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## Original Research

# Early Clinical Outcomes of Intra-Articular Injections of Bone Marrow Aspirate Concentrate for the Treatment of Early Osteoarthritis of the Hip, and Knee: A Cohort Study

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## Abstract

**Background:** Bone marrow aspirate concentrate (BMC) is one of the few cell-based therapies available as a possible biological treatment for early osteoarthritis (OA). Its efficacy, safety, and benefit compared with other treatments are still to be determined.

**Objective:** To assess the clinical outcomes of patients undergoing intra-articular injection of BMC for the treatment of early knee and hip OA.

**Design:** Prospective, cohort study.

**Setting:** Single institution, quaternary level of care.

**Patients:** Nineteen patients (16 female and 3 male), totaling 25 joints (10 knees, 15 hips), treated with intra-articular BMC for early OA between 2014 and 2016. The mean age at time of the procedure was  $58 \pm 12.7$  years (range, 30-80 years). The mean follow-up was  $13.2 \pm 6.3$  months (range, 6-24 months). Inclusion criteria included  $\geq 18$  years; knee OA, Kellgren–Lawrence grade I-II; hip OA, Tönnis grade I-II; first-time intra-articular BMC therapy, after unsuccessful symptomatic and conservative treatments (ie, physical therapy, analgesics and anti-inflammatory drugs) for 6 months. Exclusion criteria included pregnancy; malignancy; rheumatologic diseases; infection; Kellgren–Lawrence grade III-IV; Tönnis grade III; and previous intra-articular injections or surgery.

**Interventions:** All patients had autologous bone marrow aspirate harvested from the iliac crest and centrifuged to achieve BMC, for intra-articular injection.

**Main Outcome Measurements:** The hypothesis was formulated before the study. Patient-reported outcomes measures were assessed preoperatively and at last follow-up using the Western Ontario and McMaster Universities Arthritis Index.

**Results:** Western Ontario and McMaster Universities Arthritis Index improved from a baseline of  $40.8 \pm 18.3\%$  to  $20.6 \pm 17\%$  ( $P < .001$ ) at final follow-up. The satisfaction rate was 63.2%. The minimal clinically important difference threshold of 9.15 points was reached by 64% of the patients. Two patients were converted to total hip arthroplasty at 8 months after BMC injection.

**Conclusions:** Intra-articular injections of BMC for the treatment of early knee or hip OA were safe and demonstrated satisfactory results in 63.2% of patients. Future studies are necessary to determine the efficacy of this technique and its safety profile.

**Level of Evidence:** II

## Introduction

Osteoarthritis (OA) is one of the leading causes in both disabling (ie, pain and decreased range of motion) and generated economic burden (ie, long-term treatment costs for the patient and the society) in musculoskeletal conditions, with knee and hip joints most commonly affected [1-5]. Regenerative and biological

therapies continue to provide new insights within the field of orthopedics. These therapies may expand the available options of nonsurgical or minimally invasive treatments for patients with early OA and other joint diseases [6]. Bone marrow aspirate concentrate (BMC) has been proposed as a possible biological treatment for symptomatic focal chondral defects and OA of the knee [7-12], femoral head osteonecrosis [13-17], as well as