



Psychiatric disorders increase complication rate after primary total knee arthroplasty



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ABSTRACT

Background: Psychiatric disease is difficult to screen preoperatively and the incidence of mental health disorders in patients undergoing total knee arthroplasty (TKA) may be underappreciated. The purpose of this study is to evaluate the perioperative complication profile in patients with psychiatric disorders.

Methods: A search of the entire Medicare database from 2005 to 2011 was performed to identify patients who underwent primary TKA with bipolar disorder (20,972), depression (187,448), and schizophrenia (7607). A cohort of 1,271,464 patients as controls with minimum 2.5-year follow-up. Medical and surgical complications at 30-days, 90-days, and overall were compared between the two cohorts.

Results: Patients with any psychiatric disease were more likely to be younger (age < 65 OR 5.5, $p < 0.001$), female (OR 2.61, $p < 0.001$), and more medically complex (significant increase in 28/28 Elixhauser medical comorbidities, $p < 0.05$). There was a significant increase ($p < 0.001$) in 11/14 (78.5%) of recorded postoperative medical complication rates at 90-days. There was a statistically significant increase in periprosthetic infection (OR 2.17 $p < 0.001$), periprosthetic fracture (OR 2.40, $p < 0.001$), revision TKA (OR 2.06, $p < 0.001$), and extensor mechanism rupture (OR 2.41, $p < 0.001$) at 90 day and overall time points.

Conclusions: Patients with psychiatric disorders who undergo elective primary TKA have significantly increased medical and surgical complication rates in the global period and short term follow-up. An ideal screening tool is yet to be determined and these patients need to be counseled appropriately regarding the increased complication rates before proceeding with TKA.

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1. Introduction

Total knee arthroplasty (TKA) is the superior treatment to increase pain relief and functional ability in debilitating knee arthritis [1]. With the “bundle of care” era approaching, hospital and surgeon reimbursements will be based on complication rates and readmissions. Critical patient selection and evaluation of modifiable comorbidities will be essential to achieve the best outcome for patients. Depression and psychiatric disease (PD) have been previously associated with increased complications after total joint replacement and may be more prevalent than traditionally reported [2–7].

However, there are no studies reporting the medical and surgical complications associated with psychiatric disease after TKA in the global period (first 90 days after surgery) and short-term follow-up. Understanding the effect of this comorbidity on perioperative morbidity

after TKA may help surgeons identify those at risk. The purpose of this study is to evaluate the medical and surgical complication profiles at 30 day, 90 day, and minimum two year follow-up in patients undergoing TKA with pre-existing psychiatric disease. The authors hypothesize that these patients will have an increased risk of medical and surgical complications.

2. Methods

A retrospective review of 100% of the Medicare database was performed from 2005 to 2011 using PearlDiver Technologies (West Conshohocken, PA). All patients who underwent primary TKA with coexisting bipolar disorder, depression, or schizophrenia during the study period with minimum two-year follow-up were included. These patients were identified using both the corresponding International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) procedure code V43.64 and Current Procedural Terminology (CPT) code 27447. The ICD-9 diagnosis codes for the relevant psychiatric diseases were bipolar (296.0, 296.40 to 296.89), depression (296.2 to

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296.3), and schizophrenia (295.00 to 2.5.95). Patients with total hip arthroplasty (THA), coexisting substance abuse disorders (SUD), and revision total knee arthroplasty were excluded. The control group was defined as patients who underwent TKA and did not carry a diagnosis of psychiatric diseases. Using relevant ICD-9-CM and CPT codes, the rates of various postoperative complications that occurred within 30 days, within 90 days, and overall were evaluated. Comorbidities of the various groups were identified based on the Elixhauser comorbidity index [8]. Incidence (IN), odds-ratios (OR), and 95% confidence intervals (CI) were calculated. Statistical analysis was performed using Chi-squared test and two-sided Fischer's exact test for categorical variables. A p value of less than 0.05 indicated statistical significance. No funding was provided for this study. This study was exempt from institutional review board (IRB) approval at our institution as no protected health information (PHI) was included for review.

3. Results

Overall, 216,027 patients were identified with a preexisting psychiatric disease including bipolar (20,972), depression (187,448), and schizophrenia (7607) compared to 1,271,464 controls (Table 1). Patients with any psychiatric disease were more likely to be younger (age < 65, OR 5.5, p < 0.001), female (OR 2.61, p < 0.001), and more medically complex (significant increase in 28/28 Elixhauser medical comorbidities, p < 0.05). The incidence of depression in patients undergoing TKA during the study period was 14.7%.

At the 30 day time point, patients with any psychiatric disease had a significant increase in 11/14 (78.5%) of the recorded medical complications (Table 2) and 10/11 (90.9%) of the recorded surgical complications including bleeding complications (OR 1.19, p < 0.001), cellulitis/seroma (OR 1.80, p < 0.001), and wound complications overall (OR 2.18, p < 0.001, Table 2).

At the 90 day time point, there was a significant increase in 10/14 (71.4%) recorded medical complications including deep venous thrombosis (DVT, OR 1.28, p < 0.001), pulmonary embolism (PE, OR 1.31, <0.001), respiratory failure (OR 2.14, p < 0.001), acute renal failure (ARF, OR 1.57, p < 0.001), stroke (OR 1.86, p < 0.001), pneumonia (PNA, OR 1.80, p < 0.001), sepsis (OR 1.85, p < 0.001), postoperative anemia (OR 1.26, p < 0.001), and need for blood transfusion (OR 1.17, p < 0.001, Figure 1).

During this time there was also a significant increase 6/8 (75.0%) recorded surgical complications including periprosthetic infection (PJI, OR 2.17, p < 0.001), periprosthetic fracture (OR 2.40, p < 0.001), TKA revision (OR 2.06, p < 0.001), need for arthroscopy/irrigation and debridement (I&D, OR 1.35, p < 0.001), patellar complications (OR 2.30, p < 0.001), and extensor mechanism rupture (OR 2.41, p < 0.001). Manipulation under anesthesia (MUA) was significantly decreased in the PD group compared to control (OR 0.91, p < 0.001) and there was no difference in polywear (OR 1.31, p = 0.053).

Finally, at the overall time point there was a significant increase in 6/7 (85.7%) recorded surgical complications including periprosthetic infection (OR 1.92, p < 0.001), periprosthetic fracture (OR 1.80, p < 0.001), TKA revision (OR 1.69, p < 0.001), need for irrigation and debridement (OR 1.52, p < 0.001), patellar complications (OR 2.22, p < 0.001), and extensor mechanism rupture (OR 2.20, p < 0.001, Figure 2). Only osteolysis/polywear was not significant (OR 1.05, p = 0.337). There were no differences in complications rates between the individual psychiatric diagnoses.

4. Discussion

The results of the current study support the hypothesis that patients with preoperative psychiatric disease have an increase in medical and surgical complications. The realization that roughly 18% of patients are dissatisfied after their total knee replacement [9–11] has generated

Table 1
Patient demographics.

	Control		Psychiatric disease	
Gender				
Female	756,939	59.53%	154,749	78.62%
Male	496,894	39.08%	39,355	19.99%
Unknown	25,745	2.02%	3729	1.89%
Age				
Less than 65	78,059	6.14%	51,938	26.39%
65–69	353,995	27.84%	42,436	21.56%
70–74	338,177	26.60%	43,717	22.21%
75–79	291,199	22.90%	33,150	16.84%
80–84	173,994	13.68%	19,439	9.88%
85 and over	66,523	5.23%	7352	3.74%
Unknown	25,745	2.02%	3729	1.89%
Total cohort size	1,271,464		216,027	

Table 2

Medical and surgical complications at 30 day time point. IN, incidence; OR, odds ratio; CI, confidence interval; MI, myocardial infarction; Afib, atrial fibrillation; DVT, deep venous thrombosis; PE, pulmonary embolism; PNA, pneumonia; SIRS, systemic inflammatory response syndrome; MUA, manipulation under anesthesia; TKA, total knee arthroplasty; I&D, irrigation and debridement.

30-Day Complication (medical)	Control		Any psychiatric disease			
	IN		IN	OR	CI	p-Value
MI	1.61%		1.46%	0.90	0.86–0.94	<0.001
Heart failure	4.71%		7.35%	1.61	1.57–1.64	<0.001
Arrhythmia without Afib	7.24%		6.56%	0.90	0.88–0.92	<0.001
Arrhythmia with Afib	15.24%		13.47%	0.87	0.85–0.88	<0.001
Respiratory failure	0.61%		1.25%	2.07	1.97–2.17	<0.001
DVT	2.73%		3.32%	1.22	1.18–1.25	<0.001
PE	1.16%		1.45%	1.25	1.2–1.30	<0.001
Stroke	0.53%		0.94%	1.78	1.69–1.87	<0.001
PNA	1.59%		2.68%	1.71	1.65–1.76	<0.001
Sepsis/SIRS	0.51%		0.89%	1.75	1.65–1.84	<0.001
Acute renal failure	2.51%		3.75%	1.51	1.47–1.55	<0.001
Postoperative anemia	23.81%		28.11%	1.25	1.23–1.26	<0.001
Blood transfusion	22.57%		25.35%	1.17	1.15–1.18	<0.001
Suicide/self Injury	<0.001%		0.02%	62.03	24.69–155.80	<0.001

30-Day Complication (surgical)	Control		Any psychiatric disease			
	IN		IN	OR	CI	p-Value
Bleeding complications	1.51%		1.79%	1.19	1.14–1.23	<0.001
Cellulitis or seroma	2.72%		4.79%	1.8	1.75–1.84	<0.001
Wound complications	0.56%		1.22%	2.18	2.08–2.28	<0.001
MUA	0.48%		0.37%	0.77	0.71–0.83	<0.001
Periprosthetic infection	0.60%		1.25%	2.08	1.98–2.17	<0.001
Periprosthetic fracture	0.09%		0.20%	2.20	1.96–2.47	<0.001
Osteolysis/polywear	0.02%		0.03%	1.34	0.99–1.79	0.052
TKA revision	0.29%		0.57%	2.01	1.88–2.15	<0.001
Arthroscopy/I&D	1.08%		1.35%	1.26	1.21–1.32	<0.001
Patellar complications	0.12%		0.26%	2.16	1.95–2.39	<0.001
Extensor mechanism rupture	0.10%		0.23%	2.18	1.95–2.42	<0.001

further investigation into the influence of preoperative psychiatric disease on outcomes when mechanical, infectious, or radiographic causes have been ruled out [2]. Depression is one of the most common mental

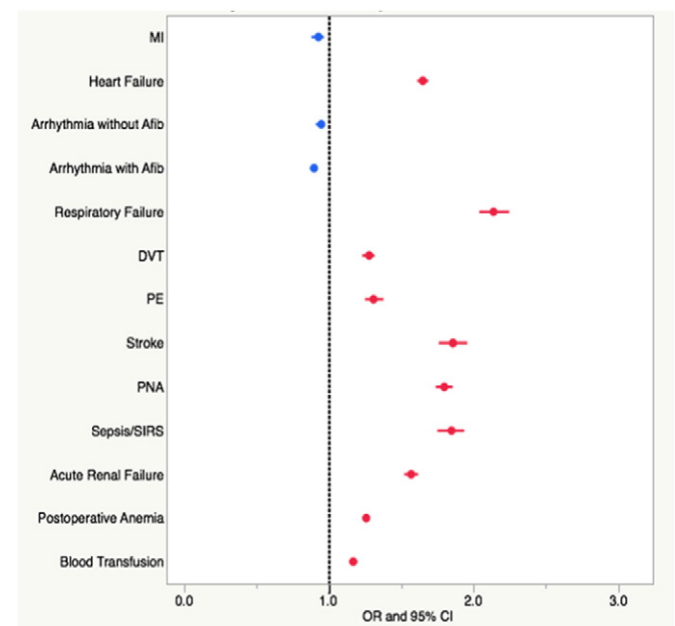


Figure 1. Forest plot comparing medical complications at 90 days between any psychiatric disease (PD) cohort and control. Blue lines indicate complication is significantly decreased, black lines indicate no statistical difference, and red lines indicate that the complication is statistically increased in the combined PD cohort. MI, myocardial infarction; Afib, atrial fibrillation; DVT, deep venous thrombosis; PE, pulmonary embolism; PNA, pneumonia, SIRS, systemic inflammatory response syndrome.

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