

# Patella Fractures in Children: Outcomes and Complications

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**INTRODUCTION:** Patella fractures are uncommon in the pediatric population, comprising 1% of all children’s fractures. Existing research is limited by small sample sizes. Therefore, the outcomes and complications associated with patella fractures are poorly defined. The primary objective of this study was to describe the outcomes and complications of patella fractures in the pediatric population. We hypothesized that older children age (10-14) were more likely to develop complications after treatment.

**METHODS:** This retrospective study utilized a multicenter network of deidentified data abstracted from electronic medical records (TriNetX). ICD-10 and CPT codes were used to identify patients fourteen years or younger that sustained a patella fracture between October 2015 and May 2020. Patients with preexisting knee pathology, osteogenesis imperfecta, and skeletal dysplasia were excluded. Diagnosis codes were used to identify outcomes of interest which occurred within two years of fracture treatment, to include patellofemoral arthritis and disorders, arthrofibrosis, quadriceps atrophy, knee pain, infection, and patellectomy.

**RESULTS:** A total of 2,072 patients were identified with an average age of 11.1 ± 2.4 years. There were 397 patients treated with open reduction and internal fixation and 1,675 patients treated conservatively. Knee pain was the most encountered sequela of any treatment, occurring in 12.4% of patients treated surgically and 9.5% of those treated conservatively (p=0.39). The overall risks of developing arthrofibrosis, patellofemoral arthritis, and patellofemoral disorders were 3.7%, 2.5%, and 1.2%, respectively. Patients treated surgically demonstrated higher risk of infection (2.5% vs. 0% p<0.01) and arthrofibrosis (11.9% vs. 2.5% p<0.01). When stratified by age, younger children (below age 10) demonstrated lower risk of post-injury knee pain (5.8% vs. 16.9%, p<0.01). Patients aged 10-14 had a higher risk of requiring arthroscopy with lysis of adhesions (2.5% vs. 0%, p<0.01), developing quadriceps atrophy (2.5% vs. 0%, p<0.01), and requiring incision and drainage (2.6% vs. 0%, p<0.01). No patient underwent patellectomy or hemipatellectomy.

## DISCUSSION AND CONCLUSION:

Knee pain occurs frequently after both surgical and conservative management and is more frequent in older children. Patients undergoing surgery have a greater risk of arthrofibrosis and infection. Patients older than ten years of age are more likely to develop most complications. This study represents the largest described cohort of pediatric patella fractures. These findings can be of use when counseling patients sustaining this relatively rare fracture.

	Risk for age ≤9	Risk for age 10-14	Risk Ratio	95% CI	p-value
Patellofemoral arthritis	2.6%	4.9%	0.518	0.244 – 1.100	0.081
Arthrofibrosis	2.5%	3.3%	0.765	0.340 - 1.725	0.517
Manipulation under anesthesia	2.5%	0.0%	-	-	0.002
Arthroscopy with lysis of adhesions	0.0%	2.5%	-	-	0.002
Patellofemoral disorders	2.6%	3.1%	0.833	0.364 – 1.906	0.665
Knee pain <sup>2</sup>	5.8%	16.9%	0.343	0.178 - 0.661	0.001
Patella alta	0.0%	0.0%	-	-	-
Quadricep atrophy	0.0%	2.5%	-	-	0.002
Infection <sup>1</sup>	2.5%	2.5%	0.997	0.420 – 2.370	0.995
Incision and drainage	0.0%	2.6%	-	-	0.001
Patellectomy and hemipatellectomy	0.0%	0.0%	-	-	-

**Table 1** Risk by Age Group

The risk of adverse outcomes between patients less than nine years of age at the time of injury and patients between ten and fourteen years of age at the time of injury. Infection includes septic arthritis, osteomyelitis, and surgical site infections. (CI = confidence interval).

<sup>1</sup>Includes septic arthritis, osteomyelitis, surgical site infection

<sup>2</sup>Knee pain occurring between 6 months and 2 years after fracture treatment