

Medial meniscus posterior root repair reduces the extruded meniscus volume during knee flexion with favorable clinical outcome

Ximing Zhang¹⁾, Takayuki Furumatsu^{*1)}, Yoshiki Okazaki²⁾, Yuki Okazaki¹⁾, Takaaki Hiranaka¹⁾, Haowei Xue¹⁾, Keisuke Kintaka¹⁾, Takatsugu Yamauchi³⁾, Toshifumi Ozaki¹⁾.

Affiliations:

1) Department of Orthopaedic Surgery, Okayama University Graduate School of Medicine Dentistry and Pharmaceutical Sciences, 2-5-1 Shikatacho, Kitaku, Okayama 700-8558, Japan.

2) Department of Orthopaedic Surgery, Chikamori Hospital, 1-1-16 Okawasuji, Kochi 780-8522, Japan.

3) Division of Radiology, Medical Technology Department, Okayama University Hospital, 2-5-1 Shikata-cho, Kitaku, Okayama 700-8558, Japan.

Abstract

Purpose: The volume of medial meniscus (MM) extrusion at 10° and 90° knee flexions using three-dimensional (3D) magnetic resonance imaging (MRI) and assessed relevant clinical outcomes at 1-year follow-up were evaluated.

Methods: Twenty-four patients who underwent MM posterior root repair were retrospectively reviewed. At 10° and 90° knee flexions, the meniscal extrusion distance and volume were measured using 3D meniscus models constructed by SYNAPSE VINCENT®. The correlation between Knee Injury and Osteoarthritis Outcome Score, Lysholm, International Knee Documentation Committee scores, Tegner activity, and pain visual analog scales and changes in MM extrusion were assessed.

Results: No significant differences in the MM medial extrusion were observed between 10° and 90° knee flexions postoperatively. MM posterior extrusion (MMPE) decreased

significantly at 10° and 90° knee flexions postoperatively. At 90° knee flexion, the meniscus volume at the intra-tibial surface increased at 3 and 12 months postoperatively. The MM extrusion volume increased slightly at 10° knee flexion; however, the volume decreased significantly at 90° knee flexion postoperatively. The change in MMPE significantly correlated with clinical scores. All 12-month clinical scores were significantly improved compared to preoperative scores.

Conclusions: The progression of meniscus posterior extrusion and reduction of its volume at 90° knee flexion can be suppressed by MM posterior root repair. Postoperative clinical scores correlated with reductions of the posterior extrusion. Regarding clinical relevance, the dynamic stability of the meniscus can be maintained by MM posterior root repair, which is an effective therapeutic method for improving its clinical status.

Level of Evidence: Level IV

Keywords: Medial meniscus, Posterior root tear, Transtibial pullout repair, Meniscal extrusion, Three-dimensional magnetic resonance imaging