9 Patellofemoral Instability in the Young Male Soccer Player with First-Time Dislocation, Closed Physes, Normal Trochlea: 17-Year-Old

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9.1 Case

9.1.1 History

A 17-year-old male, who was physically active and soccer player at high level with no history of knee complaints: He had a contact injury resulting in a fall and obvious knee-twisting injury. He felt sudden pain in his right knee, and he had to leave the court immediately. He could not describe how he felt, despite acute pain. Walking was possible only with crutches and physical examination revealed knee hemarthrosis.

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9.1.2 Physical Examination

There were significant pain and tenderness around the medial side of the knee. Knee was heavily swollen. Aspiration was done with 50 ml blood. Difficulties were there in full extension, and flexion was at 80 degrees. Passive ROM was 0–110. He was able to stand on the injured leg. Stable knee joint was found in varus and valgus stress, and anteroposterior laxity seemed normal, but pain caused muscle tension and difficulty evaluating in physical examination. Patellar movement made significant pain on the medial patellar side and acute lateral patellar dislocation injury was suspected; concomitant injuries were hard to define, though.

9.1.3 Radiographic Examination

X-rays of the right knee at the date of the injury were reviewed. They showed no significant fractures, despite suspicion of small osteochondral fracture on lateral view. Patella was located centrally, and patellar height was normal. MRI was required to confirm the location of the suspected osteochondral fracture, as well as to confirm the diagnosis (Figs. 9.1, 9.2 and 9.3).

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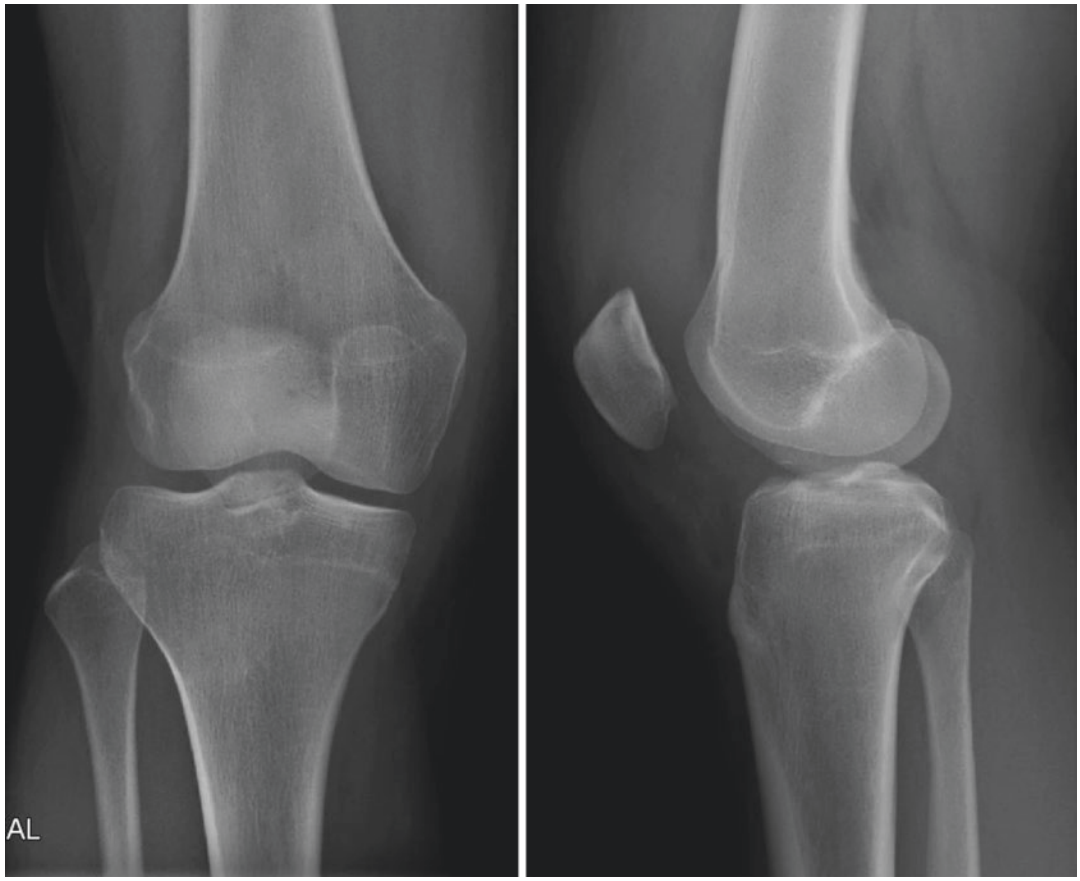

Fig. 9.1 Radiographs at the time of injury

9.1.4 Proposed Treatment

Surgery was necessary to fixate the osteochondral fracture, which was considered as significantly affecting the lateral femoral condyle articulating surface. In a case of primary patellar dislocation without an osteochondral fracture amenable for fixation, the proposed treatment would have been nonoperative. An arthroscopic evaluation was performed, and the osteochondral fracture was fixated arthroscopically with two bioabsorbable nails. As the patella was significantly unstable, a medial patellofemoral ligament (MPFL) reconstruction was performed simultaneously. The gracilis tendon was harvested and the free ends of the graft were placed into 3.5 mm blind-end tunnels at the medial patella. The graft was located between the layers two and three at the medial side of the knee and the loop of the graft was fixated at the femoral 5 mm tunnel. Tunnel position was confirmed to be anatomical with true lateral fluoroscopic view, and before fixation of the femoral side, MPFL graft behavior was checked to be anatomical not resulting in any graft tightening at any point of knee flexion cycle. Femoral fixation was performed with a 5 mm bioabsorbable interference screw.

9.2 Rehabilitation and Outcome

After surgery, free knee range of motion was allowed as tolerated by pain, and no brace was used. Full weight bearing was permitted in straight leg and partial weight bearing for 2 weeks for flexed knee. Crutches were necessary for 4 weeks, until pain and muscle control allowed controlled gait pattern. Full extension

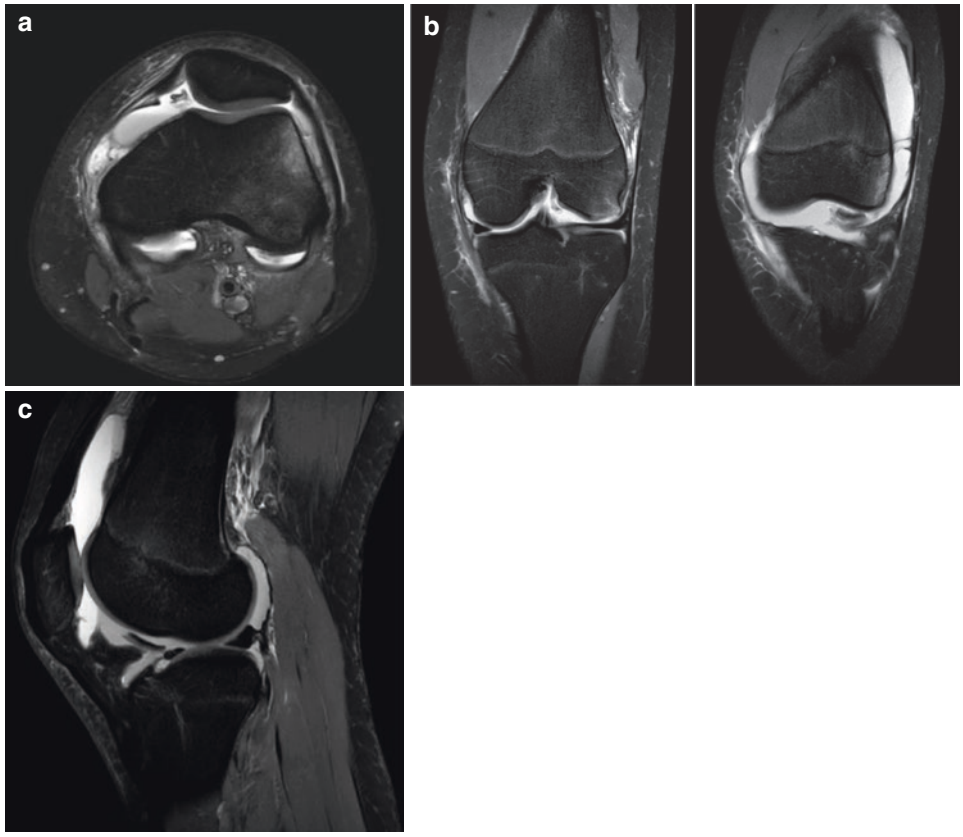

Fig. 9.2 MRI (axial (**a**), coronal (**b**), and sagittal (**c**) PD sequence) at the second day from the injury verified the diagnosis of lateral patellar dislocation (medial patellofemoral ligament disruption on the femoral attachment and lateral femoral condyle bone bruises) and revealed osteochondral fracture at the lateral femoral condyle. No trochlea dysplasia or patella alta was seen

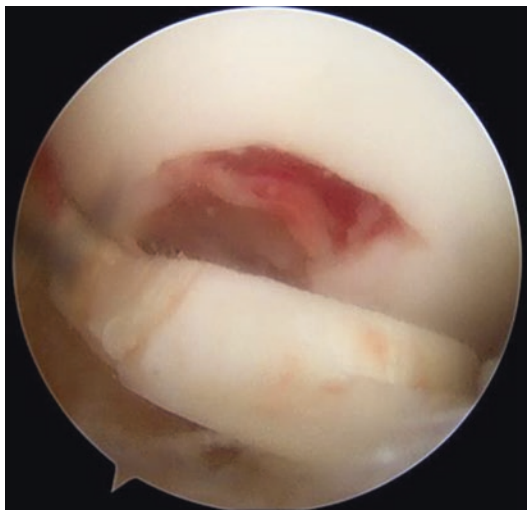

Fig. 9.3 Arthroscopic view of the displaced lateral femoral condyle osteochondral fracture. Size of the fragment was 9 mm of width and 18 mm anteroposterior length

should be gained as soon as possible and 90 degrees flexion at 3 weeks. The patient could walk normally at 4–5 weeks and return to near-normal daily activities including stairs by 6–8 weeks. He could run at 3 months and return to play soccer at 5 months. In follow-up, the osteochondral fracture healed and the patient had no complaints, pain, or instability at 6 months postoperatively.

Take-Home Message

In a case of first-time patellar dislocation, the medial stabilizing structures, MPFL being the most important, have evident, though limited, spontaneous healing capacity. Nonoperative treatment is therefore a viable option, if no significant concomitant injuries or risk factors for recurrent instability exist. When load-bearing articular cartilage has fractured, the fracture

should be fixated if possible to preserve articulating joint surface and simultaneous patellar stabilizing surgery (MPFL reconstruction) performed.

Key Points

1. First-time patellar dislocation results in MPFL injury and osteochondral fractures are frequently seen.
2. MRI is necessary to confirm the diagnosis and to assess any concomitant osteochondral fractures.
3. Indication for surgery is an osteochondral fracture amenable for fixation.

9.3 Perspective

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9.3.1 First-Time Dislocation with OC Fragment

This is an interesting case, not only because it highlights important factors in decision-making, but also because some aspects are a little unusual. The important factors in the decision-making process are the patient's age, the contact mechanism of injury, the lack of risk factors for recurrent patellar dislocation, and the presence of a displaced osteochondral fragment.

Both the contact mechanism and the absence of risk factors put this patient at low risk of recurrent patellar instability, probably in the order of less than 15%, based on the findings of a recent systematic review [1].

The displaced osteochondral fragment raises the question of surgical intervention. Given the location of the fragment on MRI scans (anterolateral) it needs to be addressed as it is likely to become symptomatic. However, it is not uncommon for an osteochondral fragment to become adherent to the lateral aspect of the lateral femoral condyle and not cause any symptoms. This can be seen at arthroscopy as part of a patellar stabilization procedure in the setting of recurrent patellar instability.

Once a decision has been made to perform an arthroscopy, consideration needs to be given to whether the fragment is suitable for reduction and fixation. In this case, the single arthroscopic view suggests an unusual site for the osteochondral lesion in that anteriorly it seems quite central on the lateral femoral condyle in a mediolateral plane. Typically, these lesions are lateral and involve the lateral margin of the condyle.

When deciding whether to retain or remove such a fragment, an assessment of the potential for healing needs to be made. On the positive side, this patient is relatively young, but the fragment appears to be essentially chondral with no or minimal bone on the deep surface, at least anteriorly. This reduces the chance of it healing. The size of the lesion probably tips the balance in favor of an attempt at repair. It would not need to have been much smaller for me to have removed it.

Accessing these lesions arthroscopically can be challenging. The more anterior they are, the harder it is. The site reflects the degree of knee flexion at the time of patellar dislocation/reduction with greater knee flexion leading to a more posterior lesion. I am impressed that in this particular case the fragment could be reduced and fixed arthroscopically. It is not uncommon to need a limited anterolateral arthrotomy to achieve this. With regard to the fixation used, this is the same as I would use, although I would perhaps have aimed for three nails.

Then comes the question of whether a medial patellofemoral ligament (MPFL) repair or reconstruction is warranted. I think there is general agreement that if the MPFL is to be addressed, the results of reconstruction are superior to repair or plication, even in the acute situation. In this case, the surgeon made a decision to proceed with an MPFL reconstruction. I think a reasonable case can be made either way.

On the one hand, the patient is young and the osteochondral fragment needs to be addressed surgically, so that the addition of an MPFL reconstruction might be seen to be relatively small in terms of affecting the recovery from surgery. A

risk of recurrence following an MPFL reconstruction in this setting is very low and less than the assumed risk of 15% or less.

On the other hand, a <15% risk of recurrence can be seen as relatively low, particularly as the injury mechanism was contact, in keeping with the absence of risk factors for recurrence. In other words, without contact, this patella was very unlikely to dislocate in the first place. Without the osteochondral injury, this patient would most likely have been treated nonoperatively. As such, I would have strongly considered limiting my surgery to addressing the osteochondral fragment.

9.4 Perspective

Laurie A. Hiemstra

Dr. Sillanpää has presented a relatively straightforward case of a first-time patellofemoral dislocation in a young athlete with no significant pathoanatomic risk factors. This case raises several interesting issues, more related to pathways of care than to the final treatment of this athlete. Early assessment of knee injuries, with early imaging when necessary, is the crucial step that allows for optimal patient care, especially those patients that may have time-sensitive repairable osteochondral lesions.

The principal issue in this case is the early diagnosis and imaging of this young patient to allow for optimum surgical care with fixation of the cartilage injury and restoration of knee stability. This young athlete was assessed the day after his injury, an example of an excellent care pathway for an acute knee injury. In many countries, this access to an appropriate practitioner such as a sport medicine physician or orthopedic surgeon that can provide a definitive diagnosis may take weeks to months. This delay decreases the chances that a potentially fixable osteochondral fragment will remain fixable. It also introduces significant deconditioning to the athlete, increased time of missed play, and delayed return to sport.

Access to early MRI was the other key to this successful outcome. The early MRI allowed the surgeon to rule out an ACL injury which would be a common differential diagnosis with this history. The MRI confirmed the existence, location, and size of the osteochondral fracture giving the evidence to proceed with emergent surgical management. MRI is highly sensitive to detecting osteochondral injury after patellofemoral dislocation and in children and adolescents these lesions are reported in 34–62% of patients [2, 3]. Early MRI allows for the appropriate management of any associated osteochondral injury avoiding the challenges related to addressing a neglected (undiagnosed) fracture. MRI has the added benefit in patients with patellofemoral dislocation of allowing for the assessment of pathoanatomic risk factors, which may alter surgical management [4]. In many countries, MRI may not be available in a timely fashion or may not be affordable for all patients. Further research into the cost and clinical outcome benefits of emergent MRI in a first-time patellofemoral dislocation to identify the repairable chondral lesion may lend evidence to push for early imaging in this patient population.

Dr. Sillanpää's treatment was ideal for this patient. The primary goals in treating this young athlete are to return him to full function, to prevent any recurrent dislocation, and to have minimal issues in this knee in the future. It is known that patellofemoral dislocation is associated with osteoarthritis later in life [5]. Primary repair and healing of an osteochondral fracture will provide the best outcomes, conceivably saving multiple surgeries should the chondral lesion remain symptomatic or progress to further degeneration. Early return to sport with minimal deconditioning will optimize the patient's sport performance and recreational activities. Most experts would agree with treating the first-time patellofemoral dislocation nonoperatively in the setting of relatively normal pathoanatomy and no repairable osteochondral fracture. Individual circumstances may influence toward earlier stabilization. If the patient is already having an anesthetic, surgery, and rehabilitation to address the osteochondral fracture, the benefit of adding an MPFL reconstruction is potentially significant with minimal potential harm.

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