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Original Research

The association between chondral lesions and patient-reported outcomes after meniscectomy: Data from the Osteoarthritis Initiative

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A R T I C L E I N F O

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A B S T R A C T

Introduction: Evidence and guidelines around the treatment of meniscal tears in patients with knee osteoarthritis (OA) are conflicting, and the impact of chondral damage on surgical outcomes is unclear.
Objective: Our objective was to evaluate patient-reported outcomes (PROs) following meniscectomy and to determine whether the extent of chondral damage is associated with worse outcomes.
Methods: We utilized data from the Osteoarthritis Initiative and selected participants with radiographic knee OA (Kellgren-Lawrence grades 2 and 3) and magnetic resonance imaging (MRI) available. We identified the MRI before meniscectomy and measured lesion area on sagittal intermediate-weighted fat-suppressed and axial reformatted Double Echo Steady State MRI. The primary analysis included knees with pain in the year preceding arthroscopic surgery (Western Ontario and McMaster Universities Osteoarthritis Index [WOMAC] Pain > 20) and femoral lesion area > 2 cm^2. Secondary analysis included all knees.
Results: The primary analysis included 66 participants. Average improvements in PROs 2 years post-surgery were 13.2, 7.6, and 12.1 for WOMAC Pain, WOMAC Function, and Knee Injury and Osteoarthritis Outcome Score (KOOS) Pain, respectively. WOMAC Pain improvements were 10.6 (95% confidence interval: 2.3, 18.9) in those with femoral lesion area 2 to 9 cm^2 and 15.1 (95% confidence interval: 8.1, 22.0) in those with femoral lesion area ≥9 cm^2. Results were consistent in secondary analyses.
Conclusions: Participants with radiographic knee OA undergoing meniscectomy reported improvements in PROs. Total femoral lesion area varied considerably, but we did not find associations between lesion area and PROs. These preliminary findings suggest that meniscectomy outcomes do not vary by chondral lesion extent in patients with Kellgren-Lawrence grades 2 and 3 OA.

Introduction

Osteoarthritis (OA) affects more than 600 million adults worldwide and is a leading cause of disability.[1,2] The disease is associated with pain, functional limitations, and diminished quality of life.[3] Meniscal tears are common in patients with knee OA, with estimates suggesting that up to 90% of patients with symptomatic knee OA have concomitant meniscal tears.[4,5]

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Meniscectomy is a surgical treatment for a meniscal tear that involves the partial or complete removal of the damaged meniscus. Studies have shown that patients with both meniscal tear and OA report improved symptoms, such as reduced pain and enhanced function, after meniscectomy and debridement. However, randomized controlled trials find that in intention-to-treat analyses, these improvements are not superior to sham procedures or physical therapy.[6-9] Notably, some trials report that up to one-third of patients randomized to nonoperative therapy cross over to surgery.[8,9] These findings have led the American Academy of Orthopedic Surgeons to support the use of arthroscopic partial meniscectomy (APM) for patients with meniscal tears and mild to moderate OA who have failed to improve after nonsurgical treatments.[10]

In patients with OA, the presence of articular cartilage damage, including lesions on the femoral, tibial, and patellar aspects of the knee joint, is often treated with arthroscopic debridement to remove loose or unstable cartilage. While a recent study found that patients undergoing APM with unstable chondral lesions have worse outcomes at 1 year compared to patients without unstable chondral lesions, the impact of the extent of chondral damage on surgical outcomes remains unclear.[11] A recent systematic review found the evidence conflicting, with some studies reporting that the presence of chondral damage at the time of surgery is associated with worse outcomes, while others found no difference.[12] In this study, we investigate the association between the extent of chondral damage and outcomes of meniscectomy in patients with radiographic OA.

Methods

Sample

We used data from the Osteoarthritis Initiative (OAI), a multicenter, longitudinal observational study of knee OA.[13] Participants between the ages of 45 and 79 were enrolled at 4 clinical centers in the United States between 2004 and 2006. The OAI enrolled participants who had knee OA, defined by frequent knee pain and radiographic evidence of OA (Kellgren-Lawrence [KL] grade ≥2), or were at high risk of developing knee based on various risk factors, including family history, injury history, and obesity. The study was approved by each site's Institutional Review Board and participants provided written informed consent. The study protocol and data are publicly available.[14] Participants completed questionnaires annually for 9 years. Imaging studies, including knee magnetic resonance imaging (MRI) and x-ray, were obtained annually from baseline to year 4, and then again at years 6 and 8.

For this analysis, we selected participants from the OAI who reported undergoing a meniscectomy on any of the 9 follow-up questionnaires. Participants were asked, "Have you had a meniscectomy (where they repaired or cut away torn meniscus or cartilage), since your last visit about 12 months ago?" To be included in the current study, participants also needed to have an x-ray with central study reading of KL grade within 3 years before the reported meniscectomy, with mild to moderate knee OA defined as a Kellgren-Lawrence grade (KLG) 2 or 3. Participants also had to have an MRI before the reported meniscectomy so that chondral defect size could be measured.

In our primary analysis, we excluded participants with femoral lesion areas < 2 cm^2 and participants with Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain in the visit preceding report of meniscectomy less than 20 (on a 0-100 scale, with 100 being the worst). In secondary analysis, we included all participants, regardless of WOMAC pain, and additionally considered participants with lesion sizes under 2 cm^2.

We extracted data on age, body mass index (BMI), and sex. At each OAI visit, participants were asked whether they received injections for treatment of arthritis in the prior 6 months. We determined whether participants reported receiving an injection in the same knee and same OAI study visit as the reported meniscectomy.

Outcomes

We examined several patient-reported outcomes (PROs), including the pain and function subscales from the WOMAC index (scaled from 0-100 with higher scores indicating more severe pain) and the Knee Injury and Osteoarthritis Outcome Score (KOOS) Pain subscale (scaled from 0-100, with 100 indicating the best outcome). Baseline was defined as the visit before the reported meniscectomy. We investigated changes in PROs in the visits preceding and following the reported meniscectomy. The minimally clinically important difference (MCID) for improvement after meniscectomy is approximately 10 points on a 0 to 100 scale.[15,16] We categorized patients as either achieving or failing to achieve MCID by Year 2 (ie, the annual questionnaire following the one where meniscectomy was reported, 12-24 months postsurgery).

Lesion area

We identified the most recent MRI before the reported meniscectomy. An independent musculoskeletal radiologist measured each MRI taken before meniscectomy/debridement using sagittal intermediate-weighted fat-suppressed and axial reformatted Double Echo Steady State MRI to measure patellofemoral lesion area predebridement and coronal reformatted Double Echo Steady State and sagittal intermediate-weighted fat-suppressed MRI to measure the tibiofemoral lesion sizes. Measurements were taken for the long and short axes in millimeter and converted to area in centimeter square by multiplying the long axis by the short axis assuming a rectangular shape. The lesions of the patella were classified as either medial or lateral, while femoral lesions were divided into medial and lateral regions across the anterior, central, and posterior areas. Lesions in the tibia were classified as medial or lateral.

The prevalence and area of lesions in each location are detailed separately for the femur, tibia, and patella. Total lesion area in the femur was defined as the sum of lesion area in the anterior, central, and posterior regions in both the medial and lateral compartments. We dichotomized total femoral lesion area as 2 to 9 cm^2 vs ≥9 cm^2. We based the threshold of 2 cm^2 on literature suggesting that this is the lower limit of a significant chondral lesion.[17,18] A threshold of 9 cm^2 for large lesion is based on the largest indication seen in cartilage repair treatments.[17] In secondary analyses, we included participants with lesion areas less than 2 cm^2 and categorized lesions size as small (< 2 cm^2), medium (2-9 cm^2), and large (≥9 cm^2). We also considered total lesion area in the tibiofemoral joint (TFJ) and patellofemoral joint (PFJ).

Statistical analysis

Means and standard deviations (SDs) were used to summarize continuous variables, while numbers and percentages were used for categorical variables. We assessed changes over time in PROs using linear mixed effects models with an unstructured covariance matrix to account for repeated measurements over time within individuals and to account for 2 knees for those reporting bilateral meniscectomy. To assess the effect of lesion area on outcomes, we included a time by lesion size (2-9 vs > 9 cm^2) interaction term. We estimated cumulative change from the OAI visit before the report of meniscectomy (Year 0) to the second visit after the report of meniscectomy (Year 2). Models were adjusted for KLG, age, and sex. We assessed the association between 2-year change in PROs and continuous total lesion area in the femur using scatterplots overlaid with locally estimated scatterplot smoothing curves.

Results

Cohort characteristics

Figure 1 shows the participant flow diagram. Of the 4796 participants enrolled in the OAI, 338 participants (364 knees; n = 26 reported bilateral meniscectomy) reported a meniscectomy at any OAI follow-up questionnaire. Of these, 348 knees had a radiograph

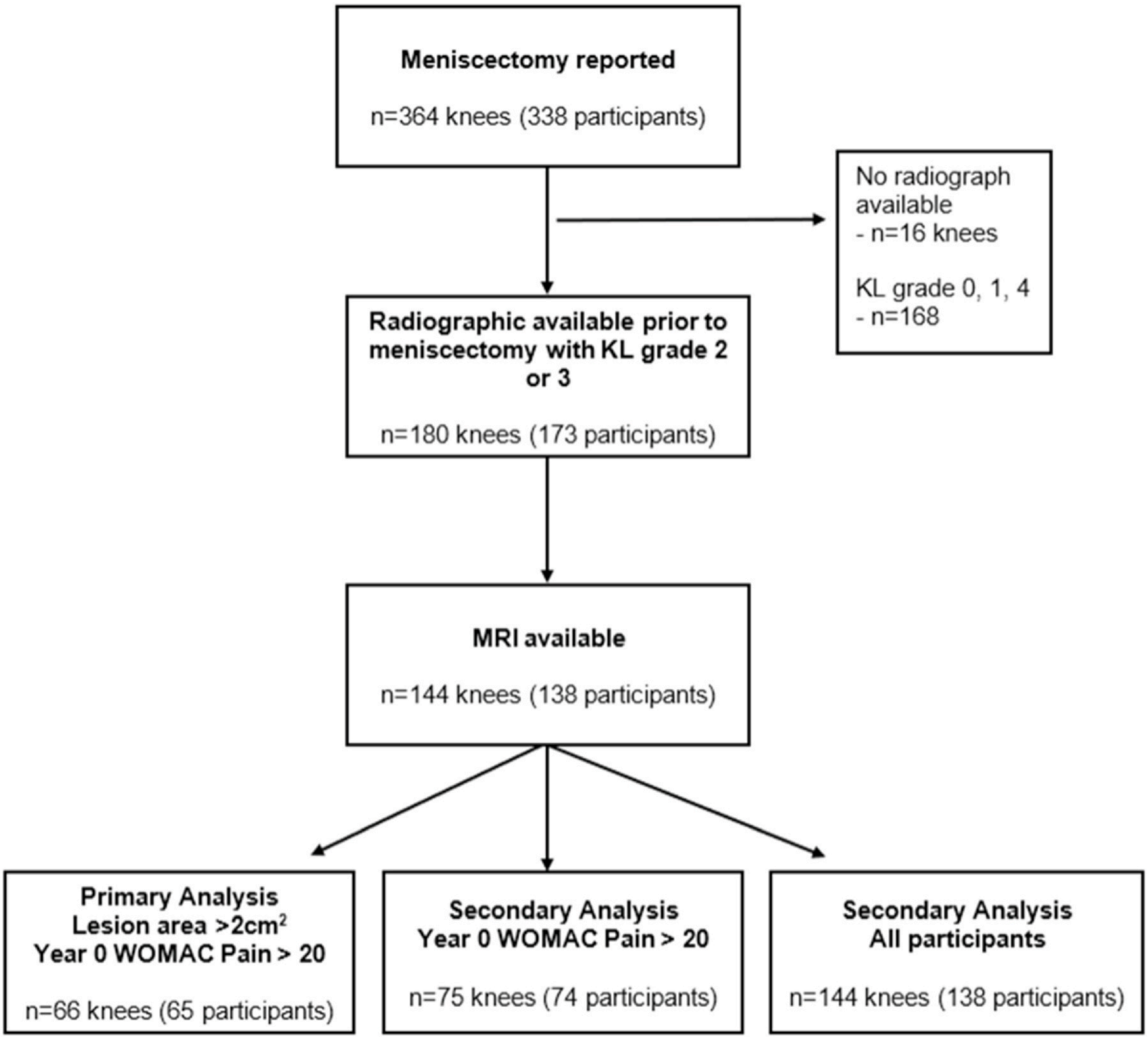

Fig. 1. Participant flow diagram. The diagram shows the number of OAI participants (knees) with meniscectomy reported, the number included based on KLG (2 or 3) and MRI availability, and the number included in each analysis. KLG, Kellgren-Lawrence grade; MRI, magnetic resonance imaging; OAI, Osteoarthritis Initiative.

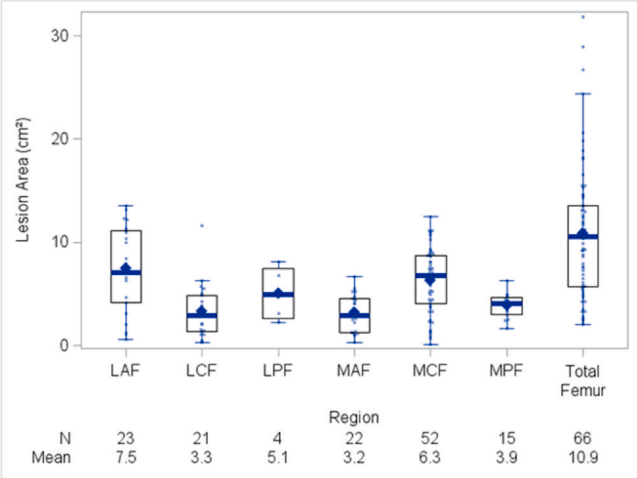

Fig. 2. Distribution of femoral lesion area. Each region of the femur is shown along the x-axis and lesion area (cm^2) is shown on the y-axis. The bottom of the box represents the first quartile, the center line the median, and the top of the box the third quartile. Whiskers extend to 1.5 times the interquartile range. The solid diamond is the mean. Each small dot represents the individual data point. The number of knees with a lesion in each region is shown at the bottom of the figure. LAF, lateral anterior femur; LCF, lateral central femur; LPF, lateral posterior femur; MAF, medial anterior femur; MCF, medial central femur; MPF, medial posterior femur.

within 3 years before the reported meniscectomy and 180 were KLG 2 or 3 on the most recent x-ray. Of these, 144 had an MRI at any point before and after the reported meniscectomy. MRIs were available at the visit before the reported meniscectomy (Year 0 of the current analysis) for 117 (81%) participants and at 1 year before baseline (Year −1 of the current analysis) for 27 (19%) participants. Twenty-one participants with lesion areas under 2 cm^2 were excluded from primary analyses (12 with Year 0 WOMAC Pain < 20, 9 with Year 0 WOMAC Pain ≥20) and an additional 57 with lesion areas ≥2 cm^2 and Year 0 WOMAC Pain < 20 were excluded, for a final analytic sample for the primary analysis of 66 knees.

Participants were 36% male with an average age of 59 (SD 8) and an average BMI of 31 (SD 5). Of the knees, 35 (53%) were classified as KL grade 2 and 31 (47%) were KL grade 3 at the OAI visit before meniscectomy. Cohort characteristics are provided in Table S1. Those with femoral lesion area ≥9 cm^2 were similar to those with femoral lesion area 2 to 9 cm^2 with respect to age, BMI, and sex, and were more likely to be KLG 3 (54% vs 37%). Twelve participants (18%) reported receiving an injection for arthritis at the same OAI study visit as the report of meniscectomy; this was higher in those with femoral lesion area ≥9 cm^2 compared to those with femoral lesion area 2 to 9 cm^2 (26% vs 7%).

Average WOMAC pain at the baseline visit (OAI study questionnaire before questionnaire where meniscectomy was reported) was 39.5 (SD 14.7) with a median of 37.5. The average WOMAC function was 31.6 (SD 15.5) and the average KOOS Pain score was 55.7 (14.7).

Distribution of lesion areas across all regions in the femur is shown in Figure 2. In the analytic cohort of participants with femoral lesion areas > 2 cm^2 and Year 0 WOMAC Pain ≥20, the average total lesion area (summing all regions in the femur) was 10.9 cm^2 (SD 6.4), with a median of 10.6. Total lesion area was between 2 and 9 cm^2 for 27 (41%) participants and ≥9 cm^2 for 39 (59%) participants. The distribution of lesion areas for all regions is shown in Figure S1.

Longitudinal PROs

Mean PROs worsened in the visits leading up to meniscectomy and then improved following meniscectomy (Fig. 3). Table 1 shows mean (SD) PRO at each time point (Year −1 through Year 2) and changes in PROs over time estimated from mixed effects models. PROs worsened in the year before meniscectomy and then improved significantly following meniscectomy. From Year 0 to Year 2 WOMAC Pain improved by 13.2 points (95% confidence interval [CI]: 7.9, 18.6), WOMAC Function improved by 7.6 points (95% CI: 2.7, 12.6), and KOOS Pain improved by 12.1 points (95% CI: 6.7, 17.5).

By year 2 (12-24 months postsurgery), 46 participants (70%) achieved MCID in WOMAC pain, 35 participants (54%) in WOMAC Function, and 43 participants (65%) in KOOS Pain (Fig. 4).

PROs and femoral lesion area

Adjusted mean change in PROs from Year 0 to Year 2 by lesion group is shown in Figure 5. In participants with lesion areas < 9 cm^2, improvements for WOMAC Pain, Function, and KOOS Pain were 10.6, 5.4, and 10.4, respectively. These were 15.1, 9.1, and 13.4 in participants with lesion area ≥9 cm^2 (Fig. 5, Table S2). PROs in the year before meniscectomy were similar between the groups (Table S2). The percentage of participants reaching MCID in each PRO was similar between lesion area groups (Fig. 4). The association between continuous lesion area and Year 0 to Year 2 change in PROs is shown in Figure S2. Locally estimated scatterplot

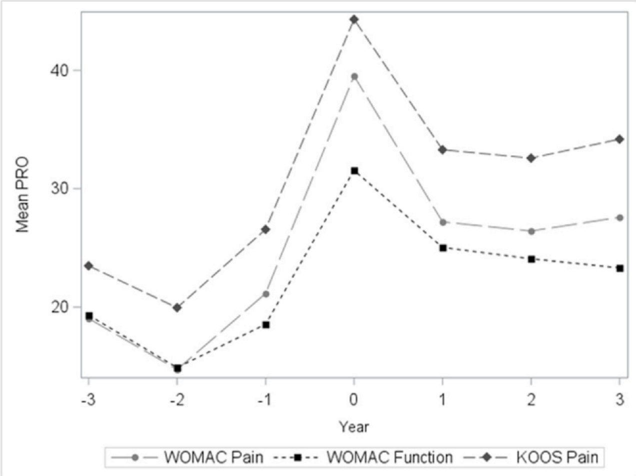

Fig. 3. Mean WOMAC Pain, WOMAC Function, and KOOS Pain over time. The x-axis shows time point, with year 0 representing the time point before the reported meniscectomy and year 1 representing the time point after the reported meniscectomy. Mean PRO is shown on the y-axis, with medium gray diamonds, light gray circles, and dark gray squares representing KOOS Pain, WOMAC Pain, and WOMAC Function, respectively. Mean PRO is estimated from separate linear mixed-effects models. Data are for the primary analytic cohort with femoral lesion area > 2 cm^2 and year 0 WOMAC pain > 20. KOOS, Knee Injury and Osteoarthritis Outcome Score; PRO, patient-reported outcome; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

Table 1
Change in PROs before and after meniscectomy.

PRO	Year −1 Mean (SD)	Year 0 Mean (SD)	Year 1 Mean (SD)	Year 2 Mean (SD)	Change: Year 0 to year 1 estimate (95% CI) *P*-value	Change: Year 0 to year 2 estimate (95% CI) *P*-value
WOMAC Pain	21.1 (18.6)	39.5 (14.7)	27.2 (20.5)	26.4 (18.9)	−12.3 (−17.1, −7.5) < **.001**	−13.2 (−18.6, −7.9) < **.001**
WOMAC Function	18.5 (16.4)	31.6 (15.5)	25.0 (18.9)	24.1 (18.3)	−6.4 (−10.6, −2.2) **.004**	−7.6 (−12.6, −2.7 **.003**
KOOS Pain	73.4 (19.5)	55.7 (14.7)	66.7 (20.7)	67.4 (18.6)	11.0 (6.0, 16.0) < **.001**	12.1 (6.7, 17.5) < **.001**

CI, confidence interval; KOOS, Knee Injury and Osteoarthritis Outcome Score; PRO, patient-reported outcome; SD, standard deviation; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.
P-values < .05 are bolded.

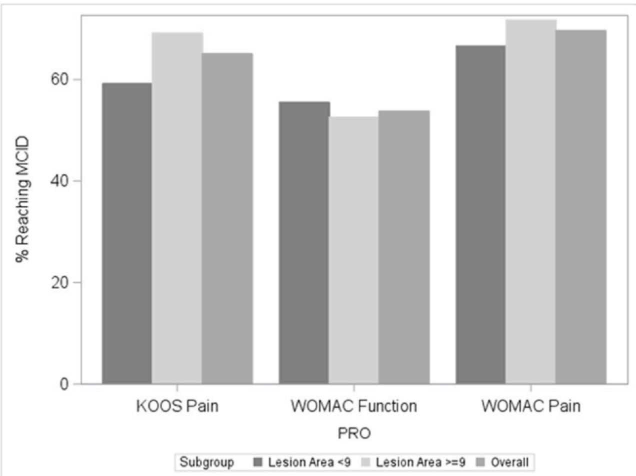

Fig. 4. MCID overall and by lesion area. The percent of participants achieving MCID is along the y-axis and PRO is along the x-axis, with the bars representing those participants with femoral lesion area < 9 cm^2 (dark gray), femoral lesion area > 9 cm^2 (light gray), and all participants (medium gray). The height of the bars shows the percent achieving MCID. Data are for the primary analytic cohort with femoral lesion area > 2 cm^2 and year 0 WOMAC pain > 20. MCID, minimally clinically important difference; PRO, patient-reported outcome; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

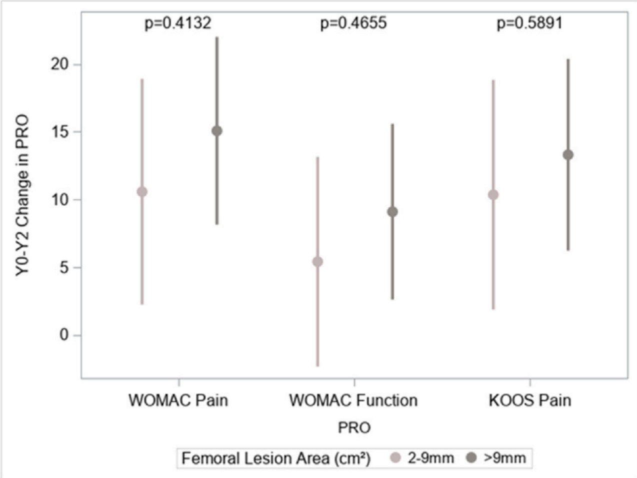

Fig. 5. Adjusted mean changes (95% CI) in PROs from Year 0 to Year 2 by lesion area. Adjusted mean Year 0 to Year 2 change in PRO from linear mixed-effects models (adjusted for KLG, age, and sex) is shown on the y-axis, and each PRO is shown along the x-axis. The light gray bars with solid circles represent the mean change in PRO for those participants with femoral lesion area $< 9\,cm^2$ while the dark gray bars with solid squares represent those participants with femoral lesion area $> 9\,cm^2$. Mean changes and *P*-values are estimated from linear mixed-effects models. Data are for the primary analytic cohort with femoral lesion area $> 2\,cm^2$ and Year 0 WOMAC pain > 20. CI, confidence interval; KLG, Kellgren-Lawrence grade; PRO, patient-reported outcome; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

smoothing curves show slightly more improvement in PROs from lesion area of $2\,cm^2$ to approximately $12\,cm^2$, and then a trend for less improvement with increasing lesion areas $> 12\,cm^2$. However, there are few participants with large lesion areas (greater than approximately 15-20 cm^2) and confidence bands are wide.

Nine participants with femoral lesion areas $< 2\,cm^2$ were included in secondary analysis. Average WOMAC Pain at Year 0 was 31.1 (SD 9.6) in participants with femoral lesion areas $< 2\,cm^2$ and this group demonstrated smaller improvements in PROs compared to participants with lesion areas that were 2 to 9 cm^2 and ≥9 cm^2 (Fig. S3). However, CIs were wide and there were no significant differences between any groups.

In analyses including all 144 participants, regardless of Year 0 WOMAC pain, average PROs at the baseline visit (OAI study questionnaire before questionnaire where meniscectomy was reported) were 23.3 (SD 19.5), 19.4 (17.4), and 71.5 (20.0) for WOMAC Pain, Function, and KOOS Pain, respectively. Cohort characteristics are shown in Table S1. Those with femoral lesion area ≥9 cm^2 were slightly older, had higher BMI, and were more likely to be KLG 3 compared to those in the other lesion area groups (Table S1). Improvements in PROs after meniscectomy were attenuated compared to the analyses restricted to participants with Year 0 WOMAC pain > 20 (Table S3), with adjusted Year 0 to Year 2 changes in WOMAC Pain of 0.7 (−7.9, 9.3), −2.9 (−8.5, 2.7), and −5.3 (−9.9, −0.7) for participants with femoral lesion areas $< 2\,cm^2$, 2 to 9 cm^2, and ≥9cm^2, respectively. There were no significant differences in change from Year 0 to Year 2 in PROs between lesion area groups (Fig. S4).

PROs and TFJ lesion area

In the entire sample of 144 knees, 136 had one or more lesions in the TFJ with average lesion size $12.6\,cm^2$. Sixty-nine knees had TFJ lesion area $> 2\,cm^2$ and WOMAC Pain > 20. Of these, 27 (39%) had TFJ lesion area 2 to 9 cm^2 and 42 (61%) had TFJ lesion area $> 9\,cm^2$. In participants with TFJ lesion areas $< 9\,cm^2$, adjusted mean improvements for WOMAC Pain, Function, and KOOS Pain were 11.4, 5.9, and 9.8, respectively. These were 12.9, 6.8, and 11.1 in participants with lesion area ≥9 cm^2. The difference between groups was not significant for any of the PROs (Fig. S5).

PROs and PFJ lesion area

In the entire sample of 144 knees, 112 had one or more lesions in the PFJ with average lesion size $9.0\,cm^2$. Fifty-four knees had PFJ lesion area $> 2\,cm^2$ and WOMAC Pain > 20. Of these, 26 (48%) had TFJ lesion area 2 to 9 cm^2 and 28 (52%) had TFJ lesion area $> 9\,cm^2$. In participants with PFJ lesion areas $< 9\,cm^2$, improvements for WOMAC Pain, Function, and KOOS Pain were 12.3, 5.4, and 10.8, respectively. These were 14.6, 10.7, and 13.1 in participants with lesion area ≥9 cm^2. The difference between groups was not significant for any of the PROs (Fig. S6).

Discussion

In this analysis of observational data from the OAI, we found improvements in PROs among participants with knee OA who self-reported undergoing meniscectomy. Total femoral lesion areas varied considerably in this sample, but we found no significant differences in improvements in PROs after surgery between those with smaller vs larger lesion areas.

Reports on the association between the size of chondral lesions and outcomes of arthroscopic meniscal surgery are mixed.[12] Haviv et al report on 1 year follow-up of patients without radiographic OA (KL grade < 2) with an average age of 44 undergoing knee arthroscopy for a preoperative diagnosis of a torn meniscus.[19] Degree of cartilage lesion depth at arthroscopy was graded from 0 to 4 according to the International Cartilage Repair Society classification. The authors used multivariable regression with step-wise selection to find the set of prognostic factors predictive of 2 outcomes: postoperative Lysholm score and substantial pain relief defined as Visual Analog Scale < 2. International Cartilage Repair Society grade was not significantly associated with either outcome and was not selected in either of the multivariable models. Rosenberger et al report on a cohort of 180 patients aged 17 to 80 (average age of 48) undergoing APM (patients undergoing more extensive surgery were excluded from the analysis).[20] Depth of articular cartilage damage was graded by physicians during surgery with the modified Outerbridge articular surface grading scale. Outerbridge score was significantly associated with decreased Tegner-Lysholm score, but associations were modest, with each increase in modified Outerbridge grade associated with approximately a 2-point decrease in Tegner-Lysholm score (0-100, with 100 being the best). Anderson et al report on outcomes of arthroscopic mechanical chondroplasty in patients without OA or other concurrent pathology and find no association between lesion size and PROs.[21]

While our analysis was focused on the association between the size of chondral lesions and outcomes in patients with knee OA, literature suggests that the presence of chondral damage is associated with worse outcomes following APM. The Chondral Lesions and Meniscus Procedures randomized controlled trial enrolled patients undergoing APM age ≥30 years old with symptomatic meniscal tear and without radiographic evidence of OA.[22] Those with normal chondral surfaces or very minor chondral damage were followed observationally, and patients with unstable cartilage damage were randomized to debridement vs observation. Patients without unstable chondral lesions reported better outcomes at 1 and 5 years post-APM compared to patients with unstable chondral lesions that were left in situ.[11,23]

Few studies have examined the role of chondral lesions on outcomes in patients with mild to moderate OA. The role of chondral lesions is less clear in this population, where one would expect most patients to have some degree of chondral damage. Giri et al performed a study of an arthroscopic regimen to treat participants fulfilling the clinical and radiographic criteria for OA defined by the American College of Rheumatology.[24] The authors report that 80% of patients with chondral and meniscal lesions showed good outcomes, defined by Lysholm score > 83 at 18 months postoperatively. In a retrospective review of patients with KLG 2 or 3 who underwent chondroplasty of the femur for large (2-9 cm^2) areas of cartilage loss, Mufti et al find that debridement results in significant improvements in physical function and knee-specific PROs at 1- and 2-year follow-up.[25]

In our primary analysis restricted to those with mild to moderate knee pain in the year before reported meniscectomy, we found average improvements on par with MCIDs for WOMAC Pain and KOOS Pain; 65% of participants improved by greater than the MCID in KOOS Pain by year 2 postsurgery with a slightly higher proportion reaching MCID among those with lesion areas ≥9 cm^2 (69% vs 59%). This is similar to previous studies that have investigated improvements in PROs following meniscectomy. Bisson et al report that among participants with KL grade < 3 undergoing isolated APM, 72% achieved MCID in KOOS Pain at 6 months postsurgery.[26] Warner et al report that 73% of patients with KL grade 3 with an average age of 53 and without concomitant ligamentous injury achieved MCID in KOOS Pain by 1 year postsurgery.[27] Our results are also in line with recent work that has developed a prognostic model for predicting clinical improvement following APM.[16] Based on this model, we would expect a patient with symptom duration greater than 3 months and KL grade 2 to have a 67% chance of achieving clinical improvement and a patient with symptom duration greater than 3 months and KL grade 3 to have a 64% chance of clinical improvement.

This study should be interpreted in the context of several limitations. Identifying participants undergoing meniscectomy was based on self-report, according to the question "Have you had a meniscectomy (where they repaired or cut away torn meniscus or cartilage), since your last visit about 12 months ago?" It is possible that some participants misunderstood or provided incorrect responses to this question, leading to potential misclassification. No details on surgical approach, including whether debridement was performed, or whether the meniscectomy was partial or complete, are available, nor are details on meniscal pathology. Data were collected at regular 1-year intervals according to participants' enrollment in the OAI study. Thus, the timing of the collection of PROs and MRI in relation to surgery was different for each participant. Year 0, defined as the OAI study questionnaire preceding the questionnaire where meniscectomy was reported, could range from 0 to 12 months before surgery, while Year 1, defined as the OAI study questionnaire following the questionnaire where meniscectomy was reported, could range from 0 to 12 months following surgery. A higher proportion of participants in the larger lesion size groups reported receiving an injection during the same study visit in which they reported undergoing meniscectomy. As procedure dates were not available, we could not determine the temporal order of these interventions or whether they were performed during the same encounter. The sample size for the primary analysis was modest, with only 65 participants (66 knees) meeting the eligibility criteria for the primary analysis. We excluded knees that did not have a radiograph within 3 years before the reported meniscectomy ($n = 16$) or did not have MRI before the reported meniscectomy ($n = 36$).

In conclusion, we found that participants with radiographic knee OA undergoing meniscectomy reported improvements in PROs. Total femoral lesion areas varied considerably in this sample, but we found no significant differences in improvements in PROs after surgery between those with small vs larger lesion areas. These preliminary findings suggest that meniscectomy outcomes do not vary by chondral lesion extent in patients with mild to moderate knee OA.

Funding

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Ethics approval

We used publicly available data from the Osteoarthritis Initiative (OAI), a multicenter, longitudinal observational study of knee OA. The study was approved by each site's Institutional Review Board and participants provided written informed consent. For more information, please see: Ethical Conduct of Research: https://nda.nih.gov/oai/ethical_conduct. The Osteoarthritis Initiative: Protocol for the Cohort Study: https://s3.amazonaws.com/nda.nih.gov/cms/prod/StudyDesignProtocolAndAppendices.pdf.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Corresponding author: A.G. is a shareholder of Boston Imaging Core Labs, LLC (BICL) and consultant to Peptinov, 4Moving, Formation Bio, TissueGene, Novartis, Coval, ICM, Scarcell, Pacira, Levicept, Paradigm, and Medipost. Aesculap/B.Braun: research support (B.J.C.), Medipost Inc: research support (B.J.C.), American Journal of Sports Medicine: editorial or governing board (B.J.C.), Arthrex Inc: IP royalties, paid consultant, research support (B.J.C.), Bandgrip Inc: stock or stock options (B.J.C.), Elsevier Publishing: IP royalties, publishing royalties, financial or material support (B.J.C.), Journal of the American Academy of Orthopedic Surgeons: editorial or governing board (B.J.C.), JRF Ortho: other financial or material support (B.J.C.), National Institutes of Health (NIAMS and NICHD): research support (B.J.C.), Ossio: stock or stock options (B.J.C.). J.E.C. is a paid consultant for Boston Imaging Core Labs, LLC (BICL). The other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jcjp.2025.100278.

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