

CORRESPONDENCE



Arthroscopic Partial Meniscectomy for Degenerative Tear — 10-Year Outcomes

TO THE EDITOR: Arthroscopic partial meniscectomy (i.e., keyhole resection of torn meniscal tissue) is among the most frequently performed orthopedic procedures worldwide. It is commonly performed in middle-aged and older adults with knee pain attributed to a degenerative meniscal tear. Over the past decade, randomized trials comparing arthroscopic partial meniscectomy with nonoperative care or sham surgery have shown little or no benefit from the procedure, whereas observational evidence has aroused concern that arthroscopic partial meniscectomy may accelerate structural degeneration and increase the likelihood of subsequent knee replacement.¹

We conducted a multicenter, randomized, sham-surgery–controlled trial to evaluate arthroscopic partial meniscectomy for degenerative medial meniscal tear in adults without radiographic evidence of established osteoarthritis (FIDELITY ClinicalTrials.gov numbers, NCT00549172 and NCT01052233). Trial methods and short- and intermediate-term outcomes^{2,5} have been reported previously. Here, we report the 10-year outcomes.

Participants underwent diagnostic arthroscopy to confirm eligibility before intraoperative randomization to arthroscopic partial meniscectomy or sham surgery. Participants and outcome assessors were unaware of trial-group assignments. The funders had no role in the collection, analysis, or interpretation of the data; in the writing of the manuscript; or in the decision to submit the manuscript for publication. The trial protocol is available with the full text of this letter at NEJM.org.

Over 10 years of follow-up, we performed serial radiographic assessments of osteoarthritis; evaluated predefined clinical outcomes, including reoperations and subsequent knee pro-

cedures; and collected repeated participant-reported outcome measures (see the Supplementary Appendix, available at NEJM.org). The three primary participant-reported outcome measures were the score on the Western Ontario Meniscal Evaluation Tool (WOMET), which assesses meniscal symptoms and related disability (scores are calculated as a percentage of the best possible score and range from 0 to 100, with higher scores indicating fewer symptoms and less disability); the Lysholm knee score, which assesses knee function (scores range from 0 to 100, with higher scores indicating less severe symptoms); and knee pain after exercise (scores range from 0 to 10, with higher scores indicating more severe pain).

Of the 146 participants who underwent randomization, 64 of 70 (91%) in the partial-meniscectomy group and 69 of 76 (91%) in the sham-surgery group completed the 10-year follow-up (Tables S1 and S2 in the Supplementary Appendix). At 10 years, adjusted mean differences

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Table 1. Primary and Secondary Outcomes at 10 Years after Arthroscopy.*

Outcome	Arthroscopic Partial Meniscectomy (N = 64)	Sham Surgery (N = 69)	Adjusted Mean Difference (95% or 98.33% CI)†	Adjusted Risk Difference (95% CI)† percentage points
Primary outcomes				
Participant-reported outcomes				
WOMET score‡	80.1±21.8	87.3±14.7	-9.4 (-17.0 to -1.7)	—
Lysholm knee score§	80.2±17.8	84.6±13.9	-5.1 (-11.2 to 0.95)	—
Knee pain after exercise¶	2.5±2.8	1.8±2.2	0.86 (-0.12 to 1.85)	—
Radiographically assessed outcomes				
Kellgren–Lawrence grade progression — no./total no. (%)	52/64 (81)	44/63 (70)	—	12 (-1 to 26)
OARSI score**	5.9±4.0	4.7±3.3	1.02 (-0.02 to 2.07)	—
Secondary outcomes				
Trial-group unblinding — no. (%)	8 (12)	9 (13)	—	0.01 (-0.09 to 0.12)
Mechanical symptoms — no. (%)	11 (17)	15 (22)	—	-4 (-18 to 8)
Participant-reported satisfaction — no. (%)	48 (75)	58 (84)	—	-8 (-22 to 5)
Participant-reported improvement — no./total no. (%)	50/61 (82)	61/69 (88)	—	-6 (-19 to 6)
Return to normal activities — no./total no. (%)	44/62 (71)	55/65 (85)	—	-13 (-27 to 1)
Clinical knee osteoarthritis — no./total no. (%)††	13/59 (22)	12/64 (19)	—	4 (-11 to 18)
Rearthroscopy — no. (%)	3 (5)	7 (10)	—	NA
High tibial osteotomy or total knee replacement — no. (%)	8 (12)	3 (4)	—	NA

* Plus-minus values are means ±SD. NA denotes not assessed.

† Between-group differences were calculated as the mean difference (continuous variables) or the difference in risk (categorical variables) for the partial-meniscectomy group as compared with the sham-surgery group. The estimates of risk difference were derived from an adjusted logistic-regression model with the method of standardization. The three primary participant-reported outcomes are shown with 98.33% confidence intervals for between-group comparisons to account for the performance of three tests. These confidence intervals do not take into account previous tests of these outcomes. All other estimates are reported with 95% confidence intervals without any adjustment for multiplicity. The reported confidence intervals should not be used in place of hypothesis testing.

‡ The Western Ontario Meniscal Evaluation Tool (WOMET) contains 16 items that address three domains: 9 items address physical symptoms; 4 items address disabilities with respect to sports, recreation, work, and lifestyle; and 3 items address emotions. Scores are calculated as the percentage of the best possible score and range from 0 to 100, with higher scores indicating fewer symptoms and disabilities.

§ The Lysholm knee score is based on an 8-item questionnaire designed to evaluate knee function and symptoms in activities of daily living. Scores range from 0 to 100, with higher scores indicating less severe symptoms.

¶ Knee pain after exercise and at rest (during the week preceding assessment) was assessed on a numeric rating scale of 0 to 10, with 0 denoting no pain and 10 denoting extreme pain.

|| The Kellgren–Lawrence grading system is a radiographic scale that is widely used to assess tibiofemoral osteoarthritis. Grades range from 0 to 4, with progression to a higher grade reflecting worsening structural disease. Data were unavailable for 6 participants in the sham-surgery group who did not undergo radiographic assessment.

** The Osteoarthritis Research Society International (OARSI) scoring system is a semiquantitative radiographic measure that combines assessment of joint-space narrowing and the presence of osteophytes in medial and lateral compartments. Scores range from 0 to 18, with higher scores indicating more severe structural change.

†† Knee osteoarthritis was assessed as a dichotomous outcome (yes or no) according to the clinical criteria of the American College of Rheumatology.

between the partial-meniscectomy and sham-surgery groups for the three primary participant-reported measures were -9.4 points (98.33% confidence interval [CI], -17.0 to -1.7) for the WOMET score, -5.1 points (98.33% CI, -11.2 to 0.95) for the Lysholm score, and 0.86 points (98.33% CI, -0.12

to 1.85) for knee pain after exercise (Table 1). Among participants who completed the 10-year follow-up and underwent radiographic assessment, radiographically confirmed progression of osteoarthritis occurred in 52 of 64 (81%) in the partial-meniscectomy group and in 44 of 63 (70%) in the sham-surgery group (adjusted risk difference, 12 percentage points; 95% CI, -1 to 26). Eight participants (12%) in the meniscectomy group and 3 (4%) in the sham-surgery group underwent knee replacement or high tibial osteotomy (Table 1). Findings were similar in sensitivity analyses with censoring of participant-reported data after knee replacement or osteotomy and with imputation of missing radiographic outcome data (Tables S3 and S4).

Because the original trial was designed to maximize the chance of detecting benefit from arthroscopic partial meniscectomy, we enrolled participants with minimal osteoarthritis or no osteoarthritis as assessed by radiography. Yet, even in this low-risk group, we found no evidence of benefit from the procedure, with a suggestion of worse outcomes after arthroscopic partial meniscectomy than after sham surgery. Taken together with other evidence, these findings arouse concern with regard to the use of arthroscopic partial meniscectomy for degenerative meniscal tear in middle-aged and older adults.

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*A complete list of the Finnish Degenerative Meniscus Lesion Study (FIDELITY) Investigators is provided in the Supplementary Appendix, available at NEJM.org.

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1. O'Connor D, Johnston RV, Brignardello-Petersen R, et al. Arthroscopic surgery for degenerative knee disease (osteoarthritis including degenerative meniscal tears). *Cochrane Database Syst Rev* 2022;3:CD014328.
2. Sihvonen R, Paavola M, Malmivaara A, et al. Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. *N Engl J Med* 2013;369:2515-24.
3. Sihvonen R, Englund M, Turkiewicz A, Järvinen TLN, Finnish Degenerative Meniscal Lesion Study Group. Mechanical symptoms and arthroscopic partial meniscectomy in patients with degenerative meniscus tear: a secondary analysis of a randomized trial. *Ann Intern Med* 2016;164:449-55.
4. Sihvonen R, Paavola M, Malmivaara A, et al. Arthroscopic partial meniscectomy versus placebo surgery for a degenerative meniscus tear: a 2-year follow-up of the randomised controlled trial. *Ann Rheum Dis* 2018;77:188-95.
5. Sihvonen R, Paavola M, Malmivaara A, et al. Arthroscopic partial meniscectomy for a degenerative meniscus tear: a 5 year follow-up of the placebo-surgery controlled FIDELITY (Finnish Degenerative Meniscus Lesion Study) trial. *Br J Sports Med* 2020; 54:1332-9.

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CD19 CAR T-Cell Therapy for Treatment of Chronic Graft-versus-Host Disease

TO THE EDITOR: Chronic graft-versus-host disease (GVHD) is a major contributor to death and complications after allogeneic hematopoietic-cell transplantation (HCT). Reconstitution of alloreactive B cells contributes to the pathogen-

esis of chronic GVHD through multiple mechanisms,¹ which provide the rationale for the use of B-cell-directed therapy to prevent or treat chronic GVHD.^{2,3} CD19-directed chimeric antigen receptor (CAR) T-cell therapy has changed