Prediction of Clinical Outcomes After Transforaminal Lumbar Interbody Fusions Based on Preoperative Opioid Use

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Introduction

Opioid analgesics have become one of the most prescribed drugs in the world, despite the lack of long-term studies evaluating benefits vs. risks for chronic conditions and the fact that long-term use may be associated with worse long-term clinical outcomes. The primary objective of this study was to identify if preoperative opioid use predicted inferior clinical outcomes in patients undergoing transforaminal lumbar interbody fusion.

Methods

A prospective observational study was performed. A total of 93 patients were enrolled undergoing elective one- to two-level transforaminal interbody fusions and divided into two groups based on preoperative opioid use. Total daily opioid dose consumption was converted to a standardized morphine equivalent dose. Multivariate logistic regression analysis was used to examine the relationship of preoperative narcotic medication use and clinical outcome scores at 12-month follow-up while controlling for the following independent variables: number of surgical levels, baseline scores, age, previous surgeries and comorbidities.

Results

A total of 60 (64.5%) patients had documented regular use of prescribed opioid medications prior to undergoing surgery. The average preoperative 24-hour morphine equivalent dose was 65.4 mg (range, 10 – 270; SD 50.9). Baseline demographic and surgical characteristics were compared.

There were no statistically significant differences between the groups, with the exception of the duration of symptoms. The patients who did not use opioid medications experienced symptoms twice as long (p = 0.008) compared to the patients who used opioids, but they were similar in regards to preoperative diagnoses. Although not statistically significant (p = 0.11), a higher percentage of patients who did not use opioid medications prior to surgery were undergoing two-level TLIFs. Surgical parameters were also comparable, except the patients who did not use opioid medications had slightly longer operative time (p = 0.07). This was most likely due to a higher percentage of two-level TLIFs in that group of patients.

When comparing preoperative clinical scores **(Table 1).** There were no statistically significant differences for SF-36 PCS scores (p = 0.19), low back (p = 0.39) and leg (p = 0.60) pain VAS scores, however, the patients who preoperatively used opioid narcotic medications had significantly higher disability scores (p = 0.04) and lower SF-36 MCS scores (p = 0.012).

Table 1

	Opioid use (n = 60)	Non-users (n = 33)	P value
VAS Back	6.5 (0 – 7)	6.0 (3 – 10)	0.39
VAS Leg	5.5 (0 -10)	5.1 (0 – 10)	0.60
Oswestry disability score	40.3 (6 – 78)	33.7 (14 – 66)	0.04
SF-36 MCS	42.7 (17.3 – 63.6)	49.2 (19.5 – 68)	0.012
SF-36 PCS	32.1 (13.4 – 51.1)	34.4 (20.1 – 49.3)	0.19

Table 1. Preoperative clinical scores. Values are presented as means and ranges. Student t tests were used for calculation. MCS– mental component summary; PCS – physical component summary; VAS – visual analog scale.

All patients had highly significant improvements (<0.0001) in back and leg pain, disability and SF-36 PCS scores when postoperative clinical outcome scores were compared to the baseline scores.

Table 2

	Opioid use (n = 60)	Non-users (n = 33)	P value
VAS Back	2.5 (0 – 8)	1.5 (0 – 6)	0.042
VAS Leg	1.5 (0 – 8)	0.6 (0 - 3)	0.038
Oswestry disability score	17.5 (0 – 48)	10.3 (0 – 42)	0.015
SF-36 MCS	51.4 (20.5 – 64.7)	55.1 (25.2 – 63.9)	0.096
SF-36 PCS	44.7 (20.8 – 61.4)	49.6 (33.4 – 59)	0.016

Table 2. Postoperative clinical outcome scores. Values are presented as means, ranges, or percentages when appropriate. Student t tests were used for calculations. MCS– mental component summary; PCS – physical component summary; VAS – visual analog scale.

Controlling for the number of spinal levels, baseline scores, age, previous surgeries and comorbidities, multivariate logistic regression analysis detected statistically significant differences in postoperative back pain (p=0.016), Oswestry (p=0.013) and SF-36 PCS scores (p=0.03) when patients who preoperatively used opioid drugs vs. non-users were compared at the 12-month follow-up. The difference in the postoperative SF-36 MCS scores was also significant (p=0.035), but this was due to the significantly lower preoperative SF-36 MCS scores (p=0.01) in the opioid user group preoperatively. The postoperative leg pain VAS scores (p=0.061) did not quite reach statistical significance. The only other variable that played some role in clinical outcomes, namely Oswestry and SF-36 PCS scores was the number of spinal levels (p=0.061 and p=0.016, respectively). However, although not statistically significant when performing chi2 test, there was a higher percentage of patients who had two-level TLIFs in the patient group who did not preoperatively used opioids. Postoperative clinical outcome scores are presented in **Table 2.**

Because the opioid medication user group was quite heterogeneous and the doses ranged from 10 to 270 mg of morphine equivalent dose, Pearson regression coefficient and p values (significance level = 0.05) were calculated for independent opioid dose and dependent outcome variables to see if the linear relationship between those variables existed. There were not significant correlations found for VAS back pain (r = 0.0351; p = 0.81), VAS leg pain (r = -0.0066; p = 0.97), Oswestry (r = 0.1188; p = 0.42), SF-36 PCS (r = 0.0176; p = 0.91), or SF-36 MCS scores (r = 0.0168; p = 0.91). This analysis demonstrated that there was no dose-related effect detected and poorer outcomes were not related to higher medication doses taken.

Conclusions

The use of opioid medications to control pain symptoms prior to undergoing lumbar fusion for degenerative lumbar conditions rwas associated with less favorable clinical outcomes postoperatively. This is the first study that has demonstrated this association in a homogeneous population of patients, which should be studied further to confirm these conclusions.

Learning Objectives

The participants will be able to recognize relationships between preoperative narcotic medication use and clinical outcomes in patients undergoing transforaminal lumbar interbody fusion for degenerative low back pain conditions.