

While Cannabis Use Alone Does Not Increase Perioperative Complications and Two Year Surgical Complications after Ankle and Hindfoot Arthrodesis, Combined Use with Tobacco Worsens Outcomes Compared to Tobacco Alone

Alejandro Miguel Holle, Nathan Chad Beckett, Jose M. Iturregui, Jack Haglin¹, Todd Alan Kile²

¹Mayo Clinic, ²Mayo Clinic Arizona

INTRODUCTION: Ankle and hindfoot arthrodesis are commonly performed procedures to relieve pain and improve function in patients with debilitating joint disease. While the influence of factors like cigarette smoking on surgical outcomes is well-documented, the impact of cannabis use remains poorly understood. Given the increasing prevalence of cannabis consumption and its potential effects on postoperative complications, this study aimed to investigate the association between cannabis use and postoperative outcomes following ankle and hindfoot arthrodesis.

METHODS: A retrospective cohort study using a large national insurance database from 2010 to 2022 was conducted. All patients who underwent ankle or hindfoot arthrodesis for osteoarthritis with at least two years follow up were included. For patients who underwent multiple procedures, only the first instance was used. Patients were divided into 4 groups: cannabis only users, tobacco only users, cannabis and tobacco users, and non-user controls. Groups were matched 1:4 with non-user controls based on demographics and comorbidities. Also, both cannabis and tobacco users were matched 1:4 with tobacco only users based on demographics and comorbidities. Medical complications within 90 days of surgery and surgery specific complications within 2 years were compared between groups. Multivariable logistic regressions, controlling for any demographic variable or comorbidity statistically significant between groups, were used to compare complications. A Bonferroni correction was applied, and statistical significance was set to $p \leq 0.005$.

RESULTS: After applying exclusion criteria, there were 61,705 ankle or hindfoot arthrodesis patients eligible for analysis. Of these, there were 380 (0.62%) that used cannabis only, 25,774 (42%) that used tobacco only, and 2,299 (3.7%) that used both cannabis and tobacco. Compared to non-user controls, cannabis users were not at increased risk of 90-day medical complications or 2-year surgical complications. Tobacco use was associated with increased risk of postoperative admission (OR: 1.32; 95% CI: 1.21-1.43, $p < 0.001$) and emergency department (ED) utilization (OR: 1.57; 95% CI: 1.48-1.66, $p < 0.001$) within 90 days as well as infection (OR: 1.24; 95% CI: 1.18-1.30, $p < 0.001$), hardware removal (OR: 1.12; 95% CI: 1.07-1.18, $p < 0.001$), nonunion (OR: 1.33; 95% CI: 1.27-1.40, $p < 0.001$), and wound dehiscence (OR: 1.38; 95% CI: 1.27-1.49, $p < 0.001$) within 2 years of surgery compared to non-user controls. Similarly, compared to non-user controls, people who used both tobacco and cannabis had an increased risk of postoperative admissions (OR: 1.43; 95% CI: 1.16-1.76, $p < 0.001$) and ED visits (OR: 2.86; 95% CI 2.51-3.27, $p < 0.001$) within 90 days as well as infection (OR: 1.72; 95% CI: 1.51-1.97, $p < 0.001$), hardware removal (OR: 1.24; 95% CI: 1.08-1.42, $p = 0.002$), nonunion (OR: 1.90; 95% CI: 1.64-2.20, $p < 0.001$), and wound dehiscence (OR: 1.86; 95% CI: 1.52-2.27, $p < 0.001$) within 2 years of surgery. Compared to tobacco only use, combined cannabis and tobacco use was associated with increased risk of ED visits within 90 days (OR: 1.45; 95% CI: 1.30-1.62, $p < 0.001$) and nonunion within 2 years of surgery (OR: 1.19; 95% CI 1.05-1.35, $p = 0.005$).

DISCUSSION AND CONCLUSION: Cannabis use alone was not associated with increased odds of perioperative complications or 2-year surgical complications compared to non-user controls. However, its combined use with tobacco was associated with increased adverse outcomes, including higher ED utilization and rates of nonunion compared to tobacco alone. These findings suggest that while cannabis use alone may not exacerbate postoperative risk, it may enhance the negative effect of tobacco use on postoperative outcomes.

Table 1. Demographic Variables and Comorbidity Characteristics of Each Cohort

Comorbidities	Cannabis (n=380)	Control (n=1,520)	Tobacco (n=25,114)	Control (n=33,250)	Both Tobacco and Cannabis (n=2,291)	Control (n=8,776)
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
Age (SD)	39.5 (17.7)	39 (18.0)	55.8 (13.4)	54.2 (17.6)	44.3 (13.1)	43.3 (19.0)
Male	214 (56.3)	861 (56.6)	12487 (49.7)	13427 (40.4)	1293 (56.3)	4887 (55.7)
Female	166 (43.7)	659 (43.4)	12627 (50.3)	19823 (59.6)	1001 (43.6)	3889 (44.3)
Etiology (SD)	3.83 (3.65)	3.57 (3.51)	4.53 (3.44)	3.44 (3.15)	5.53 (3.94)	5.02 (4.08)
Alcohol Abuse	101 (26.6)	93 (6.1)	3789 (15.1)	1467 (4.4)	1099 (47.9)	568 (6.5)
CKD	52 (13.7)	221 (15.2)	5744 (22.9)	6655 (20.0)	413 (18.0)	2070 (23.6)
COPD	133 (35.0)	51 (33.6)	12502 (49.8)	10718 (32.2)	1300 (56.7)	3522 (40.1)
CHF	25 (6.6)	103 (6.8)	2627 (10.5)	2787 (8.4)	167 (7.3)	1028 (11.7)
CAO	52 (13.7)	240 (15.8)	8818 (35.1)	8258 (24.8)	620 (27.0)	2130 (24.2)
Obesity	198 (52.1)	816 (53.7)	14703 (58.5)	17073 (51.3)	1232 (53.7)	4776 (54.6)
Diabetes	123 (32.4)	454 (29.9)	12148 (48.4)	13861 (41.7)	985 (42.9)	3679 (41.9)
RA	20 (5.3)	81 (5.3)	2299 (9.2)	2816 (8.5)	158 (6.9)	889 (10.0)
HTN	211 (55.5)	825 (54.3)	20559 (81.9)	23998 (72.2)	1681 (73.3)	5760 (65.6)

*EC: Elixhauser Comorbidity Index, CKD: Chronic Kidney Disease, COPD: Chronic Obstructive Pulmonary Disease, CHF: Congestive Heart Failure, CAO: Coronary Artery Disease, RA: Rheumatoid Arthritis, HTN: Hypertension

Table 2. Ankle and Hindfoot Arthrodesis 90-Day Medical and Two-Year Joint Complications

	Cannabis (n=380)	Control (n=1,520)	Tobacco (n=25,114)	Control (n=33,250)	Both Tobacco and Cannabis (n=2,291)	Control (n=8,776)
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
90 Day Medical Complications						
Cardiac Arrest	0 (0)	<11	<100 (0.4)	14 (0.04)	17 (0.05)	0.81 (0.38-1.71)
PE	0 (0)	<11	<100 (0.4)	14 (0.04)	17 (0.05)	0.81 (0.38-1.71)
DVT	<11	19 (1.3)	1,000 (4.0)	330 (1.3)	404 (1.2)	0.96 (0.82-1.13)
Pneumonia	<11	<11	2,222 (8.8)	338 (1.3)	328 (1.0)	1.05 (0.89-1.23)
AKI	<11	19 (1.3)	1,222 (4.8)	533 (2.1)	507 (1.5)	1.08 (0.95-1.24)
UTI	<11	27 (1.8)	634 (2.5)	817 (2.5)	59 (0.2)	0.91 (0.64-1.20)
Admission	17 (4.5)	57 (3.8)	1,044 (4.1)	1,458 (4.4)	1,285 (3.6)	1.32 (1.21-1.45)
ED Visits	13 (3.4)	103 (6.8)	1,044 (4.1)	1,458 (4.4)	1,285 (3.6)	1.57 (1.48-1.66)
2-year Joint Complications						
Infection	53 (13.9)	198 (13.0)	1,044 (4.1)	1,458 (4.4)	1,285 (3.6)	1.24 (1.18-1.30)
Hardware removal	82 (21.3)	307 (20.2)	1,044 (4.1)	1,458 (4.4)	1,285 (3.6)	1.12 (1.07-1.18)
Nonunion	42 (11.1)	161 (10.6)	1,044 (4.1)	1,458 (4.4)	1,285 (3.6)	1.33 (1.27-1.40)
Wound Dehiscence	23 (6.1)	51 (3.4)	1,044 (4.1)	1,458 (4.4)	1,285 (3.6)	1.38 (1.27-1.49)

* PE: Pulmonary Embolism, DVT: Deep Vein Thrombosis, AKI: Acute Kidney Injury, UTI: Urinary Tract Infection, ED: Emergency Department, <11 indicates that there were between 1-10 patients as **PainDx** does not report on groups <11 patients for patient privacy concerns. Bold indicates statistical significance ($p < 0.005$).