

Editorial Commentary: Medial Meniscal Root Repair May Not Be Required During Knee Medial-Compartment Unloading High Tibial Osteotomy



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Abstract: Medial meniscal root tears are biomechanically similar to a total meniscectomy. Repair is clinically indicated and supported by evidence. Increased contact pressures can result in cartilage degeneration and early onset of osteoarthritis. Once diffuse grade 3 or 4 osteoarthritis has settled in, repair may not be indicated anymore. Combining medial meniscal root repair with a high tibial osteotomy for grade 3 or 4 medial-compartment osteoarthritis is not beneficial, and osteotomy alone provides very similar clinical outcomes at 2 years. Meniscal healing was observed in only 18% of patients, and the rate of “cartilage recovery” during second-look arthroscopy was between 8% and 24%. The low sample size, short follow-up, and historical control group limit the validity and generalizability of these conclusions.

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Medial meniscal posterior root tears interrupt the continuity of the circumferential fibers and result in failure of converting axial loads into transverse hoop stresses.¹ Medial peak contact pressures increase by 25% compared with the native state, and this is biomechanically very similar to a total meniscectomy.² The increased contact pressures expose the articular cartilage to greater loads, which then contribute to cartilage degeneration, and this can accelerate any arthritic process.³ It is interesting to note that medial meniscal root tears are 6 times more likely to have concomitant chondral defects.⁴ More interesting is the fact that medial root tears are more commonly degenerative in nature, are more commonly seen in middle-aged women, and overall represent 21% of all medial tears.⁴ In the Asian population, age, increased body mass index, female sex, varus deformity, and lower sports activity level were strong determinants of medial meniscal root tears.⁵ Hwang et al.⁵ suggested that these

intrinsic risk factors were similar to the factors predisposing patients to osteoarthritis. Similarly, Bhatia et al.⁶ and Kim et al.⁷ reported that medial root tears can occur during traumatic events but mainly occur in degenerative knees in approximately 70% of patients without a specific injury or after minor trauma. Because there is usually no history of trauma, patients often only present with a history of subacute pain; meniscal symptoms are not common.³

This inevitably leads to the question of whether meniscal root tears should be repaired. A recent Editorial Commentary used a very strong title to drive the message home that repair should be strongly considered: “We Know We Need to Fix Knee Meniscal Radial Root Tears—But How Best to Perform the Repairs?”⁸ Certainly, data suggest that meniscal root tears should be repaired.⁹ Such repair significantly improves functional outcome scores and may prevent progression of osteoarthritis in the short term.⁹ Unfortunately, this repair heals in only 60% of patients,⁹ leading to the inevitable question of whether the other 40% inevitably progress toward more severe chondral damages with subsequent osteoarthritis. Despite these potential problems with healing, repair results in better clinical outcomes when compared with partial meniscectomy at 2 years.¹⁰ Because the primary goal of repair is to

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restore contact pressures and kinematics, surgical repair may not be indicated anymore in patients with diffuse and higher-grade osteoarthritis, that is, grade 3 or 4.¹¹

And this is exactly what Lee, Lee, and Kim¹² have investigated. In their study titled “Outcomes of Medial Meniscal Posterior Root Repair During Proximal Tibial Osteotomy: Is Root Repair Beneficial?” Lee et al.¹² evaluated clinical and radiological outcomes and arthroscopic findings after repairing the medial meniscus root in patients undergoing a high tibial osteotomy for grade 3 or 4 osteoarthritis of the medial knee compartment. Root repair was performed by either suture pullout or side-to-side repair and compared with a group of patients who only underwent high tibial osteotomy. Second-look arthroscopy was performed at 2 years, and meniscal healing of the articular cartilage was assessed. Meniscal healing was observed in only 18% of patients, and the rate of “cartilage recovery” was between 8% and 24%, with no differences between groups.

The logical conclusion seems that it makes no sense to repair medial meniscal root tears. Lee et al.¹² basically confirmed what Pache et al.¹¹ outlined in their 2018 current concepts review. However, the conclusions of Lee et al. should be viewed with some caution. The follow-up was short and the results may be very different at 5 years. The authors have also changed their repair technique. Earlier, pullout techniques were used; these were later replaced by an all-inside suturing technique. Moreover, these 2 groups were then compared with an earlier group that underwent osteotomy only. Comparisons with historical control groups are problematic and introduce systematic error.^{13,14} Selection bias is a common problem, and often, patients have better clinical outcomes.¹⁴ Adaptive designs and Bayesian approaches to analysis are a good alternative but often aim to discount or down weigh historical controls.^{15,16} Although the study included a total of 71 patients, subdivision into 3 groups diluted the sample size and most likely caused a type II error. When G*Power (version 3.1.9.2) was used and very generous parameters (large effect size, power of 0.8) were applied, the sample size was calculated as a total of 111 patients to achieve adequate power. This is a problem for the study because the lack of differences between groups could simply be due to lack of power. Of course, these are purely statistical considerations and the clinical reality may be much simpler: Repair just does not work in these types of patients.

We should ask ourselves the following question: Is it worthwhile to repair a torn medial meniscal root when patients undergo a high tibial osteotomy for medial-compartment osteoarthritis, considering that the approximate healing rate is only 20% with a similar

percentage of “some” cartilage recovery after 2 years? Current evidence is limited, and it again boils down to clinical judgment.

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