2005	21 251	3444 (16.2)	20 (0.09)	3754 (17.7)	119 (0.56)	20 433 (96.2)
2006-2009	36 751	6836 (18.6)	85 (0.23)	8675 (23.6)	221 (0.60)	35 169 (95.7)
2010-2013	39 038	5288 (13.5)	2543 (6.5)	9916 (25.4)	250 (0.64)	36 822 (94.3)
2014-2017	20 878	2121 (10.2)	2869 (13.7)	4721 (22.6)	113 (0.54)	19 247 (92.2)
Age, years						
Mean \pm SD		53.8 \pm 12.3	61.3 \pm 12.8	58.8 \pm 14.1	48.8 \pm 20.8	55.5 \pm 14.6
18-29	4413	401 (9.1)	74 (1.7)	775 (17.6)	197 (4.5)	3931 (89.1)
30-44	24 899	3642 (14.6)	585 (2.4)	3709 (14.9)	67 (0.27)	23 600 (94.8)
45-59	41 124	8090 (19.7)	1550 (3.8)	8752 (21.3)	168 (0.41)	38 988 (94.8)
60+	47 482	5556 (11.7)	3308 (7.0)	13 830 (29.1)	271 (0.57)	45 152 (95.1)

Abbreviations: ALIF, anterior lumbar interbody fusion; LLIF, lateral lumbar interbody fusion; PLF, posterior lumbar fusion.

Table 2. Rate of Delayed Ejaculation and Other Complications Within 2 Years of Lumbar Spine Surgery.

Surgery	Total, n	DE, n (%)	DVT, n (%)	PE, n (%)	Urinary retention, n (%)	Retrograde ejaculation, n (%)	ED, n (%)
All	164 060	163 (0.09)	5276 (3.22)	3035 (1.85)	15 154 (9.24)	119 (0.07)	19 109 (11.65)
ALIF/LLIF	17 350	23 (0.13)	586 (3.38)	333 (1.92)	1324 (7.63)	26 (0.15)	2194 (12.65)
PLF	27 233	29 (0.11)	1311 (4.81)	770 (2.83)	3583 (13.16)	30 (0.11)	3745 (13.75)
Other	119 477	111 (0.09)	3379 (2.83)	1932 (1.62)	10 247 (8.58)	63 (0.05)	13 170 (11.02)

Abbreviations: DE, delayed ejaculation; DVT, deep vein thrombosis; PE, pulmonary embolism; ED, erectile dysfunction; ALIF, anterior lumbar interbody fusion; LLIF, lateral lumbar interbody fusion; PLF, posterior lumbar fusion.

surgery. Inspired by these patients, we sought to evaluate the rate of DE following lumbar spine surgery using a large, national insurance claims database. We aim to describe the prevalence of the condition and associated surgical approaches.

Methods

Data Source

Given the deidentified nature of claims data, this study was exempt from institutional review board approval. We accessed data from the Optum De-identified Clinformatics Database, which contains data on more than 100 million commercially insured and Medicare Advantage beneficiaries from 2003 to 2017. Men undergoing surgery of the lumbar spine, including but not limited to anterior lumbar interbody fusion (ALIF) or lateral lumbar interbody fusion (LLIF) and posterior lumbar fusion (PLF), were identified using Current Procedure Terminology (CPT) codes (Supplemental Table 1). Development of DE related to lumbar surgery was assessed by examining for the appropriate diagnosis code within 2 years after their lumbar surgery. The primary outcome was the occurrence of delayed ejaculation using the International Classification of Diseases, Ninth and Tenth Revision (ICD-9/ICD-10) diagnosis codes (Supplemental Table 1). We examined other postoperative entities after spinal surgery including deep vein thrombosis (DVT), pulmonary embolism (PE), urinary retention, retrograde ejaculation, and erectile dysfunction using ICD-9 codes (Supplemental Table 1). Patients were excluded if they were

younger than 18 years or developed DE prior to their index lumbar surgery. Additionally, for those patients who underwent multiple lumbar surgeries and developed DE, any surgeries following the DE-associated surgery were not included in our analysis.

Statistical Analysis

Patient and disease characteristics were analyzed using descriptive statistics, including proportions, median, and mean \pm standard deviations. Multivariable logistic regression was used to identify factors associated with development of delayed ejaculation.

All analyses were performed using the Redivis software (Redivis Inc) and R v3.5.3 (R Foundation for Statistical Computing). This article fulfills the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.⁸

Results

We identified 117 918 men who underwent 162 646 lumbar spine surgeries (Table 1). The largest fraction of patients were in the 45- to 59-year age bracket; detailed age distribution and year of surgery data is summarized in Table 1. A total of 163 patients in our cohort developed DE after surgery, yielding an overall incidence of 0.09% (Table 2). Individuals who underwent ALIF/LLIF experienced the highest rate of DE (0.13%); however, this was not statistically different from other approaches (Table 2). Stratification of the cohort by age

Table 3. Multivariable Regression: Factors Associated With Delayed Ejaculation.

Characteristic	n (%)	OR (95% CI)	P
Age (years)			
18-29	4413 (3.7)	0.52 (1.12-2.20)	.39
30-44	24899 (21.1)	Reference	Reference
45-59	41 124 (34.9)	1.08 (0.65-1.80)	.23
60+	47 482 (40.3)	0.83 (0.49-1.43)	.97
Risk factors			
Smoking	37 806 (32.1)	1.47 (0.998-2.16)	.052
Type 2 diabetes	28 854 (24.5)	0.96 (0.60-1.53)	.86
Obesity	21 297 (18.1)	1.56 (1.00-2.44)	.0502
Spine surgery			
ALIF/LLIF	17 278 (14.7)	Reference	Reference
PLF	26 576 (22.5)	0.71 (0.40-1.26)	.57
Other	74 064 (62.8)	0.66 (0.41-1.07)	.21

Abbreviations: ALIF, anterior lumbar interbody fusion; LLIF, lateral lumbar interbody fusion; PLF, posterior lumbar fusion.

revealed no difference in the rate of DE among patients <50 years old (0.09%) versus those ≥50 years old (0.09%) (Supplemental Table 2). Additionally, examining patients who only underwent one surgery or those who only underwent a single day of surgery (which may have included multiple, simultaneous procedures) revealed a similar rate of DE at 0.07% (Supplemental Table 3). Though not explicitly reported due to data use agreements regarding the reporting of small sample sizes, stratification of operations by first interspace versus subsequent interspaces did not reveal any difference in the rate of DE. In order to assess the validity of our database cohort, we assessed for the rates of many common complications to be able to compare with previously published rates (eg, DVT, PE, urinary retention, retrograde ejaculation, and erectile dysfunction) within 2 years following surgery (Table 2). Multivariable regression revealed no statistically significant predictors of developing DE, but there was a trend noted for smoking history (OR 1.47, 95% CI 0.998-2.16, $P = .052$) and obesity (OR 1.56, 95% CI 1.00-2.44, $P = .0502$). Though the type of spine surgery did not reach statistical significance, PLF and other surgeries were associated with lower odds of DE as compared with ALIF/LLIF. It is worth noting that the use of combined posterior/posterolateral and interbody surgery increased during the period of analysis, from 0.09% of the cases between 2003 and 2005, rising each 4-year period to reach 13.7% of cases by the 2014 to 2017 time period.

Discussion

In the present study, we report, for the first time, DE after surgery of the lumbar spine and estimate national incidence. Our analysis of over 160 000 patients undergoing lumbar spine surgery revealed the overall incidence of DE to be 0.09%. Our multivariable regression model, adjusted for age, smoking history, obesity, and type 2 diabetes also suggested a higher odds of DE among those undergoing ALIF/LLIF.

Surgery of the spine is common with more than 1 million spine procedures performed each year in the United States.^{9,10} Fusion and laminectomy, in particular, are among the 10 most common operations during inpatient stays according to the Healthcare Cost and Utilization Project.¹¹ Elective surgeries of the lumbar spine, including discectomies, laminectomies, and fusions, are estimated to constitute almost half of all spine surgeries.¹² Thoracolumbar procedures, more so than cervical procedures, are associated with substantial risk of intraoperative and perioperative complications.^{13,14} The incidence of other postoperative complications (eg, DVT, PE, urinary retention, retrograde ejaculation, and erectile dysfunction) were found to be consistent with that of previously published reports.¹⁵⁻¹⁷ As such, establishing the full spectrum of complications after these common surgeries is important in order for patients to be counseled appropriately.

The complication rate of spinal procedures varies greatly in the literature, owing largely to the differences in methodology and patient samples among studies. For example, Campbell et al¹⁸ found the complication rate to be as high as 52% whereas others have found rates as low as 16%.¹⁴ Common complications include surgical site infection, venous thromboembolism, durotomy, misplaced screw, and hardware malfunction.¹⁹ Ejaculatory complications are rare in spinal surgery; however, these conditions can be particularly distressing for patients and the existing literature has focused predominantly on retrograde ejaculation following ALIF, which occurs at a rate of approximately 2.5% to 8.4%.^{6,7,20} This is thought to be due to injury of the superior hypogastric plexus, which lies along the anterior spine at L5, just anterior and inferior to the aortic bifurcation; this structure is routinely manipulated during an anterior approach to the lower lumbar regions.²¹

In our institutional experience with 3 patients who developed DE immediately after lumbar spine surgery, 2 patients underwent ALIF and all 3 patients had procedures involving the L5-S1 region. Our analysis of claims data also showed the rate of DE following ALIF/LLIF to be higher than that of any other lumbar spine surgeries. Though statistical significance was not reached in our regression model, the odds of DE were higher among patients undergoing ALIF/LLIF as compared with other surgical approaches. The lack of statistical significance may be attributed to the rarity and likely underdiagnosis of DE, as only 0.09% of our cohort developed DE, whereas DE is estimated to affect 1% to 5% of men.¹ However, the risk of development of DE after spinal surgery has not been previously recognized, and the actual postoperative incidence is likely underreported. Certainly, the anterior approach to the spinal canal has a number of advantages including the preservation of the paravertebral muscles and improved access to the anterior spinal column. However, the unavoidable mobilization of abdominal structures, great vessels, and nerves leaves the patient at risk for vascular complications, in addition to ejaculatory dysfunction. Though we were unable to identify the levels of surgery in our claims cohort, L4-L5 and L5-S1 are the most common levels for surgical intervention.²²

The etiology of ejaculatory dysfunction, such as DE, after spinal surgery likely involves insult to either of the pathways involved in the 2 phases of ejaculation—emission and expulsion.²³ As both of these processes receive input from the sympathetic and parasympathetic systems, injury to either, which are at risk during surgery around the vertebrae/paravertebral areas, may lead to dysfunction.^{24,25} Surgeons should therefore be aware of this risk so that patients may be counseled appropriately prior to these surgeries. There are currently no Food and Drug Administration–approved drugs for DE, though medications, including cabergoline and oxytocin have shown success in off-label usage of DE²⁶ and were used to treat our patients. While patients may voluntarily bring up ejaculatory dysfunction at clinic visits, these conditions can be distressing and individuals may be hesitant to voluntarily bring them up, particularly during a postoperative visit with their spine surgeon. Therefore, patients could be queried for symptoms of ejaculatory dysfunction during follow-up visits after specific surgeries involving the thoracolumbar region. For patients of reproductive age, semen cryopreservation could even be considered to maintain reproductive outcomes should an ejaculatory complication occur. In the event of retrograde ejaculation, noninvasive options for management of infertility include centrifugation and resuspension of postejaculatory urine samples as well as ejaculation on a full bladder.²⁷ Though these options will likely not be possible for patients with DE, more invasive techniques such as testicular sperm extraction and percutaneous epididymal sperm aspiration remain viable options.

This study should be considered in the context of its limitations. Our analysis of claims data possesses limitations common to that of administrative datasets, including missing data, lack of granularity for specific predictive factors, and reliance on the accurate coding of diagnoses, procedures, and disease characteristics. Additionally, DE may be underrecognized, underdiagnosed, and therefore undercoded in a claims dataset. In particular, it is possible that younger patients who are more sexually active are more likely to report the development of DE. Though we found the rate of DE was the same in younger patients versus older patients (Supplemental Table 2) and no association was found between age and odds of developing DE (Table 3), this potential source of bias cannot be excluded and must be considered when interpreting our results.

In conclusion, DE is a rare complication than can occur after thoracolumbar spinal surgery. As such, surgeons should be aware of this and consider querying patients postoperatively for symptoms as appropriate. While the underlying mechanism has yet to be elucidated, it is likely due to nerve trauma or neuropraxia, and new surgical techniques could be developed to reduce the risk of not only DE but also other ejaculatory dysfunctions such as retrograde ejaculation. The current report represents the first time DE is being reported after spine surgery. Further studies may investigate the specific types of spine surgeries associated with DE in more granular detail, as well as the indication for surgery and level of surgery. Increasing awareness of DE may result in better recognition, reporting and more detailed analysis of risk factors.


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Supplemental Material

Supplemental material for this article is available online.

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