

Effect of Non-Tobacco Nicotine Dependence on Postoperative Complications Following Tibial Plateau Fracture Open Reduction and Internal Fixation

Abstract

Introduction:

Non-tobacco nicotine products, including e-cigarettes and nicotine replacement therapies, are increasingly used and often perceived as safer alternatives to traditional tobacco. While nicotine exposure has been associated with impaired wound and bone healing, the impact of non-tobacco nicotine dependence (NTND) on outcomes following tibial plateau fracture fixation remains unclear. This study evaluates postoperative complication rates among NTND patients undergoing open reduction and internal fixation (ORIF) of tibial plateau fractures.

Materials and Methods:

A retrospective cohort study was conducted using the TriNetX federated health research network. Patients who underwent ORIF for tibial plateau fractures between 2005 and 2025 were identified. Patients with NTND were compared with non-users of nicotine (Table 1). Outcomes assessed within 180 days postoperatively included wound disruption, infection, pneumonia, nonunion, sepsis, deep vein thrombosis (DVT), pulmonary embolism (PE), and revision surgery (Table 2). Propensity score matching was performed to control for demographic and comorbidity differences. Odds ratios (ORs) with 95% confidence intervals were calculated, with $p < 0.05$ considered statistically significant.

Results:

After propensity matching, 2,238 patients were included in each cohort. NTND was associated with significantly higher rates of infection (6.5% vs. 4.2%; OR 1.580, $p = 0.001$), wound disruption (4.3% vs. 2.5%; OR 1.715, $p = 0.001$), pneumonia (5.8% vs. 3.3%; OR 1.814, $p < 0.001$), and nonunion (3.5% vs. 1.5%; OR 2.372, $p < 0.001$) at 180 days postoperatively. No significant differences were observed in rates of sepsis, DVT, PE, or revision surgery.

Conclusions:

NTND is associated with increased rates of several postoperative complications, including infection, wound disruption, pneumonia, and nonunion, after ORIF of tibial plateau fractures. These findings suggest that NTND has adverse effects on surgical recovery, warranting consideration in perioperative risk assessment and patient counseling.

Table 1. Patient demographics for propensity-matched cohorts.

Characteristics ^a	NTND (n=2,238)	Non-users (n= 2,238)	p-value
Age	46.0 ± 14.8	46.0 ± 15.9	0.907
BMI	28.6 ± 7.0	29.6 ± 7.0	0.303
<i>Gender</i>			
Male	1,379 (61.6)	1,406 (62.8)	0.405
Female	827 (37.0)	805 (36.0)	0.494
<i>Race</i>			
White	1,569 (70.1)	1,554 (69.4)	0.625
Black	450 (20.1)	484 (21.6)	0.211
Asian	12 (0.5)	13 (0.6)	0.841
Native Hawaiian/Pacific Islander	10 (0.4)	10 (0.4)	1
Native American/Alaskan	22 (1.0)	24 (1.1)	0.611
<i>Ethnicity</i>			
Hispanic or Latino	159 (7.1)	147 (6.6)	0.477
Non-Hispanic or Latino	1,799 (80.4)	1,834 (81.9)	0.181
Unknown	280 (12.5)	257 (11.5)	0.290
^a Data reported as n (%) unless otherwise indicated			

Table 2. Postoperative outcomes at 180 days.

Outcomes ^a	NTND (n=2,238)	Non-users (n=2,238)	Odds Ratio (95% CI)	p-value
Sepsis	44 (2.0)	39 (1.7)	1.131 (0.732, 1.747)	0.58
DVT	92 (4.1)	98 (4.4)	0.936 (0.700, 1.252)	0.656
PE	37 (1.7)	40 (1.8)	0.924 (0.588, 1.450)	0.730
Wound disruption	96 (4.3)	57 (2.5)	1.715 (1.229, 2.393)	0.001
Infection	145 (6.5)	94 (4.2)	1.580 (1.211, 2.063)	0.001
Pneumonia	129 (5.8)	73 (3.3)	1.814 (1.353, 2.432)	<0.001
Revision surgery	71 (3.2)	91 (4.1)	0.773 (0.564, 1.060)	0.109
Nonunion	79 (3.5)	34 (1.5)	2.372 (1.580, 3.561)	<0.001
Legend: DVT: deep vein thrombosis; PE: pulmonary embolism				
^a Data reported as n (%) unless otherwise indicated				
p-values in bold are statistically significant (p<0.05)				