

Differential Impact of Nontobacco Nicotine and Tobacco Use on Postoperative Outcomes After Rotator Cuff Repair

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INTRODUCTION: Tobacco use is a well-established risk factor for impaired healing and adverse outcomes following rotator cuff repair (RCR). However, the effects of nontobacco nicotine products—such as e-cigarettes, nicotine pouches, and vapes—remain poorly understood in this surgical population. As the use of these products becomes increasingly widespread, particularly among younger and health-conscious individuals, it is critical to assess their potential impact on surgical recovery. This study aimed to evaluate postoperative complications in patients undergoing RCR who use nontobacco nicotine and to compare outcomes with traditional tobacco users and non-users of nicotine products.

METHODS:

Patients who underwent arthroscopic rotator cuff repair (CPT code 29827) with at least two years of follow-up were identified through using the PearlDiver database. Three separate 1:1 propensity score matching analyses were conducted: nontobacco-nicotine users (n=4,844) were matched to non-nicotine users, tobacco users (n=19,182) were matched to non-nicotine users, and nontobacco-nicotine users (n=4,882) were compared directly to tobacco users (n=4,882).

Matching criteria included age, gender, Charlson Comorbidity Index (CCI), and additional comorbidities to account for baseline differences. Postoperative complications occurring within 90-days of surgery and subsequent revision shoulder surgery within 2-years were compared among the groups. Confounding variables were controlled for using multivariable logistic regression.

RESULTS:

Compared to matched controls, nontobacco nicotine users demonstrated a significantly higher rate of lysis of adhesions (0.7% vs 0.4%; OR 1.95, 95% CI 1.08–3.50; P=0.033). However, there were no significant differences between the two groups in terms of other 90-day medical complications, emergency department (ED) visits, readmissions, or revision surgery.

In contrast, tobacco users, when compared to their matched controls, exhibited significantly increased odds of multiple adverse outcomes, including: AKI (0.7% vs 0.5%; OR 1.53, 95% CI 1.17–2.00; P=0.0019); pneumonia (1.2% vs 0.9%; OR 1.38, 95% CI 1.13–1.68; P=0.002); surgical site infection (1.8% vs 1.4%; OR 1.31, 95% CI 1.11–1.54; P=0.001); ED visits (16.9% vs 12.6%; OR 1.46, 95% CI 1.30–1.64; P<0.001); readmissions (1.5% vs 1.0%; OR 1.47, 95% CI 1.22–1.77; P<0.001); revision surgery (3.5% vs 2.4%; OR 1.43, 95% CI 1.27–1.61; P<0.001); and total shoulder arthroplasty (TSA) (0.8% vs 0.6%; OR 1.30, 95% CI 1.02–1.65; P=0.039).

When directly comparing nontobacco nicotine users to tobacco users, nontobacco nicotine use was associated with: lower risk of pneumonia (0.6% vs 1.2%; OR 0.46, 95% CI 0.30–0.73; P<0.001); fewer ED visits (7.6% vs 11.9%; OR 0.62, 95% CI 0.55–0.70; P<0.001); and reduced readmission rates (0.8% vs 1.6%; OR 0.54, 95% CI 0.37–0.80; P=0.003). There were no significant differences between the two nicotine groups in rates of other complications, including infection, revision surgery, and reoperation.

DISCUSSION AND CONCLUSION: While nontobacco-nicotine use was associated with a modestly increased risk of lysis of adhesions following rotator cuff repair, it did not significantly elevate the risk of major medical complications, infections, or revision surgery when compared to non-nicotine users. In contrast, tobacco users demonstrated consistently worse postoperative outcomes across multiple domains, including higher rates of AKI, pneumonia, surgical site infection, ED visits, readmissions, and revision procedures. Notably, when compared directly to tobacco users, nontobacco nicotine users had significantly lower rates of pneumonia, ED utilization, and readmissions. These findings suggest that although nontobacco nicotine products may not be entirely benign, their perioperative risk profile appears to be less severe than that of traditional tobacco use. Further prospective studies are warranted to evaluate the long-term clinical implications and underlying mechanisms of nicotine exposure in musculoskeletal healing.

