

Depressive Disorders are Associated with Higher Rates of Complications, Readmissions, and Episode of Care Costs following Knee Arthroscopy

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INTRODUCTION:

The World Health Organization (WHO) has postulated that depressive disorders (DD) will be the leading cause of morbidity and mortality by the end of this decade. Currently, large sample sized studies evaluating the association of DD following knee arthroscopy (KA) have been limited. Therefore, the aims of this study were to utilize an administrative claims database to determine whether patients who have DD undergoing KA have higher rates of: 1) medical complications; 2) readmissions; and 3) costs of care.

METHODS:

A retrospective level III case-control study using a large private claims database was queried from January 1, 2010 to October 31, 2020. Patients and cohorts of interest were identified using International Classification of Disease, Ninth Revision (ICD-9), ICD-10, and Current Procedural Terminology (CPT) codes. The inclusion criteria for the study group consisted of patients who underwent KA with DD; whereas patients without the psychiatric comorbidity served as the comparison group. Patients who were taking selective serotonin reuptake inhibitors (SSRIs) were excluded from the investigation, as studies have shown consuming these pharmacological agents can be associated with worse outcomes following orthopaedic surgical procedures.

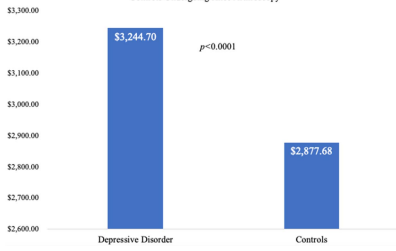
To minimize confounding bias within the investigation, study group patients were 1:5 ratio matched to the comparison cohort based on age, sex, and the following comorbidities – coronary artery disease, diabetes mellitus, general anxiety disorder, hypertension, obesity – defined as a body mass index greater than 30 kilograms per meter squared – and tobacco use. Primary aims of the study were to compare frequency of 90-day medical complications, 90-day readmission rates, and 90-day episode of care costs between the study and matched cohort. Reimbursements were used as a surrogate for costs, as done in previously published studies. Ninety-days was chosen to be compliant with the bundled payment care initiative (BPCI) set in place by the Centers for Medicare and Medicaid Services (CMS). Logistic regression analyses were used to calculate the odds-ratios (OR) and 95% confidence intervals (95%CI) on the association of DD on medical complications and readmission rates. Welch's *t*-test was used to test for significance on the episode of care costs between the two cohorts. Due to the ease of finding statistical significance with large database studies, a Bonferroni-correction was performed. Thus, a *p*-value less than 0.001 was considered to be statistically significant.

RESULTS:

The query yielded 836,504 patients within the study (*n* = 139,443) and comparison cohort (*n* = 697,061). Matching was successful as there was no statistical difference between the two cohorts (Table 1). DD patients undergoing KA were found to have significantly higher frequency and odds of developing adverse events within 90-days following their surgical procedure (19.14 vs. 2.93%; OR: 7.85, *p*<0.0001). Study group patients were found to have significantly higher rates and odds of developing acute kidney injuries (2.55 vs. 0.22%; OR: 11.75, *p*<0.0001), pneumoniae (3.47 vs. 0.34%; OR: 10.50, *p*<0.0001), transfusions of blood products (0.60 vs. 0.60%; OR: 10.04, *p*<0.0001), cerebrovascular accidents (1.29 vs. 0.18%; OR: 7.36, *p*<0.0001), in addition to other adverse events (Table 2). DD patients were also found to have significantly higher incidence of being readmitted within 90-days (1.47 vs. 1.04%; OR: 1.42, *p*<0.0001). Similarly, study group patients had significantly higher episode of care costs compared to their matched counterparts (\$3,244.70 vs. \$2,877.68, *p*<0.0001)(Figure 1).

DISCUSSION AND CONCLUSION: As the prevalence of DD continues to increase within the United States, there is a proportionate rise in the utilization of KA. After adjusting for baseline covariates, this investigation of over 836,000 patients demonstrates patients with DD undergoing KA have higher rates of medical complications, readmission rates, and costs of care within 90-days following their surgical procedure. Future studies should stratify the severity of DD and analyze the association of the condition on the dependent variables assessed within this investigation. The current study is vital as it can allow orthopaedic surgeons and other healthcare professionals to educate these patients of the potential complications which may occur following their procedure.

Figure 1. Comparison of Ninety-Day Costs Between Depressive Disorder and Controls Undergoing Knee Arthroscopy



Demographics	Depressive Disorder		Control		p-value
	n	%	n	%	
Age					0.99
5 to 9	81	0.06	397	0.06	
10 to 14	1,300	0.93	6,503	0.93	
15 to 19	5,828	4.18	29,131	4.18	
20 to 24	3,246	2.33	16,210	2.33	
25 to 29	3,400	2.44	16,953	2.43	
30 to 34	4,861	3.49	24,279	3.48	
35 to 39	6,979	5.00	34,877	5.00	
40 to 44	10,680	7.66	53,403	7.66	
45 to 49	15,397	11.04	76,969	11.04	
50 to 54	19,902	14.27	99,521	14.28	
55 to 59	21,274	15.26	106,374	15.26	
60 to 64	18,604	13.34	93,009	13.34	
65 to 69	13,234	9.49	66,160	9.49	
70 to 74	11,165	8.01	55,839	8.01	
75 to 79	3,320	2.38	16,592	2.38	
80<	168	0.12	826	0.12	
Sex					0.99
Female	70,992	50.91	354,903	50.91	
Male	68,451	49.09	342,158	49.09	
Comorbidities					
CAD	25,892	18.57	129,390	18.56	0.99
Diabetes Mellitus	43,520	31.21	217,546	31.21	0.98
GAD	17,167	12.31	85,763	12.30	0.99
Hypertension	84,269	60.43	421,280	60.44	0.97
Obesity	52,365	37.55	261,725	37.55	0.99
Tobacco Use	40,375	28.95	201,780	28.95	0.99

Table 1. Comparison of Baseline Comorbidities Among Depressive Disorder and Case-Matched Cohort Undergoing Knee Arthroscopy. CAD = Coronary Artery Disease; GAD = General Anxiety Disorder

Medical Complication	DD (%)	Control (%)	OR	95%CI	p-value
Acute Kidney Injuries	2.55	0.22	11.75	11.07 – 12.48	<0.0001
Pneumoniae	3.47	0.34	10.50	9.99 – 11.03	<0.0001
Transfusions of Blood Products	0.60	0.06	10.04	8.92 – 11.28	<0.0001
Cerebrovascular Accidents	1.29	0.18	7.36	6.84 – 7.91	<0.0001
Urinary Tract Infections	7.15	1.11	6.84	6.63 – 7.05	<0.0001
Myocardial Infarctions	0.48	0.08	6.29	5.61 – 7.05	<0.0001
Deep Vein Thromboses	0.70	0.13	5.47	5.00 – 5.99	<0.0001
Venous Thromboemboli	1.33	0.33	4.01	3.78 – 4.27	<0.0001
Pulmonary Emboli	0.75	0.22	3.43	3.17 – 3.71	<0.0001
Surgical Site Infections	0.84	0.26	3.27	3.03 – 3.52	<0.0001
Total Medical Complications	19.14	2.93	7.85	7.70 – 8.00	<0.0001

Table 2. Ninety-Day Medical Complications Among Depressive Disorder Patients and Controls Undergoing Knee Arthroscopy
DD = Depressive Disorder
OR = Odds-Ratio
95%CI = 95% Confidence Interval