Department of Orthopaedic Surgery *Keio University School of Medicine*

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Biomechanical Effect of Unstable Meniscal Injury on Gait in ACL-Deficient and -Reconstructed Knees

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COI disclosure

The authors have no conflict of interest to disclosure with respect to this presentation.

Introduction

- ✓ **Gait mechanics were reported to be more abnormal in anterior cruciate ligament (ACL)-deficient patients with severe meniscal injury than in isolated ACL-deficient patients without meniscal injury.**

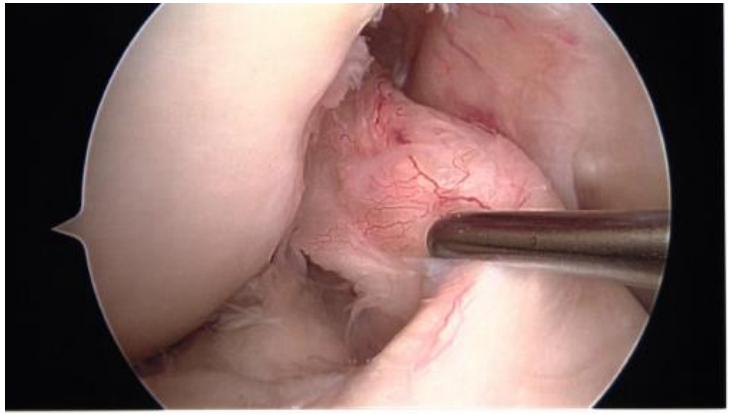
- ✓ **However, little information has been available on whether gait abnormality would improve after ACL reconstruction or not.**

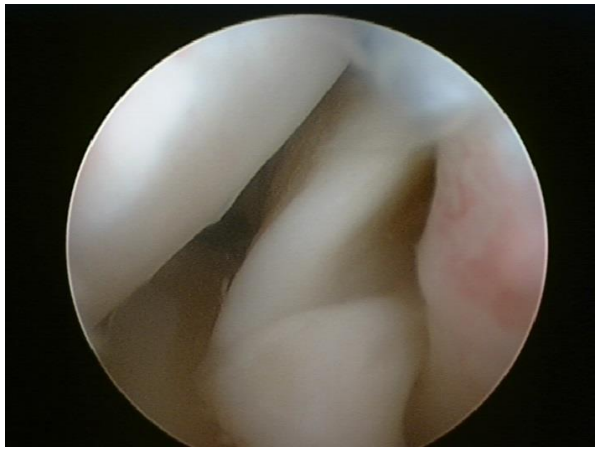
The purpose of the present study was to investigate the gait mechanics pre- and post-ACL reconstruction in ACL-deficient patients with or without meniscal injury.

Materials and Methods

- ✓ **A total of 16 ACL injured subjects**
  (8 females and 8 males, mean age = 29.2 ± 8.3 yrs, mean BMI = 22.6 ± 2.2 kg/m^2)

- ✓ **Arthroscopic ACL reconstruction using semitendinosus tendon**





Meniscal injury was observed in 9 patients and partial resection was done. (5 medial and 4 lateral meniscus)

The study protocol was approved by the University Ethics Committee.

Materials and Methods

- Gait analysis was done at pre- and post-operative period.
  (> 9 months after surgery)

- Motion analysis system
  - 8 cameras (120 fps; Oqus, Qualisys)
  - 2 force plates (600 Hz; AM6110, Bertec)
  - 46 markers

- Gait speed was self-selected.
- Marker tracking was performed
  using Qualisys Track Manager Software.

Evaluations

3D gait parameters were assessed.
(Visual 3D ((C-motion Company))

3 Groups

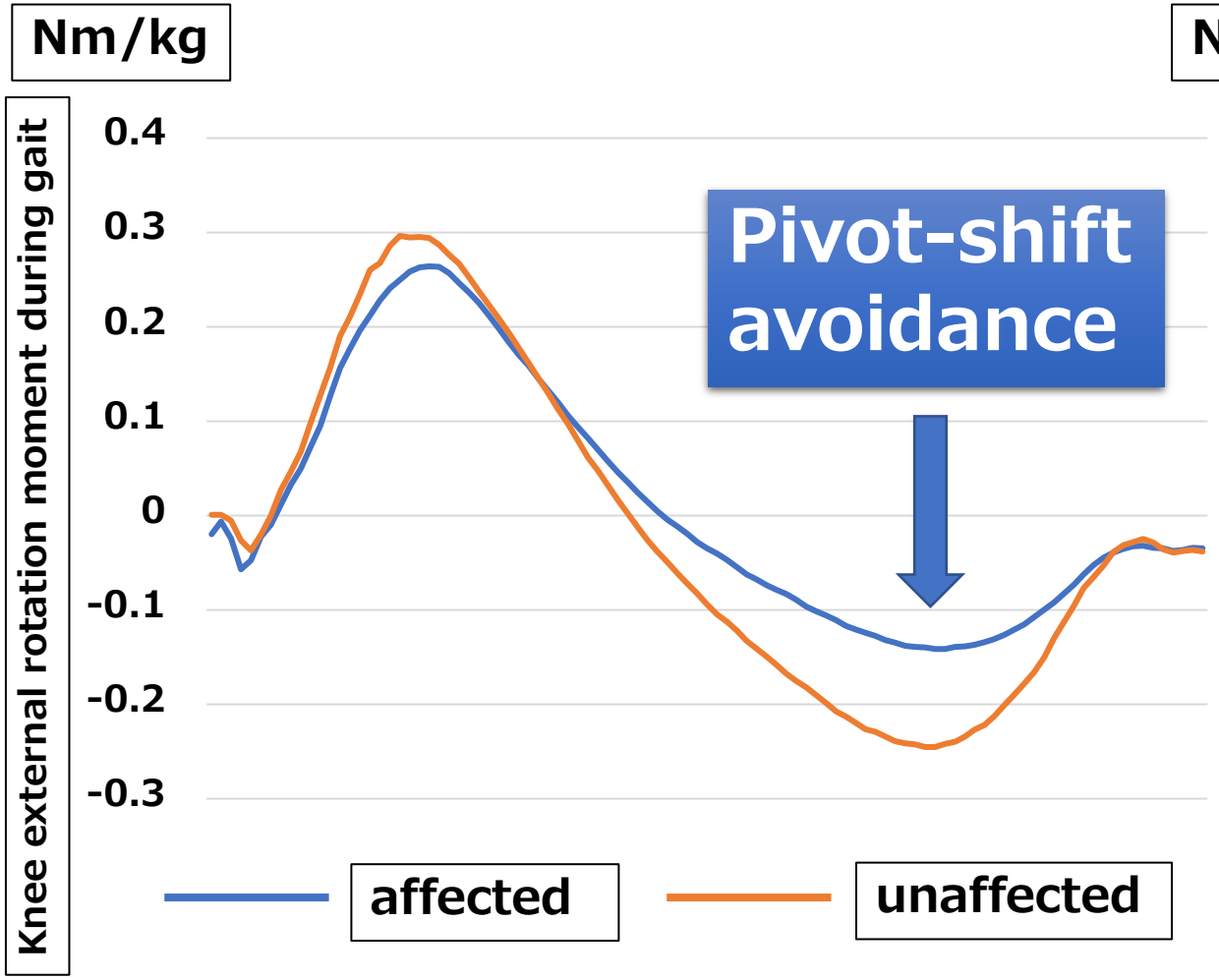
- ✓**isolated ACL injury group**
- ✓**ACL with medial meniscal injury group**
- ✓**ACL with lateral meniscal injury group.**

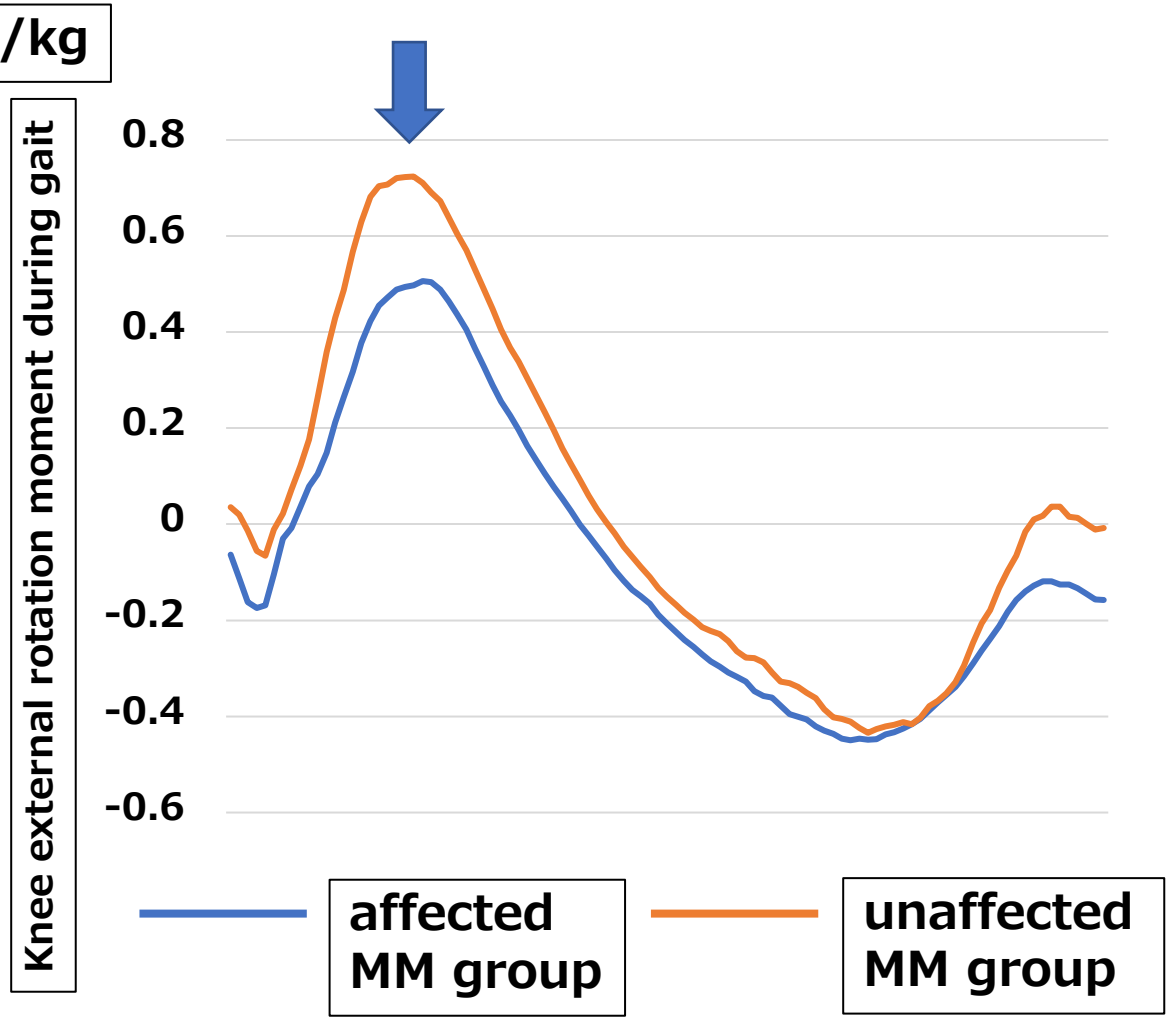
<statistical analysis>

Biomechanical differences were compared between affected and unaffected sides using two-tailed paired t-test at pre- and post-operative period in all groups, separately.
A significant difference was defined as a P value < 0.05.

Results (kinetic waveform in stance phase)

Side-to-side differences of rotation moment before surgery





Results (kinetic waveform in stance phase)

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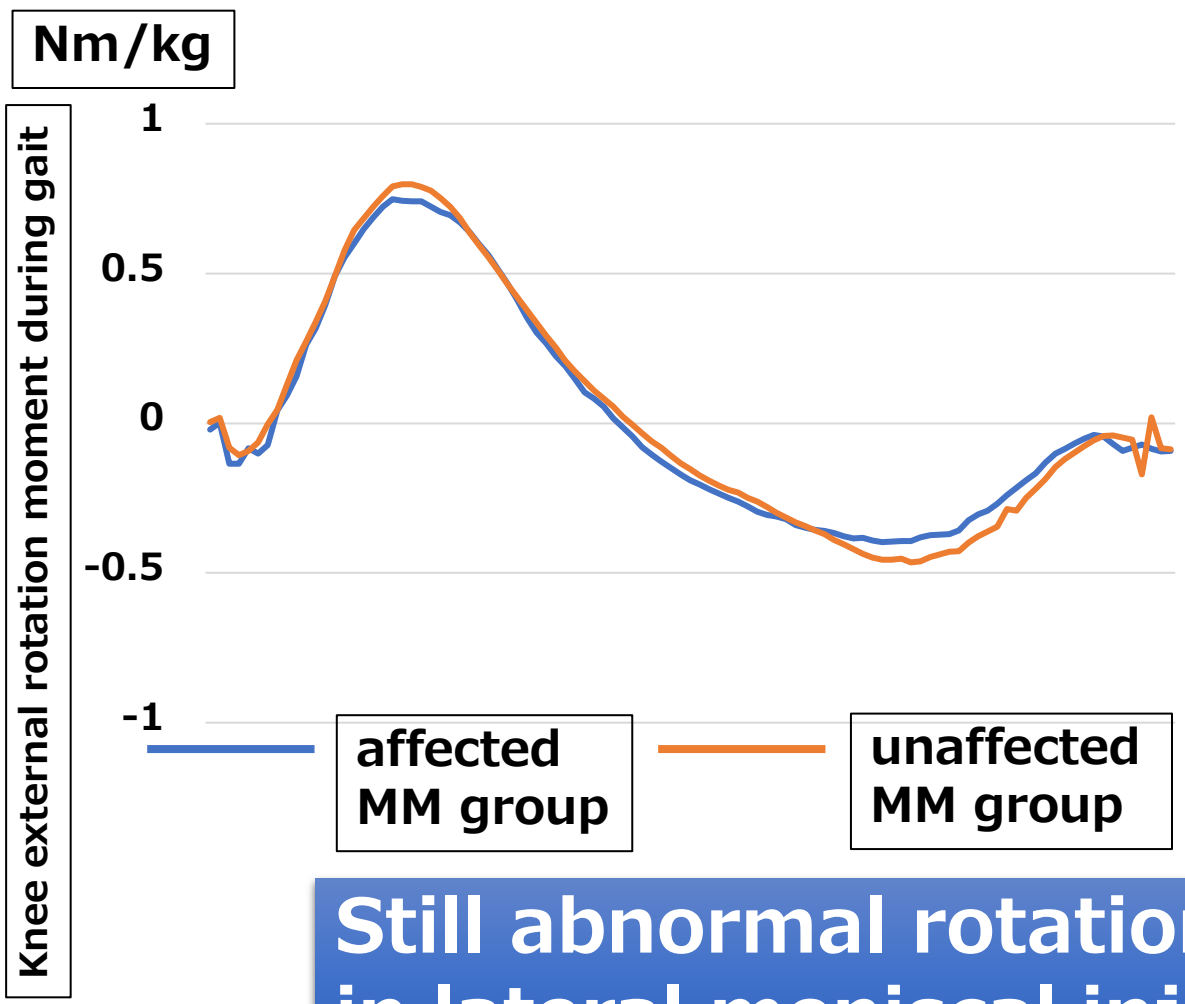
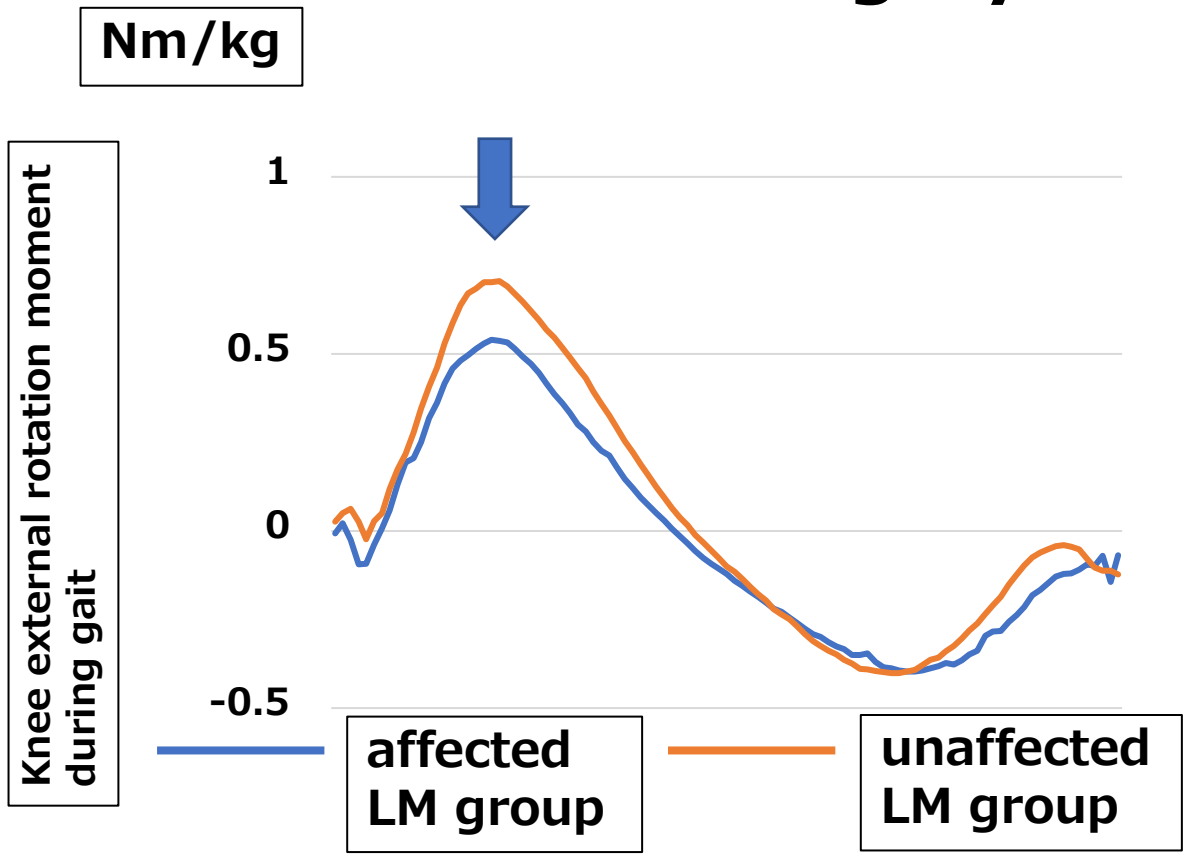




Still abnormal rotation moment was observed in lateral meniscal injury group.

Discussion (Literature Review)

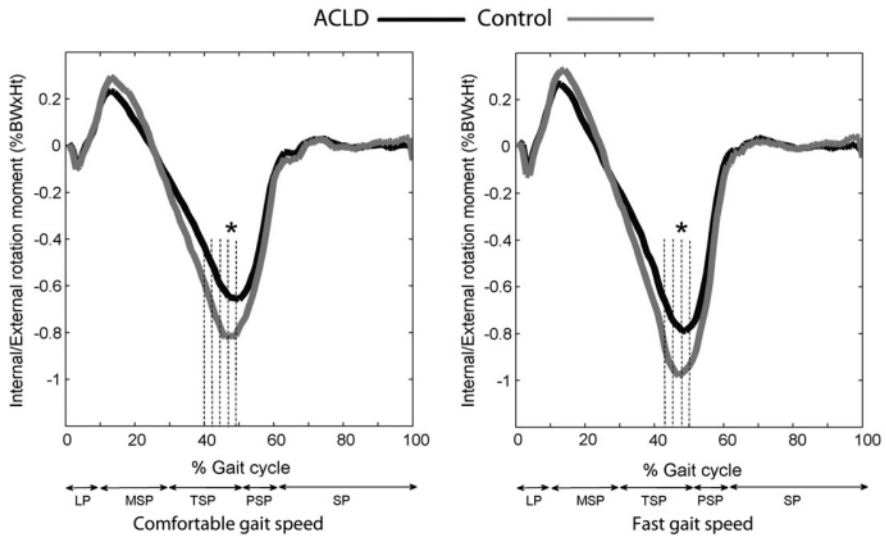


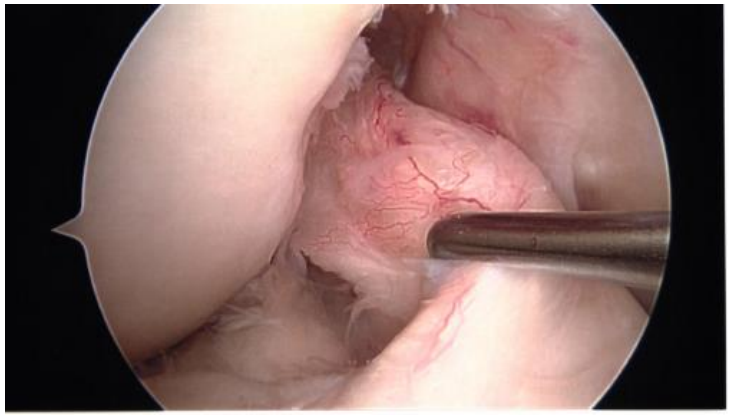
Fig. 5. Representative sagittal and axial knee motions in the ACL + M group (lateral meniscus injury).

Fuentes A, et al. Gait adaptation in chronic anterior cruciate ligament-deficient patients: Pivot-shift avoidance gait. Clin Biomech (Bristol, Avon). 2011;26(2):181-7.

Harato K, et al. Effect of unstable meniscal injury on three-dimensional knee kinematics during gait in anterior cruciate ligament-deficient patients. Knee. 2015;22(5):395-9.

Postoperative gait mechanics were unknown in ACL with unstable meniscal injury.

From the present study



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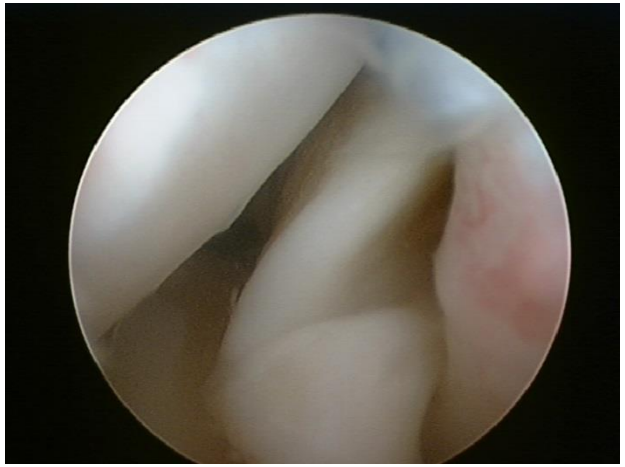

Abnormal rotation moment was still observed in ACL with lateral meniscal injury group even after surgery.

Limitation

- ✓ **Sample size was small, as the number of patients with partial meniscal resection was small.**

Summary

- The present study was done to investigate the gait mechanics pre- and post-ACL reconstruction in ACL-deficient patients with or without meniscal injury.

- Pivot shift avoidance was still notably observed especially in ACL with lateral meniscal injury group after the surgery.


Thank you very much
Keio University