



Indications and Outcomes for Microfracture as an Adjunct to Hip Arthroscopy for Treatment of Chondral Defects in Patients With Femoroacetabular Impingement: A Systematic Review

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Purpose: To evaluate the indications, preoperative workup outcomes, and postoperative rehabilitation of patients with femoroacetabular impingement (FAI) receiving microfracture as an adjunct to hip arthroscopy for chondral defects. **Methods:** The electronic databases MEDLINE, EMBASE, and PubMed were searched and screened in duplicate for studies involving patients with FAI treated arthroscopically with microfracture of the hip for chondral defects either solely or as an adjunct to hip arthroscopy. Data regarding indications, investigations, outcomes, and postoperative rehabilitation were abstracted from eligible studies. The references of included studies were additionally searched, and descriptive statistics are provided. **Results:** There were 12 studies included in this review, involving 267 patients. With the exception of a single, one-patient case report, 11 of the 12 studies reported positive outcomes after hip arthroscopy with microfracture. Only 0.7% of the total patients experienced a complication, and 1.1% required further surgery on the basis of outcomes evaluated at a mean follow-up of 29.5 (range, 4 to 60) months across the studies. Eight of 12 studies discussed the preoperative workup of these patients, with X-rays and magnetic resonance imaging being the most common preoperative imaging used. There was little reported on weight-bearing status during postoperative rehabilitation. **Conclusions:** The outcomes reported in the literature after hip arthroscopy with microfracture for chondral defects are, in general, positive, with a very low percentage of patients requiring further surgery or experiencing complications. The most common indication used in the literature for microfracture is a full-thickness, focal chondral defect (Outerbridge grade IV). The vast majority of literature recommends limited weight bearing after microfracture; however, there was significant variation among the specific rehabilitation protocols used. More research is needed to explore what indications and postoperative rehabilitation result in the best outcomes for patients. **Level of Evidence:** Level IV, systematic review of Level II, III, and IV studies.

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Femoroacetabular impingement (FAI) is a condition that causes repetitive abnormal contact between the femoral head-neck junction and the rim of the acetabulum.^{1,2} This anatomical disorder not only causes significant pain for the patient, but there is also an

association of FAI with the early development of osteoarthritis and chondral defects.^{1,3} Specifically, Beck et al.¹ proposed that the compressive and shear forces produced in cam-type FAI results in progressive chondral delamination of the corresponding acetabular

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zone. The management of damage to articular cartilage is a significant challenge owing to the very limited ability of the cartilage to heal.⁴ The majority of lesions occur in the anterosuperior aspect of the acetabulum given the typical location of the cam-type deformity along the anterolateral femoral head-neck junction.⁵ Various techniques such as fibrin adhesives, autologous chondrocyte implantation, matrix-induced autologous chondrocyte implantation, and microfracture have been used in an attempt to treat these chondral defects.⁶⁻⁸ Microfracture works by intentionally creating several small fractures in the subchondral bone underlying the chondral defect. This results in mesenchymal stem cell release in addition to clot formation, which eventually leads to formation of a more stable fibrocartilaginous tissue that fills in the chondral defect.⁹ The majority of the literature surrounding microfracture comes from treating chondral defects in the knee.^{8,10,11} Only more recently has literature started to explore the use of microfracture in the hip.^{12,13}

The Outerbridge classification system is the most commonly used system for classifying chondral lesions and has been shown to be a moderately reproducible and reliable classification system.¹⁴ In the Outerbridge classification, grade 0 represents normal cartilage, grade 1 represents cartilage with softening and swelling, grade 2 is a partial-thickness defect with surface fissures that do not reach subchondral bone or exceed 1.5 cm in diameter, grade 3 is a partial-thickness defect with surface fissures that reach subchondral bone or exceed 1.5 cm in diameter, and finally, grade 4 is for full-thickness defects. It has been suggested that the main indication for microfracture in the hip is a full thickness, well-shouldered focal (Outerbridge grade IV) chondral defect in a weight-bearing area.¹⁵ Furthermore, many studies recommend that weight bearing be limited for an extended period of time after microfracture of the hip to improve lesion fill.^{16,17} The evidence for the indications, postoperative rehabilitation, and outcomes after microfracture in the hip has yet to be systematically reviewed.

This systematic review presents a review of the literature pertaining to patients treated arthroscopically with microfracture of the hip in patients with FAI. A description of the indications for microfracture, outcomes, rehabilitation programs used, and characteristics of chondral defects currently described in the literature are analyzed and critically discussed.

Methods

Search Strategy

Two reviewers (A.M., N.H.) searched 3 online databases (EMBASE, MEDLINE, and PubMed) for literature related to microfracture performed during arthroscopic treatment of FAI (Fig 1). The database search was conducted on November 29, 2014, and retrieved articles

from database inception to the search date. The research question and individual study inclusion and exclusion criteria were established a priori. The inclusion criteria were (1) all levels of evidence, (2) male and female patients of all ages, (3) studies published in English, (4) studies on humans, (5) studies reporting any clinical or radiographic outcomes, and (6) patients received microfracture during arthroscopic treatment of FAI. Exclusion criteria were (1) any nonsurgical treatment studies (e.g., conservative treatment, technique articles without outcomes, cadaver studies, review articles, etc.); (2) patients with unrelated diagnoses such as osteoarthritis, septic joint, etc.; (3) patients receiving chondrocyte implantation, chondrogenesis, or fibrin adhesive-based treatments in addition to microfracture; and (4) studies that used the same patient population to avoid duplication of patients in the data analysis. In these cases, the study with the larger patient population was included. If a follow-up study of the same patient population was identified, the more recent study was included.

The following key terms were used in the search: “femoroacetabular impingement”, “femoral acetabular impingement”, “hip impingement syndrome”, “microfracture”, “chondral” and “delaminated

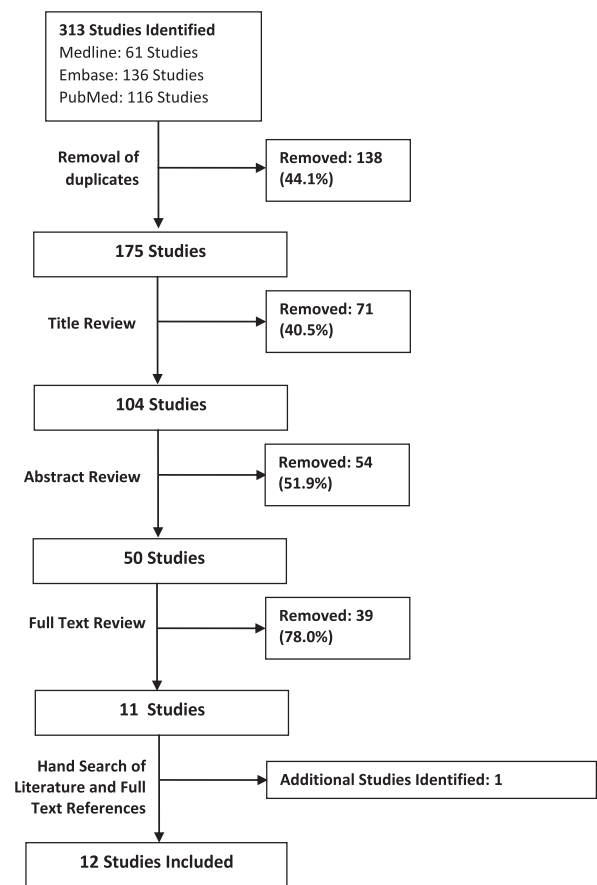


Fig 1. Flowchart demonstrating the application of inclusion/exclusion criteria and the resultant systematic screen of initially retrieved articles through each of the title, abstract, and full text stages.

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