

# Perioperative Pain, Medication Utilization, and Safety of Bone Marrow Aspirate Concentrate Application for Patients Undergoing Hip Arthroscopy

Bilal S. Siddiq, BS<sup>1</sup>, Michael P. Kucharik, MD<sup>1</sup>, Paul F. Abraham, MD<sup>2</sup>, Mark R. Nazal, MD<sup>3</sup>, Nathan H. Varady, MD/MBA<sup>4</sup>, Christopher T. Eberlin, MD<sup>1</sup>, Nathan J. Cherian<sup>1</sup>, Stephen M. Gillinov, AB<sup>1</sup>, Scott D. Martin, MD<sup>1</sup>

<sup>1</sup>Sports Medicine Center, Department of Orthopaedic Surgery, Massachusetts General Hospital, Mass General Brigham, Boston, MA <sup>2</sup>Department of Orthopaedic Surgery, Keck School of Medicine of University of Southern California, Los Angeles, CA <sup>3</sup>Department of Orthopaedic Surgery, University of Kentucky, Lexington, KY <sup>4</sup>Department of Orthopaedic Surgery, Hospital for Special Surgery, New York, NY

Email of Presenting Author: [bsiddiq@mgh.harvard.edu](mailto:bsiddiq@mgh.harvard.edu)

**INTRODUCTION:** Bone marrow aspirate concentrate (BMAC) has recently been proposed as an adjunct therapy for patients undergoing arthroscopic acetabular labral repair. There is evidence that BMAC has an anti-inflammatory effect, which may improve short-term pain control, but this has yet to be studied in this patient population. Our objective was to measure perioperative pain, medication utilization and evaluate safety in patients who underwent hip arthroscopy with and without BMAC application.

**METHODS:** Patients treated with and without BMAC in the setting of arthroscopic acetabular labral repair from September 2018 to March 2020 were enrolled. Patients recorded daily medication use and VAS pain levels preoperatively and on postoperative days 1, 5, 10, and suture removal.

**RESULTS:** Preoperative pain was similar in both groups (BMAC: 4.52 vs. No BMAC: 3.85). The BMAC group reported significantly less pain than the No BMAC group on postoperative day 5 (POD #5) (3.53 vs. 5.18;  $p=.010$ ), POD #10 (2.23 vs. 3.73;  $p=.014$ ), and the suture removal appointment (1.80 vs. 3.18;  $p=.008$ ). The mean length of opioid (4.02 vs. 2.82 days;  $p=.348$ ) and NSAID (8.59 vs. 8.00 days;  $p=.677$ ) usage did not differ significantly between groups. The total number of opioid (8.47 vs. 7.45;  $p=.715$ ) and NSAID (27.83 vs. 21.36;  $p=.464$ ) pills taken also did not differ significantly between groups. Postoperative complications were not significantly different between groups.

**DISCUSSION:** To our knowledge, this study is the first to measure perioperative pain, pain medication utilization, and postoperative complications in patients undergoing hip arthroscopy with and without BMAC application. We found that BMAC was associated with significantly lower perioperative pain levels with comparable preoperative and postoperative pain medication utilization. Moreover, we found that complications of hip arthroscopy with BMAC application are rare and occur at a similar rate to what has been reported for hip arthroscopy alone. In addition to potentially improving long-term functional outcomes, these results suggest BMAC does not cause increased perioperative pain, and, in fact, may be a useful adjuvant to mitigate perioperative pain. Notably, the BMAC cohort reported VAS pain scores at POD#5 and POD#10 that were 1.5-1.65 points lower than the No BMAC cohort, which exceeds the minimal clinically important difference (MCID) threshold for VAS pain scores of 1.48 points. POD #1 is the only postoperative timepoint at which the BMAC cohort did not experience significantly less pain than the control cohort, which may be explained by the mild, temporary pain and swelling that is associated with bone marrow aspiration in the early postoperative course. Nevertheless, it is still notable that patients who underwent bone marrow aspiration did not experience more pain than their No BMAC counterparts on POD #1.

**SIGNIFICANCE/CLINICAL RELEVANCE:** Patients treated with BMAC resulted in significantly lower VAS pain scores postoperatively and experienced an adverse event rate that was consistent with current literature for patients undergoing hip arthroscopy alone.

	BMAC (n=58)	No BMAC (n=12)	p
Age	31.9 ± 2.3 (95% CI)	27.5 ± 5.3	0.130
BMI	25.1 ± 0.9	27.2 ± 2.9	0.195
Sex			0.002**
Female	20 (34.5%)	10 (83.3%)	
Male	38 (65.5%)	2 (16.7%)	
Laterality			0.114
Left	29 (50.0%)	3 (25.0%)	
Right	29 (50.0%)	9 (75.0%)	
Tönnis Grade			0.394
0	26 (44.8%)	7 (58.3%)	
1	32 (55.2%)	5 (41.7%)	
2	0 (0.0%)	0 (0.0%)	
3	0 (0.0%)	0 (0.0%)	
Radiographic FAI			0.590
None	1 (1.7%)	0 (0.0%)	
Cam	6 (10.3%)	0 (0.0%)	
Pincer	19 (32.8%)	7 (58.3%)	
Both	32 (55.2%)	5 (41.7%)	

Abbreviations: BMAC (Bone marrow aspirate concentrate), BMI (Body mass index), FAI (Femoroacetabular impingement), CI (Confidence interval)  
Significance notation: \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

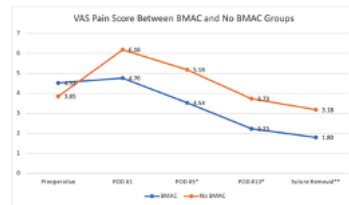


Table 3. VAS Pain Score and Opioid/NSAID Utilization in the Perioperative Period

	BMAC (n = 58)	No BMAC (n = 12)	p
VAS:			
Preoperative	4.52 [3.69-5.35]	3.85 [2.31-5.39]	0.444
POD #1	4.26 [4.14-5.39]	4.18 [3.98-4.39]	0.095
POD #5	3.53 [3.06-4.00]	5.18 [3.57-6.79]	0.010*
POD #10	2.23 [1.80-2.67]	3.73 [2.05-5.40]	0.014**
Suture Removal Visit	1.80 [1.42-2.18]	3.18 [1.81-4.55]	0.008***
Opioid Use:			
Number of Days of Opioid Use	4.02 [2.96-5.07]	2.82 [1.07-4.57]	0.348
Total Number of Opioid Pills	8.47 [6.20-10.75]	7.45 [2.93-11.97]	0.715
Max Number of Opioid Pills in a Single Day	2.61 [2.03-3.19]	2.64 [0.73-4.54]	0.973
NSAID Use:			
Number of Days of NSAID Use	8.59 [7.46-9.73]	8.00 [5.30-10.70]	0.677
Total Number of NSAID Pills	27.83 [20.71-34.95]	21.36 [5.77-36.96]	0.464
Max Number of NSAID Pills in a Single Day	5.07 [4.12-6.02]	5.55 [2.19-8.90]	0.708

Continuous variables depicted as mean average [95% CI]. Patients were given a prescription for 20 pills of 5 mg oxycodone on the day of surgery. Suture Removal Visits were 12-14 days after surgery.

Significance Notation: \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Abbreviations: BMAC = Bone Marrow Aspirate Concentrate; POD = Postoperative Day; NSAID = Non-Steroidal Anti-Inflammatory Drug.