Editorial Commentary: As Nature Intended: Will Inclusion of the Medial Patellotibial Ligament Create a Better Medial Patellofemoral Complex Reconstruction?

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Abstract: The medial patellofemoral complex, composed predominantly of the medial patellofemoral ligament, plays an important role in patellar tracking and stability. Medial patellofemoral ligament reconstruction is accordingly one of the most broadly applied surgical techniques for treating patellar instability. Orthopaedic research has demonstrated that surgeries that restore native anatomy are often more effective. The medial patellotibial ligament clearly serves an important supporting role in patellar tracking and stability, particularly in early flexion, and its inclusion in medial soft-tissue reconstructions more closely restores native patella tracking. Whether reconstructions incorporating the medial patellotibial ligament will translate to improved outcomes remains unclear.

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Recurrent patellar instability is a frequently encountered problem for the practicing sports medicine physician. Lateral patellar instability accounts for 2% to 3% of all knee injuries and is especially common in young, female patients.[1,2] Although recurrence was traditionally considered to be uncommon, recent research aimed at predicting recurrence risk has reported rates closer to 50%.[3,4] Several risk factors have been described, including trochlear dysplasia, patella alta, increased lateral patellar tilt, a high tibial tubercle—trochlear groove distance (or related ratio), and age/skeletal immaturity.[3-5] Although there are numerous surgical options available to address instability, medial soft-tissue reconstructions are perceived as less morbid and have demonstrated clinical effectiveness even in the setting of trochlear dysplasia.[6] Accordingly, these surgeries are the most commonly used subgroup, and continued efforts to optimize results and minimize morbidity have generated a renewed interest in medial soft-tissue anatomy and biomechanics.

The medial patellofemoral complex consists of the medial patellofemoral ligament (MPFL), medial quadriceps tendon femoral ligament (MQTFL), medial patellotibial ligament (MPTL), and medial patellomeniscal ligament (MPML). The MPFL contributes the greatest soft-tissue restraint to lateral translation of the patella through the full arc of motion, whereas the MQTFL, MPTL, MPML, and lateral retinaculum serve as secondary stabilizers.[7,8] The MPTL and MPML play an important role in maintaining stability of the patellofemoral joint, especially near full knee extension, when they oppose the proximal pull of the quadriceps.[9,10] Philippot et al.[11] found that the MPTL and MPML, as a unit, contributed 26% of the resistance to lateral translation in full extension and 46% at 90° of flexion. In addition, at 90° of knee flexion, the MPTL and MPML were responsible for 72% of patellar tilt and 92% of patellar rotation.

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Injuries to the MPFL and MPTL result in altered patellofemoral motion and forces.[12] In the current article, "Medial Patellotibial Ligament Reconstruction Improves Patella Tracking When Combined With Medial Patellofemoral Reconstruction: An In Vitro Kinematic Study," Grantham, Aman, Brady, Rosenberg, Turnbull, Storaci, Dornan, and LaPrade sought to investigate the isolated and combined effects of MPFL and MPTL deficiency and reconstruction on patellofemoral kinematics.[13] The authors performed dynamic and static kinematic testing between 0 and 90° using 16 matched-paired female cadaveric knees in 5 conditions: (1) intact, (2) MPFL or MPTL cut, (3) MPFL and MPTL both cut, (4) MPFL or MPTL reconstruction, and (5) MPFL and MPTL combined reconstruction. A motion-capture system was used to detect the position of the patella throughout all testing. With static testing, the authors found that isolated MPTL deficiency was not sufficient to create significantly increased lateral or superior patellar translation at any flexion angle but further increased instability when the MPFL was also deficient. Isolated MPTL reconstruction was not sufficient to restore stability to an intact state, whereas both isolated MPFL and combined reconstruction provided improved stability. The most valuable results, however, were demonstrated during dynamic tracking evaluation. When compared with the intact state, MPFL reconstruction showed increased medial translation from 0 to 30° and increased lateral translation beyond 30°. The combined reconstruction demonstrated a more balanced correction throughout the motion arc, more closely replicating the intact state.

MPFL reconstruction is the most common procedure performed for surgical treatment of patellar instability. However, clinical failure, defined as the persistence of objective or subjective instability, occurs in 12% of cases.[14] MPTL reconstruction appears to normalize the dynamic function of the MPFL reconstructions throughout a full range of motion, particularly in extension and in greater degrees of knee flexion. Previous clinical studies have demonstrated good results following isolated MPTL reconstruction.[15-17] The recurrence of patellar instability following MPFL reconstruction may be due to loosening, which occurs as a result of increased stress placed on the reconstructed MPFL. The reconstruction of a secondary stabilizing ligament (e.g., MQTFL or MPTL) could decrease stress on the MPFL, normalize functionality at full extension and deep flexion, and lead to improved functional outcomes.[18] Previous clinical studies on the combined reconstruction of the MPFL and MPTL have shown low complication rates and good overall results.[18-22]

The well-done study by Grantham et al. further defines the role of the MPFL and MPTL on patellofemoral motion with the potential for combined reconstruction to improve stability and optimize patellofemoral tracking. The primary limitation to applying these findings will be a question of indications. Patients with patella instability have a broad range of underlying risk factors, bony morphology, and expectations. The current study does not evaluate the variable contribution the MPTL may have in the setting of other anatomic risk factors such as dysplasia, tubercle−trochlear groove distance, or rotational or coronal abnormalities. Furthermore, it remains unclear whether the potential for increased morbidity will be justified by improved outcomes. In our experience, most patients with recurrent patellar instability do well following isolated MPFL reconstruction in the absence of severe dysplasia or other large bony deformities. Given the biomechanical findings of this and other studies, we believe the addition of MPTL and/or MQTFL reconstruction is most likely to have an impact in patients with greater risk for tracking abnormalities in extremes of motion, such as patients with patella alta and trochlear dysplasia. There may similarly be a role for adding MPTL reconstruction in patients with abnormalities of patellar tilt and rotation. To optimize outcomes for our patients, we will consider performing MPTL reconstruction in conjunction with MPFL reconstruction in these select cases, and eagerly anticipate future comparative clinical studies to further clarify its utility. We commend the authors on their work, which adds helpful information to the literature and will allow us to further refine our approach to managing patients with patellar instability

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