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Case Report

Autologous chondrocyte implantation for huge patellar cartilage defect

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ABSTRACT

Autologous chondrocyte implantation (ACI) is associated with excellent long-term outcomes for isolated patellar chondral defects. A 24-year-old male with a history of road traffic accident 1 month back presented with locking of the knee. An MRI was done which revealed a full-thickness patellar cartilage defect measuring 1.5 × 2 cm with a loose body measuring the same size. Pre-operative planning and evaluation were done and the patient was posted for a two-stage ACI procedure. Staged post-operative rehabilitation protocol was followed. Annual outcome scale included the short form-36, modified Cincinnati activity score, and Knee Society Score and the patient reported excellent scores in all three outcomes scales at 2 years. Magnetic resonance imaging was done at 2 years for detailed analysis of the cartilage repair using Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) score. The patient's MOCART score demonstrated complete fill of the defect, integration to the border, no hypertrophy, and no effusion.

Keywords: Outerbridge classification, Autologous chondrocyte implantation, Modified Cincinnati activity score, Knee Society Score, Magnetic Resonance Observation of Cartilage Repair Tissue score

INTRODUCTION

Patellar chondral injuries are common in road traffic accidents and high-velocity sports injuries. Chondral defects measuring more than 0.9 cm^2 are biomechanically unstable[1] with the tendency to degenerate and onset of early osteoarthritic changes.[2,3]

Cartilage restoration techniques such as microfracture, osteochondral autograft, and autologous chondrocyte implantation (ACI) can be employed for the management of patellar chondral injuries.[3] Microfracture provides good short-term results; however, long-term results are not favorable.[4] Similarly, as emphasized by Bentley *et al.*,[5] osteochondral autograft is associated with poor outcomes in patellar chondral injuries.

Recently, ACI is demonstrating promising results in patellar chondral injuries,[6-8] especially in isolated patellar cartilage defect Grade 3 or 4[9] as per Outerbridge classification larger than 2 cm^2.

CASE REPORT

History and evaluation

A 24-year-old male athlete presented with complaints of anterior left knee pain for 1 month and a history of the left knee injury due to a road traffic accident 1 month back. On clinical examination, mild left knee effusion presents, occasional locking of knee presents, and ligaments normal. On further evaluation, MRI was suggestive of full-thickness cartilage defect in interfacetal and medial facet patella measuring 1.5 × 2 cm categorized as Grade 3 as per Outerbridge classification [Figure 1a and b].

Surgical planning

After thorough clinical and MRI evaluation, the anesthetic assessment was done and the patient was posted for two-stage ACI.

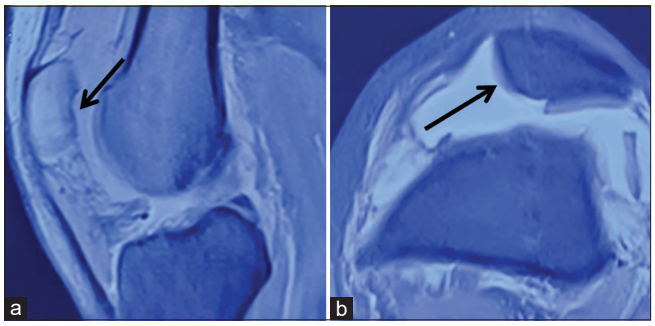

Figure 1: (a) MRI sagittal section demonstrating patellar chondral defect (black arrow). (b) MRI axial section demonstrating medial and interfacetal patellar chondral defect (black arrow).

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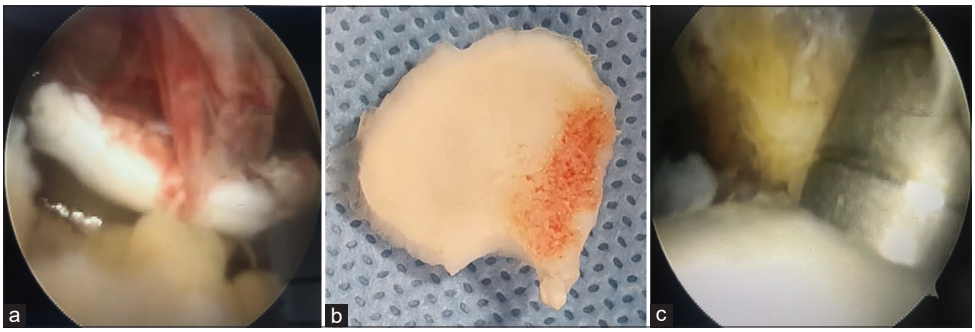

Figure 2: (a) Arthroscopic view loose body in the left knee joint. (b) Patellar articular cartilage measuring 1.5 ×2 cm. (c) Biopsy from lateral non-weight-bearing surface of lateral femoral condyle.

Figure 3: (a-d) Clinically squatting, forward lunging, and knee range of motion.

Intraoperative

Stage 1 ACI

After spinal anesthesia, the patient was positioned supine with a thigh tourniquet with a side post on the thigh and a post for 90° knee flexion. Standard anterolateral and anteromedial knee portals were made, and initially, a loose body measuring 1.5 × 2 cm [Figure 2a] was found anteriorly in the knee joint which was removed [Figure 2b], a corresponding defect was noted on the patellar articular cartilage in interfacetal and medial facet which was thoroughly debrided to stable and healthy margin and a biopsy taken from lateral femoral condyle [Figure 2c] and send to the laboratory.

Stage 2 ACI

Six weeks after Stage 1 ACI, the patient was posted for Stage 2 ACI. After spinal anesthesia, the patient was positioned supine with a thigh tourniquet with a side post on the thigh and a post for 90° knee flexion. Midline incision was taken. Medial parapatellar knee arthrotomy was done and the patella was mobilized and everted for better visualization. Curettage of defect done. Periosteal membrane harvested from distal femur microsutured flush to defect and sealed with Tisseel fibrin glue (TISSEEL [Fibrin Sealant] Pre-filled PRIMA Syringe [Frozen], 2 mL) circumferentially to ensure water tightness. Autologous cultured chondrocytes (CARTIGROW, Cell Processing Center™, Lonavala, Maharashtra, India) were implanted beneath the membrane to fill the defect injected beneath the membrane.

On the closure of arthrotomy, patellar tracking was good and no additional bony or soft-tissue procedure was done.

Postoperatively – Standard 3 phase physiotherapy protocol followed.

Follow-up

On final up at 2 years, the patient had an excellent outcome with no pain, full range of motion [Figure 3], and return to sports. Magnetic resonance imaging was performed with a Philips Medical Systems Achieva 1.5 Tesla unit, using a SENSE knee coil (phased array coil with eight elements) at 2 years post-operative. Magnetic Resonance Observation of Cartilage Repair Tissue score was used for the assessment of the ACI which demonstrated complete fill of the defect, integration to the border, no hypertrophy, and no effusion.

CONCLUSION

Autologous chondrocyte implantation (ACI) is a promising treatment modality for young patients with huge patellar chondral defects. ACI has good midterm outcome. However more long term follow up data is required before any strong conclusions can be made.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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