

Case report

Root avulsion of the posterior horn of the medial meniscus in skeletally immature patients



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ABSTRACT

Background: Meniscal root avulsion has been predominantly reported in an adult population but little is known about this meniscal lesion in children and adolescents.

Purpose: The of this article is to describe the clinical symptoms and a new MRI sign of a medial meniscus posterior root avulsion in skeletally immature patients, and to report the arthroscopic procedure for its reinsertion in the presence of open physes.

Case description: We report two skeletally immature patients who had a medial meniscus posterior root avulsion [MMPRA]. Diagnosis of a MMPRA was suspected on MRI by intense T2 hypersignal located at the postero-medial part of the tibial plateau reflecting trabecular bone oedema (“Bone bruise”) at the level of the medial meniscal posterior root attachment. Arthroscopic reduction and fixation of the posterior root of the medial meniscus with transosseous sutures was performed. The patients returned to sport at the end of 6 months without residual symptoms. At one year, the radiographs showed no modification of the physis. Healing of the medial meniscal posterior root was noted on MRI.

Clinical relevance: In a skeletally immature patient it is important that this rare meniscal lesion is diagnosed early and adequately treated. We emphasize the importance of the indirect MRI signs that can lead a clinician to suspect the diagnosis of MMPRA. The aim of the surgery was to restore the anatomical footprint of the meniscal root and to re-establish its function thus preventing future chondral damage without damage to the tibial physal growth plate.

Level of evidence: Level IV

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1. Introduction

The meniscus plays an important role in the biomechanics of the knee, including load distribution, impact absorption, and stabilization [1]. The meniscal root is a key to the normal biomechanical function of the meniscus; it behaves as a strong insertional ligament maintaining hoop tension and allowing axial load dispersion. When a lesion occurs in this ligamentary complex, its biomechanical function is compromised [2,3] and medial meniscal extrusion is observed [4]. Consequently, medial meniscal posterior root tears and radial/flap tears are associated with more severe cartilaginous lesions than other medial meniscal tears [5]. Medial meniscal root pathology is strongly associated with degenerative joint disease (DJD) [6].

Several techniques for posterior meniscal root repair have been published [7–11]. Their aim is to restore hoop tension in order to potentially avoid the rapid progression of DJD. Yet, there is little published concerning the clinical and MRI presentation of this rare meniscal lesion in children and adolescents, and in particular the surgical technique of medial meniscus posterior root avulsion (MMPRA) reinsertion in

patients with open physes. We report the case of two skeletally immature patients with a MMPRA. The purpose of this article is to describe the clinical symptoms and the importance of subtle MRI findings that can help to make an early diagnosis and treat this lesion. In addition we report the arthroscopic procedure for the reinsertion of the medial meniscus posterior root avulsion in a skeletally immature patient.

1.1. Case report

Two young adolescents were successively treated in our department for a similar medial meniscal tear root avulsion in 2011. A 14-year-old male (patient 1) and a 12-year-old male (patient 2) suffered a torsional injury to their right knee. The first patient fell and hurt his knee while rollerskating and the second patient felt pain after a torsional injury while playing football. The reason for consultation was in both cases pain and persistent effusion several weeks after the injury. They had no history of a previous knee injury. Following their injury, they both continued to complain of pain in their knee which affected their daily activities of living. Examination revealed in both cases a small joint effusion, normal range of motion (complete extension, 140° of knee flexion) and pain on the medial joint line. There was no increased laxity

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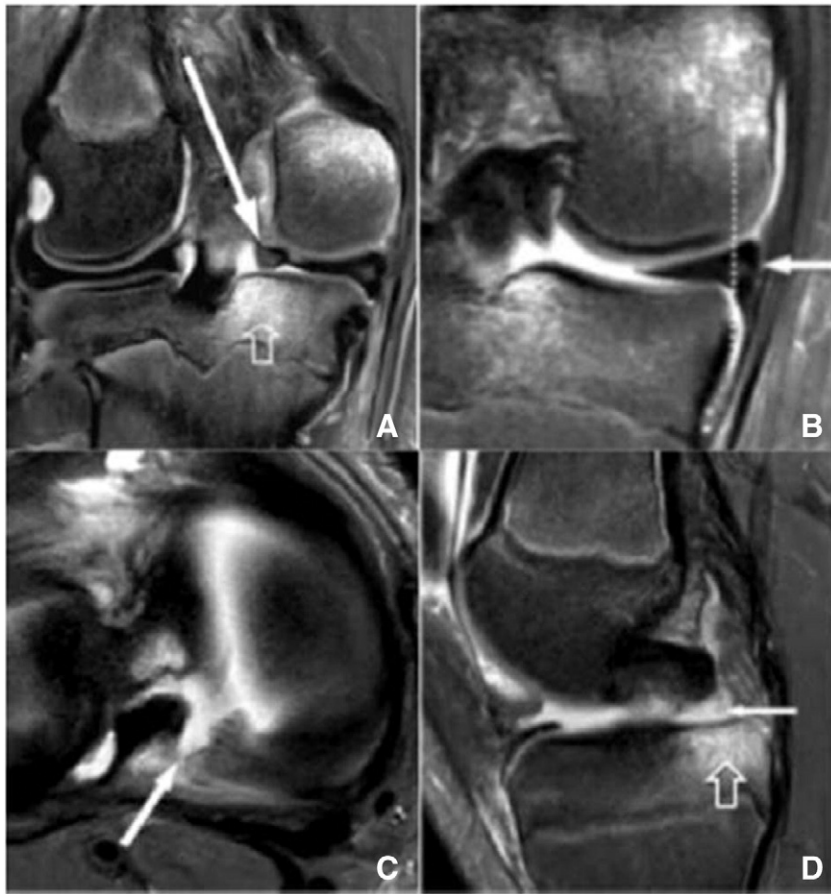


Fig. 1. Preoperative MR imaging of patient 1; T2 weighted images with fat suppression. (A) Coronal view. Bone bruise oedema (open arrow) and truncated aspect of the posterior horn of the medial meniscus filled with fluid T2 hypersignal intensity. Note retraction of the avulsed root of the medial meniscus (solid arrow). (B) Coronal slice at the level of the MCL demonstrating minor meniscus extrusion (solid arrow) indicative of the root avulsion. (C) Axial view. T2 hypersignal intensity and complete defect of the medial meniscal posterior root attachment (solid arrow). (D) Sagittal view, postero-medial tibial bone bruise oedema (open arrow) and a complete defect of the posterior meniscal root filled with fluid T2.

to varus and valgus stress on the knee at 0° and 30° of flexion and a firm endpoint to the Lachman test in both cases. By applying a varus stress to the knee in full extension, an extrusion of the middle and anterior segments of the medial meniscus could be palpated at the anteromedial joint line. An excessive anteroposterior drawer was noticed at the level of the medial plateau when the knee was bent at 90° of flexion.

An MRI was performed with our standard protocol (axial sagittal and coronal T2 weighted fast spin echo with fat saturation images) with a 1.5 Tesla magnet (Avento, Siemens HealthCare, Erlangen, Germany) (Fig. 1). The radiologist noted in our first case a trabecular

bone oedema (“Bone bruise”) located at the postero-medial part of the tibial plateau. A thorough analysis of MR imaging revealed:

- On coronal view, a truncated aspect of the meniscus filled with fluid-like T2 WI hypersignal in the area of the medial meniscal posterior root and a slight medial meniscal extrusion on the coronal slice passing through the MCL (Fig. 1A, B).
- On sagittal view, a complete loss of the normal triangular shape of posterior medial meniscus, replaced by fluid like T2 WI hypersignal, giving a “ghost meniscus sign” (Fig. 1 D).



Fig. 2. Preoperative MR imaging of patient 2: T2 weighted images with fat suppression. (A) Coronal view shows bone bruise oedema (open arrow) and minor meniscus extrusion indicative of the root avulsion. (B) Sagittal view, postero-medial tibial bone bruise oedema (solid arrow). (C) Axial view. Defect of the medial meniscal posterior root attachment (arrow head).

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