Effect of Cannabis Use Disorder on Total Shoulder Arthroplasty Outcomes

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Purpose

Cannabis use has been legalized for recreational use in eighteen states since 2012, with legalization expected to occur in additional states in the future[1]. Existing studies have found Cannabis Use Disorder (CUD) to be associated with increased incidence of perioperative complications in lower extremity arthroplasty[2]. However, studies examining CUD following total shoulder arthroplasty (TSA) are limited. **The aim of this study was to evaluate the effect of comorbid CUD on 2-year revision and 90-day postoperative outcomes in primary TSA for osteoarthritis.**

Materials and Methods

A **retrospective study** was designed using the PearlDiver Patient Records Database. Data was queried from the Mariner dataset, which includes over 121 million patient records from 2010-2020. **CPT, ICD-9, and ICD-10 codes were used to identify patients** undergoing TSA for the indication of osteoarthritis and were divided into a CUD and control group. **The primary outcomes of interest were 2-year all-cause revision, 90-day hospital readmission, and 90-day emergency department visit.** Surgical perioperative complications investigated included PJI, periprosthetic fracture, mechanical loosening, articular bearing surface wear, broken prosthesis, and prosthetic dislocation. **Univariate analysis and multivariable logistic regression were used to analyze the data.**

Results

A total of N=114,947 patients undergoing TSA were identified. The CUD cohort contained N=510 patients and the control cohort contained N=114,437 patients. **When controlled for comorbidities, there were no statistically significant differences in 2-year revision outcomes. Multivariable results also showed no association with 90-day medical or surgical complications**[2], with the exception of 90-day presentation to an Emergency Department.

Discussion

Our results showed that CUD is not an independent risk factor for 2-year revision surgery, nor is it independently associated with adverse 90-day medical or surgical complications. The results of this research expands the literature on TSA and comorbid substance use. Further, our findings can assist orthopedic surgeons in counseling patients regarding CUD as a risk factor for complications of TSA.

Table 1. Demographic comparison of patients undergoing TSA for primary osteoarthritis with and without a comorbid diagnosis of Cannabis Use Disorder (CUD)

Group	Number of Patients		
Total	114947		
Cannabis Use Disorder	510		
Control	114437		
Demographic Risk Factor	**CUD**	**Control**	
	Mean (years)	*Mean (years)*	*p-value**
Age	59.7	68.8	<0.02
	Prevalence	*Prevalence*	*p-value**
Male Gender	**60.8%**	**40.5%**	**<0.02**
Coronary Artery Disease	28.8%	32.8%	
Hyperlipidemia	77.3%	80.7%	
Congestive Heart Failures	12.8%	16.3%	
Cardiac Arrhythmia	35.5%	36.9%	
Valvular Disorder	18.4%	22.1%	
Pulmonary Circulation Disorder	5.9%	7.6%	
Peripheral Vascular Disease	18.6%	22.1%	
Uncomplicated Hypertension	**61.4%**	**68.0%**	**<0.02**
Paralysis	2.9%	2.3%	
Neurological Disorder	**13.7%**	**8.3%**	**<0.02**
Chronic Pulmonary Disorder	**36.5%**	**31.4%**	**<0.02**
Diabetes Mellitus	27.5%	30.9%	
Hypothyroidism	25.3%	27.2%	
Chronic Kidney Disease	15.7%	18.5%	
Peptic Ulcer Disease	1.8%	1.8%	
Lymphoma	1.4%	1.5%	
Metastatic Cancer	4.1%	3.9%	
Solid Tumor Without Metastasis	17.7%	19.8%	
Rheumatoid Arthritis and Collagen Disorders	19.2%	18.0%	
Coagulopathy	15.5%	14.1%	
Fluid and Electrolyte Disorder	**38.6%**	**30.3%**	**<0.02**
Blood Loss Anemia	5.7%	4.8%	
Deficiency Anemia	19.4%	16.6%	
Drug Abuse	**69.2%**	**4.8%**	**<0.02**
Psychosis	**10.0%**	**3.4%**	**<0.02**
Depression	**55.7%**	**31.8%**	**<0.02**
Tobacco Smoking and Nicotine Dependence	**12.0%**	**2.3%**	**<0.02**
Obesity (BMI>30)	**23.9%**	**19.3%**	**<0.02**
Alcohol Abuse	**4.7%**	**0.9%**	**<0.02**
Opioid Abuse	**28.0%**	**4.7%**	**<0.02**
Cocaine Abuse	**10.0%**	**0.2%**	**<0.02**
Amphetamines Abuse	**6.3%**	**0.2%**	**<0.02**
Hallucinogens Abuse	**0.8%**	**0.0%**	**<0.02**

*p-values determined by chi-squared test, demographic risk factors with p>0.02 were omitted in multivariable logistic regression

Figure 1. Univariate analysis of long term (2-year) and 90-Day outcomes

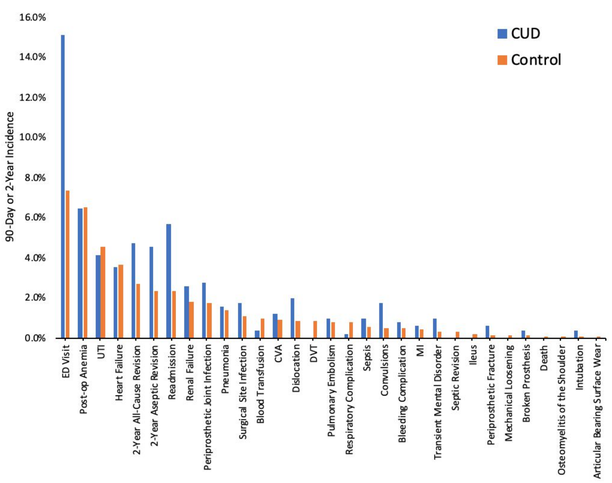

Table 2. Univariate analysis of long term (2-year) and 90-Day outcomes

Outcome	CUD	Control	
	Incidence	*Incidence*	*p-value**
2-Year Outcomes			
All-Cause Revision	**4.7%**	**2.7%**	**<0.01**
Septic Revision	0.0%	0.3%	
Aseptic Revision	**4.5%**	**2.4%**	**<0.01**
Periprosthetic Joint Infection	2.8%	1.8%	
90-Day Outcomes			
ED Visit	**15.1%**	**7.4%**	**<0.001**
Readmission	**5.7%**	**2.3%**	**<0.001**
Periprosthetic Fracture	0.6%	0.2%	
Mechanical Loosening	0.0%	0.2%	
Broken Prosthesis	0.4%	0.1%	
Articular Bearing Surface Wear	0.0%	0.0%	
Dislocation	**2.0%**	**0.9%**	**<0.05**
Surgical Site Infection	1.8%	1.1%	
Renal Failure	2.6%	1.8%	
Post-op Anemia	6.5%	6.5%	
Arrhythmia with Afib	**5.5%**	**9.2%**	**<0.01**
Arrhythmia without Afib	3.5%	4.8%	
Blood Transfusion	0.4%	1.0%	
Death	0.0%	0.1%	
DVT	0.0%	0.8%	
Heart Failure	3.5%	3.7%	
Pulmonary Embolism	1.0%	0.8%	
Pneumonia	1.6%	1.4%	
Respiratory Complication	0.2%	0.8%	
Sepsis	1.0%	0.6%	
CVA	1.2%	0.9%	
UTI	4.1%	4.6%	
Bleeding Complication	0.8%	0.5%	
MI	0.6%	0.4%	
Transient Mental Disorder	**1.0%**	**0.3%**	**<0.05**
Osteomyelitis of the Shoulder	0.0%	0.1%	
Convulsions	**1.8%**	**0.5%**	**<0.001**
Intubation	**0.4%**	**0.1%**	**<0.05**
Ileus	0.0%	0.2%	

*p-values determined by chi-squared test, insignificantly different outcomes (p>0.05) were omitted in multivariable logistic regression

Table 3. Multivariable logistic regression analysis* of long term (2-year) and 90-Day outcomes

Outcome			
	Odds Ratio	*p-value*	*GOF test p-value***
2-Year Outcomes			
2-Year Revision	0.975	0.909	0.004
2-Year Aseptic Revision	1.137	0.567	0.006
90-Day Outcomes			
ED Visit	1.373	**0.018**	0.04
Readmission	1.439	0.076	**0.203**
Arrhythmia with Afib	0.752	0.162	0.005
Transient Mental Disorder	1.585	0.336	**0.119**
Convulsions	1.707	0.167	**0.513**
Intubation	1.689	0.498	**0.133**
Dislocation	1.259	0.497	**0.329**

* Performed for significant univariate outcomes with p<0.05, included demographic risk factors with p<0.02 in analysis

** For the Hosmer and Lemeshow goodness of fit test, p-values >0.05 indicate that the model is acceptable, with higher p-values indicating a better fit

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1. National Conference of State Legislatures. State Medical Cannabis Laws. https://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx
2. Vakharia RM, Mannino A, Salem HS, Roche MW, Wong CHJ, Mont MA. The association between cannabis use disorder and the outcome following primary total hip arthroplasty : analysis of a nationwide administrative claims database. *Bone Joint J*. 2021;103-B(7 Supple B):111-115.