

Stimulant Use is Independently Associated with Infection after Intramedullary Nailing of Tibial Shaft Fractures

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INTRODUCTION: Substance use rates are elevated in the orthopaedic trauma population. The impacts of stimulant use (amphetamines, cocaine, etc.) on surgical outcomes after treatment of long bone fractures have not previously been studied. This study aims to determine the association between stimulant use and complications after intramedullary nail (IMN) stabilization of tibial shaft fractures.

METHODS: A retrospective review was performed (national all claims database) by querying ICD-10 procedure codes for intramedullary fixation of tibial shaft fractures. Demographic data was collected including age, sex, obesity, tobacco use, diabetes, Charlson Comorbidity Index (CCI), and stimulant use. Complications assessed included infection and nonunion. Univariate, multivariate regression, and propensity matched analysis was performed evaluating the association of patient factors with complications.

RESULTS: Of the 19,162 tibial shaft fractures treated with IMN from 2015 to 2020, 1,241 patients (6.5%) had stimulant use disorder listed. Stimulant users were younger, of male sex, and four times more likely to be tobacco users ($p < 0.001$). In closed tibial shaft fractures, stimulant users exhibited a significantly higher rate of infection (6.4% versus 2.6%, $p < 0.001$) and nonunion (4.2% versus 2.6%, $p = 0.01$) compared to non-stimulant users. In multivariate regression using variables diabetes, CCI, tobacco-use, obesity, age, and sex, the stimulant group continued to demonstrate significant increased risk for infection (OR 2.3, CI 1.4-3.8), as did tobacco use (OR 1.7), obesity (OR 1.3), and male sex (OR 1.5). Multivariate regression also demonstrated no significant increase in odds of nonunion with stimulant use (OR 1.4, CI 0.9-2.0) for closed injuries. The infection and nonunion rates remained higher in the stimulant group in all open tibia fractures. However, only infection remained significantly associated with stimulant use after propensity matched analysis: OR 2.3 for closed fracture (CI 1.4-3.9) and OR 2.4 for type I and II open fractures (CI 1.3-3.9). Type III open fractures had a higher infection rate (7.8% overall) regardless of stimulant use but there was no significant difference in rates of infection between the two groups (9.6% in stimulant use group, 7.8% in non-stimulant group, $p = 0.52$).

DISCUSSION AND CONCLUSION: This study demonstrates that stimulant use is independently associated with increased risk of infection after treatment of tibial shaft fractures with IMN. This increased risk is most notable in closed fractures (OR 2.3), as well as Type I and II open injuries (OR 2.4) and dissipates as injuries become higher energy, as there was no significant difference in infection rates in Type III open fractures, which are accompanied by an overall increase in infection rate. While nonunion rates were higher in the stimulant group for all fracture types (closed and open), this increased complication rate failed to reach statistical significance. Given these findings, additional research on the surgical consequences of stimulant use in the biology of bone repair and infection is needed.