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Case report

Rapid chondrolysis following an unoperated lateral meniscus tear in a young professional rugby player



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ABSTRACT

Rapid chondrolysis following a lateral meniscectomy is a rare complication. We present the first reported case of rapid chondrolysis of the lateral compartment, which developed 6 months after a meniscus tear that was not surgically treated in a young 18-year-old professional rugby player. The possible hypotheses to explain this complication are presented, and certain previously published causes were excluded (iatrogenic during surgery, undiagnosed increased rotatory instability, chondrotoxicity of bupivacaine). Overloading of the cartilage surface of the lateral compartment from meniscal extrusion can cause cartilage necrosis.

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1. Introduction

Rapid chondrolysis of the knee following a lateral meniscectomy is defined by:

- swelling in the joint and reduced active range of motion on clinical examination [1–4];
- narrowing of the lateral compartment on Schuss view X-rays [5];
- no clinical signs or results suggesting neurological, metabolic, endocrinological, inflammatory or infectious disorders.

We report the case of a professional rugby player who developed rapid chondrolysis of the lateral compartment of the knee following conservative treatment of a lateral meniscal tear. Our goal was to report the first case of chondrolysis following a lateral meniscus tear that was not surgically treated and to review the demographic data, the clinical picture, and the results of the literature to identify factors associated with this severe complication.

2. Clinical case

A professional 18-year-old rugby player presented with persistent effusion, of the left knee following an injury that had occurred 6 months earlier during a match. The MRI performed the week after the injury showed a deep radial tear of the middle segment of the lateral meniscus and the beginning of meniscal extrusion. There

was no damage to the cruciate ligaments, or to the posterolateral corner angle. The patient was managed in another center immediately after the injury and conservative treatment was decided upon with gradual rehabilitation and return to play planned for 6 weeks after the accident. Despite this treatment, he was unable to return to sports because of persistent swelling of the knee. The patient did not improve even after he had reduced his sports activities, and he consulted in our hospital for follow-up management.

The clinical examination showed significant swelling of the joint, reduced flexion due to swelling and no anterior, posterior or mediolateral laxity. There was no redness or tenderness (including of the lateral joint space). The McMurray test was negative. A diagnosis of septic arthritis was excluded based on the clinical examination and the laboratory results.

The long-leg X-ray showed 2° valgus. The Schuss view showed 2 mm narrowing of the lateral compartment (Fig. 1). MRI showed effusion, with no subchondral edema, lateral tibiofemoral chondropathy that was predominantly on the tibial side and worsening of the meniscal extrusion to 5 mm (Fig. 2). This tibiofemoral chondropathy was not present on the first post-injury MRI. Because of the unsuccessful conservative treatment and persistent symptoms, arthroscopic lavage was decided upon. Exploratory arthroscopy showed extrusion of the middle segment of the lateral meniscus, cartilage damage extending to the tibial plateau with corresponding lesions on the femoral condyle that were less severe (Fig. 3).

The synovial membrane was inflammatory with numerous villousities. A biopsy of synovial tissue showed non-specific synovitis (infiltration of inflammatory cells, fibroblasts and lymphocytes) with hyperplasia and neovascularisation.

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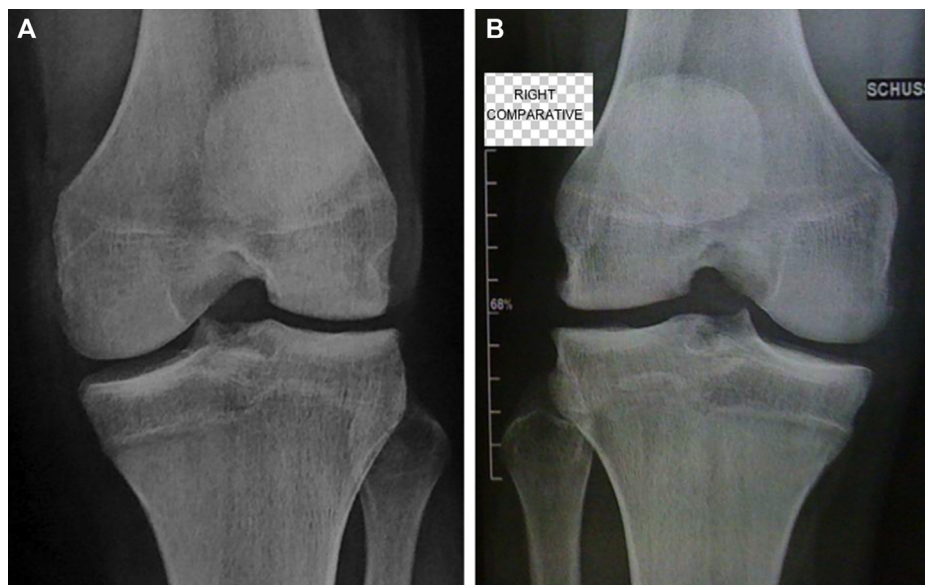


Fig. 1. Comparative Schuss view X-rays when rapid chondrolysis was diagnosed 6 months after the meniscal injury. There is 2 mm articular narrowing in the lateral femorotibial compartment of the left knee (A) compared to the right knee (B).

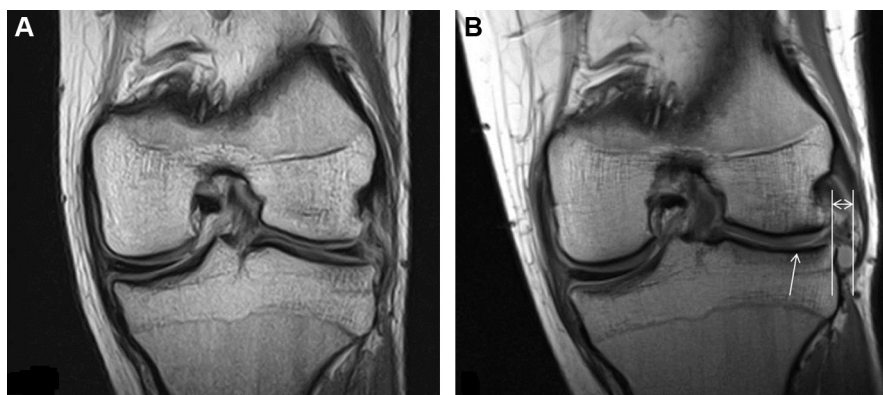


Fig. 2. T1-weighted coronal MRI slices of the left knee when the lateral meniscus injury occurred (A) which shows a deep radial tear of the middle segment of the lateral meniscus. Six months later (B) persistent swelling with no bone marrow edema, showing worsening of lateral meniscus extrusion. This is defined by the distance between the right angle of the limit of the tibial plateau and the peripheral rim of the meniscus (white line). The MRI confirms the rapid chondrolysis by showing the subchondral sclerosis of the lateral tibial plateau associated with thinning of the cartilage (white arrow).

The postoperative outcome was simple and followed by rehabilitation with partial weight-bearing on the knee. Six months later there was no swelling or pain in the knee, allowing unrestricted return to sports. At one year of follow-up, there were no swelling nor pain at clinical examination.

3. Discussion

This is the first reported case of rapid chondrolysis following an untreated radial lateral meniscus tear. There are only 12 published cases of chondrolysis of the knee following partial lateral

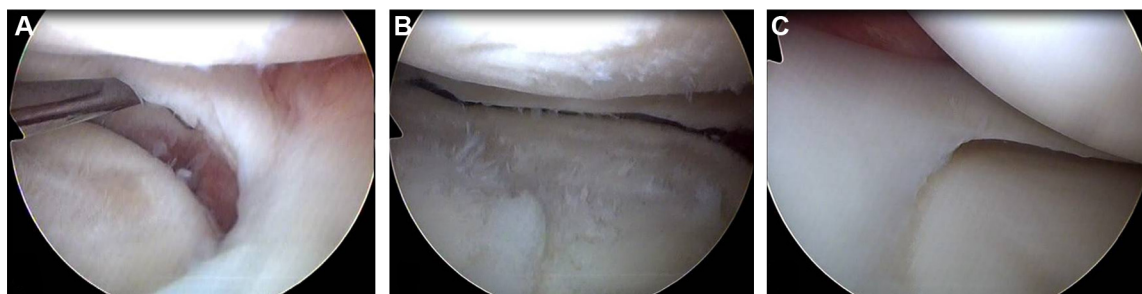


Fig. 3. Arthroscopic results of the intervention performed 6 months after the meniscal injury. A. The degenerative process involves the articular cartilage with meniscus extrusion. B. There is severe chondropathy, predominant on the lateral tibial plateau with a less severe corresponding lesion on the lateral femoral condyle. C. The medial compartment is normal.

Table 1
Overview of published data on rapid knee chondrolysis after lateral meniscectomies.

Article	Number of cases	Follow-up (months)	Sex	Sports participation	Treatment	Location/grade of chondrolysis	Outcome
Mariani et al. [3]	5	28.4	5 males	5 professional footballers	Arthroscopic lavage in all patients mean 8 months (range 6–12) Combined with open retensioning of posterior meniscofemoral capsule in all patients	2 cases diffuse Grade 3 changes lateral compartment with focal Grade 4 on tibia 3 cases diffuse Grade 2 changes lateral compartment with focal Grade 4 on tibia	Return to unrestricted activity 4–5 months from lavage
Ishida et al. [2]	1	12	1 male	High school basketball player	Arthroscopic lavage at 7 months	Grade 3 localised to lateral tibial plateau	Reduced sports activity symptom free for 1 year
Alford et al. [4]	2	24	2 males	1 'avid' runner 1 'athletic' high school footballer	Arthroscopic lavage Patient 1: 10 months Patient 2: 5 months	Grade 4 changes lateral femoral condyle and tibial plateau Grade 2 changes lateral femoral condyle and tibial plateau	Both patients required meniscal transplant and osteochondral graft to lateral femoral condyle
Charrois et al. [1]	4	30.5	3 males, 1 female	Amateur handball player Amateur boxer 2 recreational sportsmen	Arthroscopic lavage in all patients mean 6 months (range 5–8 months)	Grade 3 and 4 changes in lateral compartment in all cases	

meniscectomy in the literature [1–3] (Table 1). Although the causes of this complication have not been clearly identified, there are common etiological factors in the 12 published cases:

- chondrolysis was systematically located in the lateral compartment extending to the tibial plateau with corresponding, but less severe lesions of the femoral condyle;
- patients were young, mainly men, and practiced sports intensely;
- there were no postoperative complications before the patient returned to high intensity training.

These common factors suggest that the etiology of this complication may be mechanical. Other factors that may be involved such as toxicity of locally injected anesthetics, or the existence of cartilage damage associated with the meniscectomy [6] or caused by arthroscopy [7] have been reported. The fact that the patient in our case did not undergo any surgery or injections before the development of chondrolysis excludes these potential factors.

Mariani et al. [3] found increased rotatory instability in the 5 patients in their series and suggested that rotatory instability combined with high stress sports activity could be the cause of chondrolysis in these cases. This hypothesis was not confirmed in the present case because the patient did not present with increased rotatory instability.

Mechanical overloading can cause chondrocyte necrosis and cartilage matrix damage [8,9]. Meniscectomy or meniscal extrusion due to a deep radial tear changes the distribution of mechanical loads on the articular cartilage by concentrating them on smaller contact areas [9]. This results in maximum peaks of stress in the central area of the tibial condyle, which corresponds to the area of the most severe cartilage damage observed in the present case. The peaks of stress caused by a meniscectomy or meniscal extrusion are greater in the lateral compartment than in the medial compartment, because of the convexity of the tibial plateau [10,11].

In the present case we hypothesize that the deep radial tear of the middle segment of the lateral meniscus and the changes in the meniscal tissue in this young athlete caused progressive tearing of the collagen fibers resulting in meniscal extrusion [12,13]. Tearing or injury to the radial meniscus plays a role in extrusion by destroying the structural integrity of the meniscal rim and the distribution of peripheral loads [14]. Thus rapid chondrolysis could be

due to several factors creating a process of self-sustaining cartilage destruction. However, it is difficult to know if the chronic effusion and degeneration of the meniscal tissue and cartilage were a cascade of events, or if the chronic effusion was a simple consequence. A long-term study with several follow-up consultations at short intervals could help define and clinically specify the order and roles of the different elements involved in this degenerative process.

4. Conclusion

This is the first reported case of spontaneous rapid chondrolysis following a lateral meniscal tear that was not surgically treated, with possible hypotheses to explain this rare complication (intense physical training causing cell necrosis, convexity of the articular surface of the lateral compartment increasing mechanical loads, meniscal extrusion) and excluding other potential factors that have been identified as the primary cause of these cases (iatrogenic surgical factors, undiagnosed increased rotatory laxity, chondrotoxic effect of bupivacaine injections).

Disclosure of interest

M. Thaunat and B. Sonnery Cottet are consultant for Arthrex. R. Chatellard received a grant from Amplitude.

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