

Postoperative Remodeling and Ideal Residual Width of the Discoid Lateral Meniscus After Arthroscopic Reshaping in Pediatric Patients

Kyeongbaek Kim, Joon Ho Wang, Sang-Min Lee, Won Chul Shin, Jae Seung Seo, Min-Uk Do, Jungshin Kim

INTRODUCTION:

Background:

Arthroscopic reshaping is the standard treatment for symptomatic discoid lateral meniscus in pediatric patients. However, postoperative remodeling patterns and the ideal residual width necessary to prevent degeneration remain unclear.

Purpose:

To analyze the remodeling process of the residual meniscus after reshaping surgery and to determine the optimal remaining meniscal width to maintain adequate morphology and prevent width reduction below critical thresholds.

METHODS: A retrospective analysis was conducted on 29 pediatric patients (39 knees) who underwent arthroscopic reshaping surgery for symptomatic DLM between 2016 and 2022. MRI assessments were performed immediately after surgery and during follow-up at 6 months or 2 years postoperatively, or at both time points. Changes in meniscal width, height, extrusion and inner-to-peripheral height ratio (Hin/Hp) were measured and analyzed. Logistic regression was used to identify preoperative risk factors for meniscal changes. Using the receiver operating characteristic (ROC) curve, we identified the cutoff values for preoperative factor and surgical remnant meniscal width associated with a remaining width of less than 5 mm.

RESULTS:

Residual meniscal width decreased significantly in all segments, most notably in the midbody, with a 25.7% reduction at 6 months and 38.1% at 2 years. Anterior and posterior horns showed more modest reductions. The Hin/Hp ratio, which quantifies meniscal triangularity, also decreased significantly—indicating remodeling from a square to a more physiological triangular shape—especially within the first 6 months postoperatively.

Multivariate analysis identified complete-type DLM ($\beta = 26.0, P = 0.036$) and smaller preoperative meniscal height ($\beta = -4.51, P = 0.048$) as independent risk factors for excessive width reduction. ROC curve analysis established a postoperative residual width cutoff of 8.5 mm (AUC = 0.749) and a preoperative meniscal height cutoff of 3.3 mm (AUC = 0.753) as significant thresholds for maintaining sufficient residual width (>5 mm) at follow-up.

DISCUSSION AND CONCLUSION:

The findings of this study confirm that residual DLM undergoes substantial remodeling postoperatively, both in shape and in volume. The transformation to a more triangular morphology is largely completed within 6 months after surgery, likely facilitated by mechanical loading during rehabilitation. This natural remodeling may obviate the need for aggressive inner rim resection to achieve a triangular shape intraoperatively.

Our data also indicate that excessive reduction in meniscal width is not uncommon and tends to progress over time.

Given the observed risk of width reduction and extrusion progression, we recommend preserving a residual width of more than 8.5 mm during surgery, particularly in cases with predisposing factors such as a complete DLM or a small preoperative meniscal height. These thresholds may help reduce the likelihood of the meniscus falling below the critical 5 mm width associated with osteoarthritis development.