Opioid Consumption After Rotator Cuff Repair

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Purpose: Rising perioperative opioid use in the United States is of increasing concern. The purposes of this study were (1) to define opioid consumption after rotator cuff repair (RCR) in the United States and (2) to evaluate patient factors that may be associated with prolonged opioid use after arthroscopic RCR. **Methods:** All arthroscopic RCRs performed between 2007 and 2014 were identified by use of Current Procedural Terminology code (29,827). Patients who filled opioid prescriptions preoperatively were divided into those who filled prescriptions at 1 to 3 months preceding RCR and those who filled opioid prescriptions only in the 1 month preceding RCR. Risk ratios (RRs) were calculated by dividing the cumulative incidence of opioid prescriptions in patients with each patient factor by the cumulative incidence in those without each patient factor. **Results:** During the study period, 35,155 arthroscopic RCRs were performed. Of the patients, approximately 43% had filled an opioid prescription in the 3 months before RCR. At 3 months after RCR, patients who filled opioid prescriptions at 1 to 3 months before RCR were 7.45 (95% confidence interval [CI], 6.95-7.98) times more likely to be filling opioid medication prescriptions than those who had not been prescribed opioid medications before surgery; patients who filled opioid prescriptions in the month before RCR were 3.04 (95% CI, 2.8-3.29) times more likely to be filling opioid prescriptions at 3 months after RCR. Patients with psychiatric diagnoses (RR, 1.94; 95% CI, 1.85-2.04), myalgia (RR, 1.67; 95% CI, 1.6-1.75), and low-back pain (RR, 2.09; 95% CI, 2-2.2) were also found to be at risk of filling opioid prescriptions at 3 months postoperatively. **Conclusions:** We found approximately 43% of patients undergoing RCR received opioid medications before RCR. Patients who are prescribed narcotics before RCR are at increased risk of postoperative opioid demand. Patients with psychiatric diagnoses, myalgia, and low-back pain may be at increased risk of prolonged opioid use after surgery. **Level of Evidence:** Level III, retrospective case-control study.

Opioid pain medication use is of growing concern for surgeons and health care systems in the United States, recently reaching epidemic levels.[1,2] Opioid use has been exploding over the past 2 decades since the "under-treatment of pain"[2,3] was promoted. The World Health Organization estimates the United States is responsible for consumption of most of the world's prescribed opioids and 99% of the world's oxycodone.[4,5]

The opioid-prescribing guidelines of the Centers for Disease Control and Prevention[2] recommend a plan to taper off narcotics; however, no natural history study showing baseline normative values of opioid use after rotator cuff repair (RCR) has been performed. The detrimental impact of preoperative opiate use has been shown after spine surgery and knee arthroplasty[6-8]; however, no such study has evaluated its impact after RCR. Knowledge of risk factors for postoperative opioid use would aid surgeons and health care systems in identifying patients who are at risk of increased use and subsequently developing preoperative and postoperative pain and counseling regimens that may aid in decreased use.[9] Because all physicians and health care systems have been called to be responsible for the current opioid epidemic, patient risk factors for prolonged opioid use after various surgical interventions would be of great interest. The purposes of this study were (1) to define opioid consumption after RCR in the United States and (2) to evaluate patient factors that may be associated with prolonged opioid use after arthroscopic RCR. We hypothesized that filling of preoperative opioid prescriptions would lead to increased opioid demand in the first year after RCR.

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Methods

The Humana administrative claims database was the source of patient data and was accessed by use of the PearlDiver Technologies Research Program (PearlDiver, Fort Wayne, IN) in April 2015. Patient data are deidentified and Health Insurance Portability and Accountability Act compliant. This study was deemed institutional review board exempt by our institution. The Humana administrative claims database represents 16 million covered persons and includes both privately or commercially insured individuals and Medicare or Medicaid Advantage beneficiaries.

All patients undergoing an arthroscopic RCR between January 2007 and December 2014 were identified by use of Current Procedural Terminology code 29,827. The inclusion criterion was any patient with this code. Patients who filled preoperative opioid prescriptions were divided into 2 groups. Patients who had filled at least 1 opioid prescription at 1 to 3 months preceding surgery were considered the 1- to 3-month group. Patients in this group may have also filled a prescription in the 0- to 1-month period before RCR. Patients were included in the 0- to 1-month group if they filled opioid prescriptions only in the 1 month preceding RCR. Patients in this group did not fill any preoperative prescriptions outside of the 1-month preoperative period. Non-opioid users were defined as having no history of opioid prescriptions filled before their procedures. Monthly prescription refill rates were then tracked postoperatively on a monthly basis for 1 year. Months from surgery were defined as follows: day 0 to 1 month was defined as 1 month, 1 month to 2 months was defined as 2 months, and so on. All common opioids were included (oral and transdermal). Tramadol prescriptions were excluded. Opioid prescription refills were then tracked on a monthly basis for 1 year postoperatively for all patients who underwent RCR.

Further subgroup analysis was performed to identify patient comorbidities (determined by *International Classification of Diseases, Ninth Revision* [ICD-9] codes) that may be risk factors for increased opioid use. These risk factors were chosen based on the clinical experience of the senior author (B.R.W.). Patients were then grouped based on the presence or absence of the following comorbidities, and opioid prescription refills were trended postoperatively in the same manner for all groups: Patients who carried a psychiatric diagnosis of anxiety or depression were identified by ICD-9 codes 266.2x, 296.3x, and 300.02. Patients who carried a myalgia diagnosis were identified by ICD-9 code 729.1. Patients with low-back pain were identified by ICD-9 codes 724.5 and 724.2.

The cumulative incidence of patients receiving opioid prescriptions was analyzed each month after surgery. A risk ratio (RR) was calculated by dividing the cumulative incidence of opioid prescriptions in patients with each patient factor by the cumulative incidence in those without each patient factor, and 95% confidence intervals (CIs) were determined. A CI including 1 indicates no statistically significant difference between groups, whereas a CI not including 1 indicates statistical significance and $P < .05$. Descriptive statistics were performed by use of Microsoft Excel (Microsoft, Redmond, WA). Advanced data analyses were performed with SAS software (version 9.4; SAS Institute, Cary, NC).

Results

Among 35,155 arthroscopic RCRs performed, 47% of patients were female patients and 58.5% of patients were aged between 60 and 74 years. No patients were excluded. Of the patients, approximately 43% (15,230 of 35,155) had filled an opioid prescription in the 3 months before RCR. Of these, 58.9% had been prescribed opioids at 1 to 3 months before RCR and 41.1% had been prescribed preoperative opioids only in the 1 month before RCR. In addition, 11.86% of patients (4,170 of 35,155) had a psychiatric diagnosis, 52.57% (18,480 of 35,155) had a diagnosis of low-back pain, and 22.43% (7,884 of 35,155) had a diagnosis of myalgia or fibromyalgia. Overall, opioid pain medication use fell precipitously in the year after RCR, with fewer than 10% of patients receiving prescriptions 11 to 12 months after surgery (Fig 1).

Patient Factors Associated With Prolonged Use

Preoperative Opiate Use. Patients filling preoperative opioid prescriptions at any time point were more likely to be taking these medications for prolonged periods after surgery than those who did not fill any opioid prescriptions preoperatively (Fig 2). At 3 months after RCR, patients in the 1- to 3-month opioid group were 7.45 (95% CI, 6.95-7.98) times more likely to fill opioid prescriptions than those who did not fill narcotic prescriptions preoperatively (Table 1). At 3 months after RCR, patients in the 0- to 1-month opioid group were 3.04 (95% CI, 2.8-3.29) times more likely to be filling opioid prescriptions (Table 1). At 9 months after surgery, patients in the 1- to 3-month opioid group were 12.47 (95% CI, 11.14-13.97) times as likely to fill opioid prescriptions than those not filling opioid prescriptions preoperatively (Table 1).

Psychiatric Diagnoses. Patients with psychiatric diagnoses of anxiety and depression had a strong association with postoperative filling of opioid prescriptions after RCR (Fig 3). They were found to be 1.94 (95% CI, 1.85-2.04) times as likely to be filling narcotic