

Patient and Fracture Characteristics Associated with Reoperation in Patella Fractures: A Retrospective Study

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INTRODUCTION:

Patella fractures account for about 1% of all musculoskeletal injuries and pose management challenges due to high reoperation rates, primarily from fixation failure and symptomatic implant removal (sIR), which can occur in up to 50% of cases. Although techniques like tension band wiring (TBW) and plating have been studied to improve outcomes, both are still associated with high rates of implant-related complications. While fixation methods have been well-explored, there is limited data on patient-specific risk factors for reoperation. Factors such as older age and decreased bone quality, particularly osteoporosis, may contribute to fixation failure. This retrospective cohort study aims to identify patient and injury characteristics linked to reoperation, revision, sIR, and infection after patella fracture surgery, with the goal of improving risk stratification, follow-up, and individualized postoperative care.

METHODS:

After receiving institutional review board approval, a retrospective review was conducted for patients with operatively managed patella fractures at a single level I trauma center from January 2012-December 2022. Patients were identified using Current Procedural Terminology (CPT) code 27524.

Inclusion criteria were patients diagnosed with patellar fractures (AO/OTA 34) that underwent open reduction internal fixation (ORIF). Patients that had inadequate documentation in the electronic medical record (EMR), patients under the age of 18 and with less than 90 days of follow up after fixation were excluded from the study.

The primary outcome assessed was all cause reoperations. The secondary outcomes were reoperation for any reason including fixation failure requiring revision, sIR, or deep infection. All cause reoperation was defined as patients returning to the operating room for surgeries pertaining to patella fracture fixation. Failure of fixation requiring revision was defined as patients returning to the operating room for revision ORIF after loss of reduction. sIR was defined as patients returning to the operating room for removal of implant due to painful implant. Deep infection was defined as patients returning to the operating room surgical treatment of a postoperative infection associated with a patella fracture.

Patient demographics and injury characteristics were collected. A diagnosis of osteoporosis was defined by EMR-recorded diagnosis or active treatment of osteoporosis. Polytrauma was defined as injury severity score (ISS) of at least 16.

Descriptive statistics were used to characterize the cohort. Comparisons were made among patients with and without reoperations using chi square test for categorical variables and independent t test for continuous variables. A multivariate binary logistic regression was done to identify variables that were associated with increased likelihood for all cause reoperations. The threshold for statistical significance was defined as $p < 0.05$.

RESULTS:

A total of 251 fractures were included, of which 56 patients (22.3%) underwent reoperation. The average age was 45.8 (range: 18-89), most patients were male (57.4%), and the mean follow-up was 302 days (range 92-2185 days). The average time from index surgery to reoperation was 128.7 days (range 14-739 days). Indications for reoperation included: 37 for failure of fixation requiring revision (14.7%), 21 (8.4%) for sIR, 22 (8.8%) for deep infection and 12 (4.8%) for manipulation under anesthesia.

Patients with reoperation had lower body mass index (BMI) (26.2 vs 28.2; $p=0.049$) and higher rates of diabetes (23.2% vs 8.2%; $p=0.002$), osteoporosis (33.9% vs 8.2%; $p<0.001$) and tobacco use (53.6% vs 30.3%; $p=0.001$). Patients that had reoperation for sIR had higher rates of osteoporosis (33.3% vs 12.2%; $p=0.015$). Patients that had failure of fixation requiring revision were noted to have a lower BMI (25.8 vs 28.1; $p=0.047$), were more frequently male (73.0% vs 57.7%; $p=0.038$), and had higher incidence of diabetes (27.0% vs 8.9%; $p=0.004$), osteoporosis (40.5% vs 9.3%; $p<0.001$) and tobacco use (48.6% vs 33.2%; $p=0.069$). Patients that had reoperation for deep infection were also more likely to be male (81.8% vs 55.0%; $p=0.015$) and had significantly higher rates of osteoporosis (31.8% vs 12.2%; $p=0.011$) and tobacco use (72.7% vs 31.9%; $p<0.001$). There were no statistically significant differences in injury characteristics between any comparison group.

Diabetes (OR=4.23; p=0.012), male sex (OR=2.73; p=0.035) and osteoporosis (OR=8.51; p<0.001) were found to independently increase risk for failure of fixation requiring revision, while increasing BMI decreased risk (OR=0.93; p=0.049) (Table 1).

DISCUSSION AND CONCLUSION:

Diabetes and osteoporosis independently increased odds for failure of fixation requiring revision. Male sex and lower BMI were associated with an increased risk of reoperation for deep infection and were independently linked to a higher likelihood of fixation failure requiring revision surgery. Tobacco use was associated with all-cause reoperation and deep infection, but not failure of fixation.

Table 1. Risk factors for failure of fixation requiring revision.

Variable	Odds ratio (95% confidence interval)	p-value
Age	0.980 (0.954-1.006)	0.127
Male sex	2.73 (1.07-6.91)	0.035
Body mass index	0.93 (0.86-1.00)	0.049
Diabetes	4.23 (1.37-13.08)	0.012
Tobacco Use	1.41 (0.63-3.16)	0.409
Osteoporosis	8.51 (3.03-23.91)	<0.001