Patients Who Have Depressive Disorder Undergoing Primary Total Hip Arthroplasty for Femoral Neck Fractures Have Longer In-Hospital Lengths of Stay and Higher Rates of Complications and Costs of Care

Ivan Golub[1], Rushabh Vakharia[1], Charles Conway, Chaim Miller, Kevin Kang[2]
[1]Maimonides Medical Center, [2]Maimonides Bone & Joint Center

INTRODUCTION:

According to the World Health Organization (WHO), depressive disorders (DD) is suspected to become the leading cause of morbidity and mortality by the end of this decade. Per an epidemiological investigation, DD is shown to be the most prevalent in patients older than the age of 65. Currently, large sample sized studies evaluating the association of DD on outcomes following primary total hip arthroplasty (THA) for the treatment of femoral neck fractures has not been evaluated. As such, the aims of this study were to determine whether patients who have DD undergoing primary THA for femoral neck fractures have worse outcomes compared to a comparison cohort. Specifically, this study evaluated: 1) in-hospital lengths of stay (LOS); 2) medical complications; and 3) costs of care.

METHODS:

Using a large nationwide administrative claims database, a retrospective level III case-control study from January 1st, 2010 to October 31st, 2020 was performed. 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 primary THA for the treatment of femoral neck fractures within 48 hours following the injury with a concomitant diagnosis of DD; whereas patients undergoing surgical fixation for these hip fractures without DD served as the comparison cohort. To minimize potential confounding, study group patients were 1:5 ratio matched to the comparison cohort by age, sex, and the following comorbidities: general anxiety disorder, diabetes mellitus, hyperlipidemia, hypertension, obesity, and tobacco use – commonly encountered comorbidities in patients who have DD. Primary aims of the study were to compare in-hospital LOS, 90-day medical complications, in addition to day of surgery and total global 90-day episode of care costs. Medical complications assessed between the cohorts included: acute kidney injuries, cerebrovascular accidents, deep vein thromboses, myocardial infarctions, pneumoniae, pulmonary emboli, respiratory failures, surgical site infections, and venous thromboemboli. For comparing costs, reimbursements were used as a surrogate as it is a more accurate representation of what providers are paid from the insurance companies. Pearson's Chi-Square Analyses were used to compare baseline demographics of the matched cohorts. Logistic regression analyses were used to calculate the odds-ratios (OR) and respective 95% confidence intervals (95%CI) on the association of DD on 90-day medical complications. Welch's *t*-tests were used to compare both in-hospital LOS and costs of care between the cohorts. Due to the ease of finding statistical differences with large administrative datasets, a Bonferroni-correction was performed. Thus a *p*-value less than 0.003 was considered to be statistically significant.

RESULTS:

The query yielded 40,466 patients within the study (n = 6,758) and comparison cohort (n = 33,708). Matching was successful as there was no statistical difference between the two cohorts and the matching parameters utilized (Table 1). The study showed DD patients undergoing primary THA for femoral neck fractures had significantly longer in-hospital LOS (6- vs. 5-days, $p<0.0001$) compared to their counterparts. Additionally, study group patients were found to have significantly higher rates and odds (60.62 vs. 21.31%; OR: 2.03, $p<0.0001$) of developing complications within 90-days following the index procedure such as pneumoniae (14.50 vs. 4.12%; OR: 2.73, $p<0.0001$), cerebrovascular accidents (7.32 vs. 2.26%; OR: 2.39, $p<0.0001$), respiratory failures (10.28 vs. 3.09%; OR: 2.37, $p<0.0001$), acute kidney injuries (11.38 vs. 3.89%; OR: 1.99, $p<0.0001$), myocardial infarctions (3.17 vs. 1.21%; OR: 1.83, $p<0.0001$) in addition to other adverse events (Table 2). DD patients undergoing primary THA for the treatment of femoral neck fractures incurred significantly higher day of surgery ($14,492.48 vs. 14,238.01, $p=0.036$) and total global 90-day episode of care costs ($21,382.40 vs. $19,781.79, $p<0.0001$).

DISCUSSION AND CONCLUSION:

After adjusting for baseline covariates this investigation of over 40,000 patient demonstrates patients who have DD undergoing primary THA for the treatment of femoral neck fractures have significantly longer in-hospital LOS, in addition to higher rates of complications and healthcare costs. Future studies should stratify the severity of DD on postoperative complications in patients undergoing primary THA for the treatment of femoral neck fractures. The study is vital as it can be utilized by orthopaedic surgeons and other healthcare professionals to adequately educate these patients on the potential outcomes following their surgical procedure.

Demographics	Depressive Disorder		Comparison Cohort		
	n	%	n	%	*p*-value
Age (Years)					0.99
<64	304	4.50	1,508	4.47	
65 to 69	831	12.30	4,151	12.31	
70 to 74	982	14.53	4,886	14.50	
75 to 79	1,299	19.22	6,474	19.21	
80 to 84	1,482	21.93	7,403	21.96	
85<	1,860	27.52	9,286	27.55	
Sex					0.99
Female	4,667	69.06	23,311	69.16	
Male	2,091	30.94	10,397	30.84	
Comorbidities					
GAD	62	0.92	284	0.84	0.99
Diabetes Mellitus	2,131	31.53	10,614	31.49	0.97
Hyperlipidemia	4,028	59.60	20,091	59.60	0.99
Hypertension	5,890	87.16	29,371	87.13	0.98
Obesity	190	2.81	916	2.72	0.99
Tobacco	956	14.15	4,743	14.07	0.96

Table 1. Baseline Demographics of the Matched Cohorts Undergoing Primary Total Hip Arthroplasty for Femoral Neck Fractures With and Without Depressive Disorders.
GAD = General Anxiety Disorder

Medical Complications	DD (%)	Controls (%)	OR	95%CI	*p*-value
Pneumoniae	14.50	4.12	2.73	2.49 – 2.99	<0.0001
Cerebrovascular Accidents	7.32	2.26	2.39	2.12 – 2.70	<0.0001
Respiratory Failures	10.28	3.09	2.37	2.13 – 2.63	<0.0001
Acute Kidney Injuries	11.38	3.89	1.99	1.80 – 2.20	<0.0001
Myocardial Infarctions	3.17	1.21	1.83	1.53 – 2.18	<0.0001
Surgical Site Infections	3.11	1.36	1.68	1.41 – 1.99	<0.0001
Pulmonary Emboli	1.64	0.69	1.58	1.24 – 2.00	0.0001
Deep Vein Thromboses	4.31	2.16	1.57	1.36 – 1.81	<0.0001
Venous Thromboemboli	4.91	2.53	1.53	1.33 – 1.75	<0.0001
Total Medical Complications	60.62	21.31	2.03	1.92 – 2.14	<0.0001

Table 2. Comparison of Ninety-Day Medical Complications Among Patients With and Without Depressive Disorder Undergoing Primary Total Hip Arthroplasty for Femoral Neck Fractures
DD = Depressive Disorder; OR = Odds-Ratios; 95%CI = 95% Confidence Interval