

90% Joint Preservation Following Arthroscopy-Guided Subchondral BML Treatment at Two Years

Austin Looney¹, Raturaj Patil¹, Raj Pandya¹
¹Atlanta Orthopaedic Institute, Atlanta, GA
 austinlooney@gmail.com

Disclosures: Raturaj Patil (PanOrthopaedics), Raj Pandya (PanOrthopaedics)

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: We retrospectively analyzed 44 patients (mean ± SD age 59.1 ± 13.1 years, 31.8% male) treated between August 2018 and September 2023 with arthroscopy-guided decompression and biomaterial augmentation for symptomatic MRI-confirmed knee BMLs. Minimum follow-up was 24 months. The primary endpoint was conversion to arthroplasty. Kaplan–Meier analysis estimated survival by Kellgren-Lawrence (KL) grade. Incidence was expressed per 100 person-years. Cox proportional hazards models tested associations with KL grade, age, and BMI. All study procedures were approved by the institutional review board, and all patients provided informed consent.

RESULTS: At two years, arthroplasty-free survival was 90.7% (95% CI 77.2 – 96.4) (Fig. 2). Arthroplasty incidence was 4.8 per 100 person-years (95% CI 1.3 – 12.3). Survival curves did not differ by KL grade (global log-rank $\chi^2 = 1.17$, $p = 0.883$) (Fig. 3). Incidence rates by KL were: KL0, 0.0; KL1, 3.03; KL2, 8.05; KL3, 5.76; KL4, 0.0 per 100 person-years. Cox regression showed no significant associations with KL grade (HR 0.85, $p = 0.81$), age (HR 1.05 per year, $p = 0.36$), or BMI (HR 1.27 per kg/m², $p = 0.10$).

DISCUSSION: Arthroscopy-guided BML decompression with biomaterial augmentation achieved high joint preservation at two years, with survival rates approaching 91%. Outcomes were independent of baseline KL grade, age, and BMI, suggesting broad applicability across patients with varying degrees of osteoarthritis. Limitations include single-center design and modest sample size, warranting longer-term, multicenter studies.

SIGNIFICANCE/CLINICAL RELEVANCE: Arthroscopic guidance enables precise, low-radiation BML intervention that preserves the native joint in >90% of patients at two years. These findings support arthroscopy-assisted BML treatment as a viable joint-preservation strategy irrespective of radiographic OA severity.

REFERENCES:

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IMAGES AND TABLES:

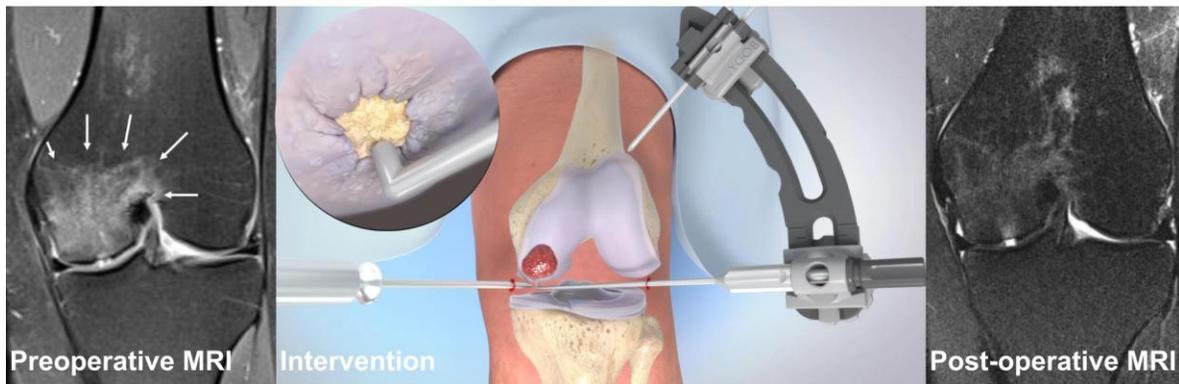


Figure 1

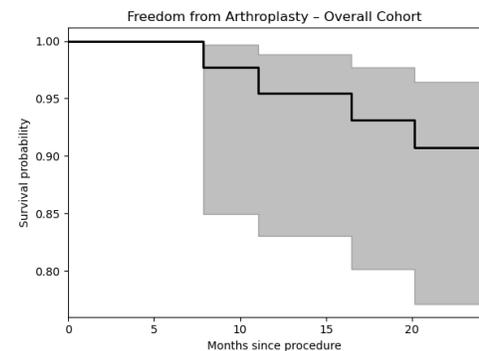


Figure 2

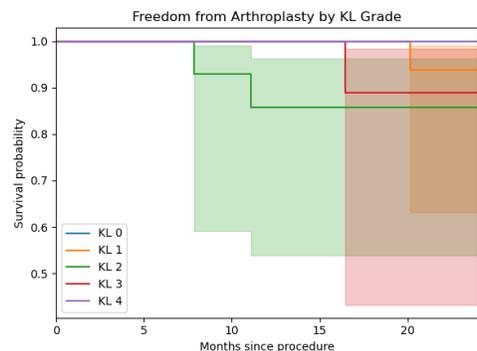


Figure 3