

Return to Sport After Articular Cartilage Repair in Athletes' Knees: A Systematic Review



Andrew B. Campbell, M.D., Miguel Pineda, B.S., Joshua D. Harris, M.D.,
and David C. Flanigan, M.D.

Purpose: To perform a systematic review of cartilage repair in athletes' knees to (1) determine which (if any) of the most commonly implemented surgical techniques help athletes return to competition, (2) identify which patient- or defect-specific characteristics significantly affect return to sport, and (3) evaluate the methodologic quality of available literature. **Methods:** A systematic review of multiple databases was performed. Return to preinjury level of sport was defined as the ability to play in the same or greater level (i.e., league or division) of competition after surgery. Study methodologic quality for all studies analyzed in this review was evaluated with the Coleman Methodology Score. **Results:** Systematic review of 1,278 abstracts identified 20 level I-IV studies for inclusion but only 1 randomized controlled trial. Twenty studies (1,117 subjects) were included. Subjects (n = 970) underwent 1 of 4 surgeries (microfracture [n = 529], autologous chondrocyte implantation [ACI, n = 259], osteochondral autograft [n = 139], or osteochondral allograft [n = 43]), and 147 were control patients. The rate of return to sports was greatest after osteochondral autograft transplantation (89%) followed by osteochondral allograft, ACI, and microfracture (88%, 84%, and 75%, respectively). Osteochondral autograft transplantation and ACI had statistically significantly greater rates of return to sports compared with microfracture ($P < .001$, $P < .01$; Fisher exact test). **Conclusions:** Athletes may return to sports participation after microfracture, ACI, osteochondral autograft, or osteochondral allograft, but microfracture patients were least likely to return to sports. The athletes who had a better prognosis after surgery were younger, had a shorter preoperative duration of symptoms, underwent no previous surgical interventions, participated in a more rigorous rehabilitation protocol, and had smaller cartilage defects. **Level of Evidence:** Level IV, systematic review of Level I-IV studies.

Articular cartilage defects are common in the knees of both athletes and the general population, but increasing participation in recreational and competitive sports has been associated with a greater incidence of chondral injury.¹⁻⁷ Furthermore, these articular cartilage defects have a limited capacity to regenerate after injury and may lead to early-onset osteoarthritis.^{8,9} The morbidity sustained from an articular cartilage

injury may force patients to make unwanted lifestyle changes, including reductions or modifications in athletic activity.^{10,11} If surgery is performed in an athlete, the repair must be able to withstand the high sport-specific mechanical stresses those activities impose on the knee.

Cartilage repair techniques like microfracture, osteochondral autograft (OAT) or allograft transplant, and autologous chondrocyte implantation (ACI) have each been shown to reduce pain and improve knee function scores in athletes.¹¹⁻²¹ Previous systematic reviews have concluded that return to athletic competition is possible after articular cartilage repair and restoration while highlighting the paucity of available data to compare treatment strategies.^{10,11} However, the number of investigations analyzing outcomes and athletic performance upon returning to sports after surgery has increased. Furthermore, inexpensive techniques like microfracture remain the most widely implemented procedures for cartilage defects²² and demonstrate return to sport potential in short-term follow-up.²³⁻²⁵ Beyond 24-36 months, however, deterioration in

From The Ohio State University Division of Sports Medicine Cartilage Repair Center, Department of Orthopedics (A.B.C., M.P., D.C.F.), Columbus, Ohio; and Department of Orthopedics and Sports Medicine (J.D.H.), Houston Methodist Hospital, Houston, Texas, U.S.A.

The authors report the following potential conflict of interest or source of funding: J.D.H. receives support from SLACK, Inc. D.C.F. receives support from Varicel, DePuy Mitek, and Smith & Nephew.

Received June 4, 2015; accepted August 11, 2015.

Address correspondence to David C. Flanigan, M.D., OSU Sports Medicine Center, 2050 Kenny Road, Suite 3100, Columbus, OH 43221, U.S.A. E-mail: david.flanigan@osumc.edu

© 2016 by the Arthroscopy Association of North America
0749-8063/15512/\$36.00

<http://dx.doi.org/10.1016/j.arthro.2015.08.028>

clinical outcomes may contribute to an increased number of reoperations.²⁶ Thus, as the field of cartilage restoration evolves, it is critical that the literature be assessed for the athletic patient population to maximize return-to-sport potential.

The purpose of this study was to perform a systematic review of cartilage repair in athletes' knees to (1) determine which (if any) of the most commonly implemented surgical techniques help athletes return to competition, (2) which patient- or defect-specific characteristics significantly affect return to sport, and (3) evaluate the methodologic quality of available literature. It was hypothesized that articular cartilage repair results would return to the same level of competition within 1 year of surgery.

Methods

A systematic review of the literature was performed according to PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines, including evidence Level I to IV therapeutic studies based on criteria established by the Oxford Centre for Evidence-Based Medicine.²⁷ The following databases were searched: PubMed, EMBASE, CINAHL (Cumulative Index to Nursing and Allied Health Literature), SPORTDiscus, PEDro (Physiotherapy Evidence Database), and Cochrane Central Register of Controlled Trials. The search was performed June 17, 2014, according to a specific strategy. All studies identified were reviewed independently by the authors and checked for potentially inclusive references. In the event of disagreement over whether an article should be included, the corresponding author made the final determination. The heterogeneity of identified studies precluded performance of a meta-analysis, most notably due to the variability of athletic populations, inclusion criteria, methods of defect assessment and classification, treatments and techniques, and outcome measures.

Inclusion criteria included the following:

- English language;
- human subjects;
- between years 1981 and 2014;
- therapeutic studies with levels I, II, III, IV evidence (randomized controlled trials [RCTs], prospective cohort studies, case-control studies, and case series);
- patients with focal nearly full- or full-thickness (grade III or IV)^{28,29} chondral defects or osteochondritis dissecans of the femoral condyles, trochlea, patella, or tibial plateau;
- results of studies after the following surgical interventions: microfracture or augmented microfracture, osteochondral allograft transplantation, OAT, or ACI;

- studies that included concomitant realignment (high tibial, distal femoral, and tibial tubercle osteotomy) and reconstructive procedures (cruciate ligament reconstruction, meniscal repair, and meniscectomy) were permitted;
- subjects are athletes, i.e., they participate in soccer, basketball, baseball, football, hockey, wrestling, volleyball, rugby, Australian rules football, cricket, track and field, cycling, running, skiing, snowboarding, handball, tennis, racquetball, squash, or golf; and
- minimum follow-up of 12 months.

Exclusion criteria included the following:

- non-English language;
- basic science or animal studies;
- expert opinion, Level V evidence studies, letters to editor;
- diagnostic, prognostic, economic studies;
- surgical technique articles;
- results of studies in nonathlete populations;
- results of studies with less than 12 months of follow-up;
- different studies, including identical subject populations, unless evaluating different data parameters;
- results of studies on articular cartilage repair or restoration in joints other than the knee; and
- results of studies on articular cartilage repair or restoration in osteoarthritis.

Initial search of all databases used yielded 1,278 citations. The 2009 PRISMA guidelines were followed during record review and the application of the inclusion and exclusion criteria (Fig 1). Limitation to the knee joint in athletes or sports yielded 38 full-text articles that were assessed for inclusion; 14 studies were excluded because they were review articles with expert opinion or systematic reviews. One study was not written in English and was excluded.³⁰ Three studies reported the same data on the same subject population,^{14,31,32} and the most recent article was retained for analysis.¹⁴ Two National Basketball Association (NBA) studies reported on the same subject population, but they evaluated different parameters and were both included.^{23,24} A third NBA study likely overlapped patients with the previous 2 studies, but authors were unable to verify this, and the study also evaluated new data; thus, the third study was also included.³³ Two studies reported on an overlapping patient population,^{34,35} but the most recent article was retained despite representing a fraction of the total patient population because it reported data specific to the knee.³⁵ After application of all inclusion and exclusion criteria, 20 studies were identified for analysis in this systematic review report.^{12-14,17,18,20,21,23-25,33,35-42}

Predetermined data were extracted systematically by the first 2 authors. A variety of patient and surgical demographics, documented clinical outcomes, and

Download English Version:

<https://daneshyari.com/en/article/4042178>

Download Persian Version:

<https://daneshyari.com/article/4042178>

[Daneshyari.com](https://daneshyari.com)