Long-term Obstructive Sleep Apnea May Lead to Postoperative Complications Following Carpometacarpal Joint Arthroplasty: A Propensity Matched Analysis

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INTRODUCTION: Osteoarthritis (OA) and obstructive sleep apnea (OSA) have been concurrently linked to physiological aging and metabolic dysfunctions. OSA has been identified as a risk factor for postoperative complications following orthopaedic procedures, including total hip arthroplasty and total knee arthroplasty. However, a gap remains in understanding the underlying risk that OSA plays in patients with OA undergoing first carpometacarpal (CMC) joint arthroplasty. Our study aims to identify negative outcomes that may be associated with a long-term diagnosis of OSA in OA patients undergoing CMC arthroplasty. The study hypothesis is that a preoperative diagnosis of OSA for OA patients undergoing CMCJ arthroplasty may have greater risk of negative orthopaedic and clinical outcomes.

METHODS: The TriNetX Global Collaborative Network was queried to identify patients aged 18 years and older who underwent CMC joint arthroplasty for primary OA. Patients were stratified into cohorts based on the presence or absence of a preoperative diagnosis of OSA at any time using International Classification of Disease (ICD), 10th edition codes. Propensity score matching was performed to balance significant differences in demographics and preexisting comorbidities between the groups. The propensity score matched cohorts were then analyzed to identify patients who experienced postoperative complications at 1-3 weeks, 1 month, 3 months, 6 months, 1 year, and 2 years. Odds ratios (OR) and complication rate differences between cohorts for each complication were calculated, and statistical significance was established at <0.05.

RESULTS SECTION: A total sample of n=3,270 patients were included, of which 2,134 (65.3%) were female. OSA patients experienced significantly higher rates of multiple individual pulmonary complications. Hypoxemia was consistently elevated, with rate differences of 0.7% at 3 months ($p = 0.002$), 1.3% at 6 months ($p < 0.0001$), 2.1% at 1 year ($p < 0.0001$), and 2.9% at 2 years ($p < 0.0001$). Pulmonary embolism occurred more frequently in the OSA cohort as well, with rate differences of 0.6% at 6 months ($p = 0.016$), 1.0% at 1 year ($p = 0.001$), and 0.9% at 2 years ($p = 0.017$). Respiratory failure was significantly higher at 2 years, with a rate difference of 1.1% ($p = 0.023$). Pneumonia was significantly greater in the OSA group at 6 months (0.6%, $p = 0.047$) and at 1 year (0.9%, $p = 0.027$). Pulmonary collapse and acute respiratory distress syndrome did not show significant differences at any time point.

Among cardiac complications, OSA patients had higher odds of heart failure at 3 months (OR: 1.32, $p = 0.048$), 6 months (OR: 1.33, $p = 0.014$), and 1 year (OR: 1.23, $p = 0.045$). Arrhythmia was also more likely in the OSA cohort at 6 months (OR: 1.35, $p = 0.019$), 1 year (OR: 1.23, $p = 0.046$), and 2 years (OR: 1.25, $p = 0.009$). The rate of acute myocardial infarction and other cardiac events did not significantly differ between groups. Patients with OSA had significantly higher odds of UTI diagnosis at all time points after 1 week, and cerebral ischemic events at 6 months and 1 year. No significant differences were found for orthopaedic complications such as revision surgery or prosthesis failure.

DISCUSSION: This study demonstrates that OSA patients may be at an elevated risk for postoperative complications following CMC joint arthroplasty. Specifically, patients with OSA experienced higher rates of cardiac and pulmonary complications, urinary tract infections, pulmonary embolism, and stroke or ischemic attacks. These findings highlight the importance of considering OSA as a significant comorbidity when evaluating surgical candidates, given its impact on both postoperative complication rates. Enhanced perioperative screening and risk management for OSA may be warranted to minimize adverse events and improve recovery. Given the nature of the TriNetX database, a few limitations are present in this study. Operative details and management are unavailable on the database, which may impact post-operative outcome risk. TriNetX data is compiled using billing codes and systems, which may hinder complete accuracy of patient characteristics and outcomes.

SIGNIFICANCE/CLINICAL RELEVANCE: Obstructive sleep apnea and osteoarthritis have a greater incidence within elderly populations. Linking these two conditions together in this study helps to identify the possible need for proper surgical management for OSA patients who may be at risk of preventable complications.