Osteochondral fracture of the patella without soft tissue injury and with no dislocation: A case report

Majed N. Alosaimi a,⁎, Mohammed M. Almutairi b, Saad M. Alshahrani b, Mansour N. Alqahtani b, Abdullah S. Alghamdi b

a Department of Orthopedic Surgery, King Khalid Hospital – King Abdulaziz Medical City, Jeddah, Saudi Arabia
b College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia

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A B S T R A C T

INTRODUCTION: Osteochondral fracture of the patella is a fairly common pathology, but almost always associated with a spectrum of soft tissue injuries including anterior cruciate ligament (ACL) rupture. We present a rare case of an osteochondral fracture of the patella in the absence of ligament or soft tissue injuries and with no dislocation of the patella in a pediatric patient.

PRESENTATION OF CASE: An 11-year-old male presented to the orthopedic clinic on crutches following a football injury. The patient had pain in his left knee with flexion deformity. Plain film radiography of the left knee was taken, and an osteochondral fracture of the patella was suspected. Further imaging studies were conducted including computed tomography (CT) and magnetic resonance imaging (MRI) which revealed an isolated osteochondral fracture of the patella with no other associated injuries. Open reduction and internal fixation of the displaced fragment was successfully performed with favorable outcomes. During follow-up, almost full range of motion was regained, and plain film radiography revealed healed fracture with a normal appearance of the patella.

DISCUSSION: Traumatic osteochondral fracture of the patella is a common injury and most of these injuries are commonly accompanied by an acute dislocation of the patella or soft tissue injuries such as rupture of the anterior cruciate ligament (ACL) and almost half of all patellar dislocations incidence are associated with osteochondral fractures of the patella. This case had an isolated osteochondral fracture of patella.

CONCLUSION: As demonstrated in this case, osteochondral fractures are common among younger population and patients need to be thoroughly evaluated. Advanced Imaging such as MRI and CT are essential to exclude soft tissue injuries. Although management is highly variable, the importance of open reduction and early fixation should be emphasized for optimal outcomes.

⁎ Corresponding author.
E-mail address: Majedalosaimi@gmail.com (M.N. Alosaimi).

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1. Introduction

Osteochondral fractures of the patella account for 1% of all bone fractures. These fractures are frequently either avulsion or complete fractures extending to the anterior cortex of the patella [1]. Osteochondral fractures of the patella are highly associated with acute dislocation of the patella and can occur due to traumatic injuries of the knee, noncontact twisting injuries of the knee, or secondary to an osteochondritis dissecans (OCD) lesion [1,2]. In the majority of cases, osteochondral injuries occur due to an acute traumatic injury to the knee, most commonly as a result of a low energy trauma or sports injuries frequently seen in adolescent patients. The involvement of both the underlying bone and the articular cartilage may be seen in osteochondral injuries; hence, the name.

Acute patellar dislocation is commonly reported in young active patients which may result in an osteochondral fracture. Osteochondral injuries can be accompanied by a pattern of soft tissue injuries, including anterior cruciate ligament (ACL) tear [2].

Those who have osteochondral fractures can be easily misdiagnosed on the basis of physical examination or plain film radiography [3]. Magnetic resonance imaging (MRI) is crucial to diagnose osteochondral fractures of the patella as they can be easily misinterpreted on plain film radiography [3,4]. Only a small bony fragment may be seen on plain film radiography and often associated with a separation of a large fragment of articular cartilage which can be clearly detected by MRI or ultrasonography [3]. Early stable fixation and mobilization should be considered for optimizing the outcome [1]. The treatment choices for osteochondral injuries are highly influenced by the size and the location of the concomitant injury as well as the presence of a soft tissue injury [2,3]. The importance of open reduction and internal fixation should be emphasized in order to prevent damage to the articular cartilage.
patients was diagnosed. Six months prior to his osteochondral
fracture, the patient had a trauma to his left hand with a swelling
and contusion in the little finger. Radiography findings were unremarkable, and the patient was discharged with analgesic agents
as needed and with no further complaints. Physical examination
demonstrated tense effusion with flexion deformity and decreased
range of motion (ROM). Neurovascular examination was unremarkable. Laboratory tests were unremarkable. For radiological workup,
anteroposterior and lateral plain films of the left knee were taken
which revealed loose bone piece intra-articular with marked joint
effusion (Fig. 1). CT showed a patellar fracture with intraarticular
fragment that measures 1.6 cm with moderate knee joint effusion
(Fig. 2A, B). MRI revealed a displaced osteochondral fracture of the
medial patellar facet with no other associated injuries (Fig. 3A, B).
The ACL, PCL, medial and lateral menisci, medial and lateral col-
lateral ligaments were intact. Open reduction and internal fixation
were planned. The patient was admitted to the surgical ward to
be prepared for operation. The day after, he was brought to the
operating room. Time-out was carried out, and he received IV cea-
zolin on induction of anesthesia for prophylaxis. The procedure was
started by doing a skin incision at the level of the patella followed
by a subcutaneous dissection. Upon inspection, both the medial and
the lateral retinaculum were intact. The medial parapatellar arthro-
tomy was done which revealed a large hematoma in the joint that
was evacuated promptly. The osteochondral fragment was found
in the suprapatellar pouch measuring approximately 2.5 cm length
and 1.5 cm width (Fig. 4). The fragment was mainly cartilaginous
and contained a very small segment of bone. There was a big ulcer
defect on the medial aspect of the patella. Upon initial assessment,
fixation of the fragment seemed better than excision because it
occupied a large area on the medial aspect of the patella. Follow-
ing irrigation, two anchors were used for fixation in the patella.
Using a 1.5 mm drill, two holes in this cartilaginous fragment were
done. Next, those two anchors were passed through the holes. Fixation
was done with nonabsorbable suture with good reduction and
fixation (Fig. 5). Closure was done in layers over a drain in the
joint. The patient tolerated the procedure and was extubated and
shifted to the recovery room in a stable condition. On postoperative
day 3, hinged brace was adjusted to 30 degrees flexion. He
was discharged home with instruction to have gentle ROM 0–30
degrees. Physiotherapy and occupational therapy were conducted

Fig. 1. Preoperative lateral radiography of the left knee shows joint effusion (arrowhead) and a displaced fragment (arrow).
Findings: Lateral patellar displacement. There is a marked Joint effusion/soft tissue swelling accompanied with intercondylar bone piece like structures detected.

along with reducing the dislocation rate of the patella [3]. Osteo-
ochondral fractures of the patella are frequently associated with
a spectrum of soft tissue injuries [4]. The report has been arranged
in accordance with the Surgical Case REport (SCARE) guidelines [5]
(Table 1). This case report highlights a rare case of an osteocond-
tral fracture of the patella in the absence of ligament or soft tissue
injuries and with no dislocation of the patella in a pediatric patient.

2. Presentation of case

An 11-year-old male was referred by a family physician follow-
ing a football injury with a mild pain in his left knee. The patient
stated that he forcefully twisted his knee and was unable to walk.
Following workup and examination, osteochondral fracture of the

Fig. 2. A: 3D CT (lateral view) scan of the left knee shows the osteochondral fragment (arrow). B: CT scan (sagittal view) of the left knee shows joint effusion (arrowhead)
and the displaced fragment (arrow).
Findings: Dense moderate knee joint effusion. A fragmented detached corticated bone is seen in the intercondylar notch anteriorly with corresponding irregularity of the
inferior aspect of the patella. The broken fragment measures 1.6 cm with scattered tiny adjacent fragments are noted as well. No clear fracture of the tibial spine, plateau or
femoral condyles. The tibiofemoral and patellofemoral joint spaces are maintained.
on a regular basis to regain full ROM. The patient was on follow-up as an outpatient every other week with gradual increase in ROM and was adherent to physiotherapy. Three months later, full ROM was regained, and plain film radiography revealed normal appearance of the patella (Fig. 6).

3. Discussion

Traumatic osteochondral fractures of the patella are one of the most common injuries seen in the orthopedic surgery clinic and may occur at any age. However, young people are more susceptible to such injury. The incidence and etiology of these fractures have been fully described in detail. The etiology of an acute traumatic osteochondral fracture, being the most common, differs entirely from other etiologies such as osteochondritis dissecans (OCD). Therefore, a traumatic osteochondral fracture of the patella represents a different entity and needs to be evaluated and managed differently. While the knee joint is frequently involved in these traumas, most of these injuries are commonly accompanied by an acute dislocation of the patella or soft tissue injuries such as rupture of the anterior cruciate ligament (ACL) [6]. Some studies have reported that almost half of all patellar dislocations incidence are associated with osteochondral fractures of the patella [6,7]. Osteochondral fracture seems to be a common pathology of the knee

Fig. 3. MRI (sagittal view) of the left knee shows marked effusion [hematoma] (arrow), (*) patellar defect, and intact ACL.

Findings: Osteochondral fracture at the medial patellar facet is present with defect measuring 1.6 cm in transverse dimension overlying hematoma is noted measuring 1.2 × 1.6 cm in AP and TV dimensions. The displaced osteochondral fragment is located within the joint space just anterior to the root of the ACL. It approximately measures 1.3 × 2 cm in its greatest AP and TV dimensions and 1 cm in thickness. The displaced bone fragment has its own cartilaginous coverage. The quadriceps tendon, as well as the infrapatellar tendon and medial retinaculum appear unremarkable. The patella is normal in position without dislocation. There is moderate joint effusion with fluid level representing hemarthrosis. The ACL, PCL, medial and lateral menisci, medial and lateral collateral ligaments appear unremarkable. Remainder of visualized bones appear unremarkable.

Fig. 4. The osteochondral fragment that measures around 2.5 × 1.5 cm.
in the clinical practice. Moreover, the mechanisms of osteochondral fractures of the patella are similar to those following patellar dislocation and ACL rupture [8].

In regard to the management, different potential treatments can be applied, taking into account the existence of prognostic parameters such as age, location within the knee joint and concomitant injuries all of which could potentially influence the treatment decision [9]. Osteochondral fractures can be managed using one of the three main potential treatment choices which are fixation of the displaced fragment, the removal of the osteochondral fragment, or preforming any kind of regenerative procedure to achieve good healing of the injury. Bone marrow stimulation and various transplantation techniques are all regenerative procedures that attain good regeneration of the bone and cartilage. Although most studies suggested that fixing the fragment seems to be the ideal treatment for acute displaced osteochondral fragments, other concerns have been raised against this choice of management [9,10]. Technical aspects of fixation of osteochondral fractures have not been fully analyzed systematically. Moreover, a critical size of the displaced fragment which necessitate refixation has not been determined, and the time between surgery and injury is crucial to salvage the displaced fragment [10].
Fig. 5. Intraoperative photos showing the reduced osteochondral fragment.

Fig. 6. A: Postoperative anteroposterior radiography of both knees two anchors fixing the patella (arrow). B: Lateral view of left knee two anchors fixing the patella (arrow). Findings: Two anchors transfixed the left patella. Healed fracture. Maintained examined both knee joint spaces with good alignment.

4. Conclusion

As illustrated in our case, the occurrence of an osteochondral fracture of the patella in the absence of ligaments or soft tissue injuries and with no dislocation of the patella in a pediatric patient remains unprecedented. However, advanced imaging such as CT and MRI are essential to evaluate the case and to exclude the presence of soft tissue injuries. The importance of early fixation should be emphasized in patients who present with an osteochondral fracture. As demonstrated in this case, the management is highly variable, and clinical judgment solely recommended open reduction and internal fixation which was successfully preformed with favorable outcomes. During follow-up, full range of motion was regained, and that patient was actively mobile without any concerns.

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Ethical approval

This case report was approved by the Ethics and Research Committee of the National Guard Health Affairs, King Abdullah International Medical Research Center, Saudi Arabia (IRB number SP20/024/J). All information collected was kept strictly confidential.

Consent

Written informed consent was obtained from the patient’s father for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Declaration of Competing Interest

The authors report no declarations of interest.
Author’s contribution

Majed Alosaimi: Surgeon preforming the operation, follow up, and final approval of the manuscript.

Mohammed Almutairi: Data collection, writing – original draft, final approval of the manuscript.

Saad Alshahrani: Writing – reviewing and editing, final approval of the manuscript.

Mansour Alqahtani: Writing – reviewing and editing, final approval of the manuscript.

Abdullah Alghamdi: Writing – reviewing and editing, final approval of the manuscript.

Registration of research studies

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