

Early Complications After Total Hip Arthroplasty Are Associated With Increased Risk of Contralateral Hip Fracture: A Retrospective Study of Frailty-Associated Outcomes

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INTRODUCTION: Total hip arthroplasty (THA) is a widely performed and successful procedure, particularly in older adults. However, a devastating and underexplored outcome following THA is the occurrence of a subsequent contralateral hip fracture, which is associated with substantial morbidity and mortality. Frailty, often underrecognized in standard risk stratification, is a known predictor of postoperative complications and may underlie susceptibility to future fractures. Early postoperative complications may serve as measurable proxies for frailty. This study investigates whether early complications within 90 days of primary THA are associated with increased risk of subsequent contralateral femoral neck or pertrochanteric fractures.

METHODS: A retrospective matched cohort study was performed using the TriNetX US Research Network, which aggregates electronic health records from over 100 institutions. Patients undergoing primary THA between 2010 and 2020 were included and required to have a minimum of two years of follow-up. Patients who sustained a contralateral femoral neck or pertrochanteric fracture within five years were identified via ICD-10 codes and operative management criteria. These patients were matched 1:1 to controls who underwent THA in the same time period but did not sustain any hip fracture during follow-up. Propensity score matching accounted for demographics, BMI, and comorbidities including osteoporosis, anemia, malnutrition, dementia, depression, and cardiovascular disease. Early postoperative complications occurring within 90 days of THA were evaluated using ICD-10 and CPT codes. These included periprosthetic joint infection, myocardial infarction, stroke, liver failure, DVT, PE, sepsis, wound disruption, transfusion, anemia (including hemoglobin <8 g/dL), and venous thromboembolism (VTE). Risk ratios (RRs) with 95% confidence intervals (CIs) were calculated.

RESULTS:

In the femoral neck cohort (n=2636 per group), patients who later sustained a contralateral fracture had significantly higher rates of early complications. Periprosthetic fracture occurred in 2.4% vs 0.4% (RR 6.30, CI 3.24–12.25, p<0.001), joint infection in 2.0% vs 0.7% (RR 3.00, CI 1.74–5.18, p<0.001), and sepsis in 1.7% vs 0.7% (RR 2.50, CI 1.45–4.31, p=0.001). Cardiovascular and hepatic complications were more common: myocardial infarction (1.9% vs 0.6%, RR 3.19, p<0.001), liver failure (3.8% vs 1.4%, RR 2.68, p<0.001), and stroke (2.2% vs 0.9%, RR 2.57, p<0.001). DVT and PE occurred more frequently (2.7% vs 1.7%, RR 1.59; 2.0% vs 1.0%, RR 2.00, respectively). Hematologic complications were elevated, including transfusion (6.7% vs 2.2%, RR 3.03, p<0.001), acute posthemorrhagic anemia (18.3% vs 7.6%, RR 2.41), and hemoglobin <8 g/dL (27.2% vs 11.5%, RR 2.37). All differences were statistically significant. In the pertrochanteric cohort (n=1119 per group), similar trends were observed. Periprosthetic fracture was more frequent in the fracture group (8.2% vs 0.9%, RR 9.39, p<0.001), as were transfusion (5.6% vs 2.4%, RR 2.33, p<0.001), and acute posthemorrhagic anemia (17.2% vs 9.0%, RR 1.90, p<0.001). Hemoglobin <8 g/dL was seen in 28.9% of fracture patients vs 12.0% of controls (RR 2.42, p<0.001). Stroke (2.0% vs 0.9%, RR 2.20) and DVT (2.4% vs 1.3%, RR 1.93) were also significantly elevated. While several complications did not reach statistical significance, the overall pattern mirrored that of the femoral neck cohort.

DISCUSSION AND CONCLUSION: Patients who later sustained a contralateral hip fracture demonstrated significantly higher rates of early postoperative complications following primary THA, particularly those related to infection, cardiovascular compromise, thromboembolism, anemia, and transfusion. These findings support the use of early postoperative complications as surrogate markers of frailty and systemic vulnerability. Recognition of such patterns may allow for improved identification of high-risk patients and the implementation of targeted interventions to prevent future fragility fractures. Future research should investigate whether early optimization strategies in patients with high complication burdens can reduce the risk of contralateral fractures and improve long-term arthroplasty outcomes.

Table 1: Ninety-Day Postoperative Outcomes Following Primary Total Hip Arthroplasty in Patients With vs Without Subsequent Contralateral Femoral Neck Fracture

Outcome	THA + Femoral Neck Fra (n = 2636)	THA + No Contralat Fx (n = 2636)	Relative Risk (RR)	95% CI	p-value
Periprosthetic Fracture	63 (2.4%)	10 (0.4%)	6.3	(3.24-12.25)	<0.001
Periprosthetic Joint Infection	51 (2.0%)	17 (0.7%)	3	(1.74-5.18)	<0.001
Sepsis	45 (1.7%)	18 (0.7%)	2.5	(1.45-4.31)	0.001
Myocardial Infarction	51 (1.9%)	16 (0.6%)	3.19	(1.82-5.57)	<0.001
Liver Failure	99 (3.8%)	37 (1.4%)	2.68	(1.84-3.89)	<0.001
Stroke	59 (2.2%)	23 (0.9%)	2.57	(1.59-4.14)	<0.001
DVT	70 (2.7%)	44 (1.7%)	1.59	(1.1-2.31)	0.014
PE	54 (2.0%)	27 (1.0%)	2	(1.26-3.16)	0.003
Postop Infection (general)	50 (1.9%)	15 (0.6%)	3.33	(1.88-5.92)	<0.001
Wound Disruption	28 (1.1%)	18 (0.7%)	1.56	(0.86-2.81)	0.139
Transfusion	176 (6.7%)	58 (2.2%)	3.03	(2.27-4.06)	<0.001
Acute Posthemorrhagic Anemia	482 (18.3%)	200 (7.6%)	2.41	(2.06-2.82)	<0.001
All Anemia Codes	873 (33.1%)	413 (15.7%)	2.11	(1.91-2.35)	<0.001
Hemoglobin < 8	718 (27.2%)	303 (11.5%)	2.37	(2.1-2.68)	<0.001
VTE	113 (4.3%)	65 (2.5%)	1.74	(1.29-2.35)	<0.001

Table 2: Ninety-Day Postoperative Outcomes Following Primary Total Hip Arthroplasty in Patients With vs Without Subsequent Contralateral Ptertrochanteric Hip Fracture (n = 1,119 each)

Outcome	THA + Ptertrochanteric Fracture (n = 1119)	THA + No Fx (n = 1119)	Relative Risk (RR) (95% CI)	p-value
Periprosthetic Fracture	92 (8.2%)	10 (0.9%)	9.39 (4.92-17.95)	<0.001
Periprosthetic Joint Infection	17 (1.5%)	11 (1.0%)	1.56 (0.74-3.32)	0.243
Sepsis	10 (0.9%)	10 (0.9%)	1.00 (0.42-2.39)	1
Myocardial Infarction	15 (1.3%)	10 (0.9%)	1.50 (0.68-3.33)	0.315
Liver Failure	34 (3.0%)	18 (1.6%)	1.89 (1.07-3.32)	0.025
Stroke	22 (2.0%)	10 (0.9%)	2.20 (1.05-4.62)	0.033
DVT	27 (2.4%)	14 (1.3%)	1.93 (1.02-3.66)	0.04
PE	18 (1.6%)	15 (1.3%)	1.20 (0.61-2.37)	0.599
Postop Infection (general)	19 (1.7%)	10 (0.9%)	1.90 (0.89-4.07)	0.093
Wound Disruption	18 (1.6%)	10 (0.9%)	1.80 (0.84-3.88)	0.128
Transfusion	63 (5.6%)	27 (2.4%)	2.33 (1.50-3.63)	<0.001
Acute Posthemorrhagic Anemia	192 (17.2%)	101 (9.0%)	1.90 (1.52-2.38)	<0.001
All Anemia Codes	343 (30.6%)	187 (16.7%)	1.83 (1.57-2.15)	<0.001
Hemoglobin < 8	324 (28.9%)	134 (12.0%)	2.42 (2.01-2.91)	<0.001
VTE	40 (3.6%)	28 (2.5%)	1.43 (0.89-2.30)	0.139