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Influence of preoperative opioid use on postoperative outcomes and opioid use after arthroscopic rotator cuff repair

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Background: Recent orthopedic research has questioned the effect of opioid use on surgical outcomes. This study investigated this in the context of arthroscopic rotator cuff repair. We hypothesized that preoperative opioid use would be associated with inferior outcomes and greater postoperative opioid requirements.
Methods: A database query identified adult patients with full-thickness or partial-thickness supraspinatus tears surgically treated between 2011 and 2015. Preoperative and postoperative outcomes scores (active range of motion [AROM], American Shoulder and Elbow Surgeons [ASES], Constant scores, Simple Shoulder Test [SST], and visual analog scale [VAS] for pain) and postoperative opioid use were retrospectively recorded. Patients with less than 2 years of follow-up data at the time of the retrospective review were contacted for prospective ASES, SST, and VAS data collection.
Results: A total of 200 patients, 44 of whom received opioids preoperatively, were identified for inclusion. Patients prescribed preoperative opioids had consistently inferior preoperative and postoperative outcomes scores; however, the magnitudes of improvement were not significantly different between groups. Postoperatively, patients in the preoperative opioid group received 1.91 (95% confidence interval, 1.31-2.78) times more opioids over a postoperative course of treatment that was 2.73 (95% confidence interval, 1.62-4.59) times longer. In addition to having a greater proportion of women, this group also had significantly higher rates of certain comorbidities, including back pain, depression, degenerative joint disease, and chronic pain conditions.
Conclusions: All patients demonstrated significant improvements in outcomes scores after surgical repair that were not significantly different between groups. However, patients taking opioids preoperatively did not ultimately reach the same level of functionality and had substantially greater opioid requirements postoperatively.
Level of evidence: Level III; Retrospective Cohort Comparison; Treatment Study

Keywords: Opioids; narcotics; pain scores; arthroscopy; rotator cuff repair; supraspinatus tendon

Tears of the rotator cuff are a common problem that can cause shoulder dysfunction and significant limitations. Tears are frequently found in investigated asymptomatic populations but can become increasingly symptomatic and functionally disabling over time. In patients presenting with

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unilateral shoulder pain, Yamaguchi et al[18] reported a 33.8% and 30.1% incidence of unilateral and bilateral rotator cuff tears, respectively. Treatment options for such injuries range from nonoperative conservative management to early surgical intervention and arthroscopic repair. When surgical repair is indicated, several factors influence the success of the procedure and postoperative function of the patient.

To date, researchers have evaluated several variables influencing postoperative outcomes, including patient-related and surgeon-related factors. Injury characteristics, including tear size, fatty infiltration, rotator cuff atrophy, tendon retraction, and other patient-related factors, including age, smoking, osteoporosis, hypercholesterolemia, and diabetes, have been associated with impaired healing and inferior outcomes.[15] Additional research has begun to focus on other potential prognostic factors, including preoperative treatment strategies and medications. For example, the preoperative use of nonsteroidal anti-inflammatory drugs, steroid injections, and narcotics may be useful in predicting postoperative outcomes and potentially guiding treatment strategies.[1,2,4,6,7,13]

Considering the current opioid epidemic and its particularly significant implications for the specialty of orthopedics, several investigations have questioned the influence of opioid use on surgical outcomes, particularly in the context of total joint arthroplasty. Collectively, these studies suggest that preoperative opioid use is associated with inferior outcomes, increased postoperative pain management requirements, and a common pattern of comorbidities, including increased frequencies of back pain and psychiatric diagnoses.[5,10-12,14,19]

The present study investigated this relationship in a patient sample undergoing arthroscopic rotator cuff repair. We hypothesized that patients taking opioids preoperatively would have inferior postoperative outcomes and require significantly more opioids postoperatively compared with individuals who were not taking opioids before the operation.

Materials and methods

Study sample and data collection

This was a retrospective comparative study. Electronic patient records were queried to identify adults with full-thickness or partial-thickness tears of the supraspinatus tendon who were treated with arthroscopic rotator cuff repair performed by a single hand and upper extremity fellowship-trained orthopedic surgeon (S.I.G.) between 2011 and 2015. Exclusion criteria were patients aged younger than 18 years at the time of surgery, revision cases, patients with previous arthroscopic shoulder surgery, and patients without preoperative and postoperative outcomes questionnaires from the study sample.

After the patient sample was identified, we collected a predetermined, standardized set of patient data, including sex, age at the time of surgery, preoperative treatments, preoperative and postoperative opioid use (medication, dose, and duration), surgical procedure details, select medical comorbidities before surgery, and other data. Data collection included all opioid medications with established morphine equivalent conversions. Recorded comorbidities included alcohol abuse, back pain, chronic pain conditions, depression, diabetes, degenerative joint disease, heart disease, hyperlipidemia, hypertension, smoking status, and the use of select medications, including antidepressants/anxiolytics (including benzodiazepines), neuroleptics, nonsteroidal anti-inflammatory drugs, and oral corticosteroids.

Preoperative and postoperative measurements were collected for the American Shoulder and Elbow Surgeons (ASES) Standardized Shoulder Assessment Form, Constant scores, Simple Shoulder Test (SST) scores, visual analog scale pain scores (VAS), and active range of motion (AROM) values from standardized patient questionnaires and clinical measurements. Constant scores were normalized for age according to methods described by Katolik et al.[8]

Patients were divided into 2 groups by preoperative use of opioids. Most patients completed a questionnaire, one question of which asked, "Do you take narcotic pain medication?" For patient records in which this questionnaire was absent or incomplete, preoperative opioid status was determined by medication records available in the electronic medical record at the time of the initial visit. Due to the limited availability and reliability of information regarding preoperative prescriptions, distinctions were not made based on the quantity or duration of preoperative opioid use.

One investigator (B.T.W.) extracted all information from patient records and operative reports and compiled it in a standardized, deidentified data sheet. We performed prospective collection of select subjective outcomes for patients for whom less than 2 years of final follow-up data was available in the electronic medical record. Prospective data collection was accomplished by telephone and mailed questionnaires, including ASES, SST, and VAS assessments. A minimum of 2-year follow-up data for ASES, SST, and VAS scores was required for inclusion; therefore, patients lost to follow-up were excluded from the analysis. We used strength components, calculated Constant scores, and AROM measurements from each patient's last clinic appointment deemed "end of healing." The mean length of follow-up for specific outcomes scores is noted in the Results.

Statistical methods

Patient sample sizes were comparable to prior similar studies.[10,12] Patient demographic information and frequencies of select comorbidities for the 2 groups were compared using Wilcoxon rank sum tests for continuous variables (age, body mass index [BMI]) and Fischer exact tests for categorical variables (sex, comorbidity indicators). For outcomes, improvements in scores were compared between preoperative opioid and no-preoperative opioid groups using Wilcoxon rank sum tests. Biostatisticians also performed a weighted analysis to adjust for possible selection bias. Propensity scores were calculated using a logistic regression model for preoperative opioid use with age, sex, BMI, back pain, depression, and chronic pain as predictors.

Inverse propensity score weighting is a form of covariate adjustment often used in observational studies subject to selection bias between comparison groups. The propensity score is the predicted probability of receiving treatment (preoperative opioid use in our study) that is estimated using logistic regression. Patients are then given a weight that corresponds to their baseline probability of receiving treatment. The weights act to create a pseudopopulation with nearly perfect covariate balance between comparison groups (as if the study were randomized). Propensity score weighting is similar to matching; however, the benefit is that the analysis incorporates data from all study participants. Multiple linear regression (weighted

by the inverse propensity score) was used to model shoulder score improvement with preoperative opioid use as the main predictor and additionally controlling for the baseline outcome score and postoperative opioid quantity (milligram morphine equivalents). Postoperative morphine equivalents and duration of postoperative opioid therapy outcomes were modeled similarly using weighted linear regression with preoperative opioid use as the only predictor; however, each outcome was log-transformed to better accommodate the regression assumption of normality.

All statistical analyses were performed using R 3.3.1 software (R Foundation for Statistical Computing, http://www.R-project.org). All *P* values were 2-sided, and *P* values of <.05 were considered statistically significant. Analyses included patients with incomplete or missing data where data were available. Tables include the frequency of missing data in the results.

Results

Patient demographics and comorbidities

A total of 200 patients (200 shoulders) satisfied the criteria for inclusion in the final analysis. Of the 200 patients, 44 patients were prescribed opioids preoperatively for pain, and the remaining 156 were not prescribed opioids preoperatively. The demographic information for the 2 groups is summarized in Table I. The mean lengths of follow-up for subjective patient-reported outcomes assessed by telephone and mailed questionnaires (ASES, SST, and VAS) were 47.2 (standard deviation [SD], 15.4) months for the no-preoperative opioid group and 47.2 (SD, 14.7) months for preoperative opioid group. For metrics requiring measurements performed in the clinic, including Constant scores and AROM, lengths of follow-up were equivalent to the time points deemed "end of healing." These values were 10.4 (SD, 4.8) months for the no-preoperative opioid group and 11.7 (SD, 6.8) months for preoperative opioid group. Frequencies of select comorbidities can be found in Table II. Notable statistically significant differences between groups included a greater proportion of women and increased frequencies of back pain, depression, use of antidepressants or anxiolytics, or both, degenerative joint disease, and chronic pain conditions in the preoperative opioid group. The preoperative opioid group also had a slightly higher BMI; however, this difference did not reach statistical significance.

Table I Patient demographic information

Variable	All	Preoperative opioid use		*P* value
		No	Yes	
	(N = 200)	(n = 156)	(n = 44)	
Age, yr	58.4 (10.1)	58.4 (10.2)	58.6 (9.6)	.864
Sex				
Male	104 (52.0)	89 (57.1)	15 (34.1)	.010
Female	96 (48.0)	67 (42.9)	29 (65.9)	—
BMI, kg/m^2	30.6 (6.1)	30.0 (5.6)	32.6 (7.4)	.061

BMI, body mass index.
Age and BMI are presented as mean (standard deviation). Sex composition of each group is presented as number (%).

Table II Frequency of select comorbidities and other patient medications

Comorbidity	All	Preoperative opioid use		*P* value
		No	Yes	
	(N = 200)	(n = 156)	(n = 44)	
Back pain	45 (22.5)	28 (17.9)	17 (38.6)	.007
Chronic pain	20 (10.0)	7 (4.5)	13 (29.5)	<.001
Depression	33 (16.5)	21 (13.5)	12 (27.3)	.038
Diabetes	38 (19.0)	28 (17.9)	10 (22.7)	.515
Degenerative joint disease	164 (82.0)	123 (78.8)	41 (93.2)	.028
Heart disease	20 (10.0)	16 (10.3)	4 (9.1)	>.999
Hyperlipidemia	81 (40.5)	64 (41.0)	17 (38.6)	.863
Hypertension	80 (40.0)	59 (37.8)	21 (47.7)	.296
Alcohol abuse	5 (2.5)	4 (2.6)	1 (2.3)	>.999
Antidepressants/ anxiolytics	67 (33.5)	42 (26.9)	25 (56.8)	<.001
Neuroleptics	6 (3.0)	5 (3.2)	1 (2.3)	>.999
NSAIDs	150 (75.0)	115 (73.7)	35 (79.5)	.555
Oral corticosteroids	14 (7.0)	8 (5.1)	6 (13.6)	.086
Smoking status	25 (12.5)	16 (10.3)	9 (20.5)	.118

NSAIDs, nonsteroidal anti-inflammatory drugs.
Data are presented as number (%).

Active range of motion

Both groups demonstrated statistically significant improvements in all tested planes of motion. On average, patients in the preoperative opioid group demonstrated greater preoperative limitations in abduction and forward elevation. However, the magnitudes of improvement between preoperative and postoperative AROM for all planes of motion were not significantly different between groups based on weighted analysis. Additional details regarding preoperative and postoperative AROM for both groups are summarized in Fig. 1 and Table III.

Outcomes scores

As observed with AROM, both groups demonstrated significant improvements in all outcomes measures after rotator cuff repair. Patients receiving preoperative opioids had inferior preoperative and postoperative outcomes scores; however, the magnitude of improvement was not significantly different between the groups for any outcomes scale assessed. Specific preoperative and postoperative values for each outcomes instrument are detailed in Table IV and Figs. 2-5.

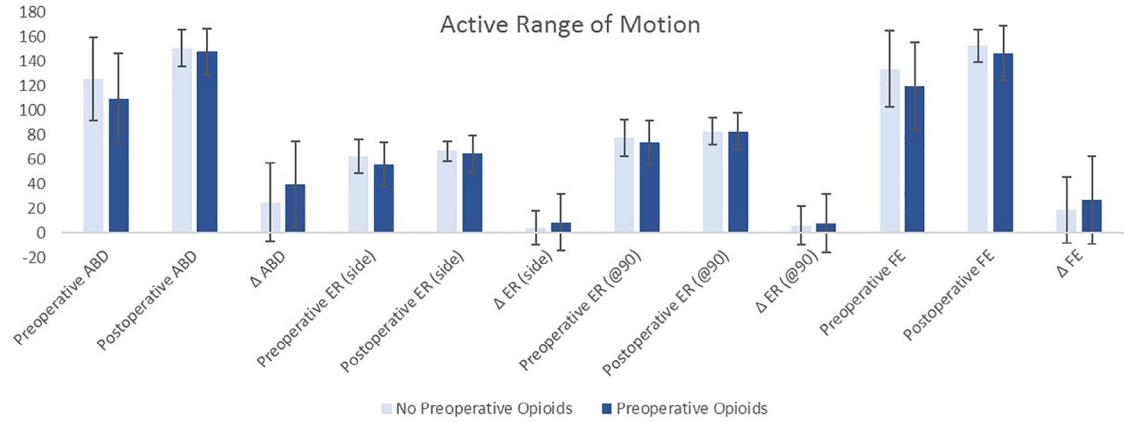

Figure 1 Preoperative and postoperative active range of motion (*AROM*). *ABD*, abduction; *ER*, external rotation; *FE*, forward elevation. Data are presented as the mean and standard deviation (*error bars*).

Table III Preoperative and postoperative active range of motion

Variable	No preoperative opioid use			Preoperative opioid use			*P* value*
	Pre	Post	Δ	Pre	Post	Δ	(Δ)
Abduction							
Mean (SD), °	126 (34)	151 (15)	25 (32)	110 (37)	148 (19)	40 (35)	.897
No. missing	0	1	1	0	1	1	—
External rotation (side)							
Mean (SD), °	63 (14)	67 (8)	4 (14)	56 (18)	65 (15)	9 (23)	.405
No missing	0	0	0	0	1	1	—
External rotation (90°)							
Mean (SD), °	78 (15)	83 (11)	6 (16)	74 (18)	83 (15)	8 (24)	.281
No. missing	8	0	8	4	1	5	—
Forward elevation							
Mean (SD), °	134 (31)	153 (13)	19 (27)	120 (36)	147 (22)	27 (36)	.314
No. missing	0	0	0	0	0	0	—

SD, standard deviation.
* Reported *P* values are from inverse propensity weighted linear regression analysis to control for baseline outcomes scores and postoperative morphine equivalents

Table IV Preoperative and postoperative outcomes scores

Outcome assessment	No preoperative opioid use			Preoperative opioid use			*P* value*
	Pre	Post	Δ	Pre	Post	Δ	(Δ)
ASES							
Mean (SD)	47.6 (19.6)	85.6 (19.3)	37.9 (21.5)	32.1 (16.1)	68.4 (27.8)	36.4 (28.6)	.351
No. Missing	0	1	1	0	0	0	—
Constant (normalized for age)							
Mean (SD)	60.1 (17.4)	86.2 (13.1)	26.7 (17.0)	48.3 (15.6)	81.3 (14.1)	31.8 (19.5)	.350
No. missing	10	9	18	4	6	10	—
Simple Shoulder Test							
Mean (SD)	6.1 (3.3)	10.2 (2.7)	4.1 (3.6)	4.1 (2.5)	7.5 (3.7)	3.5 (3.9)	.057
No. missing	0	0	0	0	0	0	—
Visual analog scale							
Mean (SD)	4.9 (2.6)	1.5 (2.2)	−3.4 (3.0)	6.7 (2.2)	3.2 (3.0)	−3.4 (3.2)	.340
No. missing	0	0	0	0	0	0	—

ASES, American Shoulder and Elbow Surgeons; *SD*, standard deviation.
* Reported *P* values are from inverse propensity weighted linear regression analysis to control for baseline outcomes scores and postoperative morphine equivalents.

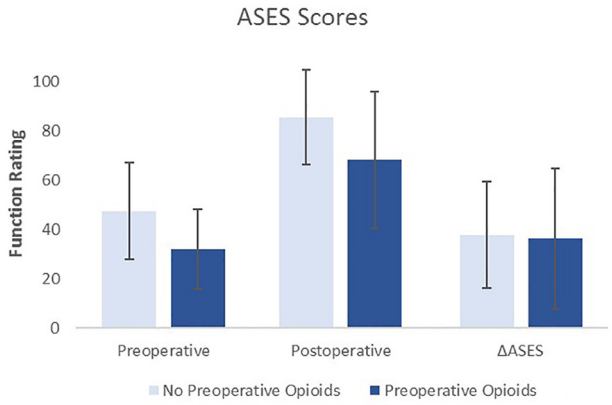

Figure 2 Preoperative and postoperative American Shoulder and Elbow Surgeons (*ASES*) scores. Data are presented as the mean and standard deviation (*error bars*).

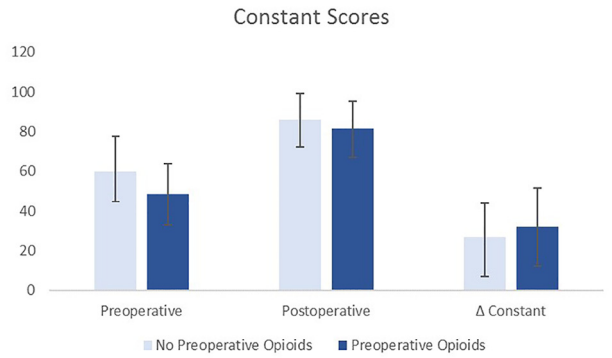

Figure 3 Preoperative and postoperative Constant scores. Data are presented as the mean and standard deviation (*error bars*).

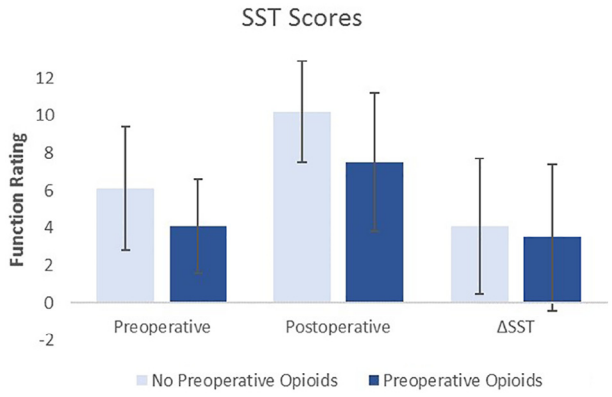

Figure 4 Preoperative and postoperative Simple Shoulder Test (SST) scores. Data are presented as the mean and standard deviation (*error bars*).

Postoperative opioid use

Patients in the preoperative opioid group required both a significantly greater quantity and a longer duration of postoperative opioid therapy. The median duration of therapy, as indicated by the length of time from surgery to the last filled prescription, was 1.0 week (range, 0.0-206.6 weeks) for

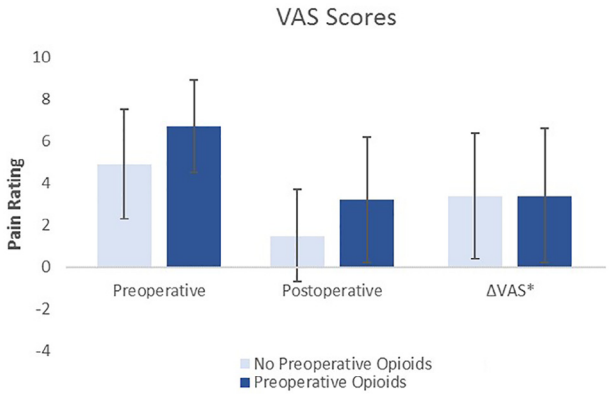

Figure 5 Preoperative and postoperative visual analog scale (*VAS*) pain scores. Data are presented as the mean and standard deviation (*error bars*). *ΔVAS (postoperative minus preoperative VAS) were reported as absolute values for graphical representation.

the no-preoperative opioid group compared with 12.8 weeks (range, 0.0-55.7 weeks) for the preoperative opioid group (Fig. 6). Due to a non-normal distribution, postoperative opioid duration and morphine equivalents (mg) were log-transformed before inverse propensity weighted linear regression analyses. The exponentiated regression coefficients are interpretable as ratios. On average (log-transformed), patients in the preoperative opioid group received 1.91 (95% confidence interval, 1.31-2.78) times more opioids over a postoperative course of treatment that was 2.73 (95% confidence interval, 1.62-4.59) times longer than patients who did not take opioids preoperatively.

Discussion

The present study attempted to investigate the influence of preoperative opioid use on both outcomes and opioid needs after arthroscopic rotator cuff repair. Overall, patients prescribed opioids preoperatively presented with inferior baseline scores and AROM before surgery. Although these absolute discrepancies in outcomes and AROM between groups remained consistent through the final follow-up, the magnitudes of improvements were not significantly different for any of the reported measures. The preoperative opioid group did, however, have a significantly greater opioid demand postoperatively as measured by overall quantity and duration of therapy.

This study expands upon previous similar research that has questioned the influence of preoperative opioid use on outcomes after orthopedic procedures. Recently, investigators have repeatedly asked these questions in the context of various total joint arthroplasty procedures. Franklin et al[5] retrospectively analyzed 6364 primary unilateral total knee arthroplasty procedures. Patients who used narcotics before surgery were more likely to be using narcotics at 12 months postoperatively and more likely to be dissatisfied with their outcome.[5] Zywiel et al[19] later compared outcomes after total knee arthroplasty for patients who reported regular use of opioid medications relative

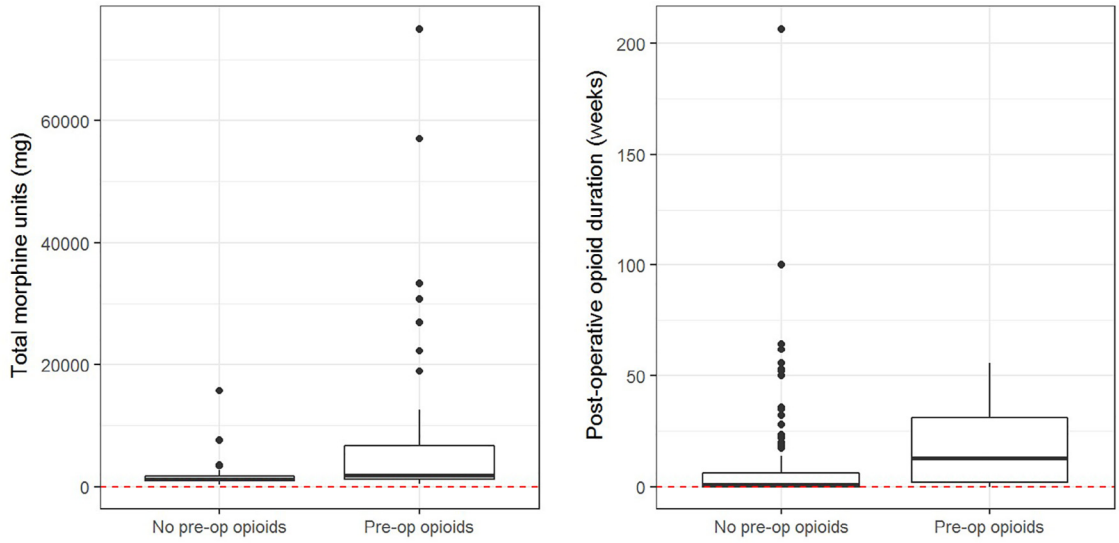

Figure 6 Total postoperative morphine equivalents and duration of postoperative opioid therapy. The *horizontal line* in the middle of each box indicates the median, the *top and bottom borders* of the box mark the 75th and 25th percentiles, respectively, and the *vertical lines* mark the maximum and minimum values within the boundary of +/- 1.5 times the interquartile range. The *circles* indicate outliers.

to a nonopioid control group. Despite no significant difference in preoperative scores, patients taking preoperative opioids had significantly lower Knee Society scores at the final follow-up. Patients in the preoperative opioid group also had significantly longer postoperative hospital stays, required significantly more revisions for recalcitrant pain or stiffness, and were more frequently referred for pain management. With respect to comorbidities, Zywiel et al[19] reported a higher prevalence of antidepressant and anxiolytic medication use in the preoperative opioid group, which was similarly noted in other studies, including the present patient sample.

Pivec et al[14] subsequently asked a similar question in a sample of patients undergoing total hip arthroplasty. In their sample, patients reporting preoperative opioid use had significantly worse outcomes at the final follow-up, as indicated by Harris Hip Scores. Patients in the opioid group also had significantly longer postoperative hospital stays, greater postoperative opioid consumption, and a greater proportion that continued opioid therapy until the final follow-up. Furthermore, investigators again described a greater proportion of psychiatric conditions in the preoperative opioid group.

Additional studies have continued to elaborate on these findings to identify other opioid-associated postoperative complications and patient risk factors correlated with opioid abuse and dependence. Cozowicz et al[3] recently investigated 1,035,578 lower joint arthroplasties and 220,953 spine fusions. When data were analyzed by quartile of postoperative opioid therapy, these investigators found that the highest number of opioid prescriptions was associated with increased odds of deep venous thrombosis, postoperative infection, and increased gastrointestinal, urinary, and respiratory complications.[3]

Menendez et al[9] conducted a similar investigation that sought to determine the prevalence of opioid abuse and dependence in patients undergoing major elective orthopedic surgery, the risk factors for dependence, and the effect on outcomes. In their patient sample, opioid abuse and dependence were associated with increased inpatient mortality and morbidity, including induced mental disorder, respiratory failure, surgical site infection, mechanical ventilation, pneumonia, myocardial infarction, and postoperative ileus or other gastrointestinal events. Abuse and dependence were also associated with increased risk of prolonged stay, nonroutine disposition at discharge, and failure to rescue. Investigators also found that high-risk opioid users were more likely younger, male, nonwhite, spine patients receiving Medicaid, with preexisting mental health, and substance abuse disorders.

In the specific context of orthopedic shoulder operations, a recent pair of studies investigated this effect on both anatomic and reverse total shoulder arthroplasty and reached similar corroborating conclusions.[10,12] In the case of reverse total shoulder arthroplasty, patients taking preoperative opioids were found to have significantly inferior preoperative scores for Constant-Pain, ASES, ASES-Pain, and the Western Ontario Osteoarthritis Shoulder index.[10] These differences were largely maintained throughout the postoperative period; however, the authors emphasized that the magnitudes of improvement between the preoperative assessment and final follow-up were nearly identical for both groups.

In a subsequent study, Morris et al[12] investigated the influence of preoperative opioid use in a sample of patients undergoing anatomic total shoulder arthroplasty. Similarly, patients taking opioids preoperatively had significantly inferior scores for all patient-reported measures, aside from the Single Assessment Numeric Evaluation (SANE) score. Likewise, these discrepancies between groups persisted in the postoperative period, again, with comparable magnitudes of postoperative improvement between groups. In this second study, however, the authors reported differences in select

comorbidities, including a significantly higher average BMI and greater prevalence of chronic back pain and depression in the preoperative opioid group. They also noted that the no-preoperative opioid group had a greater portion of men.

Most recently, Westermann et al[17] conducted a large retrospective analysis of 29,827 patients who underwent arthroscopic rotator cuff repair with the purpose of analyzing postoperative opioid consumption and identifying patient factors associated with prolonged postoperative use. The authors noted that 43% of patients had filled an opioid prescription in the 3 months before surgery. Patients in their sample prescribed opioids <1 month preoperatively were 3.04 times more likely to require opioids at 3 months postoperatively. This risk was even greater (7.45 times) for patients prescribed opioids between 1 and 3 months preoperatively. They also noted that psychiatric conditions, low back pain, and myalgias were also associated with longer durations of postoperative opioid therapy.

Lastly, research has also attempted to identify trends in both the quantity and duration of opioid therapy after common surgical procedures. Scully et al[16] conducted one such study with the goal of determining the adequacy of postoperative opioid therapy based on rates of prescription refills. In patients undergoing rotator cuff repair, the median length of initial therapy was 5 days, and 36% of these patients received 1 or more refills. The median time to the first refill was 8 days, with a median duration of 5 days. In the present patient sample, the median length of time between surgery and the last filled opioid prescription was 1.0 week (range, 0.0-206.6 weeks) for the no-preoperative opioid group and 12.8 weeks (range, 0.0-55.7 weeks) for the preoperative opioid group.

Overall, the results observed in the present study sample are consistent with the trends established in previous investigations. In addition to inferior outcomes and greater postoperative opioid therapy requirements, prior studies have also identified trends similar to the present study with respect to patient demographics and comorbidities. Specifically, patients taking preoperative opioids across a variety of procedures commonly had an increased prevalence in obesity (BMI), back pain, depression, anxiety, and psychiatric conditions.[9,12,14,17,19] Morris et al[12] also noted that men were less likely to be prescribed preoperative opioids. Similarly, preoperative opioid use, back pain, and depression have been associated with increased postoperative opioid use in arthroscopic rotator cuff repair patients.[17] These trends were also observed in the current study sample.

Collectively, these data provide additional clinically relevant information describing this specific patient population that may help guide clinical and surgical decision making. Patients taking preoperative opioids clearly benefit from surgery with an approximately equal magnitude of improvement; however, providers may need to temper postoperative expectations, either based on lower baseline functionality or potentially due to the constellation of comorbidities present in this patient population. Furthermore, and potentially more importantly, patients prescribed opioids preoperatively should receive special postoperative considerations and counselling regarding multimodal pain management to help reduce the quantity and duration of opioid therapy while achieving adequate analgesia.

We acknowledge that the present study is not without some limitations. Foremost, this study was a retrospective review of patient records lacking any prospective randomization. Consequently, the nonrandom samples were somewhat imbalanced with respect to select patient factors and comorbidities, including sex, back pain, depression, degenerative joint disease, and chronic pain conditions. However, these differences were consistent with previous research and provided valuable insights into the complexity of these patients. Nonetheless, we attempted to account for these differences through the described weighted statistical analyses. In addition, analysis was limited to the information available in electronic medical records, which had several implications. We excluded patients with incomplete or absent preoperative questionnaires, less than 2 years of follow-up, and patients lost to follow-up via telephone or mail.

Secondly, due to the available data, we did not stratify preoperative opioid status based on medication type, quantity, or duration of preoperative therapy. Similarly, quantification of postoperative opioid use was limited to the prescriptions listed in patient electronic medical records. We were thus unable to account for patients not completing all prescribed opioids or patients who may have obtained opioids illegally or from other providers outside of our medical system. Likewise, the analysis included all prescriptions filled after surgery and before the final follow-up; therefore, the analysis did not make distinctions between prescriptions from other providers or potentially for other conditions.

Lastly, we acknowledge that prospective collection of data via telephone and mailed questionnaires only included subjective patient-reported outcomes (ASES, SST, and VAS) and did not include the collection of important AROM and strength data only abstracted from each patient's last clinic visit.

Despite these limitations, we believe the present study provides valuable information regarding the treatment of what may likely become an increasingly relevant patient population. However, additional prospective research is necessary to further determine and isolate the influence of opioids on postoperative outcomes.

Conclusion

Overall, patients experienced significant improvements in outcomes scores after arthroscopic rotator cuff repair, and the average magnitude of improvement after surgery was not significantly different between groups. However, patients taking opioids preoperatively required a significantly greater quantity and longer duration of postoperative opioid therapy and did not ultimately reach the same level of functionality, as indicated by final follow-up outcomes scores.

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