

# Comparison of Instability, Redislocation, and Revision Rates between Tibial Tubercle Osteotomy and Medial Patellofemoral Ligament Reconstruction for the Treatment of Patellofemoral Instability

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**INTRODUCTION:** Patellofemoral instability (PFI) is a common orthopaedic condition characterized by recurrent patellar subluxation or dislocations. Several surgical options have emerged for the treatment of recurrent PFI, with tibial tubercle osteotomy (TTO) and medial patellofemoral ligament (MPFL) reconstruction among the most widely performed. Current literature has shown both procedures are effective in the prevention of recurrent patellar dislocation with recent studies reporting redislocation rates of 2.4 – 20% in adolescent patients following MPFL reconstruction and redislocation rates of 0 - 13% in the same population following TTO. However, while the outcomes associated with these procedures have been well described in case series and studied in comparison to historical treatment options, direct comparison of these two operative strategies in the prevention of recurrent patellar instability and redislocation remains to be elucidated.

**METHODS:** We performed a retrospective cohort analysis on patients aged 10 to 19 years who received TTO or MPFL reconstruction at our institution from March 1, 2008 to March 1, 2021. Demographic, treatment, and imaging data for all patients were obtained from the electronic health record. Our primary outcomes of interest were rates of patient-reported patellar instability that limited activity after corrective surgery, rates of patellar redislocation, and rates of revision surgery. Secondary outcomes included time to instability and time to redislocation. Statistical differences between instability, redislocation, and revision rates were performed via Chi-square tests, and differences between times to instability and redislocation were performed via student's t-tests.

## RESULTS:

A total of 212 patients were identified after exclusions (65 TTOs and 147 MPFL reconstructions). Both TTO and MPFL reconstruction cohorts had similar baseline demographic characteristics of age (15.1 vs. 14.9 years;  $p=0.49$ ), sex (72.3 vs. 61.9% female;  $p=0.30$ ), and race (81.5 vs. 88.4% Caucasian;  $p=0.26$ ). Likewise, there was no significant difference in the surgical side (47.7 vs. 53.1% left side;  $p=0.46$ ) or postoperative follow up (754.9 vs. 558.5 days;  $p=0.09$ ) between the TTO and MPFL reconstruction groups, respectively. The only statistically significant preoperative difference in baseline characteristics between patients that received TTO and MPFL reconstruction was BMI (26.1 vs. 24.1;  $p=0.04$ ). There were no significant differences in rates of patient-reported instability between patients who received TTO and those who received MPFL reconstruction (7.7 vs. 5.4%;  $p=0.53$ ), nor the time to instability between groups (1516.4 vs. 1111.9 days;  $p=0.45$ ). Likewise, there were no significant differences in redislocation rates between patients that received TTO and those who received MPFL reconstruction (9.2 vs. 8.2%;  $p=0.80$ ), nor in time to redislocation (1000.2 vs. 825.8 days;  $p=0.56$ ). There was no significant difference in surgical revision rates between the treatment groups (7.7 vs. 8.8%;  $p=0.78$ ).

## DISCUSSION AND CONCLUSION:

Our results illustrate no significant difference in long-term rates of patient-reported patellar instability, patellar redislocation, or requirement for surgical revision between patients treated with TTO and MPFL reconstruction. The low instability and redislocations rates found in our study are consistent with those reported in the current literature, providing further evidence that both TTO and MPFL reconstruction are effective techniques in the treatment of PFI.

**Table 1: Patient Demographic, Treatment, and Imaging Data**

	Technique		p
	TTO n=65	MPFL Reconstruction n=147	
Age at surgery (years)	15.1 (1.6)	14.9 (1.9)	0.49
Gender			
Male (%)	27.7	37.4	0.30
Female (%)	72.3	61.9	
Other (%)	0.0	0.7	
BMI	26.1 (6.4)	24.1 (4.8)	<b>0.04</b>
Race			
Caucasian (%)	81.5	88.4	0.23
Black (%)	7.7	6.8	
Asian (%)	1.5	0.0	
Multiracial (%)	7.7	2.7	
Unknown (%)	1.5	2.0	
Side (L, R, Bilateral) (%)			
Left (%)	47.7	53.1	0.46
Right (%)	52.3	45.6	
Bilateral (%)	0.0	1.4	
Post-Operative Follow-up (Days)	754.9 (828.4)	558.5 (628.0)	0.09
Caton-Deschamps Ratio	1.30 (0.22)	1.32 (0.23)	0.51
Dejour Classifications			
A (%)	74.6	68.3	0.57
B (%)	14.3	15.1	
C (%)	11.1	16.5	
TT-TG lengths (mm)	15.4 (5.6)	15.9 (5.2)	0.59
Osteochondral Fracture <sup>1</sup> (%)	28.9	19.8	0.22
Ligament Tear <sup>1</sup> (%)	20.0	20.8	0.92

Categorical variables expressed as percentages; Quantitative variables expressed as mean (SD). TT-TG = tibial tuberosity – trochlear groove. 1 – Determined by pre-operative MRI. Significance bolded at a level of p <0.05.

**Table 2: Instability, Re-dislocation, and Surgical Revision Rates**

	Technique		p
	TTO	MPFL Reconstruction	
Instability (%)	7.7	5.4	0.53
Time to Instability (Days)	1516.4 (1037.2)	1111.9 (472.4)	0.45
Re-Dislocation (%)	9.2	8.2	0.80
Time to Re-Dislocation (Days)	1000.2 (592.9)	825.8 (518.9)	0.56
Revision Surgery (%)	7.7	8.8	0.78

Categorical variables expressed as percentages; Quantitative variables expressed as mean (SD). Significance bolded at a level of p <0.05.