

Double-Layered Lateral Meniscus Mimicking Locking of Lateral Meniscus: A Case Report

Takashi Katsuo^{1,2}, Yasushi Takata¹, Naoki Takemoto¹, Manase Nishimura¹,
Satoru Demura¹, Junsuke Nakase¹

Learning Point of the Article:

Double-layered lateral meniscus could be considered when MRI shows sharp inner margins and non-attached meniscal horns mimicking locking.

Abstract

Introduction: Double-layered lateral meniscus is an extremely rare anomaly, often presenting with symptoms similar to those of meniscal tears or locking. Characteristic magnetic resonance imaging (MRI) findings are not well established, and definitive diagnosis typically requires arthroscopy.

Case Report: A 47-year-old male presented with left knee pain following martial arts training. Locking of the lateral meniscus was suspected by MRI; however, arthroscopy revealed a double-layered lateral meniscus. The accessory meniscus was resected and post-operative outcomes were uneventful.

Conclusion: MRI may serve as an adjunctive tool in the diagnosis of a double-layered lateral meniscus. Resection of the accessory meniscal layer can lead to favorable clinical outcomes.

Keywords: Double-layered lateral meniscus, meniscectomy, magnetic resonance imaging, locking

Introduction

Meniscal abnormalities are rare but can cause various symptoms, such as pain, swelling, and locking [1]. Among these, the discoid meniscus is the most common, with an incidence of 0.4–17%, whereas the double-layered lateral meniscus is extremely rare, accounting for <1% of all meniscal anomalies [2]. Although there is no strict definition of double-layered meniscus, it is generally considered as the presence of an accessory meniscus that exists separately from the normal meniscus, originates near the anterior or posterior horn attachment of the normal meniscus, and attaches to the lateral or medial femoral condyle.

Although arthroscopic meniscectomy has been reported as an effective treatment for the double-layered lateral meniscus, its characteristic magnetic resonance imaging (MRI) findings remain unclear, and arthroscopic observation provides the definitive diagnosis [3].

In this report, we present a 47-year-old man with left knee pain. MRI initially suggested a locked lateral meniscus, but arthroscopy revealed double layers of the lateral meniscus. The patient was successfully treated with arthroscopic meniscectomy.

Author's Photo Gallery



Dr. Takashi Katsuo



Dr. Yasushi Takata



Dr. Naoki Takemoto



Dr. Manase Nishimura



Dr. Satoru Demura



Dr. Junsuke Nakase

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¹Department of Orthopaedic Surgery, Graduate School of Medical Sciences, Kanazawa University, Kanazawa, Japan,

²Kaga Medical Center, Kaga, Japan.

Address of Correspondence:

Dr. Junsuke Nakase,

Department of Orthopaedic Surgery, Graduate School of Medical Sciences, Kanazawa University, 13-1 Takaramachi, Kanazawa - 9208641, Ishikawa, Japan.

E-mail: nakase1007@yahoo.co.jp

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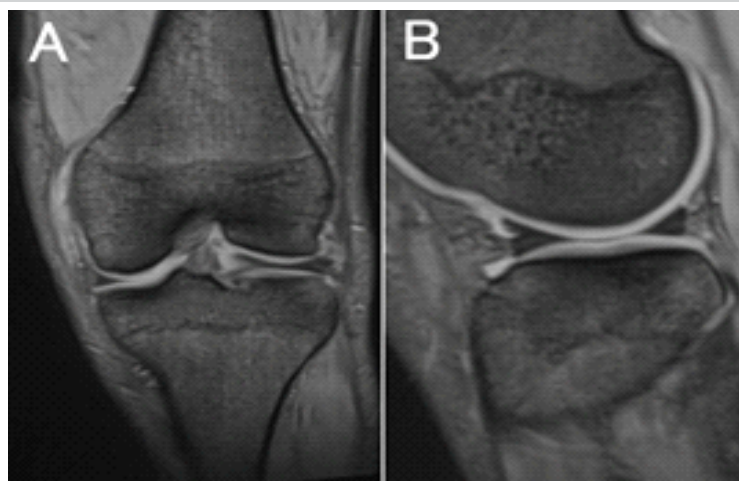


Figure 1: Magnetic resonance imaging (MRI). (a) Coronal T2-weighted MRI image demonstrating apparent locking of the lateral meniscus. (b) Sagittal T2-weighted MRI image showing increased thickness and signal alteration in the anterior segment of the lateral meniscus. The inner margin of the meniscus appears sharp.

Case Report

A 47-year-old male presented to our department with left knee pain during martial arts training. Physical examination revealed no swelling or patellar ballottment, with a range of motion from 0° extension to 140° flexion. Both the McMurray test and Lachman test were negative, as was the sagging sign. Plain radiographs revealed no abnormal findings, including bone injury or osteoarthritic changes. Coronal MRI suggested lateral meniscal locking, with a duplicated meniscal structure overlapping the native lateral meniscus attached to the tibia. In the

sagittal plane, thickening and signal changes on T2-weighted images were observed in the anterior horn of the lateral meniscus. However, the inner margin of the anterior horn appeared sharp on the sagittal view, making it difficult to definitively diagnose a meniscal tear (Fig. 1). An arthroscopic examination was performed for diagnostic and therapeutic purposes, revealing a double-layered lateral meniscus with the superior layer flipped anteriorly (Fig. 2). On the double-layered meniscus, the unstable superior layer extended from the anterior horn to the midbody (Fig 3). This superior layer was resected entirely (Fig. 4). A horizontal tear was observed in the inferior meniscus after resection of the superior layer; this was repaired using an all-inside device (JuggerStitch Meniscal Repair Device; Zimmer-Biomet, Warsaw, IN) (Fig. 5). Post-repair, stability of the meniscus was confirmed. Partial cartilage damage was found on the lateral tibial plateau. The procedure was completed without major complications. Post-operatively, range-of-motion exercises and weight-

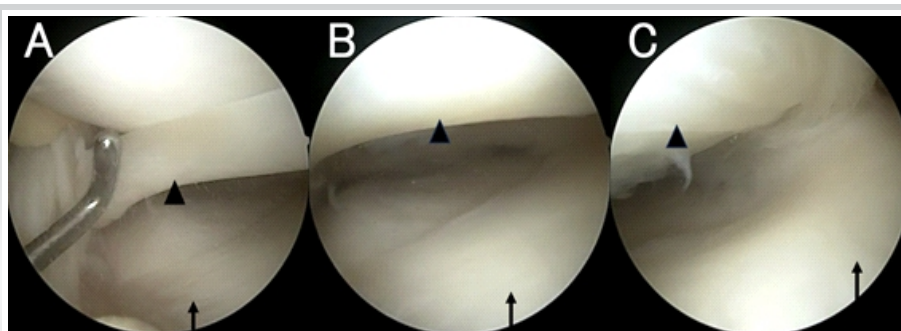


Figure 2: Arthroscopic image of lateral meniscus. (a) An unstable meniscus is observed overlying the normal lateral meniscus. Arrow head indicates the accessory meniscus. Arrow indicates anterior segment of normal lateral meniscus. (b) Arrow head indicates the accessory meniscus. Arrow indicates from the anterior segment to the middle segment of normal lateral meniscus. (c) Arrow head indicates the accessory meniscus. Arrow indicates middle segment of normal lateral meniscus.

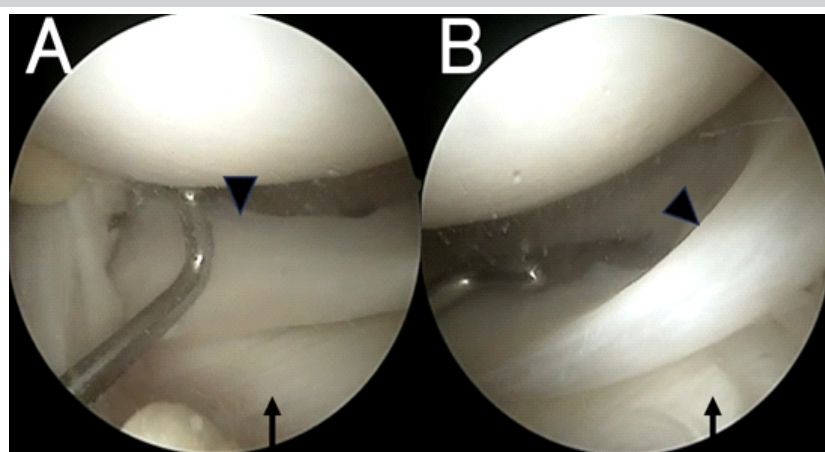


Figure 3: Arthroscopic image which shows that the accessory meniscus overlying normal lateral meniscus is unstable. (a) Arrow head indicates the accessory meniscus. Arrow indicates anterior segment of normal lateral meniscus. (b) Arrow head indicates the accessory meniscus. Arrow indicates middle segment of normal lateral meniscus.

bearing ambulation were initiated according to pain tolerance.

Discussion

In the present case, symptom improvement was confirmed after the resection of the accessory meniscal layer. Furthermore, we found that MRI may serve as an adjunctive tool for pre-operative assessment of the double-layered meniscus.

This case showed that resection of the accessory meniscus resulted in symptomatic improvement. The double-layered lateral meniscus is a rare morphological abnormality of the meniscus. Ryu et al. conducted an anatomical study of 437 patients and reported that 0.5% of meniscal



Figure 4: Resected unstable meniscus. The superior unstable layer was resected entirely.

abnormalities were double-layered lateral meniscus [4]. A double-layered meniscus is known to cause pain, swelling, and mechanical locking of the knee. Although a partial tear of the lateral meniscus was identified in the present case, clinical findings strongly suggestive of a symptomatic meniscal tear – such as joint swelling or a definitively positive McMurray test – were absent. Arthroscopic observation is the definitive diagnosis and most previously reported cases of the double-layered lateral meniscus underwent meniscectomy; our case similarly demonstrated symptom resolution following resection [1,5,6,7,8]. While partial horizontal tears in the inferior native lateral meniscus were repaired using the all-inside device, it remains unclear whether these tears were directly related to the double-layered meniscus.

This case suggested that an accessory meniscal layer can be suspected on MRI when the inner margin of the meniscus appears sharp, and when anterior or posterior horns are observed without tibial attachment. As characteristic MRI findings for the double-layered lateral meniscus have not yet been established, definitive diagnosis typically requires arthroscopic confirmation of a double-layered meniscal structure. Ota et al. reported that sagittal MRI images revealed signal changes and thickening within the meniscus, while coronal images suggested intercondylar locking typically associated with discoid meniscus tears [3]. Shimozaki et al. described posterior horn thickening as a feature of inverted-type discoid meniscus tears; however, whereas the inner edge of the meniscus appears blunted in such cases, the double-layered lateral meniscus observed in the present case showed a sharp



Figure 5: Arthroscopic image after resection. Arthroscopic image of the lateral meniscus after resection of the accessory meniscus and repairing the horizontal tear which was not identified on magnetic resonance imaging.

inner edge [9]. Although the coronal appearance may mimic intercondylar locking of a discoid meniscus, this finding in the double-layered lateral meniscus is attributed to the presence of anterior and posterior horns that do not attach to the tibia, in addition to a normally attached meniscus.

Conclusion

Resection of the accessory meniscal layer can improve symptoms in patients with a double-layered lateral meniscus. It could be suspected on MRI by the presence of sharp inner meniscal margins and non-attached anterior/posterior horns. When such MRI findings are present, the double-layered lateral meniscus should be considered in the differential diagnosis, and meniscectomy may provide symptomatic relief.

Clinical Message

Double-layered lateral meniscus can mimic meniscal locking on MRI. Recognition of sharp inner margins and non-attached horns on MRI may help preoperative suspicion and arthroscopic resection yields good results.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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