ISAKOS CONGRESS 2025 | MUNICH GERMANY June 8–11

Medial patellotibial ligament reconstruction obtains a significant improvement of patellar stability: motion analytic study

Department of Orthopaedics, Ramathibodi Hospital, Mahidol University, Thailand

Potsawat Surabotsopon, Nadhaporn Saengpetch

Faculty Disclosure Information

- The study has no financial relationships to disclose.

Introduction

- The medial patellotibial ligament (MPTL) has been proved to restrain patellar stability as a secondary stabilizer.[1, 2]
- Nonetheless, its mechanical properties resemble those of the medial patellofemoral ligament (MPFL).[3]
- The awareness of MPTL reconstruction (MPTLR) is challenging since it might improve patellar tracking.

Purpose

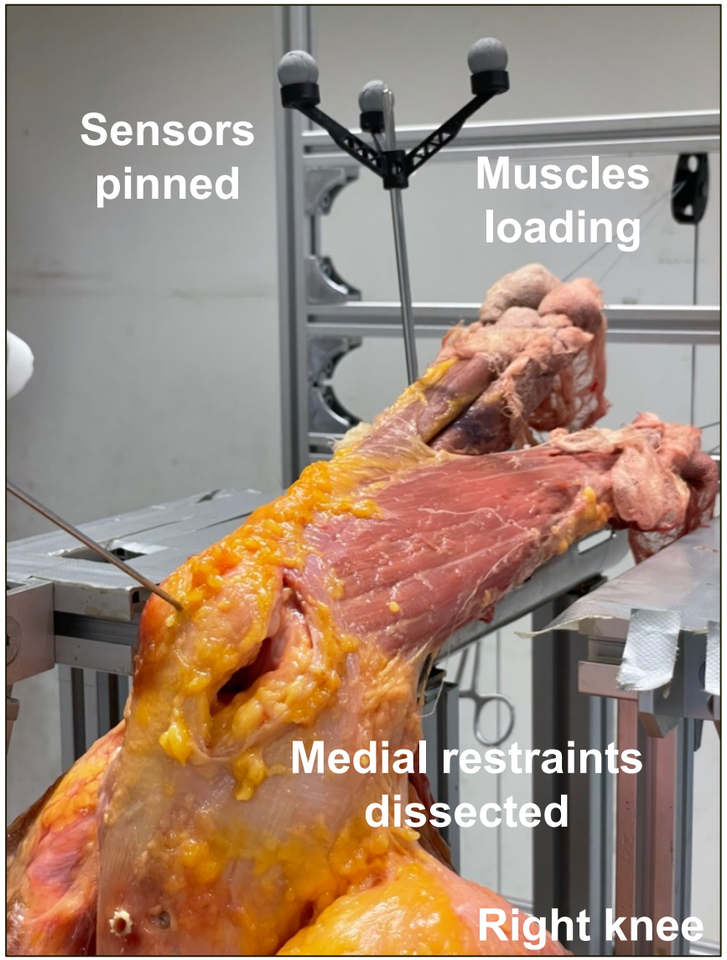
- **Purpose:** To evaluate the differences in patellar motion between combined MPFL and MPTL reconstruction and isolated MPFL reconstruction.

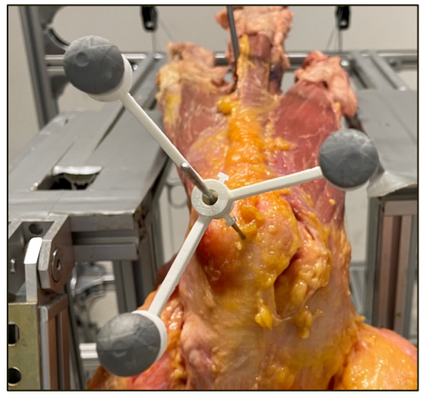
- **Hypothesis:** Combined reconstruction may enhance patellar stability more effectively than isolated reconstruction.

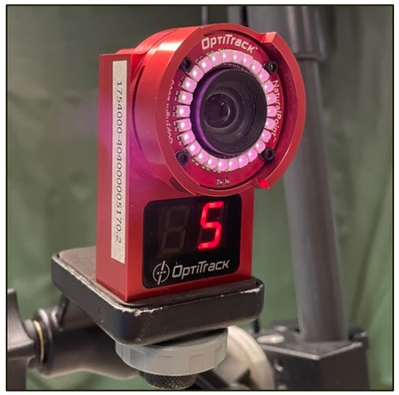
This study conducted motion analysis to validate its function following simulated patellar lateral instability at various angles.

Materials and Methods

- Eighteen cadaveric knees were utilized, with medial stabilizing structures were dissected to induce lateral instability.
- The patellar motion was assessed using three-dimensional motion analysis (3DMA).
- Two different surgical techniques (combined versus isolated reconstruction) were compared across four directions
  - **Superior/Inferior.**
  - **Medial/Lateral.**



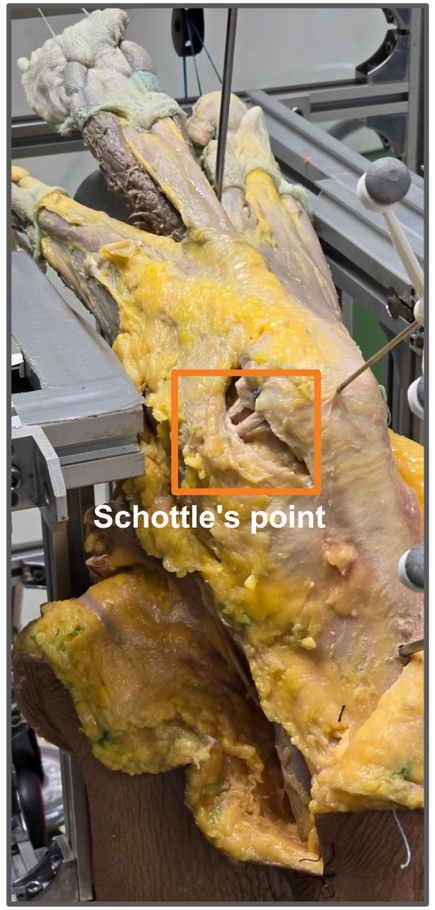




Biomechanics machine & OptiTrack Flex 3 systems

ISAKOS CONGRESS 2025

Materials and Methods



Group 1

Medial restraints dissected

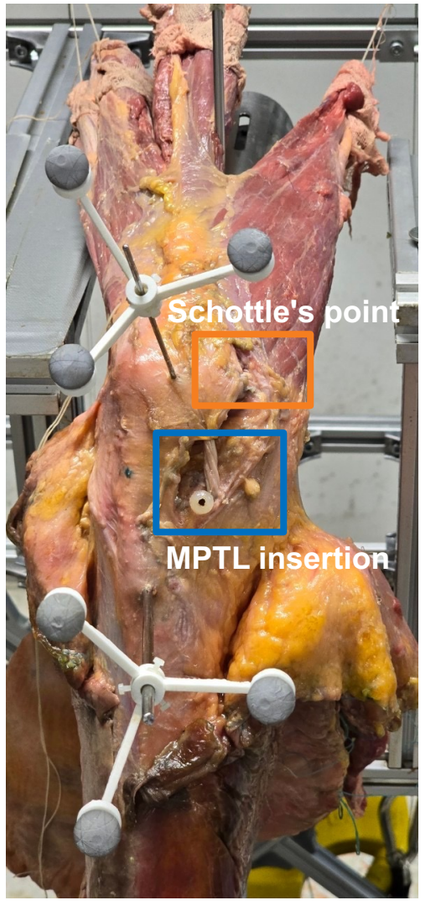
↓

Isolated MPFL reconstruction

↓

3D motion analysis at 30°, 45°, 60°, 90°

Isolated reconstruction



Group 2

Medial restraints dissected

↓

Combined MPFL with MPTL reconstruction

↓

3D motion analysis at 30°, 45°, 60°, 90°

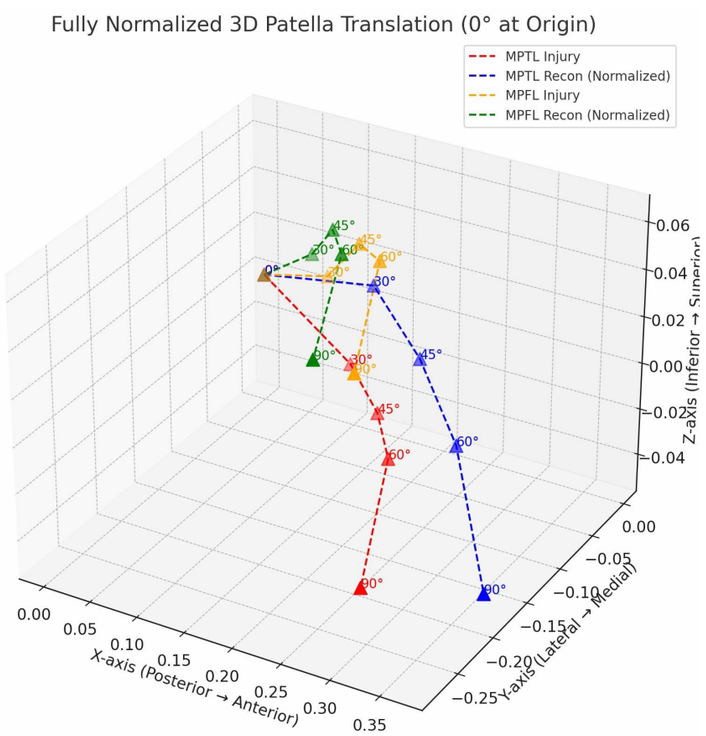
Combined reconstruction

- MPFL-R via Schottle's point.
- MPTL-R via anatomical MPTL insertion.

ISAKOS CONGRESS 2025
MUNICH GERMANY
June 8–11

Results

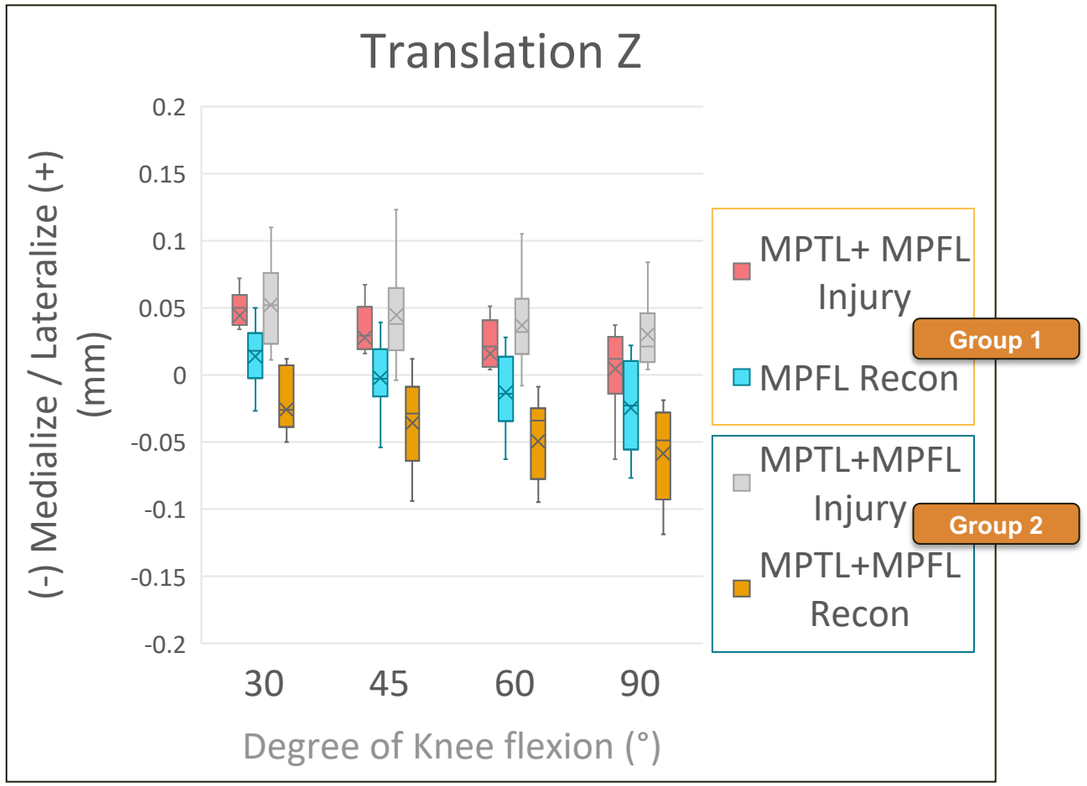
- The mean and standard deviation (SD) of patellar displacement between injury and reconstruction at different knee flexion angles are presented in graphs.
- Significant differences were observed in the mediolateral direction (Z-axis) across all angle comparisons.
- However, no significant differences were observed in superoinferior direction (Y axis).



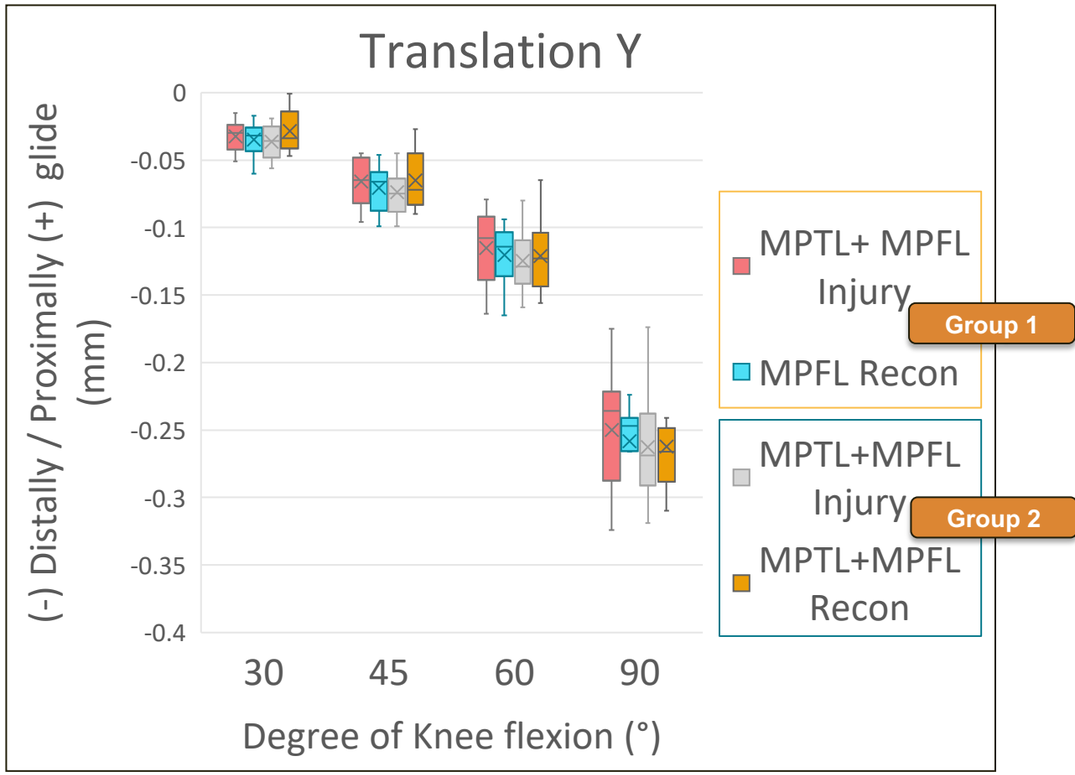
3D motion analysis at 30°, 45°, 60°, 90°

ISAKOS CONGRESS 2025
MUNICH GERMANY
June 8–11

Results

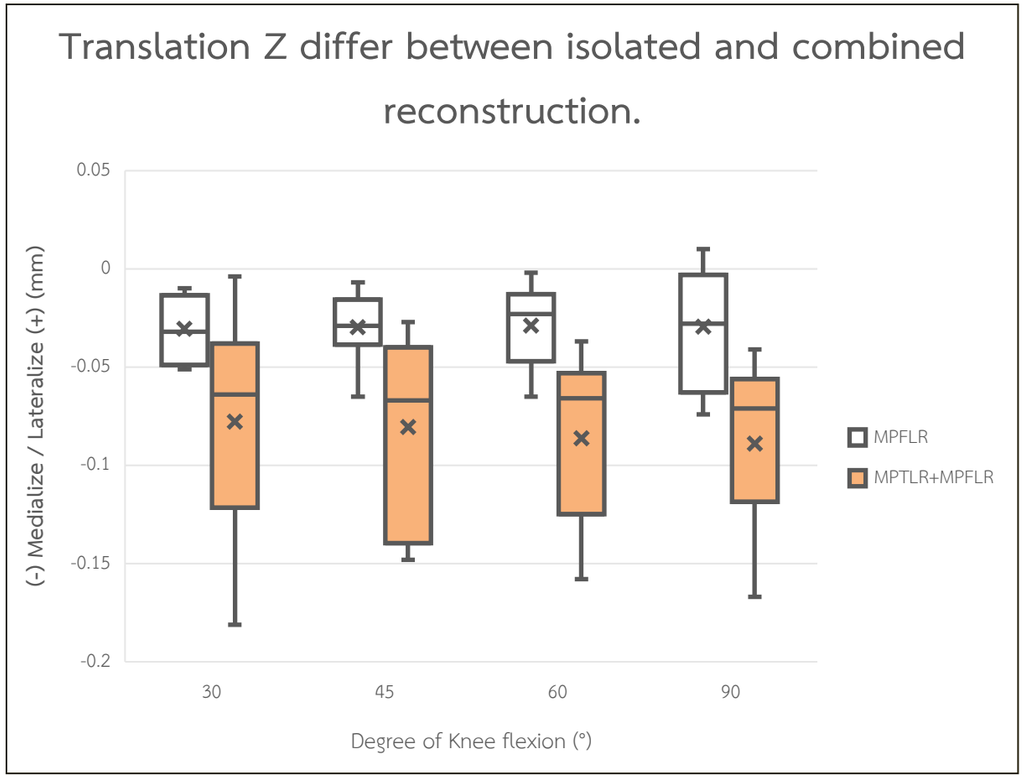


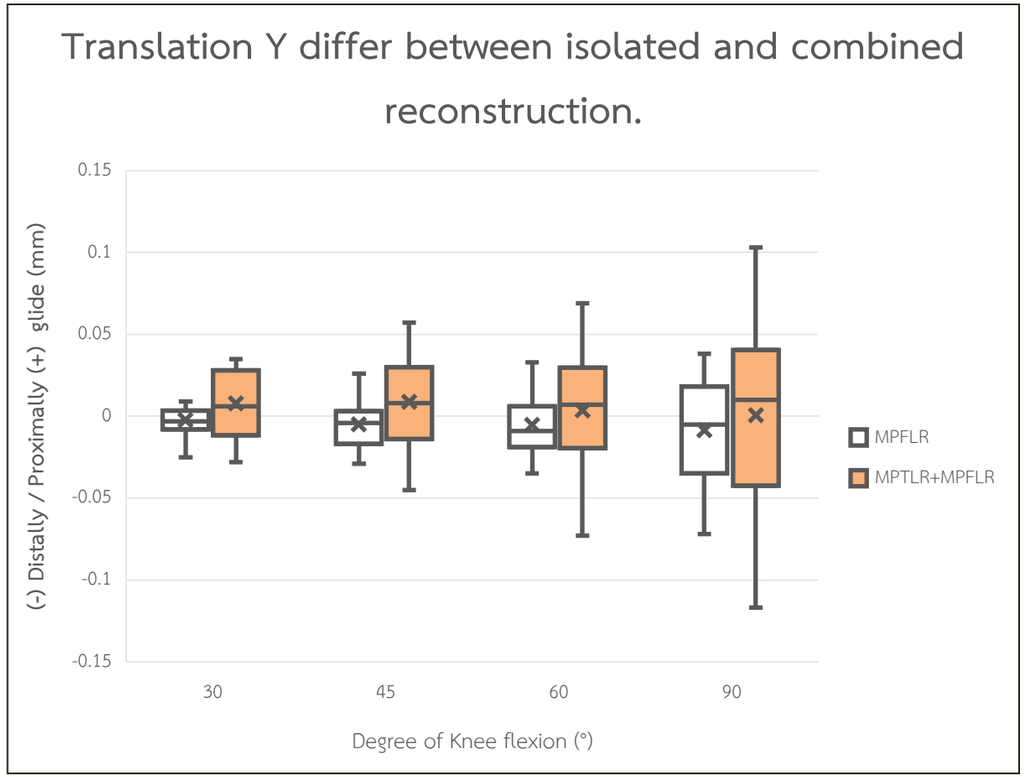
Mediolateral direction (Z-axis).



Superoinferior direction (Y axis).

Results





- Significant differences were found in the mediolateral direction (Z-axis) across all angle comparisons, but none were observed in the superoinferior direction (Y-axis).

Discussion

- MPTL has been shown to act as a secondary stabilizer of the patella, and its mechanical properties are similar to those of the MPFL.[1, 2, 3]

- The MPTL is gaining more focus in clinical research, with some authors proposing MPTL reconstruction either alone or together with MPFLR.[4, 5, 6]

- This study focuses on the differences between isolated MPFLR and the combined MPTL with MPFL reconstruction, and their influence on patellar motion.

Discussion

- Additional MPTL reconstruction with MPFL reconstruction provides significantly greater medial stabilization than the isolated procedure.
- The combined reconstruction shows no superiority in vertical direction resistance compared to the isolated reconstruction.
- The outcomes of this study are consistent with previous biomechanical research and similar studies.[2, 3, 7]

Conclusion

- Additional MPTL reconstruction along with MPFL reconstruction could improve medial stabilization of the patella, as demonstrated by motion analysis in this study.

- Therefore, MPTL reconstruction should be a consideration in the surgical management of lateral patellar instability.

References

1. Hinckel B, Gobbi R, Demange M, Pereira C, Pécora J, Natalino R et al. Medial Patellofemoral Ligament, Medial Patellotibial Ligament, and Medial Patellomeniscal Ligament: Anatomic, Histologic, Radiographic, and Biomechanical Study. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 2017;33(10):1862-1873.
2. Aicale, R. and Maffulli, N. (2020) ‘Combined medial patellofemoral and medial patellotibial reconstruction for patellar instability: A Prisma systematic review’, *Journal of Orthopaedic Surgery and Research*, 15(1).
3. LaPrade R, Chahla J, Moatshe G. Biomechanical Evaluation of the Medial Stabilizers of the Patella: Response. The American Journal of Sports Medicine. 2019;47(8).
4. Baumann C, Pratte E, Sherman S, Arendt E, Hinckel B. Reconstruction of the medial patellotibial ligament results in favorable clinical outcomes: a systematic review. Knee Surgery, Sports Traumatology, Arthroscopy. 2018;26(10):2920-2933.
5. Yang Y, Zhang Q. Reconstruction of the medial patellofemoral ligament and reinforcement of the medial patellotibial ligament is an effective treatment for patellofemoral instability with patella alta. Knee Surgery, Sports Traumatology, Arthroscopy. 2018;27(8):2599-2607.
6. Hinckel B, Gobbi R, Demange M, Bonadio M, Pécora J, Camanho G. Combined Reconstruction of the Medial Patellofemoral Ligament With Quadricipital Tendon and the Medial Patellotibial Ligament With Patellar Tendon. Arthroscopy Techniques. 2016;5(1):e79-e84.
7. Grantham, W.J. *et al.* (2020) ‘Medial patellotibial ligament reconstruction improves patella tracking when combined with medial patellofemoral reconstruction: An in vitro kinematic study’, *Arthroscopy: The Journal of Arthroscopic & Related Surgery*, 36(9).