




Clinical Research

Opioid Usage After Hallux Valgus Correction Surgery

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Abstract: Background. *Given the lack of objective data on opioid use and the difficulty of addressing a patient's postoperative pain, we sought to quantify patient's narcotic use after hallux valgus surgery. The purpose of our study was to determine the average quantity and type of postoperative opioids consumed after hallux valgus surgery and to assess potential predictive factors for increased opioid consumption.* Methods. *At the preoperative visit, patients were consented and completed a demographical questionnaire. Data were collected from the operative record, 2, 6, and 12-week postoperative visits. Type and number of pills prescribed were recorded as well as number of pills consumed at each postoperative visit. A logistic regression was performed to determine the average quantity consumed postoperatively and any statistically significant correlations.* Results. *The average number of opioid pills collectively consumed at the 2-week and 12-week postoperative visit was 20 and 23, respectively. At the 2-week postoperative visit, only patient body mass index (BMI) showed a correlation with increased opioid*

use. Conclusion. *Patients consumed an average of 23 of 40 (57.5%) narcotic pain pills prescribed after hallux valgus reconstruction surgery through the 12-week postoperative period. Owing to the opioid epidemic and potential for narcotic diversion, surgeons should counsel their patients on proper nonopioid postoperative pain management.*

Level of Evidence: II
Therapeutic

Keywords: bunion; hallux valgus; opioid; pain management; postoperative pain

Introduction

There are more than 200,000 surgeries for hallux valgus correction annually in the United States.¹ Although there have been advances in minimally invasive and percutaneous techniques, there is no significant decrease in postoperative pain compared to other operative techniques.^{2,3} Orthopaedic surgeons will commonly use opioids to help manage pain in the acute postoperative setting.⁴

However, there has been increased attention to opioid overuse, misuse, diversion, and dependence leading to a focus on their use in the postoperative setting.

The United States consumes 80% of the world's opioids despite representing only 5% of the world's population.^{5,6} Furthermore, drug overdose has become

“Further research has also shown that increased opioid consumption during the postoperative period was associated with greater pain intensity and that fewer narcotics can be prescribed with similar outcomes.”

the leading cause of death in the United States for those under 50. The Department of Health and Human Services reports that 12.5 million Americans misused prescription opioids, with 2 million of them having prescription opioid use disorders leading to an economic impact of 78 billion dollars.⁷⁻¹⁰

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Given the difficulty of over- or under-addressing a patient's postoperative pain, we sought to quantify a prospective series of patient's narcotic use after hallux valgus surgery to help guide the surgeon in the number of opioids that are used during the postoperative period and to assess potential predictive factors for increased opioid consumption.

Materials and Methods

After receiving institutional review board approval, patients undergoing primary hallux valgus surgery above the age of 18 were approached for inclusion in this prospective observational study. Patient recruitment took place from 10/02/2018 to 02/09/2020. Patients were recruited from the participating surgeons' clinics after they were indicated for hallux valgus surgery. A total of 75 patients were initially recruited. All patients included in this study gave their specific written informed consent. Patients were excluded from the study if they had previously received professional treatment for opioid abuse, had consumed opioids within 2 weeks before their surgery, were undergoing significant concurrent procedures, or were pregnant. Two patients were excluded for long-term opioid use and 1 patient was excluded for undergoing significant concurrent procedures. Data collection took place from 10/02/2018 to 06/26/2020. Two patients were removed from the data pool as they currently used marijuana and the study team was worried this could influence pain management during the postoperative course. Three patients requested to be removed from the study and 8 patients elected to cancel their surgery and were thus removed from the data pool. Three patients were lost to follow-up after their procedure.

Patient demographic data collected included age, sex, height, weight, body mass index (BMI), history of mental illness, current opioid use, prior long-term opioid use (greater than 1 year), tobacco use, and illicit drug use.

Operative technique was based on the surgeon's medical judgment. Operations included the modified Lapidus procedure, first metatarsal phalangeal joint arthrodesis, and distal chevron osteotomies. Patients were offered regional anesthesia based on the anesthesiologist's clinical judgment and was not standardized. While in the postanesthesia care unit (PACU), the patient was given opioid medication in response to their pain based on the anesthesiologist's discretion, if needed. The type, amount, and frequency of opioid administration in the PACU was recorded in the medical record. The patient was then discharged with a prescribed opioid pain medication solely at the surgeon's discretion. Information about the surgery, anesthesia, and postoperative stay was collected.

Patients were provided either a prescription for hydrocodone, oxycodone, or meperidine for pain management after surgery. The dosage and quantity of postoperative opioids was left up to the surgeons' clinical judgment. Patients were also encouraged to use other methods of pain management such as nonsteroidal anti-inflammatory drugs (NSAIDs) or acetaminophen to help with the postoperative pain. There was no standardization among the study population on the timing or amount of these medications used. Patients presented back to clinic at 2, 6, and 12 weeks postoperatively and were instructed to bring their prescribed opioid pain medication so that the number of pills unutilized could be counted. Patients were also asked to keep a log of the number of NSAIDs and acetaminophen pills that were taken.

Continuous data were summarized using means and standard deviations. Categorical data were summarized using frequency tables. We investigated whether there were associations of narcotic use with BMI, history of mental illness, pain score, and laterality. Logistic regression was used to investigate associations with our binary outcomes. Evaluations of regression coefficients

were made using a 5% level of significance.

Process for Pill Count

Two team members were present during the counting of narcotic pain medication. Clean techniques were used with a pill-counting wand and tray. The patient then signed a form confirming that the pills have been counted and that they agree to the count. Patients still using opioid pain medication 12 weeks postoperatively were recorded.

The data were stored securely in a REDCap database to allow for data analysis.^{11,12}

Results

Fifty-nine subjects completed the operation with operative data collected, and 56 completed portions of the postoperative data collection. Patient demographic and regional anesthesia data can be found in Tables 1 and 2, respectively. Ropivacaine 0.5% was used as a regional anesthetic preoperatively in 50 patients. The popliteal nerve was the most common location for regional anesthetic, occurring in 44% of patients.

Around 48 (82.76%) subjects completed the 2-week postoperative follow-up, 40 (68.97%) completed the 6-week postoperative follow-up, and 28 (48.28%) completed the 12-week postoperative follow-up.

For the 59 subjects who completed treatment and data collection in the PACU, 53 consumed opioids. Initial prescriptions for these 53 patients included 39 prescriptions for hydrocodone/acetaminophen (73.58%), 13 oxycodone/acetaminophen (24.52%) and 1 meperidine (1.89%). Of the 59 patients consented, 39 patients were initially prescribed 40 pills of hydrocodone/acetaminophen 5/325, 5 patients were prescribed 30 hydrocodone/acetaminophen 5/325, 5 patients were prescribed 40 oxycodone/acetaminophen 5/325, 4 patients were prescribed 50 oxycodone/acetaminophen 5/325, 2 patients were prescribed 30 oxycodone/acetaminophen 5/325, 2

Table 1.

Patient Demographics.

Patient demographics				
	Age (years)	Height (in)	Weight (lbs)	BMI
Mean	55.96	65.01	169.64	28.17
Std Dev	13.54	3.54	41.20	6.17
Min	18	54	102	19.00
Max	83	74	314	45.50

Abbreviation: BMI, body mass index.

Table 2.

Regional Anesthesia Data.

Regional anesthesia					
Type	Number of subjects	Average medication dose (mL)	Minimum medication dose (mL)	Maximum medication dose (mL)	Standard deviation
Popliteal	22	23.5	10	40	6.3
Popliteal/Adductor Canal	9	46.6	40	60	7.6
Popliteal/Saphenous	6	39.6	33	50	6.4
Adductor Canal	6	17.8	12	20	3.5
Sciatic	3	30	25	35	5
Femoral	2	45	45	45	0
Ankle	2	30	30	30	0
Femoral/Sciatic	1	55	55	55	0
Adductor Canal/Sciatic	1	45	45	45	0
Popliteal/Ankle	1	38	38	38	0
Total	50	31.4	12	60	12.3

patients were prescribed 50 hydrocodone/acetaminophen 5/325, 1 patient was prescribed 40 hydrocodone/acetaminophen 10/325, and 1 patient was prescribed 60 meperidine 50mg. An average of 40 narcotic pain pills was prescribed across the study population. Tramadol was prescribed twice, each time it was in addition to a prescription

for hydrocodone/acetaminophen. One subject was prescribed gabapentin and meloxicam in addition to an initial oxycodone prescription.

The average 2-week postoperative visit occurred 13.52 days after operation. The average 6-week postoperative visit occurred 42.40 days after operation. The average 12-week postoperative visit

occurred 79.83 days after operation. 19 (32.76%) subjects were diagnosed with a mental health illness and 9 (15.52%) of those subjects had greater than 1 mental health illness. Two subjects admitted to tobacco use. Four subjects were noted to have concurrent Flexeril use. Two subjects admitted to current illicit drug use at the time of the study. A total of 54

Table 3.

2-Week Postoperative Data.

2-week postoperative visit				
	Number of opioid pills used	MME	Number of NSAIDs pills used	Number of acetaminophen pills used
Mean	19.99	107.55	11.71	7.1
Std Dev	2.58	97.67	8.69	10.72
Min	0	0	2	1
Max	66	495	40	39

Abbreviation: NSAIDs, nonsteroidal anti-inflammatory drugs; MME, Morphine Milligram Equivalents.

Table 4.

6-Week Postoperative Data.

6-week postoperative visit				
	Number of opioid pills used	MME	Number of NSAIDs pills used	Number of acetaminophen pills used
Mean	24.41	139.94	22.39	14.85
Std Dev	17.82	116.51	19.26	17.18
Min	0	0	1	1
Max	61	500	74	54

Abbreviation: NSAIDs, nonsteroidal anti-inflammatory drugs; MME, Morphine Milligram Equivalents.

(93.10%) subjects had regional anesthesia at the time of surgery with the specific type detailed in Table 2.

The average number of opioid pills taken at the 2-week postoperative visit was 20. Four subjects were prescribed an additional opioid prescription at the 2-week postoperative visit. The average number of NSAIDs and acetaminophen taken at the 2-week postoperative visit were 12 and 7, respectively. The average number of opioid pills taken at the 6-week postoperative visit was 24. Six patients were prescribed additional opioids at the 6-week postoperative visit. The average number of NSAIDs and acetaminophen taken at the 6-week postoperative visit were 22 and 15, respectively. The average number of opioid pills consumed at the 12-week

postoperative visit was 23 pills. One patient was prescribed additional opioids at the 12-week postoperative period. The average number of NSAIDs and acetaminophen taken at the 12-week postoperative visit was 25 and 35, respectively. Opioid and other analgesic usage consumption data can be found in Tables 3–5.

Of the 59 procedures in which postoperative data were completed, 45 (76.27%) were modified Lapidus procedures, 8 (13.56%) were distal chevron osteotomies, and 6 (10.17%) were first metatarsophalangeal joint arthrodesis procedures.

At the 2-week postoperative visit, only patient BMI showed a correlation with increased opioid use with a hazard ratio (HR) of 6.93 (95% confidence interval

[CI]: 0.42–13.81). The estimated baseline odds were found to have a coefficient value of 131.74 ± 125.06 (95% CI: $-124.87, -388.35$). At the 6- and 12-week postoperative visits, no tested variables were significantly correlated with increased opioid use.

Discussion

With the increased usage and abuse of narcotic pain medication leading to adverse side effects, dependence, and addiction, it is important that the medical community find alternative ways to manage pain and reduce opioid consumption. A recent study found that almost 9% of opioid-naïve patients had new persistent opioid use following a foot and ankle procedure.¹³ Another

Table 5.

12-Week Postoperative Data.

12-week postoperative visit				
	Number of opioid pills used	MME	Number of NSAIDs pills used	Number of acetaminophen pills used
Mean	22.52	144.52	24.54	31.50
Std Dev	14.11	109.11	34.71	56.30
Min	0	0	1	1
Max	55	500	120	138

Abbreviation: NSAIDs, nonsteroidal anti-inflammatory drugs; MME, Morphine Milligram Equivalents.

study also reported that certain procedure types such as a metatarsal-cuneiform arthrodesis had significantly increased odds of patients developing persistent opioid use.¹⁴ Further research has also shown that increased opioid consumption during the postoperative period was associated with greater pain intensity and that fewer narcotics can be prescribed with similar outcomes.¹⁵ This evidence shows a greater importance of patient counseling on postoperative pain depending on different techniques that will be used.

The average amount of opioid pain medication consumed per postoperative visit showed a steady decline across the cohort, an average of 20 total pills at the 2-week postoperative period versus 23 pills at the 12-week postoperative period. Only 7 patients needed an additional opioid pain medication prescription during the study period. Based on our results, the average patient required 23 opioid pain pills after hallux valgus reconstruction surgery, in comparison to the average prescription amount of 40 opioid pain pills. This is similar to the results of another study that found patients consumed 27 opioid pain pills after outpatient hallux valgus reconstruction surgery in which 50 opioid pain pills were prescribed.⁴ Although the overall amount of opioid pain pills used were slightly different, the consumption rate was similar at 58% in

our cohort, versus 54%. This further accentuates the thought that overprescribing can lead to increased opioid usage.

Current literature reports that surgeons are still overprescribing opioid pain medication, with only a 41% to 54% usage of the medication, compared to our cohorts' 58% usage.^{4,16-18} Although there is current literature showing that opioid pain pills are being overprescribed, the practice is still occurring. We hypothesize that the reason for the low number of refills and usage rate of opioid pain pills is due to preoperative counseling and expectations set for pain management during the postoperative period. Two randomized clinical trials for opioid consumption after orthopaedic surgery showed a 32% to 50% decrease in opioid consumption in patients who were counseled on the opioid epidemic and nonopioid pain management strategies.^{19,20} Neither of these studies were solely performed in the realm of foot and ankle surgery, but the results can be used to create similar patient education.

A correlation was found between BMI and increased opioid use in the first 2 weeks postoperatively, which is consistent with findings in other studies. It has been found that a BMI ≥ 30 is associated with 44% higher odds of opioid use than an individual with a BMI < 30 .⁴ In other studies, obesity has also

been correlated with increased incidence of long-term prescription opioid use in previously opioid-naïve patients.^{21,22} This finding was not supported by our study, as any correlation between BMI and opioid use was diminished after the 2-week postoperative visit.

Like obesity, long-term pain has also been associated with increased prevalence of mental health disorders,²³ but this association did not translate into increased opioid use in our study. Furthermore, studies have shown that anesthesia type did not have a significant role in the prevention of long-term pain after hallux valgus surgery.²⁴ Patient age was found to have no association with postoperative opioid use in our study. This is supported by other studies which have found slight decreases in filling of prescriptions for postoperative opioids by patients of increasing age.²⁵

Limitations

This study was largely limited by sample size. Of the 59 patients who initially agreed to participate, only 40 (67.8%) participated for the entire duration of the study by attending the 12-week postoperative visit. However, of those who completed full follow-up, there was very little narcotic consumption after the 2-week postoperative visit. Because of this small sample size, the data were susceptible to

influence by outliers, and large variations in values were observed within the data sets. In addition, due to the need for surgeons to remember to enroll patients for the study, there may have been selection bias. Finally, we, in a desire to make our study more generalizable, did not control for the type, method, or administration of regional anesthesia. This could have influenced the consumption of opioids but has been shown in previous studies to not have a significant impact on long-term opioid use.²¹ When we specifically analyzed for this variable in our study group, we did not note any significant correlation.

Conclusion

Our results show that patients consumed an average of 23 of 40 (57.5%) narcotic pain pills prescribed after hallux valgus reconstruction surgery through the 12-week postoperative period. Owing to the opioid epidemic and potential for narcotic diversion, surgeons should closely evaluate the amount of narcotic pain pills prescribed and counsel their patients on proper narcotic consumption for pain control as a second-line therapy after nonnarcotic pain management. Ongoing research is present in other fields investigating the use of multimodal and nonnarcotic pathways for postoperative pain relief. Further investigation into the most effective nonopioid pain management regimen after hallux valgus correction surgery is warranted to decrease the likelihood of future opioid dependence.

Author's Note

Project completed at Prisma Health-Midlands University of South Carolina, Department of Orthopedic Surgery, Columbia, SC 29203.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: JBJ, ZTT, MEB, KCSA, and TAG have no commercial associations that might pose a conflict of

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Ethical Review Committee Statement

This study underwent expedited review by the Palmetto Health Institutional Review Board and was granted approval.

Ethical Approval

Not applicable, because this article does not contain any studies with human or animal subjects.




Informed Consent

Informed consent was obtained from all study participants.

Trial Registration

Not applicable, because this article does not contain any clinical trials.

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