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ORIGINAL ARTICLE

Mental health, preoperative disability, and postoperative outcomes in patients undergoing shoulder arthroplasty

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Background: Mental health conditions are associated with poor outcomes in patients with chronic disease as well as various orthopedic conditions. The purpose of this study was to describe the relationship between mental health, preoperative disability, and postoperative outcomes in patients undergoing shoulder arthroplasty.

Methods: Data, including mental health diagnoses, were prospectively collected from patients undergoing total shoulder arthroplasty or reverse total shoulder arthroplasty from 2009 to 2015 at a single academic institution. Shoulder range of motion, visual analog scale, 12-Item Short Form Health Survey, and American Shoulder and Elbow Surgeons scores were collected preoperatively and at 1 and 2 years postoperatively. Data were analyzed using multivariate mixed-effect regression analysis.

Results: The study included 280 patients, 105 (37.5%) of whom had a mental health diagnosis of depression, anxiety, schizophrenia, or bipolar disorder. Both groups of patients had similar shoulder range of motion, pain, and function before shoulder arthroplasty. Hospital length of stay, discharge destination, and readmissions were similar for both groups. There were similar improvements in pain, function, and range of motion after shoulder arthroplasty in patients with and without diagnosed mental health conditions.

Conclusions: Overall, the presence of a psychiatric diagnosis was not predictive of outcomes. Although psychiatric conditions are often considered surgical comorbidities, mental health diagnoses should not be a barrier to performing clinically indicated shoulder arthroplasty, because both groups of patients appear to benefit from pain relief and improved shoulder function.

Level of evidence: Level II; Retrospective Design; Prognosis Study

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Keywords: Mental health; depression; total shoulder arthroplasty; reverse total shoulder arthroplasty; patient-reported outcomes; shoulder arthroplasty outcomes; ASES score; SF-12 score

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Mental health conditions such as depression and anxiety are common in the United States, with a lifetime prevalence of 17% and 29%, respectively.¹⁶ Depression is an independent risk factor for poor outcomes in those with chronic illnesses such as coronary artery disease, rheumatoid arthritis, and diabetes.^{9,11,14} Mental health disorders have been

associated with worse perioperative outcomes after orthopedic surgery, including postoperative psychosis, anemia, infection, and pulmonary embolism.⁵ Such disorders are also related to prolonged hospital length of stay and discharge to a skilled nursing facility rather than to home. After undergoing major spine surgery or lower extremity fracture fixation, those with a preoperative psychiatric diagnosis were more likely to be discharged to a rehabilitation facility.^{19,20} The presence of mental health conditions in total joint arthroplasty is linked to higher hospital charges, higher rates of nonroutine discharge, and an increased comorbidity index.²⁴

In addition to worse perioperative outcomes and greater health care utilization, depression and anxiety may also be related to long-term outcomes such as infection, pain, and disability. Depression and anxiety have been correlated with less improvement in disability and with higher levels of pain in patients undergoing lower limb arthroplasty or major spine surgery.^{12,23,25} Furthermore, patients with depression tend to have higher levels of perceived disability and pain and lower satisfaction after surgery.^{12,25,26} The relationship between pain and mental health may begin to develop in the preoperative period and may continue to influence outcomes postoperatively, because patients with higher levels of anxiety and depression also report worse pain in the preoperative period.²² Higher preoperative depression and anxiety were linked to worse pain relief and lower satisfaction 1 year after hip replacement, regardless of preoperative disease severity.²² Depression may be an independent risk factor for periprosthetic joint infection.^{4,17}

Shoulder arthroplasty is a highly effective intervention, with substantial gains in function, pain relief, and high patient satisfaction.^{1,6} However, pain and function fail to improve above the minimally clinically important difference for approximately 20% of patients undergoing shoulder arthroplasty.² Despite the increase in the number of shoulder arthroplasty procedures being performed, little is known about the relationship between psychiatric illness and clinical outcomes. The prevalence of depression among patients undergoing shoulder arthroplasty was recently estimated to be 12.4%, with the highest rates among women and patients of low socioeconomic status.²¹ Understanding the relationship between mental health, preoperative disability, and postoperative outcomes in patients undergoing shoulder arthroplasty is imperative.

The purpose of this study was to describe the relationship between mental health, preoperative disability, and postoperative outcomes in patients undergoing shoulder arthroplasty. Given the known links between mental health and outcomes in patients with orthopedic conditions, we hypothesized that patients with a diagnosed mental health condition would have higher levels of preoperative disability and less postoperative improvement in pain and function.

Materials and methods

The data were collected prospectively from the institution's shoulder arthroplasty database of patients who underwent anatomic total

shoulder arthroplasty (TSA) or reverse total shoulder arthroplasty (RTSA) with US Food and Drug Administration–approved implants between 2009 and 2015. Three sports medicine and shoulder fellowship-trained surgeons (C.B.M., B.T.F., and A.L.Z.) performed the shoulder arthroplasty operations in this database. Patients from the Orthopedic Sports Medicine clinic were recruited to this study, and informed consent was obtained.

Descriptive data collected included age, sex, body mass index (BMI), and diagnosis. The patient's mental health history was collected by review of the electronic medical record. All patients were screened by the preoperative anesthesia clinic for psychiatric diagnoses as well as the current use of a psychotropic medication for the purposes of treating a psychiatric condition. The mental health diagnoses represented by the study population included depression, mood disorder not otherwise specified (defined as taking prescribed selective serotonin reuptake inhibitor, or serotonin-norepinephrine reuptake inhibitor), anxiety, schizophrenia, and bipolar disorder. These data were entered into a privacy-protected electronic database (Research Electronic Data Capture system; Vanderbilt University, Nashville, TN, USA).

Visual analog scale (VAS), 12-Item Short Form Health Survey (SF-12) version 2 Physical Component Summary (PCS) and Mental Component Summary (MCS) scores, and American Shoulder and Elbow Surgeons (ASES) pain and function scores were recorded preoperatively and at 1 and 2 years postoperatively. Range of motion of the affected shoulder (forward flexion, abduction, external rotation, and internal rotation) and VAS scores were also recorded preoperatively and at 1 and 2 years postoperatively. Range of motion was measured according to the ASES shoulder assessment form with a goniometer by trained research assistants under the supervision of the shoulder arthroplasty surgeons. The hospital length of stay was calculated from the electronic medical record. Patients included in the study had preoperative patient-reported outcome scores and at least 1 year of postoperative follow-up. Primary and revision shoulder arthroplasties were included. Exclusion criteria were patients with a pathologic fracture and malignant lesion.

The ASES and SF-12 scores were determined using the published scoring algorithms for each outcome measure. The ASES score includes pain and function subscales that range from 0 to 50, with lower scores being indicative of worse pain and function. The ASES pain and function subscales were analyzed separately. The SF-12 is a 12-question survey, and each component score ranges from 0 (lowest health level) to 100 (highest level of health). Similarly, the PCS and MCS subscales of the SF-12 survey were used as separate outcomes.

The baseline characteristics of the patients were analyzed using the Mann-Whitney *U* test for continuous variables and the χ^2 test for categorical variables. The primary outcome measures of shoulder range of motion, VAS, SF-12, and ASES scores, and hospital length of stay were analyzed using the Student *t* test for normally distributed data and the Mann-Whitney *U* test for non-normally distributed data. A multivariate mixed-model repeated-measures regression analysis was conducted to control for variables including age, Charlson Comorbidity Index (CCI), BMI, surgery performed on the dominant arm, and smoking. Missing data were multiply imputed to reduce the chance of systematic error. A corrected *P* value of <.05 was considered significant for all tests. Statistical analysis was done using the R programming platform (R Foundation for Statistical Computing, Vienna, Austria).

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