Patellar Distalization following Anteromedializing Tibial Tubercle Osteotomy for Recurrent Knee Dislocation: A Retrospective Case Series

Alexander Hallwachs[1], Kira Smith[2], Joshua M Wiener, Jacob G Calcei, Michael J. Salata[3], James Everett Voos[4], Taylor Hobson, Michael Karns[3]
[1]Department of Orthopaedic Surgery, Case Western Reserve University, [2]University Hospitals, [3]University Hospitals Case Medical Center, [4]UNIVERSITY HOSPITALS CASE MEDICAL CENTER

INTRODUCTION:

Tibial tubercle osteotomy (TTO) is a well-documented treatment option for patellofemoral joint disorders, including patellofemoral instability. The biomechanics of the patellofemoral joint can be altered to address patient-specific pathology by varying the angle of the TTO, distance translated, and moving the tubercle anterior, medial, or distal. TTO with anteromedialization (AMZ) is a commonly used technique, with the goal of offloading and realigning the patellofemoral joint while preserving a distal periosteal hinge. Complete detachment and distalization of the tubercle to correct patella alta has been shown to increase the risk of nonunion. It is unclear of the change in patellar height following TTO with AMZ due to the scarring effect to the patella tendon. Therefore, the purpose of this investigation was to quantify the change in patellar height following TTO with AMZ.

METHODS:

Patients that underwent TTO with AMZ for patellar instability from January 2018 through December 2022 were included. Patient demographics, including age, gender, and body mass index (BMI) were collected. Preoperative and postoperative x-ray imaging was used to measure and calculate the Caton-Deschamps Index (CDI), Insall-Salvati Index (ISI), and Blackburne-Peel Index (BPI) for patellar height. Patella alta was defined as CDI > 1.3, ISI > 1.2, or BPI > 1.0. Recurrent instability, continued pain at final follow up, and need for additional surgical intervention were also recorded. Continuous variables were presented with descriptive analyses while categorical variables were presented with frequencies and percentages. The association between continuous variables was evaluated by a paired t-test. All analyses were two-tailed and $p < 0.05$ was considered to be statistically significant.

RESULTS:

There were 40 patients with a mean age of 23.59±7.52, mean BMI of 29.42±7.71, and 25 females (62.5%). Compared to preoperatively, patellar height decreased postoperatively across all measurements ($p<0.001$). The CDI decreased from 1.18±0.14 to 1.10±0.14, the ISI from 1.24±0.18 to 1.16±0.15, and the BPI from 0.99±0.15 to 0.89±0.15. As defined by the CDI, ISI, and BPI, there were 7, 24, and 17 patients, respectively, classified as having patella alta preoperatively. Postoperatively, there were 3 (42.9%), 8 (33.3%), and 9 (52.9%) patients with resolved patella alta, respectively. There were 2 patients that reported recurrent subjective instability (10.79±3.71 months postoperatively) and 3 patients that had continued pain at final follow up (9.29±7.22 months). One patient experienced a postoperative patellar dislocation and ultimately underwent further operative intervention. Additionally, four patients required hardware removal and two patients required lysis of adhesions.

DISCUSSION AND CONCLUSION:

Patellar height is significantly decreased following TTO with AMZ. The most common complication postoperatively is the need for hardware removal. Further research is needed to investigate the impact of change in patellar height on clinical and patient reported outcomes.

TABLE 1: Patient Demographics

		Patients (n=40)
Age (years)	Mean (SD)	23.59 (7.52)
	Range	15.04 – 42.53
Gender (%)	Male	15
	Female	25
BMI (mg/kg)	Mean (SD)	29.42 (7.71)
	Range	18.8 – 45.8
Laterality (%)	Right	19
	Left	21

TABLE 2: Preoperative vs Postoperative Patellar Height after TTO with AMZ

	Pre-Operative Mean (SD)	**Post-Operative** Mean (SD)	**p-value**
Caton-Deschamps Index	1.18 (0.14)	1.10 (0.14)	$p < 0.001$
Insall-Salvati Ratio	1.24 (0.18)	1.16 (0.15)	$p < 0.001$
Blackburne-Peel Ratio	0.99 (0.17)	0.89 (0.15)	$p < 0.001$