

Impact of Smoking on Postoperative Outcomes of Syndesmotic Fixations: An ACS NSQIP Analysis 2008-2016

Zenab Jamil, Ryan Kong, Juhayer S Alam, Husain Poonawala, Eugene J Dolphin, Eric N Windsor, Dillion Sedaghatpour¹, Gregory Penny², Jaime A Uribe

¹SUNY Downstate, ²SUNY Downstate Medical Center

INTRODUCTION: Currently in the United States, there are approximately 34 million adults who smoke, and roughly half of these people suffer from complications related to it. Due to this prevalence, it is important to assess the demographics of patients who smoke and analyze the implications of smoking in common orthopaedic procedures, such as syndesmotic fixations. The objective of this study is to highlight the impact of smoking on syndesmotic fixations postoperatively and call attention to important risk factors.

METHODS: The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database was used in conjunction with CPT codes between 2008 and 2016 for syndesmotic fixations (CPT code 27829) in order to query data for the study. Patients were then divided into two main categories consisting of subjects who engage in smoking and those who do not smoke. 1:1 propensity score matching was also utilized to control for gender, age, and estimated probability of mortality. In addition, 30-day postoperative outcomes, patient demographics, and comorbidities were compiled. Furthermore, univariate analysis and multivariate logistic regression models controlling for gender, age, and estimated probability of morbidity were incorporated to analyze the risk factors for postoperative complications.

RESULTS: A total of 3358 patients were included in the study, and of those 3358 patients, 2471 were non-smokers while 887 smoked regularly. 778 patients were isolated by using 1:1 propensity score match in order to account for covariates and create a well-balanced dataset. Amongst the study participants, 1002 (63.6%) participants were male while 574 (36.4%) were female. Additionally, while participants from multiple racial backgrounds were included, a majority of the participants were White (977 patients, 62.0%). On average, patient age was recorded to be 38.6 years while the BMI was found to be 32.3 kg/m². After the surgery, 76 (4.8%) patients experienced adverse events, 52 (3.3%) patients had postoperative complications, and 31 (2.0%) patients had wound complications. Moreover, 33 (2.1%) patients required readmission while 32 (2.0%) patients needed reoperation. Smokers had a significantly lower BMI when compared to non-smokers (31.7 vs. 32.9; p=0.004). Additionally, when looking at comorbidities, patients who smoke tend to have higher rates of chronic obstructive pulmonary disease (3.8% vs. 1.3%; p=0.001) but lower rates of diabetes (6.6% vs. 9.4%; p=0.041) than non-smokers. While analyzing postoperative outcomes, it was discovered that smokers tend to have significantly higher rates of postoperative complications (4.2% vs. 2.4%; p=0.048), readmission (3.0% vs. 1.1%; p=0.008), and reoperation (3.2% vs. 0.9%; p=0.001) (Table 1). Multivariate logistic regression models demonstrated that patients who smoke had higher rates of adverse events (OR 1.7 [1.0 - 2.9]; p=0.034) and postoperative complications (OR 2.1 [1.1 - 3.9]; p=0.020) (Table 2). Furthermore, smokers showcased higher rates of readmission (OR 2.9 [1.3 - 6.3]; p=0.009) and reoperation (OR 4.0 [1.6 - 9.6]; p=0.002) (Table 2).

DISCUSSION AND CONCLUSION: Smoking is a risk factor for a multitude of issues, such as postoperative complications and adverse events. Furthermore, it is associated with higher rates of readmission, reoperation, and comorbidities like chronic obstructive pulmonary disease. Due to these complications, it is important to further investigate and research the possible side effects and comorbidities amongst patients who smoke to ensure positive outcomes while carrying out procedures including but not limited to syndesmotic fixations.

Postoperative Outcomes	Non-Smokers N (%)	Smokers N (%)	P-value
Adverse Events	30 (3.8%)	46 (5.8%)	0.060
Any Postoperative Complication	19 (2.4%)	33 (4.2%)	0.048
Wound Complications	11 (1.4%)	20 (2.5%)	0.103
Superficial SSI	3 (0.4%)	8 (1.0%)	0.130
Deep SSI	0 (0.0%)	5 (0.6%)	0.062
Wound Dehiscence	1 (0.1%)	5 (0.6%)	0.102
Bleeding requiring Transfusion	7 (0.9%)	4 (0.5%)	0.364
Pulmonary Complications	4 (0.5%)	7 (0.9%)	0.364
Pneumonia	1 (0.1%)	4 (0.5%)	0.374
Pulmonary Embolism	2 (0.3%)	2 (0.3%)	1.000
Failure to Wean	1 (0.1%)	1 (0.1%)	1.000
Unplanned Intubation	1 (0.1%)	1 (0.1%)	1.000
Renal Complications	2 (0.3%)	5 (0.6%)	0.452
Progressive Renal Insufficiency	0 (0.0%)	0 (0.0%)	1.000
Acute Renal Failure	0 (0.0%)	2 (0.3%)	0.500
Urinary Tract Infection	2 (0.3%)	4 (0.5%)	0.687
Neuro Complications (CVA/Stroke)	1 (0.1%)	1 (0.1%)	1.000
Cardiac Complications	2 (0.3%)	2 (0.3%)	1.000
Cardiac Arrest	0 (0.0%)	0 (0.0%)	1.000
Myocardial Infarction	0 (0.0%)	0 (0.0%)	1.000
DVT/Thrombophlebitis	2 (0.3%)	2 (0.3%)	0.1000
Sepsis-Related Complications	0 (0.0%)	3 (0.4%)	0.250
Sepsis	0 (0.0%)	0 (0.0%)	1.000
Septic Shock	0 (0.0%)	1 (0.4%)	1.000
Organ/Space SSI	0 (0.0%)	3 (0.4%)	0.250
Readmission	9 (1.1%)	24 (3.0%)	0.008
Reoperation	7 (0.9%)	25 (3.2%)	0.001
Mortality	1 (0.1%)	0 (0.0%)	1.000

Table 1: Rate of Adverse Postoperative Outcomes Between Patients Who Smoke and Don't Smoke

Postoperative Outcomes	Univariate OR (95% CI)	P-value	Multivariate OR (95% CI)	P-value
Adverse Events	1.6 (1.0 – 2.5)	0.062	1.7 (1.0 – 2.9)	0.034
Any Postoperative Complication	1.8 (1.0 – 3.1)	0.051	2.1 (1.1 – 3.9)	0.020
Wound Complications	1.8 (0.8 – 3.9)	0.108	2.1 (1.0 – 4.7)	0.062
Superficial SSI	2.7 (0.7 – 10.2)	0.146	2.8 (0.7 – 10.8)	0.131
Deep SSI	-	-	-	-
Wound Dehiscence	5.0 (0.6 – 43.1)	0.141	5.6 (0.6 – 50.4)	0.125
Bleeding requiring Transfusion	0.6 (0.2 – 2.0)	0.370	0.8 (0.2 – 3.2)	0.731
Pulmonary Complications	1.8 (0.5 – 6.0)	0.370	2.3 (0.6 – 8.5)	0.231
Pneumonia	4.0 (0.4 – 36.0)	0.214	7.8 (0.5 – 105.5)	0.120
Pulmonary Embolism	1.0 (0.1 – 7.1)	0.995	1.0 (0.1 – 7.3)	0.988
Failure to Wean	1.0 (0.1 – 16.0)	1.000	1.5 (0.04 – 67.5)	0.822
Unplanned Intubation	1.0 (0.1 – 16.0)	1.000	2.6 (0.1 – 81.8)	0.596
Renal Complications	2.5 (0.5 – 13.0)	0.272	5.6 (0.7 – 46.8)	0.113
Progressive Renal Insufficiency	-	-	-	-
Acute Renal Failure	-	-	-	-
Urinary Tract Infection	2.0 (0.4 – 11.0)	0.423	4.2 (0.5 – 35.5)	0.181
Neuro Complications (CVA/Stroke)	1.0 (0.1 – 16.0)	1.000	1.4 (0.1 – 26.4)	0.816
Cardiac Complications	1.0 (0.1 – 7.1)	1.000	1.1 (0.2 – 8.1)	0.916
Cardiac Arrest	-	-	-	-
Myocardial Infarction	-	-	-	-
DVT/Thrombophlebitis	1.0 (0.1 – 7.1)	1.000	1.1 (0.2 – 8.1)	0.916
Sepsis-Related Complications	-	-	-	-
Sepsis	-	-	-	-
Septic Shock	-	-	-	-
Organ/Space SSI	-	-	-	-
Readmission	2.7 (1.3 – 5.9)	0.011	2.9 (1.3 – 6.3)	0.009
Reoperation	3.7 (1.6 – 8.5)	0.003	4.0 (1.6 – 9.6)	0.002
Mortality	-	-	-	-

Table 2: Odd Ratios of Postoperative Complications in Patients Who Smoke and Don't Smoke