

Patient Satisfaction With Nonopioid Pain Management Following Knee Arthroscopic Partial Meniscectomy and/or Chondroplasty

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abstract

The purpose of this study was to determine the efficacy of nonopioid pain management following arthroscopic partial meniscectomy and/or chondroplasty and to assess patients' attitudes regarding their need for opioid pain medication following these procedures. Patients who underwent a knee arthroscopy procedure for either partial meniscectomy and/or chondroplasty from July 2016 to January 2017 by a single surgeon at a single institution were included. Medical records were reviewed, and demographics were recorded. Two weeks postoperatively, patients self-reported opioid and nonopioid medication use. Patients were also questioned regarding their perceived need for opioid medication, whether they felt their pain was adequately controlled, and how their pain compared with their preoperative expectations. Thirty-four patients (17 male, 17 female), with a mean age at the time of surgery of 47.79 years (range, 19-68 years), were included. Eighty-two percent (n=28) of the patients reported using nonopioid analgesics for pain control, whereas 18% (n=6) reported using opioids. Of those not using opioids, 96.4% (n=27) reported not feeling the need for opioid medications. Three of 6 patients requiring opioids were unable to take nonsteroidal anti-inflammatory drugs. All 6 patients who took opioids felt that they needed them for adequate pain control. This study provides initial encouragement that it is largely possible to remove opioids from the postoperative pain regimen of knee arthroscopy patients and maintain adequate pain control and patient satisfaction. [*Orthopedics*. 2018; 41(4):209-214.]

Patient satisfaction, largely derived from adequate pain control, has become intricately tied to both outcome measures and reimbursement metrics; therefore, providers are enticed to prescribe pain medication such as opioid analgesics.¹ Conversely, opioid pain medications are associated with the immediate risks of delirium, respiratory depression, and death and the highly publicized long-term risks of opioid abuse, addiction, and overdose.² Orthopedic surgeons face the challenging task of achieving high patient satisfaction with pain management while protecting patients from the many risks of opioid use.

Several studies have investigated the efficacy of opioid vs nonopioid analgesics

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Postoperative pain management is a fundamental aspect of orthopedic care. Many orthopedic procedures involve significant soft tissue and bony dissection, requiring potent analgesic

medication for adequate postoperative pain control. Historically, opioids have played a central role in postoperative orthopedic pain regimens. They are often viewed by both patients and physicians as a necessity.

for managing pain after orthopedic surgery. Bot et al³ examined opioid use after surgical fixation of fractures and found that patients who took more opioid pain medication reported decreased satisfaction with pain management and greater pain intensity. A separate study evaluated opioid use following inpatient orthopedic procedures and found that increased use of opioid pain medication was associated with lower satisfaction with pain relief.⁴ For outpatient orthopedic procedures, nonopioid pain medications such as nonsteroidal anti-inflammatory drugs have been shown to be equally effective at pain control as opioid pain medication.⁵ However, few studies have specifically evaluated patient satisfaction with nonopioid pain management following a knee arthroscopic partial meniscectomy and/or chondroplasty. Knee arthroscopic partial meniscectomy is one of the most common orthopedic procedures performed in the United States, with more than 387,833 cases from 2005 to 2011.⁶ Notably, from 2004 to 2012, there was an 18% increase in opioid prescriptions after knee arthroscopy procedures.⁷ Given the volume of partial meniscectomies performed each year, decreasing opioid prescriptions for this procedure alone could significantly impact costs and decrease patient risk for prescription opioid abuse.⁸ For comparison, 100 tablets of 800-mg ibuprofen cost approximately \$29 and 100 tablets of 10-mg oxycodone cost close to \$270 at a major pharmacy chain.^{9,10} The Centers for Disease Control and Prevention¹¹ estimates that the total economic burden of prescription opioid abuse in the United States is \$78.5 billion a year. In particular, orthopedic surgeons regularly performing such procedures would likely find useful the results of research investigating patient satisfaction with and the efficacy of nonsteroidal anti-inflammatory drugs alone for pain management following minimally invasive arthroscopic surgery.

This retrospective review of prospectively collected data sought to (1) deter-

mine the efficacy of nonopioid and opioid analgesics in managing pain following an arthroscopic partial meniscectomy and/or chondroplasty, (2) determine patients' need for a postoperative opioid pain medication, and (3) evaluate patients' expectations of postoperative pain. The authors hypothesized that patients can achieve satisfactory pain management following an arthroscopic partial meniscectomy and/or chondroplasty without using opioid pain medications.

MATERIALS AND METHODS

This retrospective cohort study examined patients who underwent knee arthroscopy performed by a single surgeon from July 2016 to January 2017 at a single institution. This retrospective review of prospectively collected data received institutional review board approval. Patients were screened for study inclusion and exclusion criteria by 2 of the authors (E.M.B., E.G.M.). Patients who underwent a knee arthroscopic partial meniscectomy and/or chondroplasty were included. Patients younger than 18 years and any patient undergoing a knee arthroscopy for any other interventions besides knee arthroscopic partial meniscectomy and/or chondroplasty were excluded. All patients in the study received general anesthesia and an intra-articular injection of 30 mL of 0.25% bupivacaine at the end of the procedure. All patients were counseled preoperatively and told that they would be discharged with a prescription for 800-mg ibuprofen for pain management by the surgeon, unless there was a medical reason a patient could not take nonsteroidal anti-inflammatory drugs. All patients were advised to use ice postoperatively to potentially alleviate pain and minimize swelling. All patients followed the same postoperative care guidelines and were seen in the clinic 2 weeks following the procedure.

The medical records of eligible patients were reviewed. Patient demographics, body mass index, duration of symptoms, smoking status, workers' compensation

cases, presence of diabetes mellitus, and preoperative use of opioids were recorded. Intraoperative details such as interventions performed and locations of the interventions (eg, compartments involved) were recorded. The primary outcome measure was the use of nonopioid or opioid analgesics in managing pain following an arthroscopic partial meniscectomy and/or chondroplasty. At the 2-week postoperative visit, patients self-reported their use of opioid or nonopioid pain medications. If patients indicated that they had consumed opioid pain medication, they were then asked about who prescribed the medication (ie, surgical staff, emergency department physician, primary care physician), the type of opioid analgesic, and the number of pills/days the opioid pain medication was used. In addition, the medical records for these patients were reviewed to evaluate any pre-existing medical conditions that may have prevented them from taking nonsteroidal anti-inflammatory drugs.

As a secondary outcome measure, patients were asked, "Did you feel that you needed opioid pain medication to manage your pain postoperatively?" Responses were categorized as the primary yes or no. To understand patient expectations of pain, all patients were asked, "Did you expect to feel pain after surgery?" This question had a binary yes or no response. Further, patients were then asked to compare their expectations of postoperative pain with their experience for the first 2 postoperative weeks. This was assessed by the question, "Was the pain after surgery more, less, or the same than what you expected?" Answers were categorized into more pain, same amount of pain, or less pain than expected. All data collected were presented descriptively for the current study. Study data were collected and managed using Research Electronic Data Capture (REDCap) electronic data capture tools hosted by Partners HealthCare Research Computing, Enterprise Research Infrastructure & Services group, Boston, Massachusetts. Research Electronic Data

Capture is a secure, web-based application designed to support data capture for research studies.¹²

RESULTS

Of the patients who underwent knee arthroscopy procedures between July 2016 and January 2017, a total of 34 met the inclusion criteria. Of the 34 patients included in this study, 50% (n=17) were female and 50% (n=17) were male. The mean age was 47.79 years (SD, 10.86 years), and the mean body mass index was 28.95 kg/m² (SD, 6.20 kg/m²). Among the cohort, 5.9% (n=2) were current smokers and 5.9% (n=2) were workers' compensation cases; no patients were diabetic (**Table 1**). No patients reported preoperative opioid use. At the 2-week postoperative appointment, patients self-reported their use of opioid or nonopioid pain medications. Eighty-two percent (n=28) of patients reported using only nonopioid pain medications (nonsteroidal anti-inflammatory drugs) after surgery, whereas 18% (n=6) of patients reported consuming opioid pain medication following surgery. **Table 2** provides a detailed explanation of the use (eg, reason, duration) of opioid pain medications postoperatively. There was no difference in the number of males and females regarding the postoperative use of opioid pain medications (3 males, 3 females). There was no difference among responses of male and female patients concerning their perceived need for an opioid pain medication or their expectations of pain postoperatively.

At the 2-week postoperative appointment, patients self-reported their use of and need for opioid pain medication. Of the patients who used opioids, 100% (n=6) reported that they "needed" an opioid pain medication to manage pain postoperatively. Only 3.6% (n=1) of the patients who used nonsteroidal anti-inflammatory drugs for pain management reported that they needed opioid pain medication to manage pain postoperatively. The remaining patients (96.4%; n=27)

who used nonsteroidal anti-inflammatory drugs for pain management reported that they did not need opioid pain medication to manage their pain. Of the opioid users, 83.3% (n=5) responded yes to expecting pain after surgery and 66.7% (n=4) reported having more pain than expected after surgery. In contrast, only 3.6% (n=1) of the nonopioid users reported having more pain than expected after surgery, and all of the nonopioid users reported yes to expecting pain after surgery (**Table 3**). A comparison of the surgical intervention data (ie, location and laterality of partial meniscectomy or chondroplasty) between the group using opioids and the group not using opioids showed no significant differences. There was no difference between the cartilage surfaces between the 2 groups when the authors examined International Cartilage Repair Society grade and location of the defect.

DISCUSSION

The principal findings of this study indicate that most of the patients undergoing knee arthroscopic partial meniscectomy and/or chondroplasty maintained adequate pain control and patient satisfaction without opioid pain medication. Managing postoperative pain in a safe manner is a critical obligation of orthopedic surgeons. The substantial risks associated with opioid analgesics warrant every effort to minimize their use wherever possible. This study is the first to assess the efficacy and patient perception of a nonopioid pain management regimen following arthroscopic partial meniscectomy and/or chondroplasty. It indicates that patient satisfaction with pain control can be maintained without prescribing opioids for most patients undergoing these procedures. More than 80% of patients did not use any opioid pain medications after surgery. Of the patients who tolerated a nonopioid postoperative medication regimen, only 1 patient felt that an opioid medication was needed to control postoperative pain. The results were similar to those of Gimbel et al,⁵ who found that

Table 1

Demographics of the Cohort

Characteristic	Value
Sex, No.	
Male	17 (50%)
Female	17 (50%)
Age, y	
Mean (SD)	47.79 (10.86)
Range	19-68
Body mass index, mean (SD), kg/m ²	28.95 (6.20)
Duration of symptoms, mean (SD), mo	7.51 (6.87)
Race, No. ^a	
White	29 (85.3%)
African American	3 (8.8%)
Asian	2 (5.9%)
Hispanic or Latino	3 (8.8%)
Current smoker	2 (5.9%)
Workers' compensation case	2 (5.9%)

^aNumbers total 37 and percentages total 108.8 because 3 of the patients identified as one of the race categories (ie, white, African American, or Asian) and also as Hispanic or Latino.

in a broader outpatient orthopedic surgery population, nonsteroidal anti-inflammatory drugs proved to be more effective than opioids for pain control.

Since the turn of the 21st century, the number of overdose deaths related to prescription opioids (ie, methadone, oxycodone, and hydrocodone) has quadrupled.¹³ The Centers for Disease Control and Prevention's declaration of an "opioid epidemic" has since prompted the investigation of causes for increased opioid prescription rates, such as surgeon, patient, or societal expectations of pain.¹⁴ Subsequently, there is a need for research that examines patient satisfaction with postoperative pain management strategies to guide treatment guidelines and establish expectations. Patient expecta-

Table 2

Description of All Patients Who Used an Opioid Pain Medication Following Knee Arthroscopy

Opioid User (n=6)	Prescribing Provider	Type of Opioid Analgesic	Total No. of Pills Consumed	Self-reported a Need for Opioid Pain Medication (Yes/No)	Postoperative Pain Perceived vs Expectations (More/Same/Less)	Purpose of Opioid Management vs Nonopioid Management
Patient 1	Surgical staff ^a	Tramadol	9	Yes	More	Unable to tolerate NSAIDs because of use of warfarin
Patient 2	Emergency department physician	Tramadol	1	Yes	More	Hospitalized after surgery for syncopal episode—given tramadol during hospitalization
Patient 3	Surgical staff	Oxycodone	4	Yes	Same	Unable to tolerate NSAIDs because of use of enoxaparin
Patient 4	Surgical staff	Tramadol	15	Yes	More	Unable to tolerate NSAIDs because of history of gastrointestinal issues
Patient 5	Surgical staff	Tramadol	4	Yes	More	Prescribed tramadol for nighttime pain postoperative day 9
Patient 6	Surgical staff	Tramadol	1	Yes	Same	Prescribed tramadol for excessive pain postoperative day 1

Abbreviation: NSAIDs, nonsteroidal anti-inflammatory drugs.

^aSurgical staff included physicians (attending, fellow, or resident) or physician assistant.

Table 3

Patient Attitudes and Expectations Regarding Opioid Use and Pain Management After Knee Arthroscopy

Patient Attitudes and Expectations	Pain Management, No.	
	Opioid (n=6)	Nonopioid (n=28)
Reported "yes" to needing an opioid pain medication postoperatively	6 (100%)	1 (3.6%)
Reported "no" to needing an opioid pain medication postoperatively	0 (0%)	27 (96.4%)
Expected to be in pain after surgery	5 (83.3%)	28 (100%)
Did not expect to be in pain after surgery	1 (16.7%)	0 (0%)
Had less pain than expected after surgery	0 (0%)	17 (60.7%)
Had about the same pain as expected after surgery	2 (33.3%)	10 (35.7%)
Had more pain than expected after surgery	4 (66.7%)	1 (3.6%)

tive expectations of pain can have a great effect on postoperative experience of pain and functional outcomes.²¹ Yeola and Jai-puriya²² showed that among patients who underwent hernia surgery, those who received preoperative counseling on expectations had lower postoperative anxiety and pain and a shorter hospital stay. Further, cultural and societal norms of pain expectations may play a significant role in treatment guidelines and outcomes. Lindenhovius et al²³ compared patients with hip fractures in both the Netherlands and the United States. Although no patients in the Netherlands were prescribed narcotics after surgery, 85% of the patients treated in the United States were prescribed opioids for postoperative pain. More broadly, Americans constitute only approximately 4.6% of the global population, yet consume 80% of the global opioid supply.² This may indicate that American patients, surgeons, or both have the expectation either that patients should have low levels of pain after surgery or that their pain must be managed by opioid analgesics. The impact of patient education and expectation

tions appear to play a significant role in determining the requirement for opioid pain medication.¹⁵⁻²⁰ This is a complex topic that is influenced by both individual and societal factors. Of those patients not

initially prescribed opioids but who ended up using opioid analgesics, 5 of 6 patients reported experiencing a greater level of pain than expected. At an individual level, it has been clearly shown that preopera-

may allow surgeons to further decrease the need for these medications and should be a cornerstone of future research.

Although most patients did not use or did not feel the need for opioids after arthroscopic knee surgery, 18% of patients did use opioid pain medications to achieve adequate pain control. Many of these patients were unable to take nonsteroidal anti-inflammatory drugs because of a medical contraindication; therefore, tramadol was prescribed, as it has been shown to have less potential for dependence.^{24,25} Identifying patients who may require postoperative opioids prior to surgery and discussing the medication plan are crucial for adequate pain control and for ensuring patient satisfaction. A recent study examined risk factors for opioid use among adolescent patients with scoliosis undergoing spinal surgery and found that older age, male sex, higher body mass index, and higher preoperative pain scores were associated with increased opioid use.²⁶ Determining similar preoperative risk factors for opioid use in knee arthroscopy patients is of critical importance and will be a focus of future research. Preoperative use of opioids has also been shown to be a particularly sensitive and reliable predictor of pain and opioid use following orthopedic surgery.²⁷

Limitations of the current study included a small sample. Additionally, patients were asked about their preoperative expectations for pain during the postoperative period, which may be subject to recall bias. As with all research that involves self-reporting, there is potential for response bias. Patients may have been reluctant to report opioid medication use that was not prescribed by the surgeon. However, if patients did respond yes to taking opioid pain medication, they were asked who prescribed the medication (ie, surgical staff, emergency department physician, or primary care physician).

CONCLUSION

It is in the best interest of the patient, the surgeon, and society to limit opioid use

when possible. Most patients who underwent knee arthroscopic partial meniscectomy and/or chondroplasty did not use opioid analgesics following their procedure. Furthermore, all but 1 patient who did not consume opioids postoperatively felt that their pain was adequately controlled. Of the patients who did require opioids postoperatively, half were unable to take nonsteroidal anti-inflammatory drugs because of drug interactions or other comorbidities that precluded them. This study provides initial encouragement that it is largely possible to remove opioids from the postoperative pain regimen of knee arthroscopy patients and maintain adequate pain control and patient satisfaction.

REFERENCES

- Weidmer BA, Brach C, Hays RD. Development and evaluation of CAHPS survey items assessing how well healthcare providers address health literacy. *Med Care*. 2012; 50(9)(suppl 2):S3-S11.
- Manchikanti L, Singh A. Therapeutic opioids: a ten-year perspective on the complexities and complications of the escalating use, abuse, and nonmedical use of opioids. *Pain Physician*. 2008; 11(2)(suppl):S63-S88.
- Bot AG, Bekkers S, Arnstein PM, Smith RM, Ring D. Opioid use after fracture surgery correlates with pain intensity and satisfaction with pain relief. *Clin Orthop Relat Res*. 2014; 472(8):2542-2549.
- Nota SP, Spit SA, Voskuyl T, Bot AG, Hageman MG, Ring D. Opioid use, satisfaction, and pain intensity after orthopedic surgery. *Psychosomatics*. 2015; 56(5):479-485.
- Gimbel JS, Brugger A, Zhao W, Verburg KM, Geis GS. Efficacy and tolerability of celecoxib versus hydrocodone/acetaminophen in the treatment of pain after ambulatory orthopedic surgery in adults. *Clin Ther*. 2001; 23(2):228-241.
- Kim S, Bosque J, Meehan JP, Jamali A, Marder R. Increase in outpatient knee arthroscopy in the United States: a comparison of National Surveys of Ambulatory Surgery, 1996 and 2006. *J Bone Joint Surg Am*. 2011; 93(11):994-1000.
- Wunsch H, Wijeyesundera DN, Passarella MA, Neuman MD. Opioids prescribed after low-risk surgical procedures in the United States, 2004-2012. *JAMA*. 2016; 315(15):1654-1657.
- Anson P. CDC: prescription opioid abuse costs \$78.5 billion. *Pain News Network*. September 15, 2016. <https://www.painnewsnetwork.org/stories/2016/9/15/cdc-prescription-opioid-abuse-costs-785-billion-annually>. Accessed February 26, 2018.
- GoodRx. Ibuprofen. https://www.goodrx.com/ibuprofen?form=tablet&dosage=800mg&quantity=100&days_supply=&label_override=ibuprofen. Accessed February 26, 2018.
- GoodRx. Oxycodone ER. https://www.goodrx.com/oxycodone-er?form=tablet&dosage=10mg&quantity=100&days_supply=&label_override=oxycodone-ER. Accessed February 26, 2018.
- Florence CS, Zhou C, Luo F, Xu L. The economic burden of prescription opioid overdose, abuse, and dependence in the United States, 2013. *Med Care*. 2016; 54(10):901-906.
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap): a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009; 42(2):377-381.
- Centers for Disease Control and Prevention. CDC WONDER. <https://wonder.cdc.gov>. Accessed September 20, 2017.
- Centers for Disease Control and Prevention. CDC Grand Rounds: prescription drug overdoses—a U.S. epidemic. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6101a3.htm>. Accessed September 20, 2017.
- Swarup I, Henn CM, Nguyen JT, et al. Effect of pre-operative expectations on the outcomes following total shoulder arthroplasty. *Bone Joint J*. 2017; 99-B(9):1190-1196.
- Waljee J, McGlinn EP, Sears ED, Chung KC. Patient expectations and patient-reported outcomes in surgery: a systematic review. *Surgery*. 2014; 155(5):799-808.
- Lingard EA, Sledge CB, Learmonth ID, and Kinemax Outcomes Group. Patient expectations regarding total knee arthroplasty: differences among the United States, United Kingdom, and Australia. *J Bone Joint Surg Am*. 2006; 88(6):1201-1207.
- Mancuso CA, Jout J, Salvati EA, Sculco TP. Fulfillment of patients' expectations for total hip arthroplasty. *J Bone Joint Surg Am*. 2009; 91(9):2073-2078.
- Flood AB, Lorence DP, Ding J, McPherson K, Black NA. The role of expectations in patients' reports of post-operative outcomes and improvement following therapy. *Med Care*. 1993; 31(11):1043-1056.
- Henn RF III, Kang L, Tashjian RZ, Green A. Patients' preoperative expectations predict the outcome of rotator cuff repair. *J Bone Joint Surg Am*. 2007; 89(9):1913-1919.
- Gandhi R, Davey JR, Mahomed N. Patient expectations predict greater pain relief with

- joint arthroplasty. *J Arthroplasty*. 2009; 24(5):716-721.
22. Yeola M, Jaipuriya P. Effect of pre-operative counselling on post-operative outcome in hernia surgery patients. *Int J Sci Res (Raipur)*. 2016; 5(7):762-767.
 23. Lindenhovius AL, Helmerhorst GT, Schnellen AC, Vrahas M, Ring D, Kloen P. Differences in prescription of narcotic pain medication after operative treatment of hip and ankle fractures in the United States and the Netherlands. *J Trauma*. 2009; 67(1):160-164.
 24. Silvasti M, Tarkkila P, Tuominen M, Svarthling N, Rosenberg PH. Efficacy and side effects of tramadol versus oxycodone for patient-controlled analgesia after maxillofacial surgery. *Eur J Anaesthesiol*. 1999; 16(12):834-839.
 25. Tarkkila P, Tuominen M, Lindgren L. Comparison of respiratory effects of tramadol and oxycodone. *J Clin Anesth*. 1997; 9(7):582-585.
 26. Grant DR, Schoenleber SJ, McCarthy AM, et al. Are we prescribing our patients too much pain medication? Best predictors of narcotic usage after spinal surgery for scoliosis. *J Bone Joint Surg Am*. 2016; 98(18):1555-1562.
 27. Hina N, Fletcher D, Poindessous-Jazat F, Martinez V. Hyperalgesia induced by low-dose opioid treatment before orthopaedic surgery: an observational case-control study. *Eur J Anaesthesiol*. 2015; 32(4):255-261.