Editorial Commentary: Haven't We Seen This Somewhere Before? Laying the Foundation for Cartilage Restoration in Hip Preservation

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Abstract: Since its inception in the early 1980s, the microfracture procedure has been successfully used throughout the body to treat isolated full-thickness cartilage lesions. Although treatment of such injuries can be challenging, and outcomes variable, microfracture has afforded surgeons the ability to treat cartilage lesions in a single-stage fashion at the time of treatment for concomitant injuries. Whereas most research relating to the use of microfracture has focused on managing lesions in the knee, there continues to be interest in applying the same principles in other regions of the body. With the recent enthusiasm and procedural increase in hip arthroscopy and hip preservation procedures, evaluating the use of microfracture in the femoroacetabular joint is the next logical step in establishing treatment principles for cartilage defects in this location. Although we continue to innovate as orthopedic surgeons, and there have been recent declines in ardor for the use of microfracture, this sentiment has arisen only after decades of research and clinical advances. Because of this, continued work will be necessary to understand the limits of the microfracture procedure in hip preservation surgery. Early outcome studies are encouraging and continue to be an important platform on which to lay the foundation for further research and refinement of techniques and indications.

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Reports of minimally invasive endoscopic approaches to the hip have been reported for decades[1,2]; however, detailed reports of hip arthroscopy began in the late 1970s and early 1980s, with publications from a small number of surgeons using an arthroscope to make clinical diagnoses.[3-5] This history set the stage for the advent of modern hip arthroscopy and makes it one of the most recent advances in orthopedic surgery.[6-12] At the time of the widespread introduction of hip arthroscopy, Dr. J. Richard Steadman and colleagues were building on earlier work[13-15] by establishing the technical foundation for their own orthopedic breakthrough: the microfracture procedure.[16] This procedure was revolutionary in that it provided surgeons with the ability to treat cartilage lesions of the knee in a manner that not only established a reasonable cartilage scaffold, but also provided the tools to do so in a minimally invasive fashion. Since its inception, the microfracture procedure has been widely used and exhaustively researched. In fact, a search of "microfracture" through the United States National Library of Medicine/National Institutes of Health yields more than 13,000 results.

Although the history of microfracture begins in the knee, it is of little surprise that, because of this widespread usage and historical interest, enthusiasm has grown for the use of the procedure in other areas of the body. Previous studies have shown early structural and clinical success with microfracture of the acetabulum, and the study by Chaharbakhshi, Hartigan, Spencer, Perets, Lall, and Domb,[17] "Do Larger Acetabular Chondral Defects Portend Inferior Outcomes in Patients Undergoing Arthroscopic Acetabular Microfracture? A Matched-Controlled Study," builds on the early work supporting the use of microfracture for acetabular chondral injuries encountered at the time of hip arthroscopy.

The study is the first of its kind to evaluate the effect of chondral defect size on patient outcomes after hip arthroscopy. The primary finding in the study was that

The author reports the following potential conflicts of interest or sources of funding: J.J.M. reports personal fees from Xodus Medical and other from Arthrex. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

0749-8063/19302/$36.00
https://doi.org/10.1016/j.arthro.2019.03.010

patients undergoing acetabular microfracture at the time of hip arthroscopy showed improvements in patient-reported outcome scores, pain, and clinical function at all time points throughout the study. The authors also showed that there were no significant differences between patients with small (<150 mm^2) acetabular cartilage lesions treated with microfracture and those with large (>200 mm^2) lesions. However, it should be noted that almost 20% of the total patient population later underwent conversion to total hip arthroplasty, at 28-33 months after their index procedure. In addition, when patients where further stratified, it became clear that treatment of defects >300 mm^2 led to a 2.33 relative risk for conversion to total hip arthroplasty compared with patients with smaller lesions.

Similar to previous studies,[18-21] Chaharbakhshi et al.[17] showed the effectiveness of the microfracture procedure in both large and small defects for a majority of their patient population. However, similar to what we know about microfracture procedures in the knee, outcomes are variable, and there seems to be an upper limit beyond which this intervention does not remain effective. It has been my clinical experience, which is reinforced by the literature,[22] that younger patients with smaller lesions are the best candidates for the use of microfracture. Menge et al.[22] seem to reinforce this sentiment in their recent study evaluating outcomes at 10-year follow-up after hip arthroscopy. They state, "Higher rates of conversion to total hip arthroplasty were seen in older patients, patients treated with acetabular microfracture, and hips with ≤ 2 mm of joint space preoperatively."[22]

Although there are clearly limitations to the effectiveness of microfracture for treatment of acetabular cartilage lesions, I am encouraged by the findings of Chaharbakhshi et al.[17] I would, however, be remiss (and almost certainly chastised) if I neglected the recent fervor suggesting that we as a collective group of surgeons consider alternatives to the microfracture procedure. In fact, our Editor-in-Chief has previously opined, "In consideration of the destruction of subchondral anatomy, it may be time to abandon the arthroscopic microfracture procedure."[23] Whereas I am in agreement that advancing the field of cartilage restoration is of paramount importance, I am reminded that the present backlash against the microfracture procedure was built using almost 3 decades of painstaking research, clinical experience, and scientific advancement.

Although I am firmly of the belief that, similar to what we have been able to accomplish in the knee, cartilage restoration of the hip will continue to advance in both its effectiveness and sophistication, it takes research such as this to achieve new breakthroughs. If one considers gold standard treatment to be built like a pyramid,[24] the base of the pyramid is established through basic science, anatomy, incremental advancements in technique, and early- and long-term clinical outcomes. Only when we properly build the base can we place the capstone and reach the apex of modern-day treatment.

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