Association Between Preoperative Narcotic Use with Perioperative Complication Rates, Patient Reported Pain Scores, and Ambulatory Status After Complex Spinal Fusion (≥5 Levels) for Adult Deformity Correction

Aladine A. Elsamadicy[1], Nicolas Drysdale[2], Syed M. Adil[2], Lefko Charalambous[2], Megan Lee[1], Andrew Koo[1], Isaac G. Freedman[1], Adam J. Kundishora[1], Joaquin Camara-Quintana[1], Tariq Qureshi[1], Luis Kolb[1], Maxwell Laurans[1], Khalid Abbed[1], Isaac O. Karikari[2]

■ OBJECTIVE: **The widespread over-use of narcotics has been increasing. However, whether narcotic use impacts surgical outcomes after complex spinal fusion remains understudied. The aim of this study was to evaluate whether there is an association between preoperative narcotic use with perioperative complication rates, patient-reported pain scores, and ambulatory status after complex spinal fusions.**

■ METHODS: **The medical records of 134 adult (age ≥18 years) patients with spinal deformity undergoing elective, primary complex spinal fusion (≥5 levels) for deformity correction in a major academic institution from 2005–2015 were reviewed. Patient demographics, comorbidities, intraoperative and postoperative complication rates, pain scores, and ambulatory status were collected for each patient.**

■ RESULTS: **Patient demographics and comorbidities were similar between both cohorts, except that the Narcotic-User cohort had a greater mean age (57.5 years vs. 50.7 years; $P = 0.045$) and prevalence of depression (39.4% vs. 16.2%; $P = 0.003$). Complication rates were similar between both cohorts. The Narcotic-User cohort had significantly higher pain scores at baseline (6.7 ± 2.4 vs. 4.0 ± 3.4; $P < 0.001$) and at the first postoperative pain score reported (6.7 ± 2.8 vs. 5.3 ± 2.9; $P = 0.013$), but had a significantly greater improvement from baseline to last pain score (Narcotic-User: −2.5 ± 3.9 vs. Non-User: −0.5 ± 4.7; $P = 0.031$). The Narcotic-User cohort had significantly greater ambulation on the first postoperative ambulatory day compared with the Non-User cohort (103.8 ± 144.4 vs. 56.4 ± 84.0; $P = 0.031$).**

■ CONCLUSIONS: **Our study suggests that the preoperative use of narcotics may impact patient perception of pain and improvement after complex spinal fusions (≥5 levels). Consideration of patients' narcotic status preoperatively may facilitate tailored pain management and physical therapy regimens.**

INTRODUCTION

Patient-reported outcomes (PROs) are becoming proxies for hospitals to assess cost and overall value of health care.[1] In spine surgery, PROs are instrumental in helping surgeons better understand patient satisfaction and improve quality of life.[2,3] Patients with complex spinal deformities often experience limited mobility, poor lung function, inferior self-image, and increased back pain.[4] Pain score is a PRO that can readily be measured, and is often severe and progressively worsening in patients with complex spinal deformities.[4,5] Many spine patients report a significant reduction in pain after surgical correction.[6-8]

Key words
- Complex deformity
- Pain scores
- Preoperative narcotic use
- Spinal fusion

Abbreviations and Acronyms
ASD: Adult spinal deformity
DVT: Deep vein thrombosis
EBL: Estimated blood loss
EQ-5D: EuroQol 5 Dimensions
HTN: Hypertension
ICU: Intensive care unit
LOS: Length of stay in hospital
MI: Myocardial infarction
PE: Pulmonary embolism
PRO: Patient-reported outcome
SSI: Surgical site infection
UTI: Urinary tract infection

From the [1]Department of Neurosurgery, Yale University School of Medicine, New Haven, Connecticut; and [2]Department of Neurosurgery, Duke University Medical Center, Durham, North Carolina, USA

To whom correspondence should be addressed: Aladine A. Elsamadicy, M.D. [E-mail: aladine.elsamadicy@yale.edu]

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Therefore, identifying patient risk-factors associated with perception of pain scores is important to better overall PROs after surgical correction.

The opioid epidemic has steadily been rising in the United States, with 255 million opioids prescribed in 2017, a rate of 58.7 scripts per 100 people.[9] Particularly, in spinal deformity surgery, many patients have required opioids, pre- and postoperative narcotics, that have predicted inferior outcomes and increased health care resource use. In a multicenter database study of 575 adult spinal deformity (ASD) surgical patients, Raad et al.[10] reported that 44% of patients reported some level of preoperative narcotic use that predicted longer hospital length of stay, longer intensive care unit (ICU) stay, and greater 2-year disability scores. However, there is a paucity of data identifying the effect of preoperative narcotic use on patients' immediate perception of pain and ambulation abilities after complex spinal fusion (≥5 levels) for deformity correction.

The aim of this study was to evaluate whether there was an association between preoperative narcotic use with perioperative complication rates, patient-reported pain scores, and ambulatory status after complex spinal fusions.

METHODS

The medical records of 134 adult (age ≥18 years) spinal deformity patients undergoing elective complex spinal fusion (≥5 levels) for deformity correction at a major academic institution from 2005–2015 were retrospectively reviewed. Institutional review board approval was obtained prior to study initiation. Inclusion criteria included adult patients (age ≥18 years) with 1) available demographics and treatment; 2) known narcotic status, whether the patient consumed narcotics regularly; 3) who underwent an elective, primary complex spinal fusion (≥5 levels) primarily for deformity correction; and 4) who had baseline and postoperative patient reported pain scores and ambulation status. Patients were excluded if they had 1) no available assessment of narcotic use prior to surgery; 2) prior back surgery; or 3) severe coexisting pathology (i.e., neoplastic etiologies, acute fracture, infection). Patients were categorized based on preoperative use or non-use of narcotics at time of initial clinic evaluation. The primary outcomes investigated in this study were perioperative complication rates, patient-reported pain scores, and ambulatory status.

Baseline characteristics and demographic variables evaluated included patient sex, body mass index, and age. Comorbidities included depression, anxiety, diabetes, congestive heart failure, coronary artery disease, hypertension (HTN), diabetes, hyperlipidemia, anemia, atrial fibrillation, history of myocardial infarction (MI), prior pulmonary embolism (PE), and prior deep vein thrombosis (DVT). Other preoperative variables collected included smoking status and alcohol use.

Intraoperative variables included number of fusion levels, operative time, estimated blood loss (EBL), administration of packed red blood cell or cell-saver transfusions, and whether a laminectomy and/or osteotomy was performed. Other operative variables assessed included use of somatosensory stimulus evoked potentials, transcranial motor evoked potentials, electromyography, and fluoroscopy. Additionally, whether patients received bone graft and intraoperative drain placement were also collected. Intraoperative complications collected included spinal cord injury, nerve root injury, and incidental durotomy.

Postoperative complications included length of stay in hospital (LOS), ICU transfer rate, delirium, urinary tract infection (UTI), fever, ileus, pneumonia, deep and superficial surgical site infections (SSI), cellulitis, wound dehiscence, draining wound, HTN, hypotension, hematoma, anemia, MI, PE, DVT, stroke, sepsis, weakness, sensory deficits, and urinary retention.

Baseline and postoperative inpatient patient-reported pain scores and ambulatory status were also collected. Pain scores were recorded on a scale from 0–10 first postoperative day and prior to discharge. Ambulatory status included the number of days from the operating room to ambulation, the number of steps of first ambulatory steps, and the number of steps of last ambulatory steps. The discharge location to home, skilled nursing facility, or acute rehabilitation were collected on all patients. The 30-day readmission rate was also evaluated for all patients. No further follow-up was collected on narcotic use.

Parametric data were expressed as means ± standard deviation and compared using the Student t test. Nonparametric data were expressed as median [interquartile range] and compared via the Mann-Whitney U test. Nominal data were compared with the χ^2 test. All tests were 2-sided and were statistically significant if $P < 0.05$. Statistical analysis was performed using JMP, Version 13 (SAS Institute Inc., Cary, North Carolina, USA).

RESULTS

Patient Demographics and Preoperative Variables

There were 134 adults (age ≥18 years), there were 68 (50.7%) patients who were identified as using narcotics preoperatively and 66 (49.3%) patients who were not (Non-User: n = 68; Narcotic-User: n = 66) (Table 1). The Narcotic-User cohort had a significantly higher proportion of elderly patients (Non-User: 50.7 ± 23.1 years vs. Narcotic-User: 57.7 ± 16.1 years; $P = 0.0452$) (Table 1). There was no significant difference in proportion of women (Non-User: 67.7% vs. Narcotic-User: 75.8%; $P = 0.298$) or body mass index (Non-User: 26.7 ± 6.2 kg/m² vs. Narcotic-User: 28.0 ± 6.3 kg/m²; $P = 0.233$) between the 2 cohorts (Table 1). There was a greater proportion of patients in the Narcotic-User group with reported depression (Non-User: 16% vs. Narcotic-User: 39.4%; $P = 0.003$) and who were current smokers (Non-User: 7.5% vs. Narcotic-User: 15.9%; $P = 0.007$) (Table 1). There were no significant differences in the prevalence of other comorbidities between the 2 cohorts: anxiety ($P = 0.086$), diabetes ($P = 0.953$), congestive heart failure ($P = 0.383$), coronary artery disease ($P = 0.814$), atrial fibrillation ($P = 0.970$), prior MI ($P = 0.440$), HTN ($P = 0.733$), hyperlipidemia ($P = 0.503$), anemia ($P = 0.832$), prior DVT ($P = 0.970$), prior PE ($P = 0.148$), and alcohol use ($P = 0.419$) (Table 1).

Intraoperative Variables and Complications

The median number of fusion levels (Non-User: 10 [7–13] vs. Narcotic-User: 9 [7–12]; $P = 0.139$) and operative duration (Non-User: 331.0 ± 108.9 minutes vs. Narcotic-User: 332.8 ± 135.5 minutes; $P = 0.931$) were similar between the cohorts (Table 2). There were no significant differences in patients receiving a laminectomy ($P = 0.543$) or osteotomy ($P = 0.453$) (Table 2).

Table 1. Demographics and Comorbidities

Variables	Non-User (n = 68)	Narcotic-User (n = 66)	*P* Value
Female (%)	67.7	75.8	0.298
Age (years)	50.7 ± 23.1	57.7 ± 16.1	0.045*
BMI (kg/m^2)	26.7 ± 6.2	28.0 ± 6.3	0.233
Depression (%)	16.2	39.4	0.003*
Anxiety (%)	17.7	30.3	0.086
Diabetes (%)	10.3	10.6	0.953
CHF (%)	2.9	6.1	0.383
CAD (%)	10.3	9.1	0.814
A-Fib (%)	4.4	4.6	0.970
Prior MI (%)	4.4	7.6	0.440
HTN (%)	47.1	50.0	0.733
HLD (%)	32.4	37.9	0.503
Anemia (%)	11.8	10.6	0.832
Prior DVT (%)	4.4	4.6	0.970
Prior PE (%)	0.0	3.0	0.148
Alcohol use (%)	28.8	35.4	0.419
Current smoker (%)	7.5	15.9	0.007*

BMI, body mass index; CHF, congestive heart failure; CAD, coronary artery disease; A-Fib, atrial fibrillation; MI, myocardial infarction; HTN, hypertension; HLD, hyperlipidemia; DVT, deep vein thrombosis; PE, pulmonary embolism.
*Statistical significance ($P < 0.05$).

Table 2. Intraoperative Variables and Complications

Variables	Non-User (n = 68)	Narcotic-User (n = 66)	*P* Value
Median # of levels [IQR]	10 [7–13]	9 [7–12]	0.139
Laminectomy (%)	43.9	49.2	0.543
Osteotomy (%)	16.4	21.5	0.453
SSEP (%)	49.2	38.3	0.220
TcMEP (%)	23.4	21.7	0.814
EMG (%)	29.2	26.7	0.750
Fluoroscopy (%)	69.2	58.3	0.205
Bone graft (%)	95.5	92.3	0.452
Operative time (minutes)	331.0 ± 108.9	332.8 ± 135.5	0.931
EBL (mL)	1214.8 ± 936.1	1463.6 ± 1553.7	0.266
PRBC transfusions (%)	50.0	51.5	0.861
Cell saver transfusions (%)	66.2	63.6	0.758
Drain placement (%)	89.4	87.9	0.784
Nerve/spinal cord damage (%)	0.0	0.0	0.000
Durotomy (%)	6.0	7.6	0.712

IQR, interquartile range; SSEP, somatosensory stimulus evoked potentials; TcMEP, transcranial motor evoked potentials; EMG, electromyography; EBL, estimated blood loss; PRBC, packed red blood cells.

There was no significant difference between the cohorts in imaging or monitoring such as somatosensory stimulus evoked potentials (P = 0.220), transcranial motor evoked potentials (P = 0.814), electromyography (P = 0.750), or fluoroscopy (P = 0.205) (Table 2). The EBL (Non-User: 1214.8 ± 936.1 mL vs. Narcotic-User: 1463.6 ± 1553.7 mL; P = 0.266), packed red blood cell transfusions (Non-User: 50% vs. Narcotic-User: 51.5%; P = 0.861), and cell-saver transfusions (Non-User: 66.2% vs. Narcotic-User: 63.6%; P = 0.758) were similar between groups (Table 2). There were no significant differences in the use of bone graft (P = 0.452) or drain placement (P = 0.784) between the cohorts (Table 2). The incidence of durotomy (Non-User: 6.0% vs. Narcotic-User: 7.6%; P = 0.712) occurring between the 2 cohorts was similar, with no reported nerve or spinal cord damage in either cohort (Table 2).

Postoperative Complications

There were no significant differences in proportion of ICU transfers (Non-User: 48.5% vs. Narcotic-User: 46.2%; P = 0.789) or LOS (Non-User: 7.2 ± 4.6 days vs. Narcotic-User: 6.1 ± 3.1 days; P = 0.109) between the 2 cohorts (Table 3). There was a significantly higher incidence of DVT in Non-Users when compared with Narcotic-Users (Non-User: 5.9% vs. Narcotic-User: 0.0%; P = 0.047) (Table 3). There were no significant differences between the 2 groups for other postoperative complications including delirium (P = 0.856), UTI (P = 0.744), fever (P = 0.197), ileus (P = 0.923), deep SSI (P = 0.587), wound dehiscence (P = 0.289), draining wound (P = 0.087), superficial SSI (P = 0.957), cellulitis (P = 0.305), pneumonia (P = 0.326), HTN (P = 0.127), hypotension (P = 0.245), hematoma (P = 0.073), anemia (P = 0.071), MI (P = 0.974), PE (P = 0.163), stroke (P = 0.163), sepsis (P = 0.533), weakness (P = 0.560), sensory deficits (P = 0.305), and urinary retention (P = 0.694) (Table 3).

Pre- and Postoperative Pain Scores, Ambulatory Status, Discharge Disposition, and 30-Day Readmission

Compared with the Non-User cohort, the Narcotic-User cohort reported a significantly higher baseline pain score (Non-User: 4.0 ± 3.4 vs. Narcotic-User: 6.7 ± 2.4; P < 0.001) and in the first postoperative pain score (Non-User: 5.3 ± 2.9 vs. Narcotic-User: 6.7 ± 2.8; P = 0.013) (Table 4). The Narcotic-User cohort experienced a significantly greater reduction in pain between baseline and last pain scores when compared with the Non-User cohort (Non-User: −0.5 ± 4.7 vs. Narcotic-User: −2.5 ± 3.9; P = 0.031) (Table 4). There were no significant differences in the last pain score (Non-User: 3.7 ± 3.2 vs. Narcotic-User: 4.2 ± 3.2; P = 0.378) or the difference between baseline and first pain scores (Non-User: −1.2 ± 3.6 vs. Narcotic-User: −0.04 ± 3.5; P = 0.112) between the 2 cohorts (Table 4).

There was a significantly greater number of first ambulatory steps taken by the Narcotic-User cohort, compared with the Non-User group (Non-User: 56.4 ± 84.0 feet vs. Narcotic-User: 103.8 ±

144.4 feet; P = 0.034) (Table 4). The number of days from operating room to ambulation (Non-User: 2.2 ± 1.6 days vs. Narcotic-User: 1.8 ± 0.9 days; P = 0.148) and the number of last ambulatory steps prior to discharge (Non-User: 249.6 ± 278.1 feet vs. Narcotic-User: 210.1 ± 142.7 feet; P = 0.319) between the 2 cohorts were similar (Table 4).

There were no significant differences in the proportion of individuals discharged home (P = 0.792), to a skilled nursing facility (P = 0.677), or to acute rehabilitation (P = 0.930) between the cohorts (Table 4). The 30-day readmission rates between Non-Users and Narcotic-Users were also similar (Non-User: 13.2% vs. Narcotic-User: 15.2%; P = 0.751) (Table 4).

Table 3. Postoperative Complications

Variables	Non-User (n = 68)	Narcotic-User (n = 66)	*P* Value
LOS (days)	7.2 ± 4.6	6.1 ± 3.1	0.109
ICU transfer (%)	48.5	46.2	0.789
Delirium (%)	11.8	10.8	0.856
UTI (%)	5.9	4.6	0.744
Fever (%)	10.6	4.6	0.197
Ileus (%)	11.8	12.3	0.923
Deep SSI (%)	2.9	4.8	0.587
Wound dehiscence (%)	1.5	4.6	0.289
Draining wound (%)	4.4	0.0	0.087
Superficial SSI (%)	1.5	1.6	0.957
Cellulitis (%)	0.0	1.5	0.305
Pneumonia (%)	1.5	0.0	0.326
Hypertension (%)	2.9	9.2	0.127
Hypotension (%)	8.8	15.4	0.245
Hematoma (%)	0.0	4.6	0.073
Anemia (%)	42.7	27.7	0.071
MI (%)	1.5	1.5	0.974
PE (%)	2.9	0.0	0.163
DVT (%)	5.9	0.0	0.047*
Stroke (%)	2.9	0.0	0.163
Sepsis (%)	1.5	3.1	0.533
Weakness (%)	8.8	6.2	0.560
Sensory deficit (%)	0.0	1.5	0.305
Urinary retention (%)	7.4	9.2	0.694

LOS, length of stay in hospital; ICU, intensive care unit; UTI, urinary tract infection; SSI, surgical site infection; MI, myocardial infarction; PE, pulmonary embolism; DVT, deep vein thrombosis.
*Statistical significance ($P < 0.05$).

DISCUSSION

In this retrospective cohort study assessing the impact of preoperative narcotic use in patients undergoing complex elective primary spinal fusion involving ≥5 levels for deformity correction, we suggest that preoperative narcotic use does impact perception of pain after surgery, which may have implications on recovery and ambulatory ability.

Previous studies have attempted to demonstrate an association between preoperative narcotic use and increased complication rates after spine surgery. In a retrospective analysis of 24,610 patients who underwent a primary, 1- to 2-level posterior lumbar fusion, Jain et al.[11] found that preoperative narcotic use was associated with a higher rate of 90-day wound complications. Similarly, in a retrospective analysis of 1477 patients who underwent elective major spine surgery, Dunn et al.[12] demonstrated that preoperative narcotic users had a higher intraoperative EBL during surgery. Conversely, in a prospective cohort analysis of 583 patients undergoing spine surgery, Armaghani et al.[13] found that narcotics use did not correlate with an increased number of complications, including deep or superficial SSI, DVT, and UTI. Analogously, our study demonstrated that most postoperative complications were similar between narcotic users and non-users, with the exception of DVT rates.

Although some studies sought to examine the effect narcotics have on complications rates, other have associated preoperative narcotic use with patient-reported pain after spine surgery. In a retrospective study of 138 patients undergoing minimally invasive transforaminal lumbar interbody fusion, Haws et al.[14] found that preoperative narcotics was a predictor for higher pain scores (≥7 out of 10) on the first day after surgery. Similarly, in a prospective observational study of 93 patients who underwent transforaminal lumbar interbody fusion, Villavicencio et al.[15] demonstrated that preoperative narcotic users had significantly higher visual analog scale back pain scores 12 months after surgery. Similarly, in another prospective study of 1116 patients who underwent elective spine surgery, Bible et al.[16] demonstrated that preoperative narcotic use was the best predictor for more frequent visits to non-surgeon physicians for spine-related pain. In contrast, in a retrospective study of 253 patients who underwent surgery for adult spine deformity correction, Mesfin et al.[17] showed that narcotics users had a significantly greater improvement in Scoliosis Research Society pain scores at a 2-year follow-up. Analogous to the aforementioned study, our study demonstrated that whereas preoperative narcotic users had a greater baseline pain score, they showed greater improvement to the last pain score prior to discharge; therefore, suggesting the notion that narcotic users consume narcotics preoperatively because of a greater perception of pain, and subsequently having a greater relief and improvement after surgery. Furthermore, this allows providers to better set expectations for patients preoperatively on the likely reduction of pain that will be achieved in a postoperative setting.

Preoperative narcotic use has a negative impact on other PROs, including disability and functional status. In a prospective study of 583 patients undergoing elective spinal surgery, Lee et al.[18] found that every additional 10 mg of preoperative narcotic use was associated with a 0.03 decrease in the 12-Item Short-Form Health Survey scores, a 0.01 decrease in the EQ-5D (EuroQol 5

Table 4. Pre- and Postoperative Patient Reported Pain Scores

Variables	Non-User (n = 68)	Narcotic-User (n = 66)	*P* Value
Pain scores			
Baseline pain score	4.0 ± 3.4	6.7 ± 2.4	<0.001*
First pain score	5.3 ± 2.9	6.7 ± 2.8	0.013*
Last pain score	3.7 ± 3.2	4.2 ± 3.2	0.378
Change from baseline-first pain score	+1.2 ± 3.6	+0.04 ± 3.5	0.112
Change from baseline-last pain score	−0.5 ± 4.7	−2.5 ± 3.9	0.031*
Ambulatory status			
Days from OR to ambulation (days)	2.2 ± 1.6	1.8 ± 0.9	0.148
# of steps of first ambulatory steps (feet)	56.4 ± 84.0	103.8 ± 144.4	0.034*
# of steps of last ambulatory steps (feet)	249.6 ± 278.1	210.1 ± 142.7	0.319
Discharge disposition and 30-day readmission			
D/C home (%)	64.7	62.5	0.792
D/C SNF (%)	27.9	31.3	0.677
D/C acute rehabilitation (%)	5.9	6.2	0.930
30-day readmission (%)	13.2	15.2	0.751

OR, operating room; D/C, discharge; SNF, skilled nursing facility.
*Statistical significance ($P < 0.05$).

Dimensions) score, and a 0.5 increase in the Oswestry Disability Index and Neck Disability Index scores at a 1-year follow-up. Similarly, in a retrospective analysis of 575 patients undergoing ASD surgery, Raad et al.[10] showed that patients who used preoperative narcotics had a significantly inferior Oswestry Disability Index score at 2-year follow-up. Analogously, in the Villavicencio et al.[15] study of 93 patients, preoperative narcotic users had greater disability, lower physical component summary scores, and lower mental component summary scores 1 year after surgery. In another retrospective cohort study of 249 patients who underwent lumbar spine surgery, Levin et al.[19] demonstrated that heavy preoperative narcotic use was associated with less improvement in the functional outcome questionnaire EQ-5D and the Pain Disability Questionnaire at 1 year follow-up. Interestingly, our study showed that ambulatory status after surgery was greater for the preoperative narcotic users, perhaps because they may have a greater pain tolerance and therefore have been able to compensate accordingly.

In an era of exponentially rising medical costs, studies have shown that longer lengths of stay, increased postoperative narcotics use, and higher readmission rates increase the overall price tag of spine surgery.[11,20] In a retrospective study from a prospective ASD surgery database of 819 patients undergoing correction surgery, Raad et al.[20] demonstrated that 46% of preoperative narcotic users had a prolonged hospital length of stay (>7 days) as compared with only 29.25% of non-users. Similarly, in the Armaghani et al.[13] study of 583 patients, the authors showed that preoperative narcotic use significantly increased length of stay. In contrast, in a retrospective study of 104 patients undergoing a 1-level minimally invasive transforaminal lumbar interbody fusions, Siemionow et al.[21] found that preoperative narcotic use actually associated with decreased LOS. However, in the Walid et al.[22] study of 150 patients, the authors did not detect a correlation between preoperative opioid dependence and hospital length of stay, suggesting that fulfilling patients' cravings for opioids does not help with efforts to decrease LOS. Similarly, in the Haws et al.[14] study of 138 patients, the authors found that narcotic use did not significantly affect length of stay. Analogous to the aforementioned studies, our study showed that there was no significant difference in LOS between preoperative narcotic users and non-users.

With the growing opioid epidemic, there have been some studies that have shown a predictive association between preoperative narcotic use and long-term postoperative use after surgery. In a retrospective database review of 1017 patients who underwent lumbar deformity surgery, Qureshi et al.[23] found that patients who used narcotics preoperatively were 7.02-times more likely to have a long-term opioid prescription 3 months after surgery. Similarly, in a prospective study of 195 patients undergoing elective discectomy or spinal fusion, Ahn et al.[24] showed that preoperative narcotic use was associated with greater narcotic consumption postoperatively. Likewise, in a longitudinal cohort study of 1422 who received lumbar fusions, Mino et al.[25] revealed that 95% of patients on preoperative narcotics continued narcotic use at 2 years, at an expense of $2600 per person. In a retrospective study of 2491 adults undergoing lumbar fusion, Deyo et al.[26] found that 77.1% of patients who used opioids long term remained on them for long term after surgery, compared with 12.8% in patients who did not use opioids before surgery. Similarly, in another retrospective study of 26,553 patients who underwent lumbar spine surgery, Kalakoti

et al.[27] showed that preoperative narcotic users had 42.4% opioid prescription refill rate 1 year after surgery, compared with 8.6% in non-users. These studies show that preoperative narcotic use is correlated with increased postoperative narcotic use, which not only drives up costs but also portends opiate addiction.

With the increased risk of chronic opioid dependence by preoperative narcotics use, physicians have been recommended to take preoperative interventions to ensure that patients have the best possible outcomes. In a review article of best practices for pain management following spine surgery, Devin et al.[28] suggested a few approaches to dealing with patients consuming high quantity narcotics after being tiered: 1) patients should be counseled accordingly with an addiction specialist before surgery, 2) physicians should consider using a multimodal pain management incorporating non-opioid pain relievers, and 3) an opioid consumption assessment should be made at every follow-up visit after surgery. Similarly, in the Lee et al.[18] article of 583 patients, the authors stressed the importance of opioid-use screening prior to surgery, suggesting that physicians try to wean patients off opioids before surgery, and closely monitoring their narcotic use after surgery. There is some evidence about potential interventions during surgery to reduce postsurgical opioid use. In a prospective, randomized, blinded trial of 147 patients who underwent lumbar spinal fusion surgery, Nielsen et al.[29] found that patients who received a ketamine bolus immediately after induction of anesthesia used a significantly lower amount of patient-controlled intravenous morphine 24 hours after surgery, had longer ambulatory distances, and a greater reduction of back pain in 6 months than the control group. Analogously, in a prospective study of 29 patients undergoing multilevel thoracolumbar spine surgery with instrumentation and fusion, Gottschalk et al.[30] found that patients who received methadone prior to surgery required 50% less opioids in the first 48 hours after surgery and rated their pain as 50% lower compared with the control group who received a sufentanil infusion. Many studies have shown other ways of pain reduction while decreasing opioid use after surgery, including intravenous lidocaine,[31] oral gabapentin and pregabalin,[32] and intrathecal morphine.[33] Although surgery can significantly improve the pain scores of preoperative narcotic users, physicians may still want implement other custom measures to try to reduce the chronic use postoperatively.

This study has limitations with potential implications for study interpretation. Although all variables were recorded pre-, peri-, and postoperatively, they were reviewed retrospectively and, as such, are limited by the weaknesses inherent to retrospective analyses. The presenting symptoms were not recorded, and therefore the goals and expectations of the surgery may have implications on our patient-reported pain scores. Moreover, the spinal parameters, such as sagittal imbalance or lordosis/pelvic incidence, as well as intraoperative variables such as laminectomy and osteotomy levels were not collected, therefore may have implications on the results as these potential confounding variables were not controlled for. The dose and frequency and duration of narcotic consumption prior to surgery was not recorded, which may have implications on our results as we are not able to delineate heavy versus occasional use, along with short-term versus chronic use. Although 30-day readmission rates were recorded, whether Narcotic-Users reverted back to frequent use of narcotics or if patients in the Non-User cohort began consuming narcotics frequently was not recorded. Furthermore, a relatively small patient sample size from only 1 academic center was used, making broad conclusions difficult and potentially biasing our results for particular patient population or treatment paradigms. Additionally, the sample size limits the higher level statistical analyses that could be used to assess the impact of confounding factors that may impact patient-reported pain scores. There is a 5% chance that any statistically positive comparison may be due to random chance alone. Despite these limitations, this study has demonstrated patients who use narcotics preoperatively may impact perception of pain after complex spinal fusions $\geq$5 levels.

CONCLUSIONS

Our study suggests that the preoperative use of narcotics may impact patient perception of pain and improvement after complex spinal fusions ($\geq$5 levels). Although the use of narcotics preoperatively may be associated with greater baseline pain scores, there is a greater reduction of pain postoperatively, therefore equating the perception of pain between narcotic users and non-users. Consideration of patients' narcotic status preoperatively may facilitate tailored pain management and physical therapy regimens in patients with deformity undergoing correction surgery.

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