Risk Factors for Development of New-Onset Anxiety and Depression after Sports Medicine Surgeries in Patients 25 Years of Age or Younger

Andrea Heather Johnson, Jane Carol Brennan, Matthew Alan A Peterman, Jacob Offer, David C Lutati, James J York, Benjamin McVay Petre, Daniel Edward Redziniak, Justin Turcotte

INTRODUCTION: Mental health diagnoses are common among adolescents and young adults in the United States. Nearly 50% of adolescents aged 13-18 years and 36% of young adults aged 18-25 years have been diagnosed with a mental illness. While preexisting mental health disorders are known to affect patient outcomes, little research has been done on patients diagnosed with new mental health disorders following orthopedic surgery. Recovery from orthopedic procedures can take a particularly significant toll on the mental health of young patients due to exclusion from sports and usual social activities during recovery. The purpose of this study is to evaluate the incidence of new onset anxiety and depression (NOAD) in younger patients (≤25 years old) undergoing common orthopedic sports medicine procedures, determine the risk factors associated with NOAD and identify which treatments are used in this population.

METHODS:

The PearlDiver Mariner 170 dataset was retrospectively analyzed. All patients included in this study had no prior diagnosis of anxiety disorders or depression prior to one of the following sports procedures: anterior cruciate ligament reconstruction (ACLR), isolated meniscus repair (MR), hip arthroscopy (HA), shoulder instability repair (SIR), rotator cuff repair (RCR), or Achilles tendon repair (ATR). All patients were 25 years of age or younger at the time of surgery and were active in the database for at least 6 months prior to surgery and 1-year postoperatively. The primary outcome of interest was a new diagnosis of anxiety or depression within 1-year postoperatively. For patients with NOAD, utilization rates of antidepressant medication and psychotherapy within 1-year postoperatively were assessed. Univariate analyses (chi-square and independent samples t-tests) were performed to compare demographics, comorbidities, and outcomes across procedures. Multivariate logistic regression was used to assess risk factors for NOAD. A univariate subgroup analysis of diagnoses and mental health treatments received by patients with NOAD was performed. Statistical significance was assessed at $p<0.05$.

RESULTS:

Of the 178,759 patients included in this study, 52.6% underwent ACLR, 8.1% underwent MR, 7.7% underwent HA, 29.3% underwent SIR, 0.7% underwent RCR, and 1.6% underwent ATR.

There were significant differences in age, gender and all comorbidities included across procedure types (all $p<0.001$). Notably, HA had the highest percentage of females (67.8%), and headaches/migraines (27.5%). RCR had the highest percentage of diabetes (2.0%), and tobacco use (4.9%). MR had the highest rate of obesity (8.9%). ATR had the highest rate of alcohol disorders (1.8%), anemia (4.9%) and preoperative opioid use (33.8%).

Overall, 8,900 (5.0%) of patients developed NOAD within 1-year postoperatively. Hip arthroscopy patients had the highest rate of NOAD (8.43%), followed by SIR (5.52%), MR (5.35%), ATR (5.16%) and RCR (5.15%). Patients undergoing ACLR had the lowest rate of NOAD postoperatively (4.11%) (Figure 1).

Logistic regression identified several independent risk factors for development of NOAD. Compared to patients undergoing ACLR, HA patients (OR: 1.81, 95% CI: 1.69 to 1.94; $p<0.001$), SIR patients (OR: 1.49, 95% CI: 1.41 to 1.57; $p<0.001$), MR patients (OR: 1.42, 95% CI: 1.31 to 1.53; $p<0.001$) and ATR patients (OR: 1.26, 95% CI: 1.06 to 1.49; $p=0.009$) were at increased risk of developing NOAD. Older patients (OR: 1.03, 95% CI: 1.02 to 1.04; $p<0.001$), those with higher Charlson Comorbidity Index (CCI) scores (OR: 1.26, 95% CI: 1.21 to 1.301 $p<0.001$), headaches/migraines (OR: 1.29, 95% CI: 1.23 to 1.35; $p<0.001$), obesity (OR: 1.28; 95% CI: 1.18 to 1.38; $p<0.001$), and female patients (OR: 1.83, 95% CI: 1.75 to 1.91; $p<0.001$) were also more likely to develop NOAD. In addition, patients with alcohol disorders (OR: 1.45, 95% CI: 1.22 to 1.71; $p<0.001$), and tobacco use (OR: 2.06, 95% CI: 1.86 to 2.27; $p<0.001$) were at a greater risk of developing NOAD within 1-year postoperatively.

When comparing the NOAD diagnosis type, there were differences in rates of anxiety, depression and both anxiety and depression across procedure type (all $p <0.001$). Isolated anxiety was most common in ATR patients (41.1%) and least common in RCR patients (29.2%). Isolated depression was most common in ACLR patients (19.2%) and least common in HA patients (12.3%). Combined anxiety and depression was most common in RCR patients (52.3%) and least common in ATR patients (41.8%).

When examining postoperative treatments for NOAD, RCR patients had the highest rate of antidepressant medication utilization (61.5%), while HA patients had the highest rate of psychotherapy utilization (26.9%). Conversely, ATR patients had the lowest rate of antidepressant medication utilization (41.8%), and psychotherapy utilization (13.0%).

DISCUSSION AND CONCLUSION:

In this national database study, the incidence of NOAD in the first year after common sports medicine procedures was 5% for patients 25 years of age or younger. Increased age, substance use, comorbidities and undergoing hip arthroscopy were identified as risk factors for NOAD. While these results serve as a first step in identifying the incidence of and risk-

factors for NOAD among young sports medicine patients, further study of both mental health and functional outcomes, prevention, and treatment strategies is required.

Figure 1. Rate of New Onset Anxiety/Depression by Sports Procedure