Impact of Congestive Heart Failure on Postoperative Outcomes of Primary Total Hip Arthroplasty: A NSQIP Analysis between 2008 and 2016

Shuyang Scott Liu, Jared Newman, Ryan Kong, Juhayer S Alam, Benjamin Krasnyanskiy, FAISAL ELALI, Jack Jing Zhou, Aditya V Maheshwari[1], Qais Naziri[2]
[1]SUNY Downstate Medical Center, [2]SUNY DOWNSTATE MEDICAL CENTER

INTRODUCTION: Total hip arthroplasty (THA) is a commonly performed procedure, particularly in elderly patients. A common comorbidity is congestive heart failure (CHF), however there is a paucity of data on the impact of CHF on postoperative THA outcomes. This study aims to identify patient demographics and postoperative outcomes in patients undergoing THA with comorbid CHF.

METHODS: The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database was queried via CPT codes between 2008 and 2016 for patients undergoing THA (CPT code 27130). CHF status was identified via the "HXCHF" variable in the database. 1:1 propensity score match controlling for age, gender, BMI, and estimated probability of morbidity. Patient demographics, 30-day postoperative outcomes, and comorbidities were collected. Univariate analysis was used to make comparison between the two groups and binary logistic regression models were used to identify congestive heart failure as a risk factor for adverse postoperative outcomes.

RESULTS: A total of 139,786 patients that underwent THA between 2008 and 2016 were identified (491 with CHF, 139,295 without CHF). Using 1:1 propensity score matching, 408 patients with and without CHF were identified. Some 55.2% of patients were female, 89.3% were white, and average patient age was 64.8 ± 11.6 years old. Average body mass index (BMI) was 30.1 ± 6.4. In total, 16,489 (11.8%) patients had diabetes, 186,635 (13.3%) smoked, 78,661 (56.3%) had hypertension requiring medication, and 28,924 (20.7%) had anemia. A total of 18,024 (12.9%) patients had a postoperative complication, most commonly a wound complication (15,008 patients, 10.7%) followed by renal complications (1,678, 1.2%). In total, 4,444 (3.2%) were readmitted and 2,537 (1.8%) required reoperation. There was a 0.3% mortality rate. Patients with CHF undergoing THA were more likely to have an extended length of hospital stay (5.3 vs. 4.0 days; p<0.001), be younger (72.5 vs. 75.5 years; p<0.001), and be ASA class III or IV (94.0% vs. 90.2%; p=0.011). They were also more likely to have COPD (p=0.021), receive dialysis (p=0.012), or have a bleeding disorder (p<0.001). Patients with CHF were more likely to experience any postoperative complication (p=0.009), most commonly cardiac complications (p=0.025), followed by sepsis related complications (p=0.012), deep surgical site infection (SSI) (p=0.038), and pneumonia (p=0.043) (Table 1). They were also at increased risk for readmission (p=0.047), reoperation (p=0.001), and mortality (p=0.011) (Table 1). Using binary logistic regression, CHF was found to be an independent predictor of higher risk for deep SSI (OR 8.1 [1.0-65.4]; p=0.049), cardiac complications (OR 2.6 [1.1-6.4]; p=0.031), readmission (OR 1.6 [1.0-2.6]; p=0.048), reoperation (OR 3.4 [1.6-7.3]; p=0.002), and mortality (OR 3.9 [1.3-11.7]; p=0.017) (Table 2).

DISCUSSION AND CONCLUSION: CHF was found to increase risk of multiple postoperative complications, alongside readmission and reoperation. It was also found to correlate to an increased risk of mortality. This needs to be taken into account when planning to perform a THA on a patient with CHF, and the risk factors need to be explained in depth preoperatively.

Postoperative Outcomes	No CHF N (%)	CHF N (%)	P-Value
Adverse Events	119 (29.2%)	157 (38.5%)	0.005
Any Postoperative Complication	103 (25.2%)	137 (33.6%)	0.009
Wound Complications	83 (20.3%)	103 (25.2%)	0.095
Superficial SSI	3 (0.7%)	3 (0.7%)	1.000
Deep SSI	1 (0.2%)	8 (2.0%)	0.038
Wound Dehiscence	0 (0.0%)	2 (0.5%)	0.499
Bleeding Requiring Transfusion	79 (19.4%)	97 (23.8%)	0.126
Pulmonary Complications	8 (2.0%)	17 (4.2%)	0.068
Pneumonia	4 (1.0%)	12 (2.9%)	0.043
Pulmonary Embolism	3 (0.7%)	2 (0.5%)	1.000
Failure to Wean (Ventilator > 48 hours)	1 (0.2%)	4 (1.0%)	0.373
Unplanned Intubation	1 (0.2%)	5 (1.2%)	0.217
Renal Complications	15 (3.7%)	17 (4.2%)	0.718
Progressive Renal Insufficiency	0 (0.0%)	4 (1.0%)	0.124
Acute Renal Failure	1 (0.2%)	3 (0.7%)	0.312
Urinary Tract Infection	14 (3.4%)	11 (2.7%)	0.542
Neuro Complications (CVA/Stroke)	0 (0.0%)	3 (0.7%)	0.249
Cardiac Complications	7 (1.7%)	18 (4.4%)	0.025
Cardiac Arrest	2 (0.5%)	6 (1.5%)	0.287
Myocardial Infarction	2 (0.5%)	10 (2.5%)	0.020
DVT/Thrombophlebitis	3 (0.7%)	2 (0.5%)	1.000
Sepsis-Related Complications	3 (0.7%)	13 (3.2%)	0.012
Sepsis	1 (0.2%)	6 (1.5%)	0.123
Septic Shock	1 (0.2%)	3 (0.7%)	0.312
Organ/Space SSI	1 (0.2%)	6 (1.5%)	0.123
Readmission	32 (7.8%)	49 (12.0%)	0.047
Reoperation	9 (2.2%)	29 (7.1%)	0.001
Mortality	4 (1.0%)	15 (3.7%)	0.011

Table 1: Rate of Adverse Postoperative Outcomes Between the CHF and non-CHF Cohorts.

Postoperative Outcomes	OR (95% CI)	P-Value
Adverse Events	1.5 (1.1 - 2.0)	0.005
Any Postoperative Complication	1.5 (1.1 - 2.0)	0.009
Wound Complications	1.3 (1.0 - 1.8)	0.096
Superficial SSI	1.0 (0.2 - 5.0)	1.000
Deep SSI	8.1 (1.0 - 65.4)	0.049
Wound Dehiscence	-	-
Bleeding Requiring Transfusion	1.3 (0.9 - 1.8)	0.126
Pulmonary Complications	2.2 (0.9 - 5.1)	0.074
Pneumonia	3.1 (1.0 - 9.6)	0.054
Pulmonary Embolism	0.7 (0.1 - 4.0)	0.656
Failure to Wean (Ventilator > 48 hours)	4.0 (0.4 - 36.2)	0.213
Unplanned Intubation	5.1 (0.6 - 43.4)	0.140
Renal Complications	1.1 (0.6 - 2.3)	0.718
Progressive Renal Insufficiency	-	-
Acute Renal Failure	3.0 (0.3 - 29.1)	0.340
Urinary Tract Infection	0.8 (0.4 -1.7)	0.543
Neuro Complications (CVA/Stroke)	-	-
Cardiac Complications	2.6 (1.1 - 6.4)	0.031
Cardiac Arrest	3.0 (0.6 - 15.1)	0.176
Myocardial Infarction	5.1 (1.1 - 23.4)	0.036
DVT/Thrombophlebitis	0.7 (0.1 - 4.0)	0.656
Sepsis-Related Complications	4.4 (1.3 - 15.7)	0.021
Sepsis	6.1 (0.7 - 50.7)	0.096
Septic Shock	3.0 (0.3 - 29.1)	0.340
Organ/Space SSI	6.1 (0.7 - 50.7)	0.096
Readmission	1.6 (1.0 - 2.6)	0.048
Reoperation	3.4 (1.6 - 7.3)	0.002
Mortality	3.9 (1.3 - 11.7)	0.017

Table 2: Odd Ratios of Postoperative Complications in Those with CHF Compared to Those Without.