ISAKOS

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

11th Biennial ISAKOS Congress • June 4-8, 2017 • Shanghai, China

Paper #21

Aggravated Rotational Laxity Due To The Concomitant Meniscus Tear In The Anterior Cruciate Ligament-Injured Knees Detected By The Quantitative Measurement Of The Pivot-Shift Test.

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Summary:
The impact of meniscus injury on the rotational laxity in the ACL injured knees has not been fully examined in clinical cases due to lack of quantitative evaluation. Electromagnetic system was then used to quantify the rotational laxity in ACL-injured cases with and without meniscus tear. As a result, concomitant lateral meniscus tear deteriorated the rotational laxity in the ACL-injured knees.

Abstract:
Purpose
Meniscus injury is quite frequently accompanied with the anterior cruciate ligament (ACL) injury and assumed to have significant impact on the rotational laxity based on previous in-vitro studies. However, it is still unknown how the concomitant meniscus injury affects the rotational laxity of the ACL-deficient knees in vivo because of the roughness and variability of the clinical pivot-shift test. Recently, a meticulous assessment of the pivot-shift test has become possible in clinical cases with the development of the quantitative measurement technology. The purpose of this study was to determine the effect of the meniscus tear on the rotational laxity in the ACL-deficient knees.

Methods
Fifty-seven unilateral ACL-injured patients (26 males and 31 females, 24 ± 10 y.o.) were included. Just prior to the ACL reconstruction, the pivot-shift test was performed under general anesthesia while conducting the quantitative evaluation using electromagnetic measurement system (EMS) to provide the tibial acceleration (m/sec2) concurrently with clinical IKDC grading (none, glide, clunk, and gross). Meniscus injuries were arthroscopically diagnosed during the ACL reconstruction. Chi-square test and independent t-test was used to assess the difference between the knees with and without meniscus tear. Subgroup analysis was then performed in the same manner for each medial and lateral meniscus tear separately. Statistical significance was defined as p-value of <0.05.

Results
Concomitant meniscus tear was observed in 32 knees. There was a significant difference of clinical grading between the ACL injured knees with and without meniscus tear ($p<0.05$). Tendency of increased pivot-shift measurements in the meniscus torn knees was demonstrated by the quantitative evaluation, but statistical significance was not achieved (meniscus-injured knees 1.6 ± 1.1 m/sec2 vs meniscus-intact knees 1.3 ± 0.8 m/sec2, $p=0.09$). Subgroup analysis showed that the ACL-deficient knees with lateral meniscus tear had larger tibial acceleration (1.8 ± 1.1 m/sec2, n=19) than the meniscus intact knees ($p<0.05$), whereas the medial meniscus torn knees (1.4 ± 1.0 m/

sec2, n=20) did not show aggravated rotational laxity (p=0.33).

Discussion

There are several potential anatomic structures which were suggested to affect the knee rotational laxity in the ACL injured knees, including other ligaments, meniscus, cartilage and anterolateral capsular ligament. Although the meniscus injury is the most common in addition to the ACL injury, the impact of the meniscus injury on the knee rotational laxity has not been fully examined. This study demonstrated the significant impact of the meniscus injury, especially lateral meniscus injury, on the rotational laxity in the ACL-deficient knees, which was successfully detected by using the quantitative measurement device. The meniscus injury should not be overlooked when considering the secondary restraint for the rotational laxity in the ACL injury, though the anterolateral capsular ligament has been recently focused on. The clinical demand to repair the lateral meniscus, if any, can be reaffirmed, and a careful inspection of the lateral meniscus tear should be required in the ACL-deficient knees with a substantial pivot-shift.

Conclusion

The concomitant meniscus tear, especially lateral meniscus tear, has a significant impact on the knee rotational laxity in the ACL-injured knees.