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ORIGINAL RESEARCH

Patient-Reported Satisfaction with Non-opioid and Opioid Pain Control is Comparable Following Common Orthopedic Procedures: A Prospective Cohort Study

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Introduction: A significant proportion of circulating opioids can be attributed to overprescribing of these medications for post-operative pain control. The present study aimed to determine the success of pain management after surgery, to gain insight into how satisfaction levels vary between those patients receiving opioid pain relief and those treated with non-opioid methods only following common orthopedic procedures.

Methods: A prospective cohort study was conducted at a university hospital using a phone survey and a retrospective review of electronic medical records from 2017 to 2019. Opioid prescriptions, usage, and patient-reported pain outcomes were recorded to compare opioid and non-opioid users after knee arthroscopy, shoulder arthroscopy, and carpal tunnel release.

Results: There were 159 patients who underwent common orthopedic procedures and met inclusion criteria. Among the 66 patients who underwent knee arthroscopy, 62/64 respondents (96.8%) were "very satisfied" or "satisfied" with pain control whether they used opioids (97.8%) or not (94%) with non-opioid users more frequently reporting very well controlled pain and greater satisfaction (p = 0.002 and p = 0.005, respectively). In the 32 patients who underwent carpal tunnel release, in both the opioid (18.7%) and non-opioid (81.2%) groups all patients were "very satisfied" or "satisfied" with pain control. Of the 61 shoulder arthroscopy patients, 96.1% using opioids were "very satisfied" or "satisfied" with pain control compared to 100% in the non-opioid group. No statistically significant differences in reported pain control and satisfaction were observed for carpal tunnel release or shoulder arthroscopy.

Discussion: Patients who did not use opioids after knee arthroscopy reported significantly better perceived pain control and satisfaction than those who did. For shoulder arthroscopy and carpal tunnel release, patient satisfaction was high in both groups without significant differences. Providers should be aware of the utility in pursuing non-opioid versus opioid analgesia after certain common orthopedic procedures.

Keywords: opioids, non-opioid, pain control, orthopedics, patient satisfaction, post-operative

Introduction

In the United States, from 2013 to 2019, the age-adjusted rate of deaths involving synthetic opioids other than methadone increased by 1040%, from 1.0 to 11.4 per 100,000 population.[1] Globally, there were approximately 109,500 opioid overdose deaths in 2017 of which 57% occurred outside the US, with the highest per-capita death rates seen in Russia and Eastern Europe highlighting this growing problem worldwide.[2] Opioids are widely prescribed after surgery for post-operative pain control, but recent studies suggest that up to 92% of patients have leftover opioids after their post-operative course, creating a significant number of pills available for overuse or diversion.[3] Orthopedic Surgery as a specialty has been identified as a significant contributor to opioid prescribing, with orthopedic surgeons accounting for almost 8% of all opioid

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prescriptions and ranking as the third highest group of opioid prescribers among physicians.[4,5] However, within the specialty, there is a lack of established guidelines to avoid inadvertent overprescribing, well represented by an audience survey during the 2014 American Academy of Orthopedic Surgeons, which showed that most orthopedic surgeons are unclear on the number of opioids to prescribe to their patients and are also unaware of the prescription amount that patients actually consume.[6] Therefore, a multitude of recent studies have analyzed and suggested implementing post-operative opioid prescribing guidelines for orthopedic procedures.[4,7–12] Current research also suggests utilizing multimodal opioid-sparing post-operative pain management protocols before prescribing opioids.[13,14] Despite prior and current recommendations to reduce opioid overprescribing, providers are cautious of under-prescribing opioids and undermanaged post-operative pain.[11,15]

Current literature has demonstrated successful efforts in decreasing the quantity of post-operative opioid prescriptions and indications for their use.[14] Findings have suggested that multimodal pain regimens, enhanced patient education regarding pain expectations, institution-level prescribing protocols, and prescriber education are efficacious.[15] From a prescribing provider's standpoint, there is abundant research and data to support the benefits and guidelines of decreasing opioid prescriptions and utilizing non-opioid pain management post-surgery.[8,10,13,14] However, there are limited data regarding the patient's perspective on pain control following common orthopedic procedures. An understanding of the patient's perspective is imperative for the further development of strategies to reduce opioid use post-surgery while maintaining patient satisfaction, patient compliance, and safe discharge protocols to improve overall health provided outcomes.[15]

The present study aimed to determine the success of pain management after surgery, with the goal of gaining insight into how satisfaction levels vary between patients receiving opioid pain relief and those treated with non-opioid methods only following orthopedic procedures. We hypothesized that patients' levels of satisfaction would be comparable between those treated with opioids versus those who received non-opioid treatment during their post-surgical course.

Methods

Data Source and Setting

A prospective study was conducted at the University of Vermont Medical Center in the United States, a 620-bed teaching hospital, in conjunction with its associated ambulatory surgery facility. A telephone survey with patients was carried out one week after their surgery, accompanied by a retrospective review of medical records for patients treated between January 2017 and September 2019. Details about the study design have been reported by Fujii et al.[15] IRB approval was obtained through the University of Vermont Committee on Human Research in the Medical Sciences. A waiver of written consent was obtained due to the time sensitive data collection. At the time of patient telephone contact, verbal informed consent for the collection of survey data and to access the patient's medical record for the collection of data within 30 days after their surgery was obtained and documented. Documentation of verbal consent and all data were stored in the secure research electronic data capture (REDCap) survey program. Guidelines outlined in the Declaration of Helsinki were followed.

The reference population for this study included patients undergoing one of three common orthopedic procedures: knee arthroscopy, carpal tunnel release, or shoulder arthroscopy. These three surgical categories were reported on since they are commonly performed orthopedic procedures and yielded the highest number of patient participants that completed the study. Every participant in the study was at least 18 years old and was discharged to home. The main outcome measures in the study included information from the standardized phone survey and data concerning the type of medications patients were prescribed as indicated by the electronic medical record review.

The standardized phone survey was performed to gather patients' quantified perspectives regarding their post-operative pain control management, along with the amount of opioid medication prescribed and the amount used during the post-operative period. Questionnaire items were formatted to investigate post-operative pain management efficacy, satisfaction, and expectations. Opioid prescriptions were converted to morphine milligram equivalents (MME) using the formulas provided by the Centers for Disease Control.[16]

Inclusion and Exclusion Criteria

All elective and urgent orthopedic procedures that were identified for the database during the 2017–2019 data collection period were considered for study eligibility. The sample of patients was a random sample utilizing the main OR

scheduling board to identify patients undergoing orthopedic procedures during the study collection period. The non-opioid use group was a post-operative designation, as patients could have been using opioids 7+ days before surgery but were included in the group if they did not use any opioids after hospital discharge. The non-opioid methods for pain management that were used were acetaminophen, ibuprofen, naproxen, and walking/exercise and utilized according to patient provider preference. The amount of opioids prescribed to the opioid use group was left to the discretion of the provider. Patients who had post-operative or perioperative complications, including infection or a severe complication requiring reoperation, that could have led to a significant impact on their experienced pain were not included in the study in an effort to have the results be generalized to a typical patient experience. Further exclusion criteria included patients who were unable to communicate independently by telephone (due to mental status, disability, or language barriers), those discharged to another facility (e.g. skilled nursing facility or rehabilitation center), and patients who did not answer their telephone after four call attempts. Further data collected during review of the electronic medical record included patient demographics, medical history, surgical history, social history, medication history including quantity and refills, and readmissions or complications within 30 days following patient discharge after surgery.

Instruments

During our literature review, we found that there were no validated instruments that met the needs of this study. Therefore, an 111-item semi-structured telephone questionnaire was created through collaboration between the lead investigator and the Orthopedic Surgery service. An initial pilot period was conducted after which survey modifications were finalized. The finalized questionnaire collected data while utilizing branching logic to ensure patients were only asked questions specific to their experience and was structured to take 15–20 minutes to complete. A single trained research coordinator conducted all phone surveys, adding to the internal consistency of the questionnaire. Questions on patient satisfaction with pain control were measured on a 4-point Likert scale (very unsatisfied, unsatisfied, satisfied, and very satisfied). Similarly, questions on the level of pain control were also measured on a 4-point Likert scale (very poor, poor, well, very well).

Statistical Analysis

Descriptive statistics were used to characterize the study population. Categorical variables were summarized using frequencies and percentages. Bivariate tables were used to present the distribution of key demographic and clinical characteristics across study groups, allowing comparison of variables by group. Fisher's Exact Test was applied to compare the full distribution of Likert scale responses between the opioid and non-opioid groups from each procedure type for the following questions: "How well was pain controlled since surgery", and "How satisfied were you with pain control after discharge". Differences were considered statistically significant for p values < 0.05. Analyses were conducted using SAS 9.4 (Cary, NC: SAS Institute Inc).

Results

From 2017 to 2019, 159 patients underwent common orthopedic procedures and met the study's inclusion criteria. Of these patients, 66 underwent knee arthroscopy, 32 underwent carpal tunnel release, and 61 underwent shoulder arthroscopy. Most of the individuals in the three orthopedic surgical categories were non-Hispanic white. All surgeries included in this research were elective.

Knee Arthroscopy

Of the 66 patients who underwent knee arthroscopy, 17 reported no opioid use, and 49 reported any opioid use. A total of three patients reported regular use of an opioid medication before surgery; 2 (12%) patients were in the non-opioid usage group, and one (2%) patient was in the opioid use group. All patients except for one reported that their pain was very well controlled or well controlled since surgery. One patient in the non-opioid usage group reported that pain was poorly controlled since surgery. There was a statistically significant difference in the overall distribution of responses to how well pain was controlled since surgery between patients who used opioids and those who did not ($p = 0.002$, Fisher's Exact Test, Supplemental Table 1). All patients except for two, one from each group, reported being either very satisfied

or satisfied with pain control since leaving the hospital. One patient (2%) in the opioid use group reported being unsatisfied with pain control since leaving the hospital, while one patient (6%) in the non-opioid usage group reported being very unsatisfied. Similarly, all but one patient were either very satisfied or satisfied with post-operative care since leaving the hospital. The one patient (2%) who was unsatisfied with post-operative care since leaving the hospital was in the opioid usage group. The overall distribution of satisfaction with pain control after hospital discharge differed significantly between patients who used opioids and those who did not ($p = 0.005$, Fisher's Exact Test, Supplemental Table 1).

Sixteen (33%) patients who did use opioids had more than expected pain levels compared to 1 (6%) patient in the non-opioid usage group. Eight (16%) of the patients who did use opioids reported that less than the needed amount of pain pills were prescribed compared to 0 patients who did not use opioids (Supplemental Table 1).

Carpal Tunnel Release

Of the 32 patients who underwent carpal tunnel release, 26 reported no opioid use, and six reported any opioid use. Only one patient (4%) in the non-opioid usage group reported regular opioid usage before their procedure. Every patient in both groups reported their pain to be either very well controlled or well controlled since surgery There was no statistically significant difference in the overall distribution of responses to how well pain was controlled since surgery between patients who used opioids and those who did not ($p = 1$, Fisher's Exact Test, Supplemental Table 2). All patients in both groups reported being either very satisfied or satisfied with pain control since leaving the hospital. Every patient in both groups reported being either very satisfied or satisfied with post-operative care since leaving the hospital. There was no statistically significant difference in the overall distribution of satisfaction with pain control after hospital discharge between patients who used opioids and those who did not ($p = 0.62$, Fisher's Exact Test, Supplemental Table 2).

All but two patients (33%) who did use opioids reported that actual pain compared to expected pain was either as expected or less than expected (Supplemental Table 2).

Shoulder Arthroscopy

Of the 61 shoulder arthroscopy patients, seven reported no opioid use, and 54 reported any opioid use. There was a total of four (7%) patients in the opioid use group who reported regular use of an opioid medication before surgery. All but two patients reported that their pain was very well controlled or well controlled since surgery. The two patients (4%) who reported that their pain was poorly controlled since surgery were in the opioid use group. There was no statistically significant difference in the overall distribution of responses to how well pain was controlled since surgery between patients who used opioids and those who did not ($p = 0.25$, Fisher's Exact Test, Supplemental Table 3). Similarly, all but two patients were either very satisfied or satisfied with their pain control since leaving the hospital. The two patients (4%) who reported being unsatisfied with their pain control since leaving the hospital were in the opioid use group. There was no statistically significant difference in the overall distribution of satisfaction with pain control after hospital discharge between patients who used opioids and those who did not ($p = 0.76$, Fisher's Exact Test, Supplemental Table 3).

About 86% of the patients in the non-opioid usage group reported pain levels that were very well controlled, and 71% reported that they were very satisfied with their pain control relative to the opioid use group of (50%) and (56%) respectively. All patients in this procedure group reported being very satisfied or satisfied with post-operative care since leaving the hospital except for one (14%) patient who reported being unsatisfied in the non-opioid group. Ten (19%) patients who did use opioids experienced more than expected pain levels compared to zero (0%) patients in the non-opioid group (Supplemental Table 3).

Discussion

In the United States, it has been recognized that opioid overprescribing in the post-operative setting has made a significant contribution to the current epidemic of opioid misuse and related harm.[17] Although a multifaceted problem, some recent studies suggest that post-surgery opioid overprescribing could be due in part to the linking of patient satisfaction with pain control to hospital reimbursement.[11,18] However, the results of our study show that patients who

were not prescribed opioids after knee arthroscopy, carpal tunnel release, and shoulder arthroscopy did not report lower satisfaction with post-operative pain control compared to those who were prescribed opioids. In fact, among knee arthroscopy patients, the largest subgroup in our cohort, patients who did not use opioids reported significantly better perceived pain control and satisfaction with their pain management after surgery compared to those who did use opioids ($p = 0.002$ and $p = 0.005$, respectively). Additionally, a higher percentage of the non-opioid group reported that their actual pain after surgery was less than expected versus the opioid use group. Multiple advisory bodies currently give the recommendation that opioids be used only when necessary, at the lowest effective dose, and for the minimum duration required.[10,14,16,19] While prior recommendations have largely been based on clinical or prescribing data, our findings offer novel patient-reported evidence suggesting that, for certain procedures, greater reliance on non-opioid analgesia may be feasible without compromising satisfaction, though further research is necessary before broad changes to prescribing practices are made.

Elective knee arthroscopy is among the most commonly performed orthopedic procedures and has been notably cited as a low-risk procedure for which opioids are overprescribed.[20–22] One study found that upwards of 85% of patients had unused opioid pills after surgery and recovery.[23] Our results suggest that non-opioid analgesia is a feasible option for appropriate patients undergoing knee arthroscopy, and with the high number of yearly procedures, there could be a significant reduction in circulating unused opioid pills available for misuse. The efficacy of using post-operative multimodal opioid-sparing protocols in knee arthroscopy has been supported by recent literature.[13,24,25] One study in 2022 among patients who underwent arthroscopic knee or shoulder surgery showed a significant reduction in post-operative opioid consumption over six weeks using a standardized non-opioid analgesic protocol of NSAIDs, PPIs, and acetaminophen along with patient education regarding the risk of opioid misuse.[13] Therefore, the current literature and our findings support further exploration into expanding the role of non-opioid analgesia while reducing opioid use in appropriate patients undergoing knee arthroscopy, with larger studies needed to inform future prescribing guidelines.

Carpal tunnel release (CTR) is one of the most commonly performed procedures in the United States, with approximately 400,000–600,000 cases performed annually.[26] Recent studies have found that opioids are heavily over-prescribed after CTR, with one study showing the median amount of opioids used by patients as zero morphine milligram equivalents (MME), while the median amount prescribed is as high as 40–60 MME.[20,27,28] Consequently, CTR creates a substantial avenue for unused opioids available for diversion or abuse. The results of our current study show that the majority of patients who underwent CTR at our institution were in the non-opioid use group, and there was no difference in patient satisfaction with pain control compared to the opioid use group. A recent study showed that early post-operative pain scores demonstrated a statistically significant improvement when utilizing celecoxib, acetaminophen, and pregabalin versus opioid analgesics after CTR.[29] Thus, our finding, alongside existing literature, suggest that reducing opioid prescribing in favor of greater use of non-opioid analgesia after CTR may not negatively impact patient satisfaction in select cases, though further research is needed to guide implementation.

Shoulder arthroscopy is among the most commonly performed orthopedic procedures in the United States, with more than 500,000 procedures performed each year.[30] Recent studies have found that opioids are vastly overprescribed in the post-operative setting after shoulder arthroscopy, with one study reporting the total amount of unused narcotic medication from 119 patients was equivalent to 2382 tablets of 5-mg oxycodone.[20,31–33] Additionally, Gil et al found that in a cohort of 104,154 opioid-naive patients who underwent shoulder arthroscopy procedures from 2010 to 2015, 8.3% developed new prolonged opioid use.[34] Our results show that patients using these opioids do not report a significant difference in post-procedure pain control compared to those who used non-opioid analgesia. Recent studies have also demonstrated the efficacy of alternatives to opioid prescriptions to manage post-operative pain, such as multimodal non-opioid pain protocols, ultrasound-guided interscalene nerve block, Sucrose acetate isobutyrate extended-release bupivacaine.[35,36] Our results, together with emerging literature, highlight the need for further investigation into safely shifting toward greater use of non-opioid strategies in post-operative pain management after shoulder arthroscopy before widespread changes are adopted.

Limitations

This study has limitations regarding its generalizability and the data used. The questionnaire and chart review were conducted at a single academic medical center and represent a relatively small number of cases, which limits study power

to detect differences between opioid use and non-opioid use groups. However, the trends seen in these groups warrant further investigation utilizing a larger study population with more detailed post-operative opioid and non-opioid pain management protocols that are appropriate based on type of procedure to further characterize differences in patient outcomes. Additionally, most patients are categorized as white, which restricts how broadly the findings can be applied to other racial and ethnic populations. In terms of the procedures that were analyzed during this study, it should be noted that it is recognized that not all knee and shoulder scopes are created equal, although they were placed in generalized groups. Some of the included cases may have involved bony work that could have led to more pain accordingly, while other procedures could have been less intensive, such as diagnostic arthroscopy. This study's data set does not include the indication for surgery or what was exactly done in each case, which could be a potential limitation in the data and could be included in future studies to further clarify results. Furthermore, the survey data does not encompass the complete variety of elective orthopedic surgical interventions that are commonly conducted, such as total joint arthroplasty and spinal surgery. While these findings demonstrate opioid pain management may not be needed after certain orthopedic procedures, these findings should be interpreted cautiously before a change in practice given the need for more procedure specific data that would directly impact patient post-operative care.

Conclusion

As previously stated, an understanding of the patient's perspective is imperative for the further development of strategies to reduce opioid use post-surgery while maintaining patient satisfaction, patient compliance, and safe discharge protocols to improve overall health provided outcomes.[14] In our cohort, patients who did not receive opioids after elective orthopedic procedures reported outcomes that were comparable to those who received opioids. While no statistically significant differences were observed in satisfaction following carpal tunnel release and shoulder arthroscopy, knee arthroscopy patients in the non-opioid group reported significantly better pain control and satisfaction with pain management. In light of the current opioid epidemic, providers should be aware of the potential utility in pursuing non-opioid analgesia as an alternative to opioid prescriptions for select patients in the post-operative period following common orthopedic procedures, as our findings suggest comparable patient satisfaction with pain control. However, given the exploratory nature and limitations of this study, further research with larger and more diverse populations is needed to validate these findings before widespread practice changes are implemented.

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Disclosure

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