Increased Risk of Knee Osteoarthritis Progressing to Total Knee Arthroplasty Following Patella Fractures: An Age Stratified Population Analysis

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INTRODUCTION:

Patella fractures are peri-articular knee injuries that can lead to altered knee biomechanics, disordered joint contact forces, and cartilage degeneration. However, subsequent progression to reconstructive surgery has not been fully characterized. This study investigates the risk of progression to total knee arthroplasty (TKA) following patella fractures and analyzes whether initial operative versus nonoperative decisions impacts this risk.

METHODS:

The progression to TKA in patients with prior patella fractures was analyzed retrospectively using institutionally deidentified synthetic data from a large Level I academic trauma center. Cohorts were identified with class codes for patella fractures (1996-2024) and TKA. Age-stratified TKA rates were compared to published national data, and indirect standardization was applied to calculate the age-adjusted standardized incidence ratio (SIR), absolute risk difference (RD), and attributable risk percent (AR%).

RESULTS:

A total of 263 (8.2%) patients underwent TKA following 3,212 native patella fractures (**Table 1**). The mean age at patella fracture was 58.1 years (SD 17.5), and the mean time to TKA was 4.1 years (SD 4.9) after the fracture. The SIR of progressing to TKA was 1.6 (95% CI: 1.3, 1.9), the RD was 3.1%, and the AR% was 37.2%. The 406 patients with surgically treated patella fractures had a mean age of 55.3 years (SD 18.6), 60.8% female. Among 2,806 nonoperatively treated patients, the mean age was 58.5 years (SD 17.4), with 61.8% identifying as female. TKA occurred in 5.4% (22/406, SIR 1.4, 95% CI: 0.9–2.2) of operatively treated patella fracture patients and 8.6% (241/2,806, SIR 2.1, 95% CI: 1.8–2.3) of nonoperatively treated patients (**Table 2**). The nonoperative cohort demonstrated a significantly higher risk of TKA (p = 0.04).

DISCUSSION AND CONCLUSION:

Individuals with patella fractures face an increased lifetime risk of advanced joint degeneration and subsequent TKA compared to the general population, with nonoperative treatment linked to a higher risk than operative management, potentially due to the improved anatomic reduction achieved through surgery. While nonoperative cases may involve lower-energy, less displaced fractures, limitations precluded analysis of initial injury and patient factors, highlighting the need for further research to understand and validate these findings.

Table 1. Baseline Characteristics and TKA Outcomes of Patients with Patella Fractures

Variable	Total	Operative	Nonoperative	P-value
N	3212	406 (12.6%)	2806 (87.4%)	NA
Age (SD) years	58.1 (17.6)	55.3 (18.6)	58.5 (17.4)	**0.001**
Female n (%)	1980 (61.6%)	247 (60.8%)	1733 (61.8%)	0.76
Male n (%)	1232 (38.4%)	159 (39.2%)	1073 (38.2%)	0.76
White n (%)	2450 (76.3%)	303 (74.6%)	2147 (76.5%)	0.44
Asian n (%)	38 (1.2%)	6 (1.5%)	32 (1.1%)	0.73
Black or African American n (%)	675 (21.0%)	78 (19.2%)	597 (21.3%)	0.37
Racial ensored n (%)	49 (1.5%)	19 (4.7%)	30 (1.1%)	**<0.001**
Percent with TKA	8.20%	5.40%	8.60%	**0.04**
Time to TKA (mean (SD), years)	4.1 (4.9)	1.23 (1.4)	4.16 (4.9)	**0.002**

Table 2. Age-Stratified Incidence of Total Knee Arthroplasty Following Patella Fracture

Age Group	Total Patella Fractures	TKA n (%)	Operatively Treated Fractures	TKA n (%) After Operatively Treated Fractures	Nonoperatively Treated Fractures	TKA n (%) After Nonoperatively Treated Fractures
<50	583	21 (3.6%)	122	7 (5.7%)	461	14 (3.0%)
50-59	397	32 (8.1%)	50	5 (10.0%)	347	27 (7.8%)
60-69	694	56 (8.1%)	85	4 (4.7%)	609	52 (8.5%)
70-79	811	92 (11.3%)	92	6 (6.5%)	719	86 (12.0%)
80-89	547	58 (10.6%)	47	0 (0.0%)	500	58 (11.6%)
90+	180	4 (2.2%)	10	0 (0.0%)	170	4 (2.4%)
Total	**3212**	**263 (8.2%)**	**406**	**22 (5.4%)**	**2806**	**241 (8.6%)**