The Effect of the Hyaluronic Acid Enhanced Calcium Phosphate Subchondroplasty on Bone Marrow Lesion Outcomes

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Introduction

Subchondral calcium phosphate injections are rising in popularity as a method to address bone marrow lesions (BMLs) due to minimal invasiveness and promising improvements in knee pain and function. While several studies have investigated the short-term outcomes of these injections, little research has explored the results of a newer hyaluronic acid-enhanced, calcium phosphate (HACP) bone graft substitute material. The goal of this study is to investigate the short-term outcomes of these HACP injections, and to confirm that they reflect the results seen with similar injections in other studies.

Objective: To address a gap in research regarding pain outcomes of patients with bone marrow lesions who have received hyaluronic acid-enhanced, calcium phosphate bone graft substitute material injections, a newer product in the realm of subchondral phosphate injections.

Methods: This retrospective observational cohort study includes 39 patients who received HACP injections between August 2022 and January 2024 for treatment of BML by a single orthopedic surgeon. All patient data were acquired through the Ochsner Epic electronic medical records. All patients have a documented diagnosis of bone marrow lesions in the knee joint. The primary outcome of the study is the time between when patients receive their HACP bone graft substitute material injection until their first follow-up date. The secondary outcome of the study will consist of the time from initial injection to any subsequent interventions.

Table 1: Patient Demographics (n=39)

Characteristic	Frequency	Percent
Gender		
Female	32	82.05
Male	7	17.95
Race/Ethnicity		
Black	18	46.15
White	4	10.26
Other	17	43.59
Deformity		
Valgus	1	2.56
Varus	38	97.44
BML Location		
Femoral	11	31.43
Tibial	16	45.71
Patellar	3	8.57
Fib/Tib	5	14.29
Other/Unknown	4	10.26
Number of BMLs present		
1	33	84.62
2	6	15.38
Underwent arthroscopy after injection		
No	5	12.82
Yes	34	87.18

Table 2: Subjective Patient Reported Outcomes

PROs on a scale from 1-10	N	Mean	Median
Preoperative	39	6.59	7
2 weeks post-op	35	3.57	3
3 months post-op	29	5.00	5
PRO changes	**N**	**Median**	**p-value**
From preop to 2 weeks post op	35	-2	0.001
From preop to 2-3 months post op	29	-3	0.0255

Table 3: Pre-procedural Injections and Future Interventions

	Mean	SD
Number of injections before intervention (n=36)	3.03	1.96
	Mean	**SD**
Time to first intervention in months (n=25)	3.33	2.39

Results

- Of the 39 patients included in this study, majority were female (82%), black (46%), with varus deformity (97%), and contained a single BML (87%). No patients experienced complications from the HACP injection. The average number of intraarticular injections before attempting HACP injection per patient was 3.03 (SD= 1.96), and the average time to intervention after HACP injection per patient was 3.33 (SD= 2.39). The mean and median preoperative pain scores for this patient set were 6.59 and 7, respectively. The median pain score change at 2 weeks post-HACP injection and at 3 months post-HACP injection were -2 ($p<0.001$) and -3 ($p=0.0255$) respectively, indicating a decrease in pain at both points in the postoperative course.
- Limitations:

1. Lack of a control group
2. Limited time of follow-up
3. Limited number of patients
4. Lack KOOS as an additional PRO

Conclusion

- HACP injections are a minimally invasive option to address BMLs. Complication rate is minimal, and these injections can reliably decrease knee pain within the 3-month postoperative period.