

Concomitant Notch Microfracture is Associated with No Difference in Failure Rates Compared to Meniscal Repair Alone

Nathan Varady, Suhas Parise, Riley Joseph Williams, Anil S Ranawat

INTRODUCTION:

Meniscal repairs (MR) performed in the setting of anterior cruciate ligament reconstruction (ACLR) are well-known to have superior healing rates compared to isolated meniscal repairs, a finding that is hypothesized to be related to the release of marrow elements during tunnel drilling. To stimulate a similar healing environment in the setting of isolated meniscal repair, intercondylar notch microfracture (NMF) or “marrow venting” has been proposed. However, clinical data supporting this practice are sparse, and no study of which we are aware has assessed whether MR+NMF is associated with an improvement in revision rates following MR. Therefore, the purpose of this study was to assess whether concomitant NMF is associated with improved healing rates following MR. We hypothesized that MR+NMF would be associated with a lower rate of revision meniscal surgery compared to isolated MR.

METHODS:

This was a retrospective cohort study of patients who underwent either MR+NMF or isolated MR from October 2015 through April 2023 in a large national insurance database in the United States (PearlDiver Inc., Colorado, USA). Patients with concomitant cartilage conditions or ligamentous injuries/surgeries were excluded. Demographic data, surgical information, and comorbidities were collected and analyzed. The primary outcome was ipsilateral revision meniscal surgery (meniscectomy, meniscal repair, and meniscal transplant) at 2-years. The secondary outcome was ipsilateral revision meniscal surgery or conversion to uni- or total knee arthroplasty at 2-years. Time-to-event analyses (i.e., Kaplan-Meier for unadjusted analysis and Cox proportional hazard models for adjusted analysis) were used to compare the risk of revision following MR+NMF vs. isolated MR. Comparisons in demographics were made with Student t-tests or Chi-squared tests, as appropriate. For reference purposes, supplementary analysis also compared MR+ACLR to both isolated MR and MR+NMF.

RESULTS:

There was a total of 27,700 patients (9% MR+NMF, 91% isolated MR) with an average follow-up of 3.1 ± 2.1 years. Compared to isolated MR, patients undergoing MR+NMF were similar in age (mean \pm standard deviation 35.2 ± 16.7 years vs. 35.5 ± 17.6 years, $p=0.35$), more often male (53% vs. 50%, $p=0.003$), and had a similar comorbidity burden (Charlson Comorbidity Index 0.64 ± 1.02 points vs. 0.61 ± 1.11 points, $p=0.39$). There was no difference in 2-year revision rates for patients undergoing MR+NMF vs. isolated MR (7.15% vs. 7.38%, $p=0.8$) (Figure 1). These results held in adjusted analysis controlling for age, sex, comorbidities, obesity, and tobacco use (HR [95% CI] 0.97 [0.83-1.13], $p=0.69$). Similar results were seen in the secondary analysis of revision meniscal surgery or conversion arthroplasty (unadjusted: 8.06% vs. 8.53%, $p>0.99$; adjusted: HR 1.00 [0.86-1.16], $p=0.98$) (Figure 2). By contrast, MR+ACLR was associated with significantly lower revision rates compared to both isolated MR (unadjusted: 5.29% vs. 7.38%, $p<0.001$; adjusted: HR 0.58 [0.54-0.63], $p<0.001$) and MR+NMF (unadjusted: 5.29% vs. 7.15%, $p<0.001$; adjusted: HR 0.61 [0.51-0.72], $p<0.001$).

DISCUSSION AND CONCLUSION: The addition of NMF to MR was associated with no difference in MR failure rates compared to MR alone. Although NMF carries little cost and is not known to cause any harm, these data question whether there is significant clinical benefit to MR+NMF and indicate the biologic effects of NMF do not appear to fully mimic that of ACLR. Until additional data become available, surgeons may want to perform alternative methods of biological augmentation if a reduction in failure rates is desired.

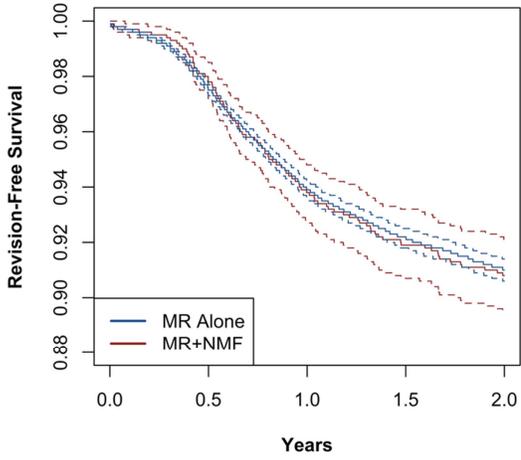


Figure 1. Kaplan-Meier curves with 95% confidence intervals (dashed lines) of revision-free survival for meniscal repair (MR) + notch microfracture (NMF) and isolated MR.

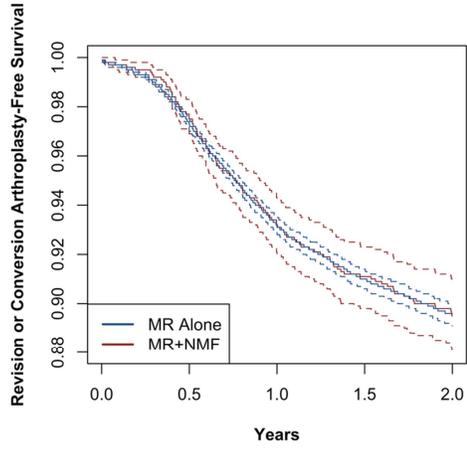


Figure 2. Kaplan-Meier curves with 95% confidence intervals (dashed lines) of revision or conversion arthroplasty-free survival for meniscal repair (MR) + notch microfracture (NMF) and isolated MR.