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The T2 Value of Normal Menisci and Comparison of the Arthroscopic Findings with Change of T2 Value for Repaired Meniscus Using T2 Mapping on Cartilage Setting

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Summary:
Our study showed that the T2 value of normal meniscus was 20.6 –21.2 msec at cartilage setting and the change of T2 value for repaired meniscus before and after surgery was -10.6 msec for healed menisci and -6.2 msec for incompletely healed menisci and +6.1 msec for no healed meniscus in the arthroscopy; these finding could allow the measurement of cartilage and meniscus in the same setting.

Abstract:
BACKGROUND
In the measurement of cartilage and meniscus MRI-T2 mapping, performing T2 mapping with different setting for both tissues take longer time and is not practical.

OBJECTIVE
The purpose of this study was to examine the T2 value of normal meniscus using cartilage setting, and also examine the change of T2 value in repaired meniscus.

METHODS
First, T2 value of the menisci which were identified as normal using knee arthroscopy, was examined retrospectively using 3.0T MRI-T2 mapping (TR = 2100 msec, TE = 10, 20, 30, 40, 50, 60 msec, field of view = 16 cm, slice thickness = 3 mm, matrix = 352 × 352) in 48 menisci of 40 patients (male 17, female 23, mean age 21.2 years). The measurement was performed in anterior horn, meniscal body and posterior horn of medial and lateral meniscus. Coefficients of variation (CVs) were calculated to determine the reproducibility of measurements in each area. Next, the T2 value of 7 repaired menisci in 7 patients (male 2, female 5, mean age 25.8 years) were evaluated with T2-weighted fast spin echo (FSE) fat saturated image for assessment of Mink grade and T2-mapping before the surgery and after 6-12 months. Healing status of all repaired menisci was examined by 2nd look arthroscopy and evaluated as complete healed, incompletely healed, and not healed based on the classification by Cannon et al. Intraclass correlation coefficient (ICC) was calculated to evaluate the reliability of measured T2 value of repaired meniscus.

RESULTS
The mean values of normal menisci were 21 ± 0.4 msec at anterior horn, 21.2 ± 0.4 msec at meniscal body, and 20.8 ± 0.4 msec at posterior horn in medial menisci?20.6 ± 0.3 msec at anterior horn, 20.8 ± 0.3 msec at meniscal body 21 ± 0.3 msec at posterior horn in lateral menisci. There were no significant difference among these menisci. In the repaired menisci, longitudinal tears were seen in 6 medial menisci at posterior part and complex tear was seen in 1 medial meniscus at posterior part. At the 2nd look arthroscopy, 4 menisci were healed, 2 menisci were incompletely healed and 1 meniscus was not healed. In the Mink grade, all menisci were rated as grade 3 preoperatively, and 1

healed meniscus was rated grade 1, and 3 healed menisci and 2 incompletely healed meniscus were rated grade 2, and 1 no healed meniscus was still rated grade 3 postoperatively. The mean changes of the T2 value of repaired menisci were -10.2 (9.8-13.1) msec in healed menisci, -6.2 (5.2-7.2) msec in incompletely healed menisci and +6.1 msec in not healed meniscus. Intrarater reliability for the T2 value measurement was high at ICC (1, 1) = 0.988, as was interrater reliability at ICC (2, 1) = 0.973.

CONCLUSION
We could found the T2 value of normal menisci at cartilage setting reliably, and the T2 value could differentiate the healed menisci from incompletely healed menisci. These finding could allow the measurement of cartilage and meniscus in the same setting.