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## CASE REPORTS

# Arthroscopic autologous chondrocyte implantation in the glenohumeral joint: a case report

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**Keywords:** Autologous chondrocyte implantation; arthroscopic; clinical outcomes; magnetic resonance imaging; shoulder; glenohumeral joint

Autologous chondrocyte implantation (ACI) is a 2-stage surgical technique used to address full-thickness, symptomatic chondral lesions. Initially, it involves a cartilage biopsy, isolation and expansion of chondrocytes *ex vivo*, and subsequent reimplantation into the damaged joint. Chondrocyte-seeded porcine collagen membrane as graft composite is considered the next-generation ACI technique, and the cell-seeded graft can be fixed to the subchondral bone without suture. Encouraging clinical outcomes using a chondrocyte-seeded collagen membrane (matrix-induced ACI) have been reported in the knee<sup>4,10,14,24,32,43</sup> and ankle.<sup>8,15,17,27,34</sup> With the development of surgical techniques, both knee ACI and ankle ACI permit arthroscopic delivery of the scaffold,<sup>9,12,13,15,16,20,24-26,29,35,40</sup> which may permit accelerated rehabilitation and minimize the morbidity of arthrotomy, including reducing the risk of complications such as adhesions, joint stiffness, excessive pain, and scarring.

While a range of surgical options exist for addressing cartilage defects in the shoulder, including débridement, microfracture, osteochondral autograft transfer, and osteochondral allografts,<sup>11,18,41</sup> published evidence reporting on ACI in the glenohumeral joint is limited to 1 case report (humeral

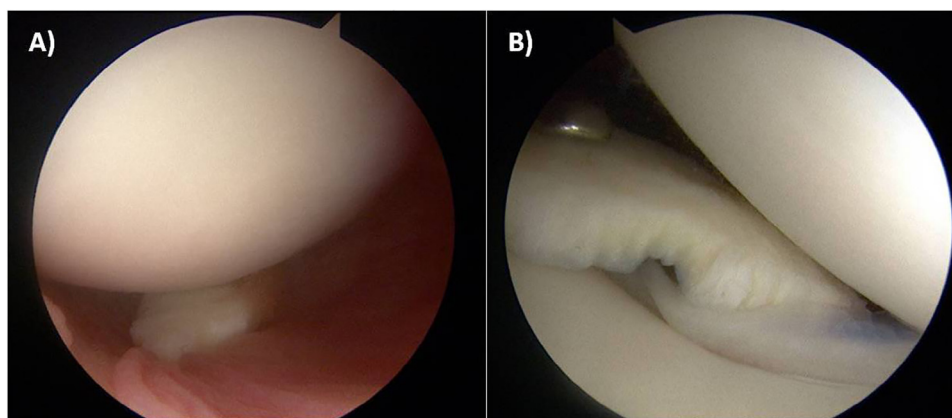
head)<sup>39</sup> and 1 small case series (N = 4),<sup>5</sup> in which 3 cases also involved the humeral head. We describe the surgical technique and clinical and radiologic outcomes up to 24 months in a young patient undergoing arthroscopic ACI for a symptomatic cartilage defect on the glenoid.

## Case report

A 25-year-old female nurse presented with pain and functional limitation of the dominant right shoulder, following a direct blow to the anterior aspect of the shoulder from another player during a game of Gaelic football. This resulted in severe pain immediately, though there was no reported sensation of an obvious glenohumeral dislocation or subluxation. Because of persistent discomfort and a painful arc, high-resolution magnetic resonance imaging (MRI) was undertaken 6 days after injury and showed a large shear injury to the glenoid articular surface from the 9-o'clock to 6-o'clock position, with a chondral defect measuring 14 mm (anteroposterior) by 10 mm (craniocaudal). The displaced chondral fragment was visualized in the anterior joint, and the labrum and glenohumeral ligaments were unremarkable, as were other supporting bony and soft-tissue structures. The patient was otherwise well and was a nonsmoker with no other medical history or any prior shoulder symptoms or injuries.

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**Figure 1** Identification of the loose fragment in the anterior-inferior joint space at the time of first-stage arthroscopic surgery (A), which was seen to be purely cartilaginous (B).

### First-stage arthroscopy and cartilage harvest

An arthroscopy was performed 14 days after injury to evaluate the extent of the injury and remove the displaced cartilage fragment, as well as harvest donor cells for ACI. A standard shoulder arthroscopy was performed with the patient in the lateral position with posterior and anterior portals.

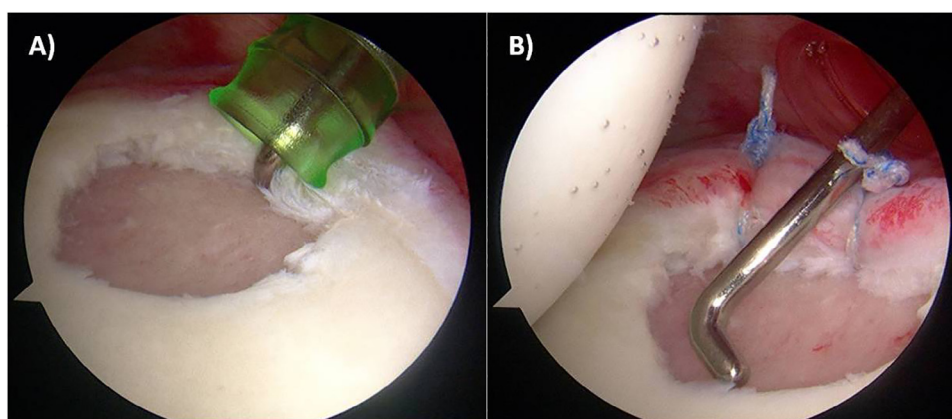
The loose fragment was found in the anterior-inferior joint space (Fig. 1, A) and was removed and seen to be purely cartilaginous (Fig. 1, B). This was sent to the laboratory (Orthocell, Perth, WA, Australia), where chondrocytes were isolated from the tissue and cultured for approximately 4-8 weeks. At this time, the joint was further evaluated, and the rotator cuff, long head of the biceps, and humeral articular surface were all normal. The full-thickness articular cartilage defect was identified on the glenoid (Fig. 2, A), while the posterior glenoid chondrolabral junction was torn and mobile but not grossly unstable. Two Y-Knot 1.3-mm anchors (ConMed Linvatec, Largo, FL, USA) were used to stabilize the posterior labrum (Fig. 2, B). Simple sutures were passed with a Spectrum MVP passer (ConMed Linvatec). This provided a defect with well-defined and stable margins for the second-stage graft implantation. Postoperatively, the patient

was managed in a simple sling for comfort. Range of motion (ROM) was limited to avoid internal rotation, and lifting with the operated arm was limited to 2 kg to avoid loading and damaging the margins of the defect.

### Autologous chondrocyte implantation

The second-stage reimplantation was performed 8 weeks later. A standard lateral arthroscopy was performed. Posterior and anterior (just above the subscapularis in the rotator interval) portals were created, and two 8 × 75-mm DryDoc cannulas (ConMed Linvatec) were inserted. There were no internal valves in these cannulas, and the outer caps were removed to allow easy passage of the graft during the dry arthroscopy. A viewing portal was placed high in the rotator interval just below the long head of the biceps (Fig. 3, A). The joint was assessed, and fibrous material had partially filled the defect (Fig. 3, B), which was débrided to subchondral bone with a curette (Fig. 3, C).

Fluid was then drained from the shoulder, and a long metal sucker was used to maintain a dry working environment, ensuring the defect bed was dry. An epinephrine-soaked patty was used on the subchondral bone to further dry the area and



**Figure 2** Identification of the full-thickness glenoid defect (A), with subsequent stabilization of the posterior labrum (B).

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