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Osteochondral Fracture of the Patella Associated with Patellofemoral Dislocation: Case Report

Dr. Gonzalo Harretche Minhondo*[1], Dr. Marcelo Dupont[2], Dr. Marcos Rodríguez[3], Dra. María Elena Pérez[4]

[1]Pediatric Traumatology and Orthopedics, University of the Republic, Faculty of Medicine. Montevideo Uruguay. 2018 - 2022. gharretche@gmail.com. ORCID: 0009-0005-8090-0838

[2]Pediatric Traumatology and Orthopedics, University of the Republic, Faculty of Medicine. Montevideo Uruguay. mdup5@icloud.com ORCID: 0000-0001-5936-3601

[3]Pediatric Traumatology and Orthopedics, University of the Republic, Faculty of Medicine. Montevideo Uruguay. marcosrodriguezbranco@gmail.com. ORCID: 0000-0003-2072-1748

[4]Pediatric Traumatology and Orthopedics, University of the Republic, Faculty of Medicine. Montevideo Uruguay. meperezcarrera@gmail.com. ORCID: 0000-0001-5778-2267

ABSTRACT

Summary Traumatic osteochondral fractures in pediatric patients are associated with patellofemoral dislocations in a high percentage (18–75%). Clinical presentation is variable, so maintaining a high index of clinical suspicion is important for better diagnosis, treatment, and outcomes. Accordingly, we present the case of a 12-year-old patient with an osteochondral fracture of the patella associated with a patellofemoral dislocation. The treatment was surgical, involving osteosynthesis with HCS screws, resulting in an excellent functional outcome at 3 years of follow-up.

KEYWORDS: pediatric age, osteochondral fracture, knee, patellofemoral dislocation.

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OBJECTIVES

The objective is to document a case of injury treated by our team, the treatment performed, and the clinical evolution during the follow-up period.

INTRODUCTION

This injury was first described in 1906 by Kroner (1). In 1943, Milgram (2) described the injury and its traumatic etiology. Coleman and later Batchelor, in 1948, reported osteochondral fractures of the patella associated with patellofemoral dislocation (3). The incidence is not well known; in a series by Isacsson et al. (4) who studied 1145 consecutive traumatic knees, they found an incidence of patellofemoral dislocation of 14 per 100,000 people across all age groups, with the most common age range being 13-15 years, with 125 cases per 100,000 people. These fractures are generally associated with patellofemoral dislocations, occurring in 18% of their series and up to 75% of patella dislocations in children and adolescents according to other series (5,6).

Less frequently, other causes such as direct or indirect trauma to the knee can cause osteochondral fractures without episodes of patellofemoral dislocation (7,8). Most of the lesions occur on the medial surface of the patella, the lateral surface of the external condyle, or both surfaces (9-13). Clinically, the patient experiences a knee trauma episode with or without patella dislocation, joint effusion, pain, and may present with acute knee locking (1). Radiographs should be taken to study the injury using frontal views (supine position, knee in extension, leg in neutral rotation, posterior cassette to the knee, with the x-ray beam directed vertically towards the knee), lateral views (side lying on the affected limb, knee flexed 30 degrees, cassette below the external sector of the knee, beam directed perpendicularly to the cassette centered on the knee), and patella axial views (supine, knee flexed 45 degrees, beam directed proximally to distally at a 30-degree angle with respect to the horizontal). X-rays have low sensitivity for diagnosing osteochondral fractures (14-17), with 30-50% of cases appearing normal (5,10). For this reason, in patients with such symptoms, we should not delay requesting magnetic resonance imaging (MRI) (10,14-19). MRI has a sensitivity and specificity of 90-95% for the diagnosis, localization, and characterization (5). It not only

allows for assessing the osteochondral fracture but also evaluates associated injuries such as anterior cruciate ligament (ACL) tears, medial patellofemoral ligament (MPFL) tears, meniscal injuries, chondral injuries, and morphological variations like trochlear dysplasia and anterior tibial tuberosity position, which predispose to patellofemoral instability (16,19).

Treatment for these injuries can be orthopedic or surgical. Orthopedic treatment has good results in patients with small osteochondral lesions less than 10 mm (10,11). It involves 3-4 weeks of immobilization with a plaster knee brace and a rehabilitation protocol with joint mobility exercises and muscle strengthening. The goal of surgical treatment, by fixing the osteochondral fragment, is to restore the articular surface and prevent early-onset osteoarthritis (7). Treatment is indicated based on the size of the osteochondral fragment, its location, and the time elapsed since the injury (6,10).

Our goal is to present a case of an osteochondral fracture in a teenage patient treated by our team.

CASE REPORT

The case involves a healthy 12-year-old pre-menarche girl with no significant osteoarticular history, who suffered an indirect left knee trauma when her foot remained fixed on the ground during an external rotation movement of the leg over the knee. She immediately developed knee pain (gonalgia), joint effusion, and limited knee flexion-extension. There was no mention of patellofemoral dislocation.

Upon admission to the emergency department, physical examination showed healthy skin, no angular or rotational alterations in the lower limbs, knee with joint effusion (horseshoe-shaped), and limited flexion-extension, with no distal neurovascular injury. Radiographs of the left knee (front and lateral) did not reveal any osteoarticular injuries (Fig. 1). An emergency arthrocentesis was performed, extracting 50 cc of hematic fluid. Post-arthrocentesis examination revealed a stable knee in the anteroposterior and varus-valgus planes, full range of motion, and no signs of meniscal injury. Rest, cryotherapy, and analgesia were recommended without immobilization.

An MRI showed joint effusion, bone edema at the external femoral condyle, and an osteochondral fracture in the inferomedial sector of the patella, with a free intra-articular fragment in the lateral parapatellar recess (Fig. 2). There were no signs of MPFL tear, although it appeared elongated, thickened, and edematous. No other associated injuries were found.

Figure 1. Radiograph of the front and side view of the left knee taken at the first consultation. No osteoarticular injury is visible.

Figure 2. Preoperative MRI of the left knee. A displaced osteochondral fragment and bone edema are visible on the inferomedial surface of the patella and the lateral surface of the external femoral condyle.

Figure 3. Intraoperative images showing an osteochondral fragment approximately 2 cm in diameter.

Three weeks after the injury, the patient underwent surgery through both arthroscopic and open approaches. Arthroscopically, the free intra-articular fragment was sought in the lateral parapatellar recess, and the site of the lesion was identified on the inferomedial surface of the patella (Fig. 3). For fixation of the lesion, a medial parapatellar approach was performed, with eversion of the patella to visualize the lesion bed. The osteochondral fragment was reduced and fixed with two HCS screws (Fig. 4).

No immobilization of the left lower limb was used, and full active joint mobility was allowed immediately postoperatively. Weight-bearing was permitted at 6 weeks, and rehabilitation focused on restoring the range of motion, progressive muscle strengthening, and neuromuscular reeducation. This treatment was guided by the institution's physiatrists and physiotherapists. At the 3-month follow-up, the patient had a full range of knee motion, no pain, and no signs of patellofemoral instability. Physiotherapy continued to strengthen the thigh muscles.

Figure 4. Immediate postoperative radiographs.

At the 7-month follow-up, the patient had no pain and could carry out all activities normally. Physical examination showed a stable knee in all planes, no joint effusion, and full range of motion (Fig. 5). The patient had no apprehension sign or J-sign.

Figure 5. Clinical images of the patient 7 months post-injury.

Three years after the injury, the patient continued to have excellent function, with no pain, and could perform all activities without restrictions. A CT scan was performed after trauma to the contralateral knee, allowing for follow-up of the original lesion. The CT scan showed a consolidated fracture (Fig. 6). The outcome was assessed using the Pediatric International Knee Documentation Committee score (Pedi-IKDC) (20), a modified version of the original IKDC validated for pediatric patients and in Spanish (21). Our patient's result was excellent, with a Pedi-IKDC score of 100 points. Additionally, the patient reported no difference compared to her pre-injury knee.

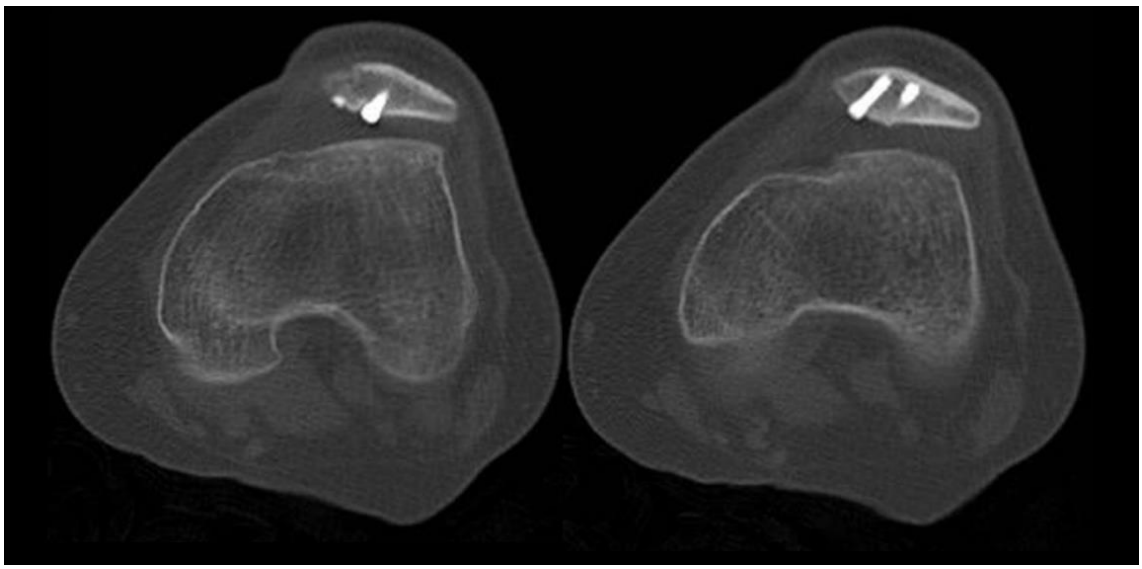

Figure 6. CT scan at 3 years post-injury.

DISCUSSION

Osteochondral fractures of the patella are increasingly seen in the pediatric population due to the rise in high-demand physical activities and improved diagnostics from advances in imaging techniques (15). They occur more frequently in this population due to the lower resistance of the growing osteochondral junction (5,22-24).

Diagnosing osteochondral fractures of the knee can be challenging at the first consultation, as they present as a traumatic knee with some of the following signs: joint effusion, pain, and joint locking. Radiographs may appear normal, so a high clinical suspicion is necessary (15). Many publications agree that MRI should be promptly requested in patients suspected of having an osteochondral fracture.

Seeley et al. found osteochondral fractures on MRI in 44% of patients with lateral patellar dislocation, even when radiographs showed no injury (10). Early diagnosis improves the prognosis of these injuries by preventing fat degeneration of the loose fragment, which enables fixation (5,9). We believe our patient experienced an episode of patellofemoral dislocation that spontaneously reduced. In the pediatric population, episodes of patellar dislocation often go unnoticed by the patient (15,25). In this case, with clinical suspicion, we decided to request an MRI, knowing it could assist in diagnosing lateral patellar dislocation by showing bone contusion, chondral, or osteochondral injury in the lateral femoral condyle and the medial articular surface of the patella (25,26). The MPFL and medial retinaculum are often injured, and our patient had these MRI findings, with a thickened, elongated, and edematous MPFL, but no complete tear.

The therapeutic management of osteochondral fractures is constantly under review. Most authors agree that large (>10-15 mm) displaced osteochondral fragments, especially those involving weight-bearing surfaces, should be fixed. In contrast, smaller fragments not involving weight-bearing surfaces may be treated conservatively or by excising the osteochondral fragments (5,6,9-11). In our case, the patient had an injury meeting the criteria for fixation.

The method of fixation is a matter of debate. Currently, there is no strong evidence to suggest one implant over another. In their work, Chotel et al. (9) performed fixation of 14 osteochondral fractures, using headless screws in 5 cases, absorbable pins in 5, and pull-out suture fixation in 4. Their study found that screws offered the advantage of compression at the injury site. We chose this method due to the availability of the implant and the secure fixation it provides. Early fixation is known to yield better results compared to delayed fixation, as it prevents the degenerative process of the osteochondral fragment, which can make reduction and fixation impossible.

Whether to repair medial stabilizing structures in the first instance is controversial. Some authors advocate conservative treatment for the first episode and surgical treatment for recurrent dislocation, while others prefer surgical treatment from the first episode due to the 40% recurrence rate of conservative treatment in some series (27). However, in a systematic review, Lee et al. (28) found no significant evidence favoring surgical treatment over conservative management for the first episode of patellar dislocation.

CONCLUSION

We present a case of a patient with an increasingly common injury in the pediatric population. It is important to highlight the role of early MRI in diagnosing these injuries, as it has high sensitivity and specificity. We believe, as widely supported by international literature, that MRI is a fundamental study for traumatic knees in pediatric patients. Delayed diagnosis increases the risk of degeneration of the osteochondral fragment, making fixation impossible, and increases the risk of developing gonarthrosis, especially when the lesion is large and involves the weight-bearing surface.

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