

Durable Functional and Pain Improvements Following Arthroscopy-Guided Subchondral BML Treatment, Independent of Radiographic Severity

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INTRODUCTION: Subchondral bone marrow lesions (BMLs) are MRI-defined areas of edema, fibrosis, and necrosis linked to pain and progression of knee osteoarthritis.¹ Conventional free-hand, fluoroscopic targeting for BML treatment is imprecise, technically demanding, and exposes patients to radiation. Arthroscopy-guided, anatomically referenced decompression and augmentation offers a precision alternative (Fig. 1).² This study evaluated arthroplasty-free survival after arthroscopic BML intervention and examined the influence of radiographic severity, age, and BMI on outcomes.

METHODS: Consecutive patients with MRI-confirmed symptomatic BMLs of the distal femur or proximal tibia treated between August 2018 and September 2024 with arthroscopy-guided decompression and biomaterial augmentation were retrospectively reviewed. A total of 60 patients (mean ± SD age, 60.8 ± 12.7 years; 70% female; BMI 31.0 ± 6.1) were analyzed with minimum 12-month follow-up. PROs included the International Knee Documentation Committee (IKDC) score, Knee injury and Osteoarthritis Outcome Score (KOOS), and Visual Analog Scale (VAS) for pain (overall and standing). Paired changes were evaluated with Wilcoxon signed-rank tests. Differences across medial and lateral KL grades were compared using Kruskal–Wallis tests. Logistic regression assessed predictors of achieving the minimal clinically important difference (MCID). Institutional review board approval was obtained, and informed consent was collected for all patients.

RESULTS: Median IKDC improved from 25 (IQR 18–32) to 57 (IQR 46–78) (p<0.001). Median Pain VAS scores decreased substantially from 7.9 to 2.1 (p<0.001). KL grade did not significantly influence change in IKDC or VAS (Table 1). Patients with higher medial KL grades reported greater residual pain at follow-up (p=0.021), but functional gains were observed across all strata. Logistic regression showed no significant correlations between MCID attainment and age (p=0.445), sex (p=0.730), or BMI (p=0.227).

DISCUSSION: Arthroscopy-guided decompression with biomaterial augmentation yielded large and durable improvements in pain and function at one year, independent of KL grade. While higher medial KL was associated with slightly greater residual pain, functional benefit persisted across all OA severities. Predictors such as age, sex, and BMI were not significantly correlated with MCID achievement.

SIGNIFICANCE/CLINICAL RELEVANCE: This precision arthroscopic approach reliably improves symptoms and preserves the native joint in patients with knee BMLs. Importantly, benefits are observed across KL grades, supporting BML-directed therapy as a distinct joint-preservation option within comprehensive knee osteoarthritis management.

REFERENCES:

1. Kon E, Ronga M, Filardo G, et al. Bone marrow lesions and subchondral bone pathology of the knee. *Knee Surg Sports Traumatol Arthrosc.* 2016;24(6):1797-1814. doi:10.1007/s00167-016-4113-2
2. Pandya R, Patil R, Looney A. Arthroscopic-Assisted Management of Subchondral Bone Marrow Lesions of the Knee. *Arthrosc Tech.* Published online July 30, 2025:103785. doi:10.1016/j.eats.2025.103785

IMAGES AND TABLES:

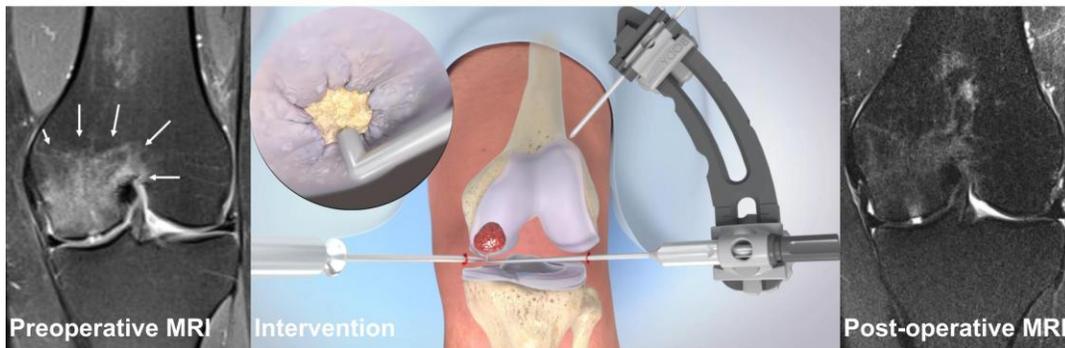


Figure 1

Location	KL grade	No. (%)	Change in IKDC score		P value
			Median	IQR	
Medial lesions	0	2 (6.9)	37.5	34.25–40.75	.279
	1	12 (41.4)	47.0	11.75–53.00	
	2	6 (20.7)	22.5	10.50–30.75	
	3	9 (31.0)	20.0	16.00–28.00	
	4	0 (0.0)	—	—	
Lateral lesions	0	3 (37.5)	41.0	32.5–53.5	.492
	1	1 (12.5)	34.0	—	
	2	2 (25.0)	48.0	44.5–51.5	
	3	1 (12.5)	19.0	—	
	4	1 (12.5)	46.0	—	

Table 1