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Tibial Tubercle–Midepicondyle Distance: A Factor Predicting Residual/ Recurrent Patellar Instability After Medial Patellofemoral Ligament Reconstruction

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Summary:
Rate of residual or recurrent patellofemoral instability after MPFL reconstruction performed for recurrent patella dislocation was significantly higher in patients with increased tibial tubercle-midepicondyler distance (15 mm or more) on preoperative CT.

Abstract:
INTRODUCTION
Residual or recurrent patellar instability after medial patellofemoral ligament (MPFL) reconstruction is, in general, attributed to uncorrected bony factors such as lateral displacement of the tibial tubercle. Conventionally, tibial tubercle-trochlear groove (TT-TG) distance have been adopted as a parameter for this etiologic facor; however, measurement of the TT-TG distance can be inaccurate especially in patients presenting substantial trochlear dysplasia. Tsujimoto et al. proposed the tibial tubercle-midepicondyler (TT-ME) distance as a more accurate and consistent parameter for lateral deviation of the tibial tubercle in relation to the femoral trochlea. The purpose of this study was to assess the significance of this parameter as a factor predicting less favorable outcome in patients after MPFL reconstruction.

MATERIALS & METHODS
A consecutive series of MPFL reconstructed patients constituted the basis of this study. The study population included 36 knees in 34 patients with the mean age at surgery of 17.7 ± 4.0 years. Indication for MPFL reconstruction was at least two episodes of patellar dislocation and the TT-TG distance of less than 20 mm on CT evaluation. MPFL reconstruction was performed using a semitendinosus tendon autograft, and the postoperative follow-up period averaged 16.8 months. Apprehension sign, J-sign as manifested by lateral shift of the patella in early flexion, and subjective instability during activities were consideres as indicators for patellar instability. The TT-ME distance was defined as a transverse distance between the midpoint of the transepiconduler line and the tibial tubercle projected axial CT images. Additionally, TT-TG distance was measured and the relationship of these two anatomical parameters and postoperative patellar instability was statistically assessed using univariate analysis and subsequent multivariate logistic regression analysis.

RESULTS
Residual or recurrent patellar instability was observed in 9 of the 36 knees (25%). The univariate analysis for potential risk factors showed that TT-ME distance was associated with patellar instability (P=0.002). The subsequent multivariate analysis revealed that TT-TM distance of 15 mm or more remained a significant risk factor (P=0.023, odds ratio: 7.9). By contrast, no significant relationship was demonstrated for the TT-TG distance.

DISCUSSION

In assessment of TT-TG distance, localization of the trochlear grove can be difficult in patients with severe trochlear dysplasia. Moreover, location of the groove is often deviated medially in correspondence to dysplastic medial patellar facet in this patient population, leading to overestimation of the displacement of the tibial tubercle. The results of this study showed that the TT-ME can be a more consistent and reliable parameter to predict inadequate restraining effect attained by MPFL reconstruction. The statistical analysis showed that TT-ME distance of 15 mm can be a cut-off line for limitation of isolated MPFL reconstruction. It is thought that tibial tubercle transfer procedure should be indicated for this patient population with increased TT-ME distance.