

Mid-Term Outcomes for Treatment of Full-Thickness Acetabular Chondral Flaps with Bone Marrow Aspirate Concentrate Versus Microfracture During Hip Arthroscopy

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INTRODUCTION: Femoroacetabular impingement (FAI) is commonly associated with acetabular labral tears due to impingement of the labrum and surrounding bony structures. In early stages of FAI, the acetabular cartilage remains mostly intact, but as the disease progresses, the cartilage can become delaminated, fissured, or cracked, with up to 88% of patients showing some degree of cartilage wear during hip arthroscopy. In some cases, the cartilage can completely delaminate from the subchondral bone, forming a full-thickness chondral flap. Previous studies have demonstrated that chondral flaps portend inferior outcomes following hip arthroscopy, and microfracture and bone marrow aspirate concentrate (BMAC) have been proposed as potential adjuncts during surgery to address chondral flaps. Currently, there is no mid-term clinical data on outcomes for chondral flap treatment. The primary aim of this study is to compare short- and mid-term patient-reported outcomes and clinically meaningful improvement thresholds for patients with chondral flaps who underwent treatment with BMAC versus microfracture.

METHODS: This was a prospective cohort study of patients who underwent arthroscopic hip surgery for symptomatic acetabular labral tears. Patients were included if they were ≥ 18 years old, had preoperative hip/pelvis radiographs, had acetabular chondral flaps visualized arthroscopically at the time of surgery, underwent surgery with either BMAC or microfracture, and completed all PROMs at enrollment and a minimum of 12 months. Patients were sent online surveys at enrollment prior to surgery and at 1, 2, and 4 years after surgery. Patient-reported outcome measures (PROMs) included the modified Harris Hip Score (mHHS), Hip Outcome Score Activities of Daily Living (HOS-ADL) and Sports-Specific Subscale (HOS-SSS), International Hip Outcome Tool (iHOT-33), and Visual Analog Scale (VAS). Mixed effects models with maximum likelihood estimation were used to analyze longitudinal outcomes adjusting for age, sex, and BMI with random intercepts to account for patient clustering. Missing data was handled through the mixed effects framework without patient exclusion.

RESULTS: A total of 78 patients were included in this study, with 54 being treated with BMAC and 24 treated with microfracture. There were no significant differences in measured baseline characteristics, including age, sex, body mass index, tear size, radiographic osteoarthritis, or radiographic femoroacetabular impingement (all $P > 0.05$). Patients in the BMAC cohort had significantly higher VAS pain scores (5.5 vs 6.6, $P = 0.011$) and lower HOS-ADL scores (72.9 vs 67.2, $P = 0.006$). There were a total of 48 males (61.5%) and 30 females (38.5%). Despite the BMAC cohort having lower baseline scores, patients in the BMAC cohort had significantly higher mHHS scores at 1 year (5.6 point benefit, $P = 0.036$) and 2 years (5.4 point benefit, $P = 0.048$) with sustained pain relief benefits through 2 years (VAS difference 1.1 points at 1 year, $P = 0.0078$; 0.9 points at 2 years, $P = 0.030$). By 4 years, functional outcomes were largely similar (BMAC mHHS difference 5.09 points greater, $P = 0.282$), with BMAC maintaining a medium effect size advantage in pain reduction (Cohen's $d = 0.55$). Patient satisfaction rates were high in both groups with no significant differences at 4 years ($P = 0.292$).

DISCUSSION: In patients undergoing arthroscopic acetabular labral repair with concurrent chondral flap, BMAC demonstrated significant early functional advantages and sustained pain relief benefits compared to microfracture, despite patients starting with worse baseline symptoms. By 4 years, both treatments provided excellent outcomes with similar functional scores, while BMAC maintained superior pain control.

SIGNIFICANCE: These findings suggest that BMAC may accelerate recovery and provide enhanced pain control compared to traditional microfracture techniques.