Risk Factors for Increased Post-Operative Narcotic Use in Orthopedic Trauma Patients

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INTRODUCTION:

Orthopedic surgeons are the third highest prescribers of opioids among physicians in the United States. Thus, orthopedic surgeons must understand the potential adverse effects associated with opioid use, as well as the importance of prescription drug monitoring programs for the identification of patients who may be at a higher risk for opioid abuse postoperatively. Several previous studies analyzed the risk factors for increased postoperative (post-op) opioid use after elective orthopedic surgery. When it comes to orthopedic trauma, only two previous studies correlated increased post-op use with increased pain scores and decreased pain control satisfaction at discharge. The purpose of this study was to identify all the potential factors in orthopedic trauma patients that put these patients at an increased risk for increased opioid use after surgery. Factors examined included preoperative opioid use, smoking status, ASA classification, Injury Severity Score (ISS), injury location, and mortality as well as patient demographics such as age, race, marital status, and gender.

METHODS:

This is a retrospective review of trauma patients who underwent fracture fixation or reconstruction between 2015-2019 at a single, Level 1 trauma center in central Pennsylvania. The demographic variables considered for the study were patient age, gender, race, marital status, tobacco use, injury severity score (ISS), American Society of Anesthesiologists (ASA) classification, injury location (upper vs. lower extremity, polytrauma vs. non-polytrauma), and preoperative narcotic use. Tobacco use was determined based on chart review. Narcotic use was based on information from the Prescription Drug Monitoring Program (PDMP), which included all narcotic use 3 months before injury and 6 months after injury. Patients with diagnoses of complex regional pain syndrome (CRPS), fibromyalgia, systemic autoimmune or inflammatory conditions, and current opioid addiction being managed by pain management were excluded. The study's primary outcome was to determine which demographic factors are associated with increased narcotic use following fracture fixation or reconstruction. The secondary outcomes were to describe the population of trauma patients and their narcotic use rate according to their 3-month pre-injury and 6-month postoperative status. The amount of opioids consumed post-operatively was reported as the total Morphine Milligram Equivalents (MME) intake and the median MME intake per single transaction in the studied postoperative period. The statistical analysis was performed using SPSS Software, version 25 where the Chi-square/Fisher's exact test to compare categorical characteristics between groups. The student's t-test/Wilcoxon, ANOVA/Kruskal-Wallis test, where appropriate, were used to compare continuous variables between groups.

RESULTS:

A total of 650 trauma patients were included in this analysis that fit the study's inclusion criteria. Table 1 displays the demographic information of the study cohort (Table 1). The average age of the entire cohort was 43.2 +- 14.6 years. There was a significant increase in the average MME per transaction in patients with a mean age of >51.1 years, male patients, and patients with higher ASA scores. For the total MME, there was a statistically significant increase in total MME in smokers, patients with higher ISS, patients with higher ASA scores, patients with lower extremity fractures, patients with pre-injury narcotic use, and polytrauma patients.

DISCUSSION AND CONCLUSION:

This is the first study, to the authors' knowledge, to specifically identify several patient factors preoperatively that can predispose patients to increased opioid use post-operatively specifically in an orthopedic trauma patient population. As per the study outcomes, the strongest risk factor found was the ASA score, since patients with higher preoperative ASA scores had significantly higher both total and average MME intake. Age (>50 years) and gender (males) were found to have increased average but not total MME intake. On the other hand, smokers, patients with higher ISS, patients with preoperative narcotic use, lower extremity trauma patients, and polytrauma patients were found to have increased total MME intake, which, in the authors' opinion represents the more important parameter to judge the overall opioid intake.

Table 1: Demographic data of the study population, including age, pre-injury narcotic use, and Injury Severity Score

	Overall N= 650	**Pre-Injury Narcotic Use N= 107 (17%)**	**No Pre-Injury Narcotic Use N= 543 (83%)**	**P-value**
Age, mean (SD)	43.2 (14.6)	49.4 (12.8)	42.0 (14.6)	<0.0001
Gender				<0.0001
Female	227 (35%)	56 (52%)	168 (31%)	
Male	423 (65%)	51 (48%)	375 (69%)	
Injury Severity Score (ISS)				0.70
Minor	212 (33%)	39 (36%)	173 (32%)	
Moderate	268 (41%)	43 (40%)	225 (42%)	
Severe	112 (17%)	18 (17%)	94 (17%)	
Very Severe	58 (9%)	7 (7%)	51 (9%)	

Table 2: Average and total MME intake, among the different demographic groups studied. Values that are in bold represent statistical significance. IQR=Interquartile range.

Category	**Average MME (IQR)**	**Total MME (IQR)**
Age	**P=0.001**	P=0.43
<50 year	**51.1 (41.0-69.8)**	146.0 (75.0-351.4)
>50 years	45.0 (34.3-63.9)	134.2 (75.0, 314.6)
Gender	**P=0.002**	P=0.50
Male	**50.7 (40.0-71.3)**	135.0 (73.8-337.5)
Female	45.6 (35.9-58.4)	146.8 (78.3-312.2)
Marital Status	P=0.77	P=0.22
Divorced	49.7 (37.5-67.5)	173.8 (79.1-472.5)
Married	49.2 (38.4-70.7)	125.9 (75.0-298.1)
Separated	45.8 (35.7-68.5)	164.8 (58.9-367.5)
Significant other	52.8 (50.6-55.1)	548.9 (440.5-657.3)
Single	48.5 (38.2-67.7)	146.3 (75.0-351.4)
Widowed	44.5 (36.8-49.4)	129.8 (60.0-242.8)
Smoking Status	P=0.35	**P=0.001**
Smoker	51.0 (39.9, 70.0)	**187.5 (90.0-459.3)**
Non-smoker	46.7 (37.5, 67.5)	125.4 (64.2-286.8)
Unknown	46.5 (27.7, 68.3)	132.9 (48.0-260.6)
ISS	P=0.66	**P=0.03**
>9	50.0 (37.5-69.7)	**150 (81.3-356.3)**
<9	46.6 (38.9-67.4)	132.1 (63.3-309.0)
ASA score	**P=0.0001**	**P=0.01**
ASA I	45.8 (45.0-66.3)	108 (45-208)
ASA II	51.4 (41.3-72.6)	119 (75-267)
ASA III	45.0 (32.1-58.2)	161 (64-318)
ASA IV	53.9 (36.4-75.0)	212 (90-695)
Pre-Injury Narcotic Use	P=0.06	**P<0.0001**
Yes	49.2 (38.9-68.6)	**337.5 (175.0, 738.0)**
No	45.9 (34.5-63.6)	123.8 (64.6, 272.0
Extremity Injured	P=0.08	**P<0.0001**
Lower	49 (41-69)	**180 (90-352)**
Upper	45 (36-67)	97 (48-200)
Polytrauma	P=0.68	**P=0.01**
Yes	48 (39-68)	**160 (84-351)**
No	48 (37-68)	**118 (56-287)**