

## Comparison of Juvenile Allogeneous Articular Cartilage and Bone Marrow Aspirate Concentrate versus Microfracture in Arthroscopic Treatment of Talar Osteochondral Lesions

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**Introduction/Purpose:** There are few prior investigations that report the clinical and radiographic outcomes of juvenile allogenic chondrocyte implantation with autologous bone marrow aspirate in the ankle. Reports that do exist have offered conflicting results and suggest that this relatively new technique has no significant advantage over current repair techniques. The purpose of this study was to compare the functional and radiographic outcomes of patients who received juvenile allogenic chondrocyte implantation with autologous bone marrow aspirate for treatment of talar osteochondral lesions with those of patients who underwent microfracture.

**Methods:** After approval was obtained from our institutional review board, the institution's foot and ankle registry was searched using relevant Current Procedural Terminology codes for all patients who underwent either microfracture or juvenile allogenic chondrocyte implantation with bone marrow aspirate concentrate for an osteochondral lesion of the talus between 2006 and 2014. Ninety-six patients fit the inclusion criteria and composed the study cohort. Of these 96 patients, 50 had undergone microfracture treatment and 46 had received DeNovo NT for juvenile allogenic chondrocyte implantation with bone marrow aspirate concentrate treatment, composing the microfracture (MF) and JACI-BMAC groups, respectively. Retrospective chart review was performed and functional outcomes were assessed pre- and postoperatively using the Foot and Ankle Outcome Score (FAOS) and Short Form-12 (SF-12) general health questionnaire. Postoperative magnetic resonance (MR) images were reviewed and evaluated using a modified Magnetic Resonance Observation of Cartilage Tissue (MOCART) score.

**Results:** The average followup was 40.0 (range 5.0 to 113.6) months with the MF group having an average followup of 40.3 months (range 5 to 133.6) and the JACI-BMAC group averaging a 18.6 month followup (range 9.1 to 39.6). Both the JACI-BMAC and MF groups had significant pre-to-postoperative improvements in Pain, Daily Activities, Sports, Quality of Life, and overall FAOS Scores; however, there were no significant differences in any patient reported outcomes between the groups. SF-12 scores were improved in both JACI-BMAC and MF groups, however the MF change from pre- to-postoperative did not reach significance ( $p = 0.214$ ). Radiographically, both the JACI-BMAC and MF groups produced reparative tissue that exhibited a fibrocartilage composition. The JACI-BMAC group tended to have more patients with hypertrophy exhibited on MR imaging than the MF group ( $p = 0.030$ ).

**Conclusion:** Juvenile allogenic chondrocyte implantation and microfracture resulted in improved functional outcomes. However, none of the differences in FAOS scores between groups achieved the minimal clinically important difference, suggesting there may not be enough of a difference between these treatments to distinguish them in terms of patient outcomes in the short term. Both techniques produced reparative tissue that exhibited fibrocartilage composition radiographically. Based on our results, juvenile allogeneous cartilage has not demonstrated a significant advantage over the microfracture technique in the treatment of talar osteochondral lesions. Longer term studies will be needed to see if these findings are maintained over time.

Table 1. Functional Outcomes of The Different Treatment Groups: JACI-BMAC &amp; MF

	Treatment (0=MF, 1=JACI-BMAC)	Preop Mean (N)	Postop Mean (N)	Difference Pre- to-Postop (N)	P-Value (Difference pre-to- postop) p<0.05
SF-12	0	65.1	71.8	5.9	0.214
	1	65.9	74.4	9.9	0.044*
Mean FAOS	0	54.6	62.3	8.6	0.018*
	1	46.5	61.0	13.7	0.005*
FAOS Pain	0	61.0	70.8	10.6	0.009*
	1	53.6	68.0	14.0	0.009*
FAOS Symptoms	0	64.9	60.9	-4.1	0.297
	1	57.9	65.9	5.8	0.852
FAOS Activities	0	76.9	81.3	4.6	0.026*
	1	66.8	77.4	11.8	0.011*
FAOS Sports	0	43.3	54.9	15.4	0.013*
	1	35.4	49.5	15.2	0.014*
FAOS Quality of Life	0	29.4	45.4	22.4	0.001*
	1	22.5	40.8	19.6	0.003*