Autologous Membrane Induced Chondrogenesis with Microfracture Improves Outcomes and Survivorship in Chondral Lesions of the Hip: A Systematic Review

Ronak J. Mahatme[1], Michael S. Lee[2], Tom George[3], Nicholas J. Pettinelli[4], Kian Kardestuncer[5], Scott Fong[6], Stephen M. Gillinov[7], Nancy Park[7], Andrew E. Jimenez[7]
[1]University of Connecticut School of Medicine, Farmington, CT, [2]Medical College of Wisconsin, Milwaukee, WI, [3]American Hip Institute, Des Plaines, IL, [4]Kansas City University, Kansas City, MO, [5]Middlebury College, Middlebury, VT, [6]Case Western Reserve University School of Medicine, Cleveland, OH, [7]Department of Orthopaedics and Rehabilitation, Yale School of Medicine, New Haven, CT,
mahatme@uchc.edu

Disclosures: Ronak J. Mahatme (N), Michael S. Lee (N), Tom George (N), Nicholas J. Pettinelli (N), Kian Kardestuncer (N), Scott Fong (N), Stephen M. Gillinov (N), Nancy Park (N), Andrew E. Jimenez (N)

INTRODUCTION: Within the field of hip arthroscopy, microfracture exists as a commonly performed technique for chondral lesions despite showing no further improvement in outcomes. Autologous membrane induced chondrogenesis (AMIC) with microfracture has been proposed to address some of the limitations associated with microfracture alone. The purpose of this study is to systematically investigate the outcomes and survivorship of patients treated for chondral defects with AMIC with microfracture and to conduct a sub-analysis to compare these patients to a control group of patients undergoing microfracture alone.

METHODS: PubMed and Cochrane were queried in June 2022 to conduct this systematic review using the following keywords: "femoracetabular impingement," "arthroscopy," "microfracture," and "autologous membrane induced chondrogenesis." Articles were included if they reported on patient-reported outcomes and survivorship of AMIC during hip arthroscopy to treat chondral lesions of the hip. The review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) criteria. Each study was queried for demographics, indications, lesion classification, surgical treatment, patient-reported outcome scores, and conversion to THA. A sub-analysis was performed to compare patients undergoing AMIC with microfracture to patients undergoing microfracture alone if mentioned in the included studies.

RESULTS: Seven studies met inclusion criteria and assessed 511 patients undergoing AMIC with microfracture. The included studies consisted of 232 males and 279 females, average follow-up ranged from 1 to 8 years, and average patient age ranged from 34.3 to 45 years. Six of the seven studies reported modified Harris Hip Scores (mHHS) and all six studies reported improvement at follow-up ($p<0.05$). Three of the seven studies compared patients treated with AMIC with microfracture to microfracture alone. In these three studies, the AMIC with microfracture groups reported 0 patients converting to THA while the microfracture alone groups reported 7.8%, 2% and 32.6% of patients converting to THA.

DISCUSSION: In the setting of FAI and chondral lesions, patients undergoing AMIC with microfracture during hip arthroscopy may expect significant clinical benefit demonstrated by the improvement in all patient-reported outcome scores at follow-up and the decline in conversion to THA compared to microfracture alone. Due to the small number of studies, further investigation is required to determine the effectiveness of the technique.

SIGNIFICANCE/CLINICAL RELEVANCE: AMIC with microfracture is a viable intervention to improve outcomes of hip arthroscopy in the setting of chondral lesions of the hip. Retrospective cohort studies suggest that AMIC with microfracture improves patient-reported outcome scores and survivorship in comparison to microfracture alone.

IMAGES AND TABLES:

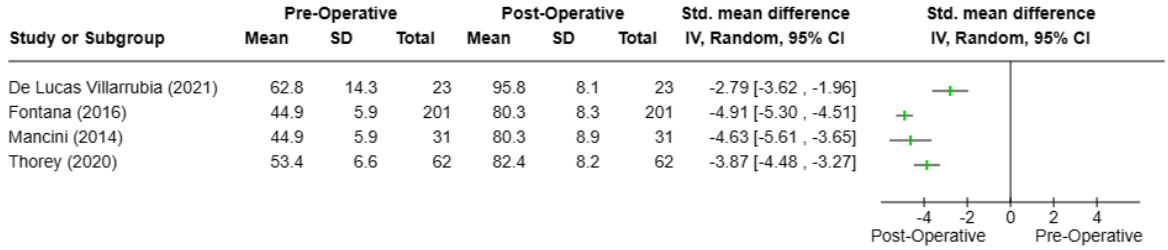

Figure 1. Forest plot showing AMIC with microfracture pre-operative versus post-operative modified Harris Hip Scores (mHHS) across four studies. Values reported as average [95% CI]. SD; standard deviation. CI; confidence interval.

Author and Year	Intervention	Patients Converting to THA (n (%))	Time to THA (mean, years)
Fontana (2015)[12]	MFx	6 (7.8%)	3.2 (1 – 5)
	AMIC	0	-
De Girolamo (2018)[13]	MFx	11 (2%)	(0.5 – 7)
	AMIC	0	-
Sobti (2020)[14]	MFx	15 (32.6%)	1.5
	AMIC	0	-

Table 1. Conversion to THA: Microfracture alone versus AMIC with microfracture sub-analysis. Values reported as n (%) and mean (range) unless otherwise indicated. MFx; Microfracture alone. AMIC; Autologous membrane induced chondrogenesis with microfracture. THA; total hip arthroplasty.