

Patellofemoral Articulating Osteochondral (Kissing) Lesion Treated with Autologous Chondrocyte Implantation: A Case Report

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What to Learn from this Article?

Patients with kissing lesions of the knee can be treated successfully with autologous chondrocyte implantation performed to multiple sites.

Abstract

Introduction: Autologous chondrocyte implantation (ACI) is an effective treatment for chondral defects of the knee; however, its use in kissing lesions is less well documented.

Case Report: A 23-year-old female with a kissing lesion of the patellofemoral compartment on magnetic resonance imaging underwent two-stage ACI to her medial patella (20 mm × 22 mm) and medial trochlea (27 mm × 18 mm). At 1-year follow-up, the patient had returned to all activities with near-complete resolution of symptoms and substantial improvement in clinical outcome scores.

Conclusion: Patients with kissing lesions of the knee can be treated successfully with ACI performed to multiple sites.

Keywords: Chondral defect, knee, kissing lesion, chondroplasty, autologous chondrocyte implantation.

Introduction

Full-thickness chondral kissing lesions have been documented in young patients, but the varying treatment modalities remain controversial. Studies have shown that articular cartilage lesions are prevalent in the knee joints of young, active persons, with the prevalence of chondral lesions found during knee arthroscopy ranging from 60% to 66% [1, 2, 3]. In a study of 993 knee arthroscopies, full-thickness lesions suitable for cartilage repair procedures were found in 11% of patients [1]. In one study, the prevalence of kissing lesions was found to be 6.3%, with half

of these associated with concomitant anterior cruciate ligament (ACL) tears [4].

Current treatments for isolated osteochondral defects include microfracture, osteochondral autograft transfer (OAT), autologous chondrocyte implantation (ACI), osteochondral allograft, and unicompartamental arthroplasty. Treatment of osteochondral kissing lesions with ACI is an established treatment; however, the results have been less favorable than that of single isolated lesions [5, 6, 7]. In addition, studies have previously excluded ACI as a treatment for kissing lesions [8].

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We present a case of a kissing lesion in the knee treated successfully with ACI evaluated at 36-month follow-up with pre- and post-operative outcome scores.

Case Report

A 23-year-old female presented with an extensive right knee history, including allograft ACL reconstruction 9 years before presentation, with subsequent graft failure and revision ACL reconstruction with bone-patellar tendon-bone autograft 7 years prior. On initial presentation, the patient complained of pain and crepitation anteriorly in her knee. Her pain was worse with stairs and worse after sitting for prolonged periods. The patient also endorsed catching, but stated that no frank locking of her knee had occurred. Clinical examination revealed Lachman of 1A and no pivot shift. Marked tenderness to palpation was present over the medial patellar facet and trochlear groove. Patellar grind test was positive and loading of the patella recreated her primary complaint of anterior knee pain as well as produced marked patellofemoral crepitus. Magnetic resonance imaging showed full-thickness cartilage loss covering the majority of the medial patellar facet, with full-thickness cartilage loss along the medial aspect of the trochlea (Fig. 1).

A two-stage reconstruction of her cartilage was planned. Initially, the patient underwent arthroscopic chondroplasty of the patellofemoral compartment and Carticel® (Aastrom Biosciences, Ann Arbor, MI) biopsy was obtained. Arthroscopy revealed a near full-thickness (Grade III) chondral defect of the medial patellar facet measured 15 mm × 10 mm. Evaluation of the trochlea showed a 20 mm × 10 mm area of Grade III and IV cartilage loss. The lateral trochlea was intact. A second Grade IV defect of the medial trochlea was noted that measured 8 mm × 15 mm. This was separated from the other defect by a thin rim of Grade II chondrosis. The medial and lateral femoral condyles and tibial plateau showed largely intact chondral surfaces with just some Grade I softening (Fig. 2). The patient was allowed to bear weight as tolerated and to initiate motion exercises when able. Running, jumping, and return to sports were limited for 6 weeks. At 6-week post-surgery, the patient denied noticeable improvement in her symptoms.

Subsequent open ACI implantation (second generation with Type I/III bilayer collagen membrane [Bio-Gide®, Getistlich Pharma North America

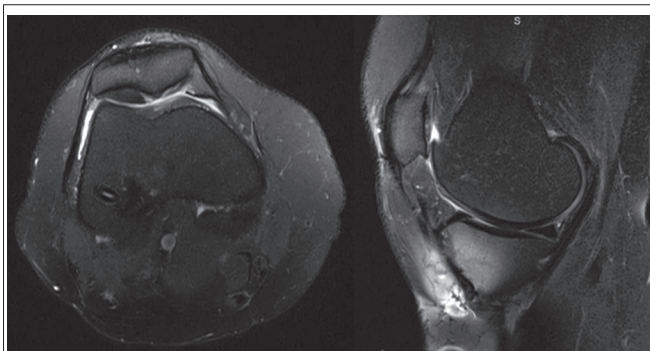


Figure 1: Magnetic resonance imaging showing full-thickness cartilage loss. Note cartilage delamination extending from the median ridge of the right patella to the lateral patella facet, with moderate and full-thickness cartilage loss along the central and medial trochlear surfaces. Left: Right knee, pre-operative, axial T2 fat saturation (FS) view. Right: Right knee, pre-operative, sagittal T2 FS view.

Inc., Princeton, NJ]) was performed. At the time of implantation, the defect of her medial patella facet measured 20 mm × 22 mm while the medial trochlea measured 27 mm × 18 mm. Both defects were combined creating a single lesion (Fig. 3).

Postoperatively, the patient was made toe-touch weight bearing for 4 weeks followed by weight bearing as tolerated in a locked knee brace until the 6-week mark. Motion was initiated on postoperative day 1 with the initiation of continuous passive motion machine. This was started at 30° and advanced as tolerated to a goal of 90° by 4 weeks. At 6-week postoperative, she no longer had any crepitation and was able to range her knee 0°-110° flexion/extension. At the 1-year visit, she reported doing extremely well with no crepitus on examination and range of motion back to her baseline of 0-130°. She was able to return to coaching both volleyball and softball at a local high school. Her pre- and post-operative patient-reported outcomes at 12 and 36 months demonstrated considerable improvement (Table 1).

Discussion

Cartilage has limited capacity for self-repair because of its limited vascularity, which results in poor replicative capacity of chondrocytes.

Table 1: Pre-operative and post-operative patient reported outcome scores

	B-P VAS/VPAES	KOOS	ARS	IKDC
Pre-operative	4.92/4.75	44	13	34.5
12 months	0.46/0	98.2	16	97.7
36 months	0.23/0	91	18	100

B-P VAS/VPAES: Brittberg-Peterson visual analog scale/Brittberg-Peterson Visual Pain, Activities, and Expectations Score [22], KOOS: Knee Injury and Osteoarthritis Outcome Score [23], ARS: Activity Rating Scale [24], IKDC: 2000 International Knee Documentation Committee Subjective Evaluation Form [25]



Figure 2: Arthroscopic images of right patellofemoral compartment. Left: Grade III and central Grade IV cartilage loss of central trochlea, 20 mm × 10 mm. Middle: A second full-thickness medial trochlear lesion separated by small rim of intact chondral cartilage, 8 mm × 15 mm. Right: Grade 3 changes of medial patellar face, 15 mm × 10 mm.

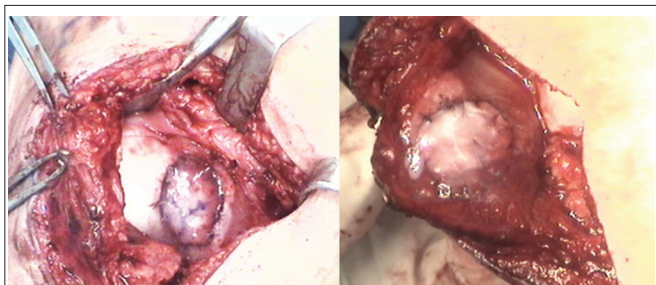


Figure 3: Open autologous chondrocyte implantation. Left: Medial trochlea with a graft measuring 27 mm × 18 mm. Right: Medial patella facet with graft size measuring 20 mm × 22 mm.

Because of this, full-thickness defects in articular cartilage lack the fundamental ability for complete spontaneous repair [2]. Current treatment methods for well-defined osteochondral defects include microfracture, ACI, OAT, and osteochondral allograft. However, microfracture and OAT are often ineffective or impractical for lesions >2 cm [9, 10]. Staged cell-based cartilage repair, such as ACI, remains a viable management option for large defects of the knee in young, active patients [3].

ACI is an established treatment for symptomatic focal chondral defects of the knee [3]. ACI has shown promising results in the treatment of full-thickness chondral and osteochondral defects of the knee in the short to medium term in adults and adolescents [10, 11, 12]. Recent studies have shown satisfactory outcomes in as high as 92% of patients, with long-term graft survival rates of 78% at 5 years and 51% beyond 10 years following ACI [11, 13]. The advantage of ACI is that it leads to the development of hyaline-like cartilage rather than fibrocartilage, seemingly leading to better long-term outcomes and cartilage durability [14]. Factors that favorably influence the results of ACI include a younger patient age, higher preoperative Cincinnati scores, a shorter duration of symptoms, a single osteochondral defect, and a defect located on the trochlea and/or lateral femoral condyle [11, 15].

However, lesions of the patellofemoral joint, as in our patient, have been shown to be the most difficult to treat [11, 16]. In a recent systematic review of 11 studies and 613 knees that underwent ACI for large patellar lesions, the percentage of either failed or fair/poor function ranged from 8% to 60%, demonstrating the unpredictability of ACI within the patellofemoral compartment [16]. Several studies have shown that the anatomic and biomechanical properties of the patellofemoral compartment differ significantly from those of the tibiofemoral compartment, potentially resulting in their worse outcomes [9, 17]. However, these complications were primarily related to periosteal hypertrophy, a first-generation technique that is currently less commonly performed with the increased use of collagen membranes and 3-dimensional bioscaffolds [3]. Yet, a recent study found that patients who underwent ACI of isolated patellar lesions performed as well as those with condylar lesions in the long term [18]. In addition, Mandelbaum *et al.*, in a case series

of 40 patients with symptomatic full thickness articular cartilage lesions of the trochlea, concluded with statistical significance that ACI improved function and reduced symptoms in young- to middle-aged patients [12].

Graft failures tend to occur due to grafts either partially or completely delaminating, insufficient fill, or symptomatic hypertrophy of the periosteum in first-generation ACI. Delaminations may be due to new traumatic injury or atraumatic flap formation secondary to insufficient integration to the normal surrounding peripheral cartilage or the underlying subchondral bone. The timing of hypertrophy development and its etiology are not completely understood although most authors report the presence of hypertrophy within the 1st year post-operatively [19]. Graft failures have been reported to occur around 18-24 months after ACI [20]. This confirms previous findings that subjects who have poor or even fair clinical outcomes by 2 years post-operatively eventually fail [21]. On the other hand, patients with good or excellent results tended to remain satisfied with their outcome, with 75% of subjects reporting their status as good as or better than prior years [13].

Conclusion

Although our patient is only 36 months from her multisite ACI surgery, our patient has shown that ACI implantation is not only a good option for patients with patellar or trochlear defects but also that it can be successfully used for the treatment of kissing lesions in the patellofemoral compartment.

Clinical Message

ACI remains an established treatment for isolated cartilage lesions about the knee. However, kissing lesions are much rarer, and therefore, much less is known about their treatment. This case report has demonstrated that ACI may be a suitable treatment for young active individuals with kissing cartilage lesions about the knee. Due to limitations of case reports and paucity of published literature, further investigation of treatment and outcome for kissing lesions about the knee is warranted.

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