

Case report

A case report of an adult with bilateral osteochondritis dissecans of the femoral condyles in both knees

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ABSTRACT

Introduction: There are several possible treatment options for the treatment of focal cartilage defects in the knee. Determining the appropriate treatment option to compensate for an osteochondral defect caused by osteochondritis dissecans (OCD) in adults is difficult. This study was conducted to clarify the importance of Autogenous Osteochondral Grafting by a mosaicplasty method in treating OCD, relieving pain, and improving knee function.

Case report: Our study is a case report of a young female patient with osteochondritis dissecans in both the medial and lateral femoral condyles of both knees. Three of these were treated with autogenous osteochondral grafting using a mosaicplasty method. The case was done in 2016 and followed up for 5 years, where the functional results were evaluated according to International Knee Documentation Committee (IKDC Questionnaire) and the pain was assessed on a visual analogue scale (VAS).

Discussion: There were no complications associated with surgery. We observed improvement in knee function according to the IKDC questionnaire from 38 before surgery to 85 after a year of surgery and her pain decreased significantly according to the visual analogue scale (VAS) from 7 before surgery to 1 after a year of surgery and continued until the end of the follow-up period.

Conclusion: Autologous osteochondral grafting with the mosaicplasty method is a good treatment option to treat osteochondritis dissecans (OCD) in the knee, as it helps to relieve pain and improve the functional state of the knee.

1. Introduction

Osteochondritis dissecans (OCD), a rare and localized pathological condition, is characterized by aseptic necrosis of a subchondral bone segment with partial or complete fragmentation along with its adjacent articular cartilage. Despite substantial research, the etiology remains idiopathic. However, ossification disorders, frequent loading, repetitive microtraumas, and ischemia are the suggested causes [1]. The genetic theory is also supported, as a high percentage of members of the same family are found to have OCD of the knee [2]. OCD may present in various joints, however, the medial and lateral femoral condyles are most commonly involved [1]. More than 70 % of OCD is found on the posterolateral portion of the medial femoral condyle. Only in 15 %–20 % of cases has OCD been found on the central-inferior portion of the lateral femoral condyle, and adult bilateral OCD of the femoral condyles is extremely rare [2]. In patients with osteochondritis dissecans (OCD), the skeletal maturity at the onset of symptoms, the stability of the lesion,

size, and the subchondral bone and bone-cartilage interface remain the most important determinants when choosing treatment [3–5]. The prognosis is better with smaller lesions, in younger patients without epiphyseal fusion, and lesions located in the medial femoral condyle [1]. Conservative management has shown 50–94 % success [5]. Operative treatment is generally recommended for patients approaching skeletal maturity who have an unstable or detached lesion; and those whose lesions have not healed after an appropriate period of non-operative treatment [3]. Several surgical options are available, including debridement, drilling, removal of loose bodies, microfracture, reduction, and internal fixation, osteochondral auto- and allograft, and autologous chondrocyte implantation [6]. Retention of fragments is a goal for OCD treatment. If preservation of the fragment is not possible, there is an agreement that the large cartilage defect should be filled with osteochondral autograft or allograft plugs. Various methods have been used for the internal fixation of displaced fragments in OCD [2]. Using multiple small grafts in a mosaic technique has been described with

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good outcomes [7]. The non-critical areas available for autograft are limited, therefore, limiting their utility in large OCD.

Additionally, the mosaic technique depends on fibrocartilage fill between plugs, potentially limiting their durability and creating an incongruent articular surface. The use of osteochondral autografts on OCD of 6 cm² or larger is associated with poor outcomes [8]. The study has been reported in accordance with SCARE 2020 standards [9].

2. Case report

A Female, 22-year-old, visited us in the joint surgery clinic at Al-Assad University Hospital with a history of severe pain in the left knee three days ago that occurred while walking without a previous trauma story. The patient reported that the pain was accompanied by a knee locking that regressed spontaneously after 24 h. By investigation, it was found that the patient was suffering from mild pain for 6 months, with a crepitus sensation in the left knee, without a history of previous trauma, and the symptoms were improving by taking pain medication. The patient has no other accompanying complaints. No surgical, family, or allergic history. On clinical examination, localized tenderness was found at the medial and lateral joint line, with slight effusion and stiffness in the left knee, an extension of about 15 degrees, and flexion of about 100 degrees. Neurovascular examination of the left lower extremity is normal.

On examination of the right knee, there is slight pain at the end of the flexion. Examination of the feet, hips, upper extremities, and spine showed no abnormalities. The plain radiograph showed irregularities in the articular surface of the medial and lateral femoral condyles of both knees (Fig. 1). The magnetic resonance imaging of the left knee showed an area of erosion in the bony cortex with damage to the cartilage surface with a diameter of 11 mm in the weight-bearing of the medial and lateral femoral condyles with accompanying edema around it (Fig. 2). The magnetic resonance imaging of the right knee showed foci of irregularity with flattening of the bone in the weight-bearing of the medial and lateral femoral condyles with foci of subchondral bony loss (Fig. 3).

The condition was diagnosed as osteochondritis dissecans OCD in the femoral condyles of both knees. A surgical procedure was planned to graft the lesions in the knees with autogenous osteochondral grafts extracted from the non-articular areas of the knee using the mosaicplasty technique.

Surgical technique:

- The patient was given 1 g ceftriaxone 20 min before surgery.
- The surgery was performed under general anesthesia
- Tourniquet was applied around the root of the thigh on both sides.
- First, arthroscopy of the knees was performed through the anteromedial and anterolateral standard portals, where the following cartilaginous ulcers were found: In the right knee a cartilaginous defect sizing 12 mm in the medial femoral condyle and 6 mm in the

lateral femoral condyle, and the left knee 13 mm in the medial femoral condyle and 10 mm in the lateral femoral condyle.

- Then we drilled the lesion in the lateral condyle of the right knee and grafted other lesions surgically. The maximum length of each of the three lesions was measured to harvest the appropriate length of the bony cartilage (plugs) and obtain the appropriate stability and avoid a fracture of the piece (plugs), its length needed to measure at least twice the depth of the central area of the lesion. The osteochondral graft was harvested from the lateral region of the groove in each knee using special chisel instruments, and the osteochondral graft pieces were inserted in a direction perpendicular to the lesion to prevent incongruity of the articular surface and to preserve the natural curvature of the femoral condyle (Fig. 4).
- The donor sites were not filled after graft harvesting.
- To prevent hematoma, the joint was drained for 24 h.

Postoperative rehabilitation comprised immediate joint mobilization with the amplitude limited to pain-free mobility. Weight-bearing was forbidden for 45 days, with a progressive return to weight-bearing after this time. Joint acclimatization (swimming and cycling) was recommended for 2.5 months, running at 4 months, and returning to all activities at 6 months.

Follow-up visits were conducted at 1, 3, 6, 12, 24 months, and 5 years postoperatively. Routine physical and radiographic examinations were performed to evaluate the status of the grafts and knee function (Fig. 5). There was a significant improvement in knee function according to the International Knee Documentation Committee (IKDC Questionnaire) [10] from 38 before surgery to 85 a year after surgery and her pain decreased significantly according to the visual analogue scale (VAS) [11] from 7 before surgery to 1 a year after surgery and continued to the end of the follow-up period.

3. Discussion

The ultimate goal of the treatment of OCD is to preserve native cartilage and bone. In skeletally immature children, non-operative treatment with limited weight-bearing, immobilization, and activity restrictions can be successful [12]. Operative treatment should be considered in skeletally immature patients with detached or unstable lesions and in those patients approaching physeal closure whose lesions have been unresponsive to non-operative management [3]. Patients with lesions <2 cm in diameter should be offered arthroscopic intervention in the form of subchondral drilling and, possibly, debridement and fragment stabilization. Bone grafting may be required. Patients with lesions >2 cm in diameter or patients with multiple loose bodies have their lesions fixed through an open procedure. Patients may also be offered autologous chondrocyte implantation or mosaicplasty [13]. Treatment of OCD of the knee is a challenge for both physicians and patients. Numerous procedures exist to treat OCD, but which treatment



Fig. 1. Plain X-ray preoperative.

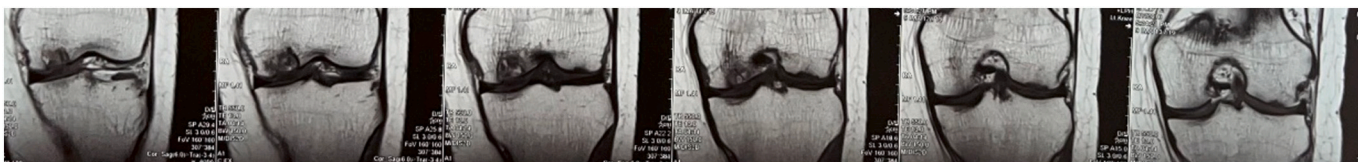


Fig. 2. MRI of the left knee preoperative.

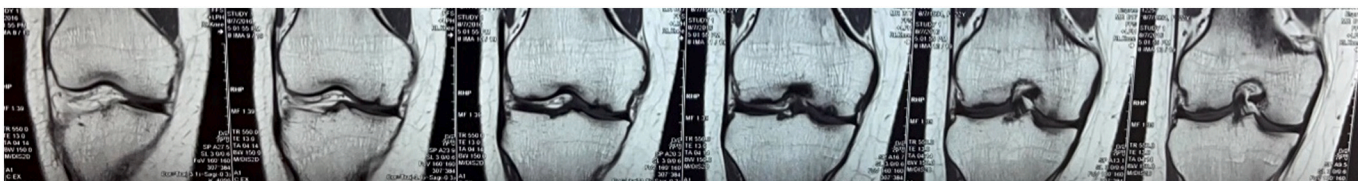


Fig. 3. MRI of the right knee preoperative.

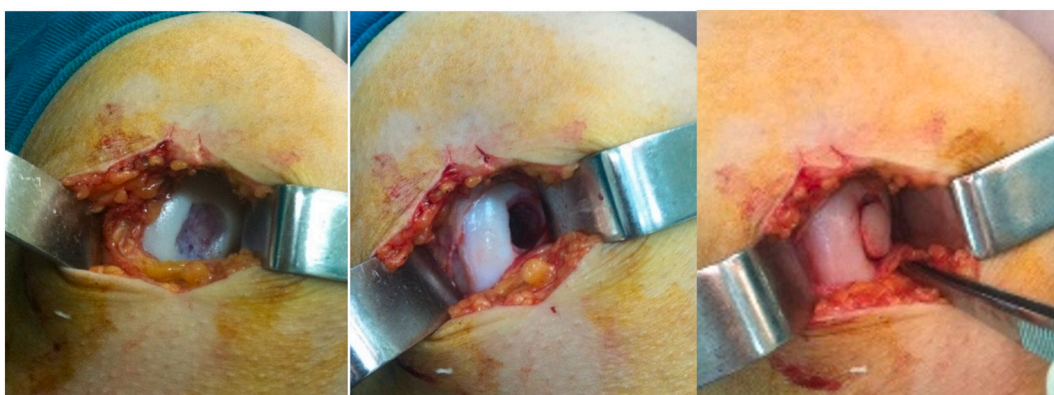


Fig. 4. Grafting the lesion in the MFC of the left knee.

constitutes the gold standard remains a topic of debate [14]. The Mosaicplasty technique involves the transplantation of cylindrical osteochondral grafts, taken from non-weight-bearing regions of the knee, to reconstruct a weight-bearing surface or affected area. Combinations of different graft sizes are used to allow a greater filling rate. Autologous osteochondral mosaicplasty was found to be 94 % effective for OCD lesions requiring surgery in the femoral condyle [13]. The use of the mosaicplasty technique for the treatment of OCD lesions was first described in 1985. The advantages of the mosaicplasty technique include a single-stage procedure that is usually performed arthroscopically, the use of hyaline cartilage with its superior mechanical properties to fibrocartilage, and the ability to address both subchondral bone loss and articular cartilage defects. The disadvantages of the procedure include donor-site morbidity, size mismatching, and a limited area available for harvesting [15]. Our patient exhibited bilateral condylar involvement in both knees. This unusual pattern could indicate that defects in the ossification centers of the distal femur, rather than ischemia or trauma, may have been the cause in these cases. The genetic theory is also supported. Although we could not confirm the mode of inheritance because the remainders of the family were asymptomatic and refused clinical and radiographic examination, we consider that genetic factors remain essential as one of the main causes. After 12 months, a significant functional improvement was observed in the patient, who took a normal questionnaire on the IKDC scale, and the pain decreased significantly on the visual analogue scale from 7 before surgery to 1 after one year and continued to the end of the follow-up period. The patient did not have any complications and she returned to various sports activities about 6 months after the surgery. Magnetic resonance imaging (MRI) a year after the operation showed complete recovery of

the bone and cartilage. In 2004, Kobayashi et al. observed that the treatment outcomes of two OCD patients using cylindrical osteochondral grafts were very satisfactory [4]. While Smolders et al. described satisfactory results treating OCD lesions ranging from 0.5 to 3.2 cm², and other studies reported that mosaicplasty provides good-to-excellent results when applied to smaller articular cartilage between 1 and 4 cm² [16]. In another study with 12 OCD cases in 2007, Miura et al. reported a significant improvement in functional outcomes with arthroscopic cylindrical autogenous osteochondral plugs. In addition, they stated that MRI findings in all patients showed no interface between the graft and subchondral bone after 3 months, and no complication was seen. Hangody et al. evaluated the role of the location of the defect. They found that results were better for medial condyle defects compared to those in the lateral condyle and patellofemoral defects [17]. Gudas et al. compared 29 mosaicplasty and 29 microfractures for defects that were a mean of 2.7 cm² in a prospective randomized study after a follow-up of three years. The authors clearly showed that mosaicplasty is better for this indication. Indeed, besides the absence of fibrocartilage in the biopsies, the mosaicplasty group had 93 % of good or very good results, compared to 49 % in the microfracture group [18]. Horas et al. compared mosaicplasty and first-generation autologous chondrocyte grafts associated with a periosteal flap in defects, which were a mean of 3.7 cm², and found no significant difference between the two techniques [8]. These results were confirmed by Dozin et al. who performed a randomized study comparing a mosaicplasty graft group and a first-generation chondrocyte graft group [19]. Only Bentley et al. found first-generation chondrocyte grafts to be better than mosaicplasty. Defects were larger in that study, up to 12.2 cm², and the mosaicplasty technique used small diameter plugs [20].

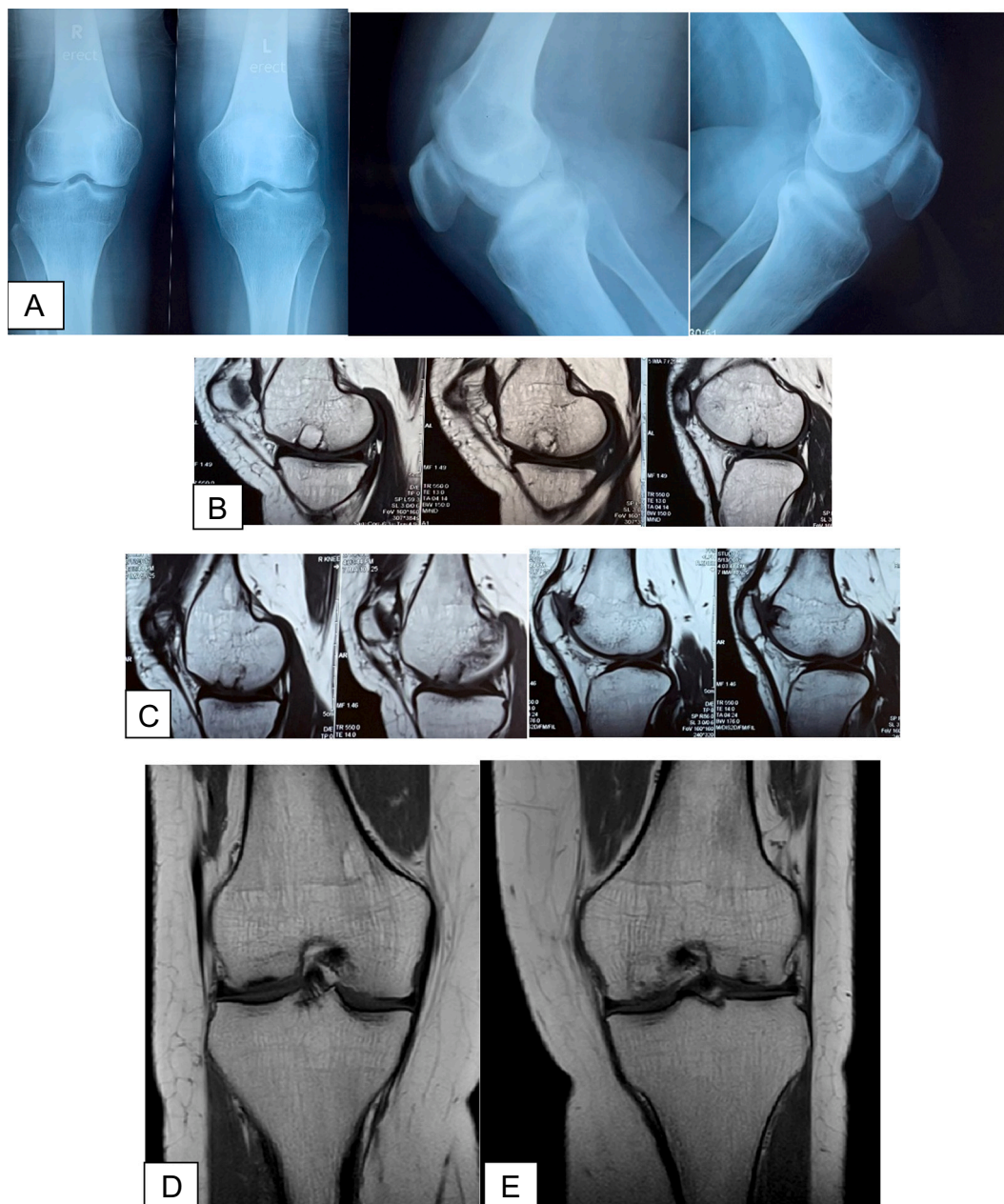


Fig. 5. A: plain X-ray one year postoperatively, B: MRI of the left knee one year postoperatively, C: MRI of the right knee one year postoperatively, D: MRI of the right knee five years postoperatively, E: MRI of the left knee five years postoperatively.

4. Conclusion

Autogenous osteochondral grafting with the mosaicplasty technique constitutes a good treatment option in the context of the treatment of Osteochondritis dissecans in the knee. It gave satisfactory results during a follow-up period of 5 years, as it helped reduce pain and improve the functional state of the knee.

Consent

Written informed consent was obtained from the patient for the 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.

Ethical approval

This study is exempt from ethical approval in our institution.

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Author contribution

Hakam Hekmat Alasaad M.D. (corresponding author): conceptualization, investigation, data curation, writing, editing, and reviewing.

Jaber Ibrahim M.D., Ph.D. conceptualization, investigation, data curation, writing, editing, and reviewing.

Guarantor

Hakam Hekmat Alasaad M.D.

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N/A.

Declaration of competing interest

The author has no conflicts to disclose.

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