

Research Article

Evaluation of Postoperative Pain and Satisfaction After Orbital Fracture Repair

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Abstract

Objective: To correlate clinical outcomes in postoperative pain managed with opioid medications after orbital fracture repairs.

Methods: A prospective observational study of all patients who underwent orbital fracture repairs and postoperative pain managed with hydrocodone-acetaminophen, oxycodone-acetaminophen or tramadol for three days was performed. Collected data included numerical pain rating scores, type of fractures, patient satisfaction, side effects and non-medicinal interventions. International Pain Outcomes (IPO) questionnaire was completed at postoperative week one visit.

Results: Twenty-nine patients who underwent orbital fracture repairs and completed the IPO questionnaire reported having taken an average of 74.8 +/- 36.6 Morphine Milligram Equivalent (MME) in the first week after the surgery from 102.5 +/- 10.0 MME of total opioids prescribed (Table 1). The amount of opioids used was not related to patient satisfaction or pain relief ($p>0.05$). Smoking status showed a moderate correlation and linear association with total MME taken by patients (spearman correlation coefficient 0.34, $p=0.051$). Although patients reported 69.4 +/- 24.9% overall pain relief and 9 out of 10 (median, IQR 5-10) scores in satisfaction with the pain regimen, 27.8% of patients reported needing more pain medication. This group reported higher levels of anxiety and lower satisfaction scores ($p<0.001$). They reported having taken more opioids than those who did not report the need for additional pain medications ($p=0.07$).

Conclusion: Postoperative pain is managed with less than the prescribed amount of opioids after orbital fracture repairs in most patients. Anxious patients who had more opioids than

average in the postoperative period expressed low satisfaction.

Keywords: Opioid; International Pain Outcomes; Fracture Repair; Pain

Introduction

Orbital fractures are a common result of traffic and assault-related maxillofacial trauma, which can produce significant morbidity [1,2]. In the repair of orbital fractures, the timing and approach of surgical repair are intended to minimize functional and aesthetic complications [2]. While technique and outcomes in orbital fracture repair have improved, postoperative pain control remains a critical aspect of patient care and satisfaction [3-5]. The International Pain Outcome (IPO) questionnaire and other outcome measurement tools have been widely used in postoperative pain research with data sets including over 550,000 patients across 200 hospitals worldwide [6,7].

The use of opioid pain medications postoperatively remains a common practice after fracture repairs [1-4]. While effective,

opioids present significant potential side effects and risks for abuse [3,4]. Moreover, the use of non-opioid pain medications such as Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) can provide effective pain relief while limiting these detrimental side effects [4]. Research has shed light on the therapeutic role of addressing preoperative anxiety and its potential benefit in managing postoperative pain [8-10]. Literature remains limited on standardized multimodal regimens for pain relief and patient satisfaction in the postoperative period [4,5]. This prospective observational study correlates the clinical outcomes in postoperative pain managed with opioid medications after orbital fracture repair surgeries.

Methodology

A prospective observational study of all patients who underwent orbital fracture repair surgeries (CPT codes 21390, 21406 and 21365) under general anesthesia from January 2022 to January 2023 at our institution was performed. The institutional review board at Ascension St. Vincent Hospital in Indianapolis, Indiana, granted the study approval. The research adhered to Health Insurance Portability and Accountability Act (HIPAA) regulations and followed the principles outlined in the Declaration of Helsinki. All patients except those who declined to consent to the study were enrolled at the preoperative clinic visit. Patients were prescribed either hydrocodone with acetaminophen, oxycodone with acetaminophen or tramadol for three days, followed by over-the-counter acetaminophen use. At the postoperative week one visit, patients filled out the IPO questionnaire. In addition to the standard items, questions on opioid usage, side effects of opioids and future pain medication use given another similar experience were asked in the survey.

Outcomes included reported opioid use, numerical pain rating scores, IPO questionnaire ratings, patient satisfaction, side effects and additional non-medical interventions used. All collected data were analyzed using Microsoft Excel (Redmond, WA) and R statistical software (ver. 4.2.1; Vienna, Austria). The statistical significance between variables was determined using Wilcoxon signed-rank test and two-tailed independent t-test. A univariate Spearman's rank correlation coefficient was calculated to determine the linear relationship between variables. Differences between variables were considered statistically significant at p-value of <0.05.

Results

Twenty-nine patients who underwent orbital fracture repairs were enrolled and completed the postoperative IPO questionnaire. Six patients declined to consent to the study. The average age was 39.8 +/- 17.3 years old, with comparable gender distributions. 55.2% of the patients underwent orbital medial wall and floor fracture repairs. 17.2% reported a history of anxiety and depression. No patient had chronic pain diagnoses or medication use. The worst median pain reported in the first week was rated 8 out of 10 (IQR 7-9), with the least median pain at 2 out of 10 (IQR 1-2). Anxiety and subjective sense of helplessness were rated between 2 (IQR 2-8) and 3 (IQR 0-8) out of 10, respectively. Patients reported spending 32.9% of their total postoperative period in severe pain, mostly in the first few days affecting their sleep, activities in bed and breathing. They also reported 69.4 +/- 24.9% in overall pain relief and 27.8% reported needing more opioid medication than prescribed. Nonetheless, the patients reported having taken 74.8 +/- 36.6 Morphine Milligram Equivalent (MME) of 102.5 +/- 10.0 MME of total opioids prescribed (Table 1,2).

The overall patient satisfaction with postoperative pain management was 9 out of 10 (median, IQR 5-10). All patients reported that they would have the same pain medication again. Although smoking status showed a moderate correlation and linear association with total MME taken by patients (spearman correlation coefficient 0.34, $p=0.051$), the amount of opioids used was not related to patient satisfaction or pain relief ($p>0.05$). The group of patients who reported needing more pain medication had higher levels of preoperative anxiety and lower satisfaction scores ($p<0.001$) (Fig. 1,2). These patients took higher MME of opioids than those who did not report needing additional pain medications ($p=0.07$) (Fig. 3).

Total Orbital Fracture Repairs (N)		29
Age (years, SD)		39.8 (17.3)
Gender (n, %)	Male	12 (41.3%)
	Female	17 (58.6%)

Types of Orbital Fractures (N, %)		
	Medial Wall and Floor	16 (55.2%)
	Isolated Floor	10 (34.5%)
	ZMC	5 (17.2%)
Past Medical History	Anxiety	5 (17.2%)
	Depression	5 (17.2%)
	Smoking (Active/Past)	8 (27.5%) / 4 (13.8%)
	Alcohol (Occasional/1-2 drinks/day)	17 (58.6%) / 1 (3.4%)
Type of Pain Medication		
	Hydrocodone/Acetaminophen 5/325 mg	28 (96.5%)
	Acetaminophen 500 mg	1 (3.4%)
Total MME Prescribed		102.5 (10.0)
Total MME Taken		74.8 (36.6)
MME Taken/day		20.4 (15.8)
Follow Up Duration (days, SD)		7.6 (2.9)
SD = Standard Deviation; ZMC = Zygomaticomaxillary Complex; MME = Morphine Milligram Equivalent		

Table 1: Baseline characteristics and opioids use in patients who underwent orbital fracture repairs.

IPO questions:	Median (IQR) (0-10)
a. Worst pain since surgery	8 (7-9)
b. Least pain since surgery	2 (1-2)
c. How often in severe pain (average %, SD)	32.9 (22.6%)
d. Pain interfered with:	
• Activities in bed	2 (0-6)
• Breathing	2 (0-2)
• Sleeping	3 (2-5)
• Activities out of bed	0 (0-5)
e. Mood and emotions	
• Anxious	2 (2-8)
• Helpless	3 (0-8)
f. Side effects	
• Nausea/Vomiting	0 (0-2)
• Drowsiness	4 (0-5)
• Itching	2 (0-5)

• Dizziness	1 (0-4)
• Constipation	1 (0-2)
• Confusion	0 (0-0)
• Rashes	0 (0-0)
g. How much pain relief	69.4 (24.9%)
• (average %, SD)	
h. Need more pain medication (% Yes/%No)	27.8% / 72.2%
i. Receive any information about treatment options (%Yes/%No)	94.1% / 5.9%
j. Want the same medication again (%Yes/%No)	100% / 0%
k. Allowed to participate in decision about pain treatment	9 (5-10)
l. How satisfied with results of pain treatment	9 (8-10)
m. Non-medicine methods (%):	
• Cold packs	
• Distraction	79.00%
• Deep breathing	32.30%
• Prayer	29.00%
• Relaxation	27.40%
• Meditation	20.90%
	19.30%
n. Persistent pain 3 months or more before the surgery:	0 (0-0)
IQR = Interquartile Range	

Table 2: Pain outcomes of patients who underwent orbital fracture repairs assessed with the International Pain Outcomes (IPO) questionnaire.

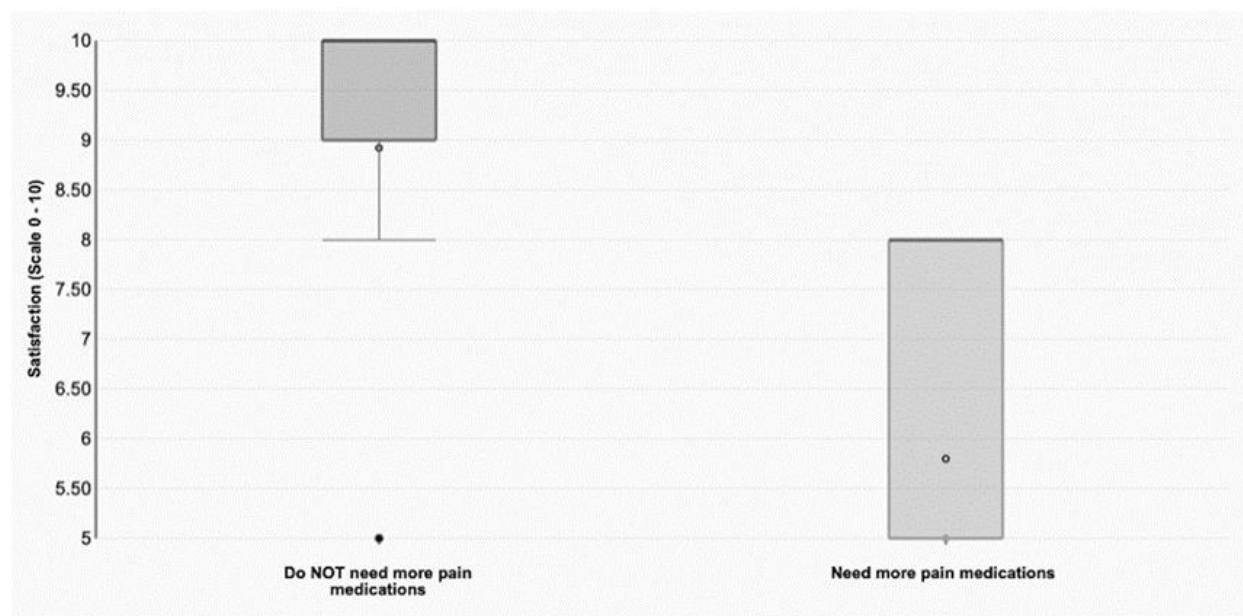


Figure 1: Differences in satisfaction scale between patients who reported needing more pain medications versus those who did not. (Wilcoxon signed-ranked test, p-value <0.01).

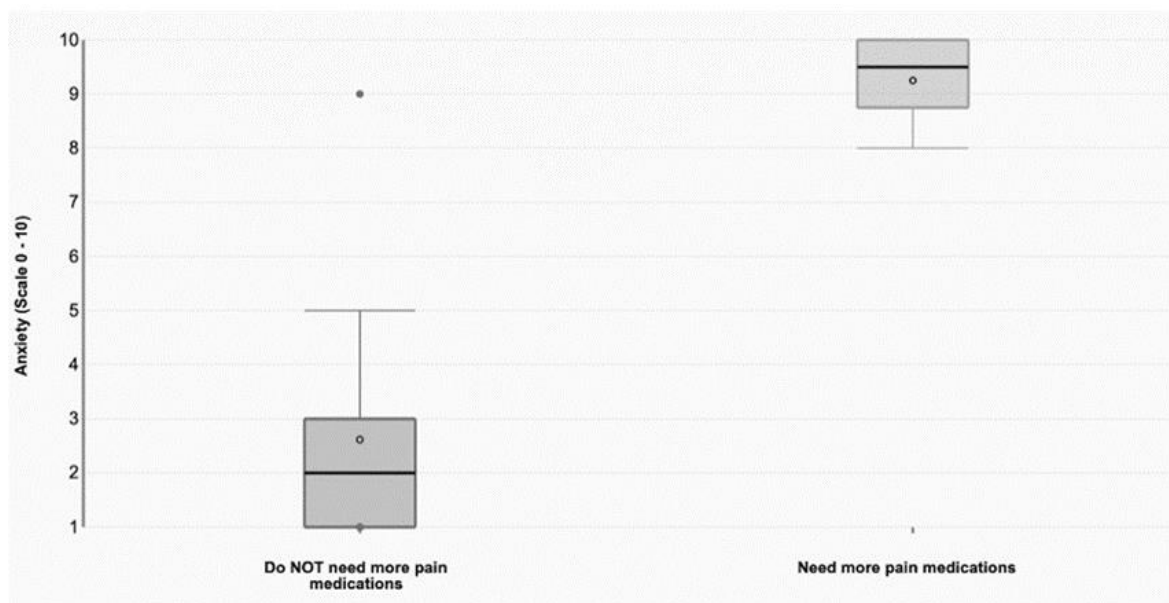


Figure 2: Differences in anxiety scale between patients who reported needing more pain medications versus those who did not. (Wilcoxon signed-ranked test, p-value <0.01).

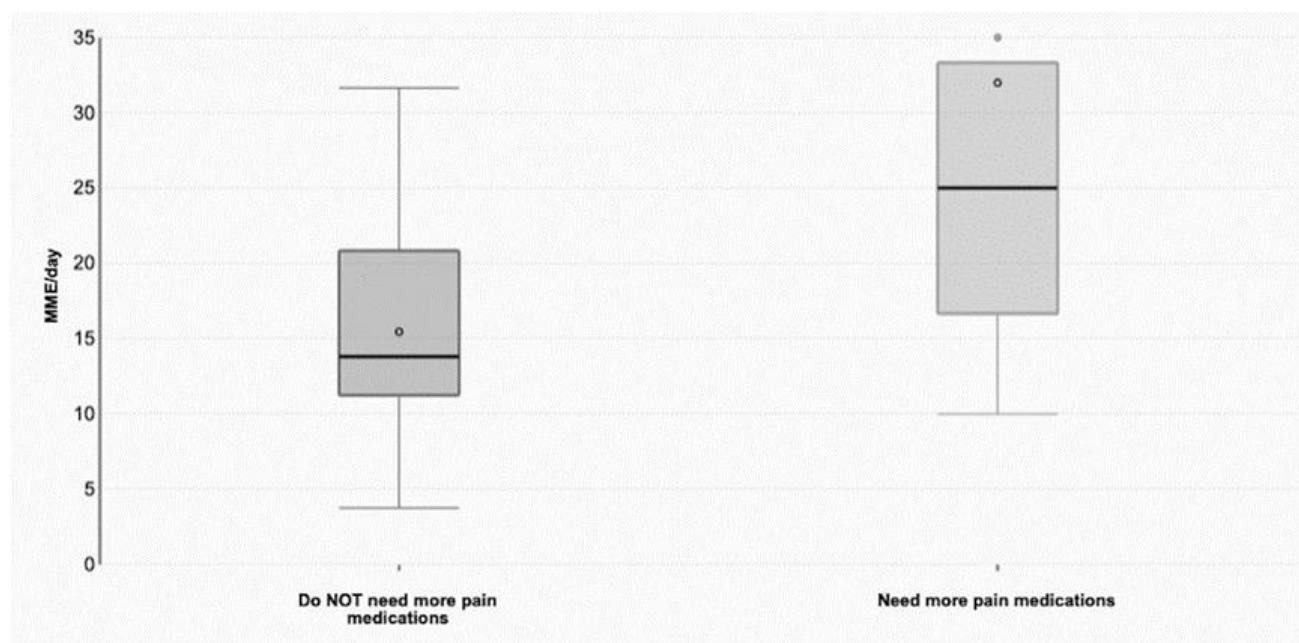


Figure 3: Differences in morphine milligram equivalent per day (MME/day) between patients who reported needing more pain medications versus those who did not. (Wilcoxon signed-ranked test, p-value =0.07).

Discussion

This prospective study is unique in that it evaluated multiple dimensions of postoperative pain after orbital fracture repairs using a validated survey tool. Pain after surgery is a complex, subjective and emotional experience with important affective and psychometric dimensions [11]. Alleviating postoperative pain is important in improving patient satisfaction after surgery and perceptions of surgical outcome [3-5]. Orbital fractures are also often a result of distressing maxillofacial trauma and can lead to injuries prone to producing significant anxiety in patients regarding adverse cosmetic or functional outcomes [1,2].

Several studies have suggested a close relationship between preoperative anxiety and pain in the postoperative setting [3,8-11]. High preoperative self-rating anxiety scores have been associated with high levels of postoperative pain and medication use [9-
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10]. Increased levels of preoperative anxiety have also translated to more anesthetics required during the surgery, poor control of postoperative nausea and vomiting and low satisfaction after recovery from surgery [12]. Although the exact mechanism remains unclear, preoperative anxiety is thought to lower the pain threshold and overestimate the intensity of pain stimuli by activating the entorhinal cortex of the hippocampal formation [11]. In our study, the patients with higher perioperative anxiety scores, not necessarily those who had a history of anxiety or depression, reported the need for more opioid medications. Ultimately, the heightened levels of anxiety may lead to prolonged hospital stays and increased overall mortality [13].

In-depth preoperative counseling about the goals of intervention and postoperative expectations regarding pain and recovery are important to reduce anxiety and improve the patient experience [11]. The amount of medical information provided and time spent on preoperative education should be individualized depending upon the personal, cultural and religious background [14]. Recognizing the needs of the patient through empathy and patience is essential in providing clear and effective communication in the perioperative setting [14].

Important considerations can be made to integrate psychological interventions such as cognitive-behavioral therapy and mindfulness techniques into the perioperative pain regimen in anticipation of surgery [15]. Music therapy has been shown to reduce pre-, intra- and postoperative anxiety and improve patient experience during cataract surgery [15]. This may also benefit patients who report high levels of anxiety between wait times on the day of the surgery [11]. Although benzodiazepines or melatonin have not shown consistent beneficial effects in managing postoperative pain, hypnotic medications including zolpidem can be used as an adjuvant analgesic to achieve a minimal but clinically significant difference in pain intensity [16]. In our cohort, upwards of 79% of patients employed some non-pharmacological adjunct pain management, most commonly cold packs, distraction methods and deep breathing (Table 1).

Given the significantly increased risk with routine use of postoperative opioids, an abundance of literature has emerged highlighting the effective use of adjunct, non-opioid pain management such as NSAIDs, regional analgesia, acetaminophen, among others [17,18]. In a small prospective cohort of orbital fractures, Wladis, et al., reported improved postoperative pain, decreased opioid requirements and no hemorrhagic complications in fifty patients with the use of intraoperative intravenous ketorolac [18]. A large systematic review and meta-analysis by Bongiovanni, et al., showed that NSAIDs, whether used in the preoperative, intraoperative or postoperative period, were not associated with an increase in the risk of clinically significant immediate postoperative bleeding across patients from multiple surgical specialties [19]. At our institution, we avoid the administration of intravenous ketorolac due to the rare possibility of hemorrhage and loss of vision.

This study is limited by a small sample size and generalizability. A larger sample size may allow multivariate analysis to include ethnicity, geographic locations and age groups stratified by generation. The long-term outcomes of this prospective cohort are yet to be determined. A daily reporting of pain-related outcomes would also be of benefit in the future to allow for more granular reporting of the postoperative experience.

Conclusion

In conclusion, postoperative pain is managed with less than the prescribed amount of opioids after orbital fracture repairs than in most patients. Anxious patients who had more opioids than average in the postoperative period expressed low satisfaction.

Conflict of Interests

The authors have no conflict of interest to declare.

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