The Plica Syndrome: Diagnostic Value of MR Imaging with Arthroscopic Correlation

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Introduction
Invasive imaging modalities such as arthrography and CT arthrography have been described as an useful imaging modality in the evaluation of medial plicae [1,2]. As a noninvasive modality, MR imaging has been extensively used in the evaluation of internal derangement of a knee. However, there have been very few reports of MR imaging about medial plicae [3].

The purpose of this study was to evaluate diagnostic value of MR imaging in patients with plica syndrome and to determine whether there is MR criteria of pathological medial plicae.

Materials and Methods
From March 1993 to February 1996, 55 patients (34 men and 21 women) with pathological mediopatellar plicae and 100 control subjects (51 men and 49 women) without pathological mediopatellar plicae participated in this study. The average age was 32 years (range, 13-59 years) for patient group and 37 years (range, 10-75 years) for control group. All cases confirmed by arthroscopy were classified according to the arthroscopic classification by Sakakibara [4]. In our study, pathological mediopatellar plicae were classified as Sakakibara type B (n=24), type C (n=12) and type D (n=19) by arthroscopic examination. All of type A (n=16) were asymptomatic non-pathological mediopatellar plicae, and then included in control group. In addition, control group included other subjects (n=84) who underwent imaging for suspected internal derangement of a knee joint and confirmed not to have medial plicae by arthroscopy. The findings of arthroscopy were used as the gold standard for the diagnosis of plica syndrome in this study.

MR imaging was performed on a 1.5-T system (Signa; GE Medical Systems, Milwaukee, Wisconsin) and a transmit-receive extremity coil. Sagittal T2-weighted MR images were obtained in all cases. Axial T1-weighted MR images were obtained in patient group (n=18) and control group (n=24). Axial MPGR MR images (500-600/15-20, 20° flip angle) were obtained in patient group (n=37) and control group (n=76). Typical MR parameters were: field of view, 15-20 cm; two excitations; matrix size, 256x192; slice thickness, 3 mm; and interslice gap, 1.5 mm.

For detection of pathological medial plicae we evaluated diagnostic efficacy between patient and control groups, depending on each MR pulse sequence. Also we evaluated association between Sakakibara types by arthroscopy and length, width or thickness of medial plicae on MR images according to Boven et al [1].

Statistical analyses of the data were performed using χ² tests. A P value of less than .05 was regarded as statistically significant difference.

Results
MR sensitivity in identification of pathological mediopatellar plicae was significantly superior in patient group [73% (27/37)] than control group [22% (17/76)] on axial MPGR MR images (P<.001) and significantly superior in patient group [71% (39/55)] than control group [17% (17/100)] on sagittal T2-weighted MR images (P<.001). Significant correlation was established between the presence of pathological mediopatellar plicae and visualization of plicae on axial MPGR or sagittal T2-weighted MR images (P<.001).

In the diagnosis of the plica syndrome, sensitivity, specificity, accuracy, positive predictive value and negative predictive value were 73, 78, 76, 61, and 86% on axial MPGR MR images and 71, 83, 79, 70, and 84% on sagittal T2-weighted MR images and 95, 72, 80, 63, and 96% on combination of axial MPGR and sagittal T2-weighted MR images, respectively. Incidence of pathological medial plica increased with a criteria of extension beyond the medial end of the patella on axial MPGR MR images (P<.05).

Discussion
In our study, the significant correlation was observed between the presence of pathological mediopatellar plicae and visualization of plicae on axial MPGR or sagittal T2-weighted MR images. Axial T1-weighted MR images played a little role in identifying medial plicae in patient and control groups. Axial MPGR and sagittal T2-weighted MR images were almost equal in diagnostic efficacy in the plica syndrome. Combination of axial MPGR and sagittal T2-weighted MR images enhanced substantial diagnostic efficacy of pathologic medial plicae compared with using just single pulse sequence. The present result of MR sensitivity (95%) in the diagnosis of plica syndrome was in good agreement with that reported by Nakamichi et al [3]. Our study showed that for the detection of pathological mediopatellar non-invasive MR imaging was better efficient than invasive arthrography and at least equally efficient to invasive CT arthrography. With a criteria of extending beyond the medial end of the patella, there would be more incidence of pathological medial plicae. However, no significant association between each Sakakibara type and width of medial plicae on axial MR images was found. This result was consistent to the reports of Hodge et al [2] and Nakasaki et al [3].

In summary, MR imaging is useful as a non-invasive screening method in the diagnosis of plica syndrome before arthroscopy. Combination of axial MPGR and sagittal T2-weighted images made acceptable efficacy in the diagnosis of the plica syndrome. Therefore, for the detection of pathological mediopatellar non-invasive MR imaging can be an alternative and efficient modality compared with invasive arthrography or CT arthrography.

References