

Can Competitive Athletes Return to High-Level Play After Osteochondral Allograft Transplantation of the Knee?



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Purpose: To investigate functional outcomes among competitive athletes undergoing osteochondral allograft (OCA) transplantation of the knee, including rates of return to play (RTP), and factors preventing RTP. **Methods:** A retrospective review identified all competitive athletes (high school, intercollegiate, professional) undergoing isolated femoral condyle OCA from 2004 to 2013. Patient-reported outcome (PRO) questionnaires (Lysholm, International Knee Documentation Committee [IKDC], Knee Injury and Osteoarthritis Outcome Score [KOOS], Western Ontario and McMaster Universities Arthritis Index [WOMAC], 12-Item Short Form Health Survey [SF-12], Tegner, and Marx) and custom RTP surveys were administered. All subsequent reoperations were documented. **Results:** Thirteen athletes (4 intercollegiate, 9 high-school) were identified with an average follow-up of 5.9 ± 2.5 years. Seven athletes (54%) returned to competitive sport at an average of 7.9 ± 3.5 months, 5 of whom returned to preinjury functional levels. Of the 8 athletes who either did not return to competitive sport or failed to sustain their high level of play, the most common reasons cited were graduation from high school or college (4 patients, 50%) or fear of reinjury (3 patients, 38%). All 4 patients citing graduation as the primary factor preventing return to preinjury level of competitive sport resumed recreational sport without limitations, yielding an adjusted RTP rate of 10 patients (77%) who either returned to competitive play or believed they could return if they had not graduated. At final follow-up, athletes reported significant improvements in all PRO scores except for KOOS-Sport, WOMAC-Stiffness, and SF-12 Mental subscales. There were 3 reoperations at an average of 3.8 ± 3.3 years after the index OCA. There were no instances of graft failure. **Conclusions:** OCAs provide an adjusted RTP rate of 77% for high-level adolescent athletes. Social factors may be more likely than persistent pain to prevent return to sport. **Level of Evidence:** Level IV, therapeutic case series.

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Articular cartilage injuries of the knee are being recognized with increased frequency in high-level athletes and often lead to persistent pain and swelling.¹⁻³ These injuries present a clinical challenge in determining the extent to which the noted chondral defect affects current performance and which treatment modality will optimally restore function. Marrow stimulation and cell-based restoration treatments have yielded high rates of return to sport in smaller (<2.5 cm²) lesions.⁴⁻⁸ However, in larger lesions and those involving subchondral bone, osteochondral allograft (OCA) transplantation has been shown to provide durable structural integrity,^{9,10} restore appropriate contour to the articular surface,^{11,12} and produce excellent functional outcomes.^{10,13,14}

Data on return to activity after cartilage restoration surgery exists, with 2 systematic reviews noting an approximately 65% return to preinjury activity level.^{8,15} One recent retrospective review reported return-to-sport

rates up to 88% after OCA at an average follow-up of 2.5 years.¹⁶ However, long-term rates of return to high-level sport after cartilage restoration surgery, particularly OCA, remain unknown.¹⁷ The purpose of this study was to investigate functional outcomes among competitive athletes undergoing OCA transplantation of the knee, including rates of return to play (RTP) and factors preventing RTP. Given prior published data on improvement in pain and function after OCA,^{10,14} the authors hypothesized that athletes would return to a high level of performance within 1 year and that pain would not limit a return to sport.

Methods

Patient Selection

This study was approved by the Institutional Review Board at Rush University Medical Center (no. 15050301). A retrospective review of prospectively collected data was performed to identify all patients who underwent isolated femoral condyle OCA between 2004 and 2013 with minimum 2-year follow-up. The primary indication for OCA was the presence of a large (>2.5 cm²), symptomatic, full-thickness cartilage defect (Fig 1). All patients who could be unequivocally categorized as high-level high-school, intercollegiate, or professional athletes based on clinical documentation were included. Patients with less than 2-year follow-up or those who underwent simultaneous meniscal allograft transplantation or non-OCA chondral procedures were excluded.

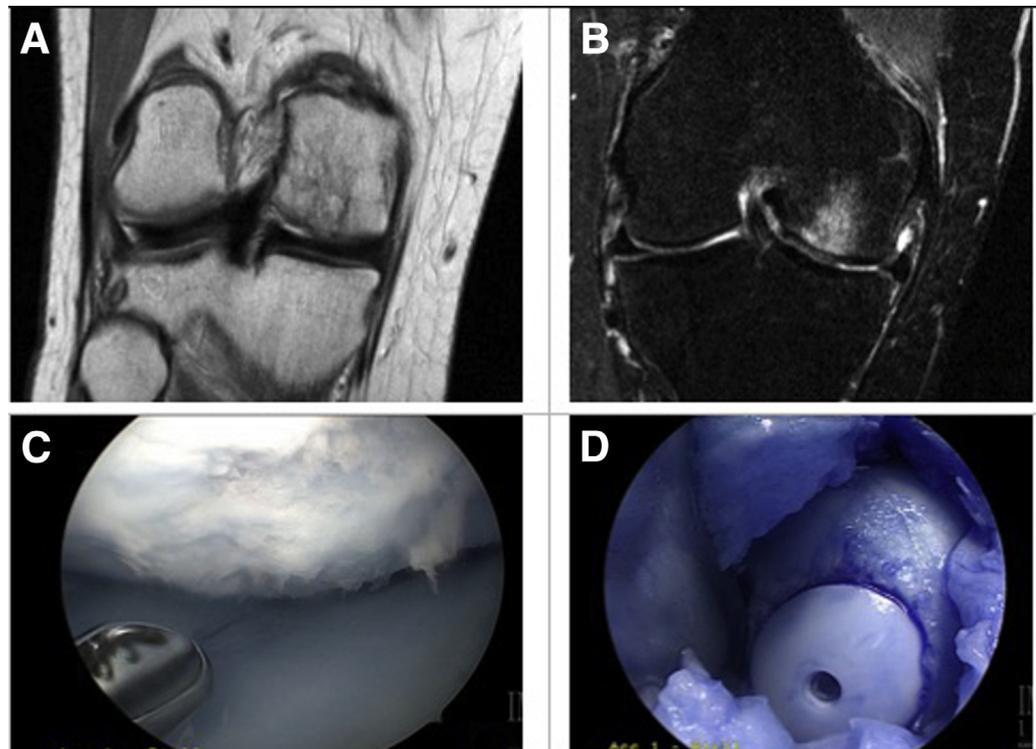
Operative Technique

Lesions were assessed radiographically and confirmed via diagnostic arthroscopy by either the senior author (B.J.C.) or a referring orthopaedic surgeon in the months leading up to OCA to identify any additional intra-articular pathology. The senior author (B.J.C.) performed all surgical procedures. In all cases, OCA was accomplished using fresh (within 28 days postmortem) allograft tissue stored at 4°C. Once operative exposure was obtained via an ipsilateral parapatellar mini-arthrotomy, an appropriately sized graft was harvested from the donor knee using an OCA harvest system (Osteochondral Autograft Transfer System, Arthrex, Naples, FL) and inserted into the prepared defect. These procedures were all single, large graft plugs, and fixated with biocomposite screws (5 patients) or press-fit technique (8 patients). After surgery, the knee was closed in standard fashion without a drain. Patients were braced in extension and placed in a rehabilitation protocol involving touchdown weight bearing and continuous passive motion machine for 6 weeks. Beyond 6 weeks, patients were followed by a physical therapist and progressed to unrestricted range of motion as tolerated (Table 1).

Clinical Assessment

Clinical course before index OCA transplantation was documented along with each patient's postoperative course and subsequent surgeries. Patient-reported outcome (PRO) questionnaires (Lysholm; International

Fig 1. 22-year-old soccer player with a history of osteochondritis dissecans has pre-operative magnetic resonance images demonstrating a focal chondral lesion (A) with associated subchondral edema (B). (C) Arthroscopy demonstrates a full-thickness cartilage defect, (D) which was treated with osteochondral allograft transplantation. The patient returned to athletic activity after 8 months.



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