

Title: Cirrhosis Confers Increased Risk Following Total Knee Arthroplasty: A National Database Study of Liver Disease

Introduction: Liver disease is a common comorbidity in patients undergoing total knee arthroplasty (TKA), but research into its effects on surgical outcomes remains limited. As such, we sought to evaluate the impact of liver disease on postoperative outcomes following TKA.

Methods: Primary TKA patients were identified using CPT codes in Premier Healthcare Database (PHD), a national deidentified inpatient dataset. Patients were divided into cohorts based on the presence or absence of liver disease as determined by ICD-10 codes within 365 days prior to surgery. Outcomes included readmissions, reoperations, and common postoperative complications (e.g. PJI, DVT, PE, etc.). Adjusted odds ratios (aORs) were estimated using multivariable logistic regression controlling for age, sex, race, ethnicity, insurance status, and comorbidity burden (Elixhauser Comorbidity Index). A subgroup analysis stratified patients with liver disease based on the presence or absence of cirrhosis.

Results: The analysis yielded 1,221,357 TKA patients from 2016 to 2022, 15,744 of whom had liver disease. Patients with liver disease had increased odds of readmissions (aOR=1.62 [1.52-1.71]) and reoperations (aOR=1.63 [1.49-1.79]) as well as significantly increased rates of PJI (aOR=1.58 [1.42-1.75]), DVT (aOR=1.58 [1.42-1.75]), and PE (aOR=1.73 [1.40-2.15]) even after adjusting for covariates (all $p < 0.001$) (**Table 1**). The sub-analysis included 3,142 patients with cirrhotic liver disease and 12,602 patients with non-cirrhotic liver disease. Patients with cirrhosis were more likely to report readmission (aOR=1.80 [1.58–2.03]), reoperation (aOR=2.27 [1.89–2.74]), and PJI (aOR=1.67 [1.34-2.09]) (all $p < 0.001$) (**Table 2**). However, there were no significant differences in select complications like DVT (aOR=1.11 [0.81–1.54], $p=0.513$) and stroke (aOR=0.38 [0.12–1.18], $p=0.095$).

Discussion: Liver disease is associated with increased postoperative complications following TKA, with cirrhosis conferring additional risk. As such, liver disease should be viewed as an independent risk factor for postoperative complications following TKA and should be incorporated into risk evaluation preoperatively and surveillance postoperatively.

Table 1. Adjusted Postoperative Outcomes Following TKA in Patients with and without Liver Disease

Outcome	Liver Disease (N=15,744)	No Liver Disease (N=1,205,613)	Adjusted OR (95% CI)	Adjusted p-value
Readmission (90 d)	1,329 (8.4%)	55,229 (4.6%)	1.62 (1.52–1.71)	<0.001
Reoperation (2 yr)	517 (3.3%)	21,264 (1.8%)	1.63 (1.49–1.79)	<0.001
PJI (90 d)	382 (2.4%)	16,023 (1.3%)	1.58 (1.42–1.75)	<0.001
DVT (90 d)	217 (1.4%)	9,239 (0.8%)	1.58 (1.37–1.81)	<0.001
PE (90 d)	89 (0.6%)	3,355 (0.3%)	1.73 (1.40–2.15)	<0.001
Stroke (90 d)	21 (0.1%)	1,106 (0.1%)	1.15 (0.73–1.80)	0.543
Delirium (90 d)	17 (0.1%)	483 (0.0%)	2.08 (1.24–3.49)	0.006
Myocardial infarction (90 d)	36 (0.2%)	1,563 (0.1%)	1.40 (1.00–1.97)	0.051
Acute kidney injury (90 d)	334 (2.1%)	9,454 (0.8%)	1.99 (1.77–2.24)	<0.001
Urinary tract infection (90 d)	386 (2.5%)	11,471 (1.0%)	2.18 (1.96–2.42)	<0.001
Pneumonia (90 d)	122 (0.8%)	3,888 (0.3%)	1.70 (1.41–2.05)	<0.001
Anemia (90 d)	852 (5.4%)	29,117 (2.4%)	1.88 (1.75–2.02)	<0.001
Hypotension (90 d)	179 (1.1%)	5,219 (0.4%)	1.93 (1.65–2.25)	<0.001

Table 2. Adjusted Postoperative Outcomes Following TKA in Patients with Liver Disease Based on Presence or Absence of Cirrhosis

Outcome	Cirrhosis (N=3,142)	Non-Cirrhotic Liver Disease (N=12,602)	Adjusted OR (95% CI)	Adjusted p-value
Readmission (90 d)	416 (13.2%)	913 (7.2%)	1.80 (1.58–2.03)	<0.001
Reoperation (2 yr)	190 (6.0%)	327 (2.6%)	2.27 (1.89–2.74)	<0.001
PJI (90 d)	117 (3.7%)	265 (2.1%)	1.67 (1.34–2.09)	<0.001
DVT (90 d)	50 (1.6%)	167 (1.3%)	1.11 (0.81–1.54)	0.513
PE (90 d)	10 (0.3%)	79 (0.6%)	0.50 (0.27–0.93)	0.027
Stroke (90 d)	1 (0.0%)	20 (0.2%)	0.38 (0.12–1.18)	0.095
Delirium (90 d)	10 (0.3%)	7 (0.1%)	3.38 (1.34–8.50)	0.010
Myocardial infarction (90 d)	9 (0.3%)	27 (0.2%)	1.13 (0.54–2.33)	0.751
Acute kidney injury (90 d)	118 (3.8%)	216 (1.7%)	1.92 (1.52–2.42)	<0.001
Urinary tract infection (90 d)	83 (2.6%)	303 (2.4%)	1.02 (0.80–1.31)	0.868
Pneumonia (90 d)	40 (1.3%)	82 (0.7%)	1.66 (1.12–2.46)	0.011
Anemia (90 d)	289 (9.2%)	563 (4.5%)	1.99 (1.71–2.32)	<0.001
Hypotension (90 d)	60 (1.9%)	119 (0.9%)	1.74 (1.26–2.41)	<0.001