Gender Effect on the Outcome of Partial Medial Meniscectomy

BARAK HAVIV, MD; SHLOMO BRONAK, MD; YONA KOSAVHILI, MD; RAFAEL THEIN, MD

abstract

Complex posterior horn tears of the medial meniscus are common. Previous reports performed statistical stratifications to address the influence of gender on outcome following arthroscopic partial medial meniscectomy with variable conclusions. The aim of this study was to compare the clinical results of arthroscopic partial meniscectomy of the knee between men and women with complex medial meniscal tear type while controlling for other variables that may affect outcome. This study compared groups of 86 men and 49 women who were followed prospectively using the Lysholm Knee Scoring Scale, the visual analogue scale, and patient's satisfaction. Mean age at operation was 51 years and mean follow-up was 26 months. Mean Lysholm score improved from 69 preoperatively to 82.1 postoperatively ($P<.001$) in the male group and from 64.2 preoperatively to 73.5 postoperatively ($P=.04$) in the female group. At last follow-up, 68 (79%) men and 35 (71%) women stated that they were satisfied with the operation. In both groups, the severity of chondral lesions was found to be negatively correlated to the preoperative score. Women had more severe chondral lesions at arthroscopy than men. This comparative study showed no significant difference between men and women in terms of clinical improvement following arthroscopic partial meniscectomies of complex tear types in stable knees with intact lateral meniscus. Women had lower functionality pre- and postoperatively, which correlated with more severe chondral degeneration at surgery compared with men. [Orthopedics. 2015; 38(10):e925-e928.]

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Received: October 22, 2014; Accepted: January 6, 2015. doi: 10.3928/01477447-20151002-61
Partial meniscectomy is the most frequent procedure performed by orthopedic surgeons.\textsuperscript{1} Patient-specific factors, such as age and activity level, or local factors, such as cartilage degeneration and malalignment of the knee, may influence the outcome of partial meniscectomies.\textsuperscript{1-3} Previous studies have investigated the effect of gender after partial meniscectomy, among other demographic factors; however, they included mixed cohorts of knees with various medial and lateral meniscal tear types, techniques, and ligamentary injuries.\textsuperscript{4-7} Some of these publications concluded that gender does not influence outcome after meniscectomy,\textsuperscript{3,5} whereas others have found less favorable results for women.\textsuperscript{6,7}

Complex tear type is a common, mainly degenerative pattern of the medial meniscus in patients aged older than 40 years,\textsuperscript{8} whereas most arthroscopic partial meniscectomies are performed in a population aged older than 40 years.\textsuperscript{9} The purpose of this study was to compare the clinical outcome of arthroscopic partial meniscectomy of the knee between men and women with complex medial meniscal tear type while controlling for other variables that may affect outcome.

**Materials and Methods**

**Patients**

A total of 135 patients who had arthroscopic partial medial meniscectomies for complex posterior horn tears with intact lateral meniscus and intact cruciate ligaments in 2012 were included in this study (86 men, 49 women). Mean age was 51 years (range, 20-80 years). Prior to this study, local institutional review board approval was obtained. Patients who had concurrent osteotomy, patellar realignment, surgery for synovial disease (eg, rheumatoid arthritis, pigmented villonodular synovitis), or ipsilateral previous knee surgery were excluded. Male and female populations were comparable in terms of demographic data, general health, and activity level (Table 1).

**Preoperative Evaluation and Surgical Technique**

All prospective preoperative evaluations and operations were undertaken and reported by 3 senior orthopedic surgeons (B.H., S.B., R.T.) who were experienced in knee arthroscopy and who worked together at a regional referral center for knee arthroscopic surgery. Preoperative data that were obtained included demographic details, clinical evaluation using the Lysholm Knee Scoring Scale\textsuperscript{10} and visual analogue scale (VAS) for pain, plain radiographs, and magnetic resonance imaging. In the case of a diagnosed meniscal tear, the indication for knee arthroscopy was an active patient with unresolved knee pain and activity limitation for at least 8 weeks. All candidates had plain radiography and magnetic resonance imaging of the knee preoperatively. Patients with varus or valgus abnormal angulation or moderate-to-severe arthritic signs on weight-bearing radiographs (ie, Kellgren-Lawrence\textsuperscript{11} grade >1) were excluded from this study.

Surgery was performed with the patients in the supine position and under general anesthesia. A leg holder and tourniquet were placed around the thigh of the affected leg. Standard anterolateral and anteromedial knee portals were used. Diagnostic arthroscopy was performed to evaluate ab-normal findings. In all cases in this study, the cruciate ligaments and lateral meniscus were found intact. This study included only complex medial meniscus tear patterns that had components in multiple planes. Medial meniscal tears were trimmed to a stable rim.

At surgery, cartilage lesions were probed, measured, and then graded according to the International Cartilage Repair Society (ICRS) classification.\textsuperscript{12} All patients were discharged from the hospital the day of surgery with nonsteroidal anti-inflammatory drugs prescribed for the first 2 weeks and were instructed in gradual self-rehabilitation using illustrated handouts.

**Outcome Assessment**

Patients were followed prospectively at a minimum of 12 months through the use of the Lysholm Knee Scoring Scale, VAS, and patient response to a question about overall satisfaction from surgery (yes/no).

**Statistics**

Paired \( t \)-tests were used to compare pre- and postoperative outcome scores. Unpaired \( t \)-tests and chi-square tests were applied to compare data from the male and female groups. Correlation coefficients between the clinical outcome and patient variables were investigated by Pearson cor-

### Table 1

<table>
<thead>
<tr>
<th>Comparison of Demographic Details Between Genders</th>
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<tbody>
<tr>
<td>Demographic</td>
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<tr>
<td>--------------</td>
</tr>
<tr>
<td>Patients, No.</td>
</tr>
<tr>
<td>Age, mean (range), y</td>
</tr>
<tr>
<td>Side, right:left, No.</td>
</tr>
<tr>
<td>Body mass index, mean (range), kg/m(^2)</td>
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<tr>
<td>Patients with comorbidities, No. (%)</td>
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<tr>
<td>Smokers, No. (%)</td>
</tr>
<tr>
<td>Physical workers, No. (%)</td>
</tr>
<tr>
<td>Recreational sports participants, No. (%)</td>
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<tr>
<td>Preceding injury, No. (%)</td>
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</table>
RESULTS
Mean follow-up was 26 months (range, 24.3–28.2 months). Lysholm Knee Scoring Scale improved significantly in both groups (Table 2). In the male group, mean Lysholm Knee Scoring Scale score improved from 69 preoperatively to 82.1 postoperatively (P < .001) and mean VAS pain score decreased from 5.9 preoperatively to 4.6 postoperatively (P = .03). In women, mean VAS pain score decreased from 6.5 preoperatively to 4.6 postoperatively (P = .02). In the female group, mean Lysholm Knee Scoring Scale score improved from 64.2 preoperatively to 73.5 postoperatively (P = .04) and mean VAS pain score decreased from 3.8 preoperatively to 1 (1.2) postoperatively (P = .04).

In both groups, the severity of chondral lesions was found to be linearly correlated with age (men: Pearson correlation coefficient, r = 0.45, P = .003; women: Pearson correlation coefficient, r = 0.46, P = .05) and negatively correlated to the preoperative score (men: Pearson correlation coefficient, r = –0.33, P = .03; women: Pearson correlation coefficient, r = –0.51, P = .04). Women had more severe chondral lesions at arthroscopy than men (P = .001) (Table 3).

In men, the postoperative score was found to be negatively correlated to body mass index (r = –0.35, P = .02). In women, the postoperative Lysholm Knee Scoring Scale score was found to be negatively correlated to the severity of chondral lesions (r = –0.47, P = .05).

At the last follow-up, 68 (79%) men and 35 (71%) women stated they were satisfied to have had the operation. None of the participants had a second knee arthroscopy at the time of the study. There were no infections, thromboembolic episodes, or permanent nerve injuries.

DISCUSSION
The key finding in this study is that both men and women improved similarly after arthroscopic partial medial meniscectomy for isolated complex tears; however, women had lower preoperative scores than men, which were correlated to more severe chondral lesions at surgery.

Because additional tears of the cruciate ligaments or lateral meniscus may influence outcome, this study included only patients with isolated tears of the medial meniscus, specifically with complex tears of the posterior horn. To the authors’ knowledge, a prospective outcome comparison between men and women with an isolated partial meniscectomy of complex meniscal tears has not been previously published.

Previous studies performed statistical stratifications of clinical outcomes based on gender with variable conclusions.1,7 Burks et al8 published a long-term follow-up of 146 patients after arthroscopic partial medial or lateral meniscectomies. They included patients with both meniscal and cruciate ligament tears. Eighty-eight percent of patients had good to excellent results, and there were no differences in functional results between genders.4 Englund et al9 evaluated a cohort of 204 patients at 14 years after unilateral meniscectomy in stable knees. Women had lower outcome scores than men, but this was not statistically significant.5 Roos et al10 assessed the long-term influence of meniscectomy on pain, functional limitations, and muscular performance of 159 patients compared to controls. They found significantly worse results in women compared to men.6 In another study by Englund and Lohmander,7 factors such as obesity, female gender, and preexisting early-stage osteoarthritis were associated with poor self-reported and radiographic outcomes after meniscal resection.

Although all of the study patients had no more than mild arthritis on weight-bearing radiographs (ie, Kellgren-Lawrence grade ≤ 1) preoperatively, 27 (55.1%) of 49 women had moderate-to-severe chondral lesions (graded by the ICRS) at surgery compared to 18 (20.1%) of 86 men. This corresponds with previous association between female gender and a higher prevalence and greater severity of osteoarthritis.13

Unfortunately, cartilage degeneration has a major negative impact on the outcome of arthroscopic partial meniscectomy,14 which was significant in the current study, specifically in women.

In addition to more severe chondral lesions, lower preoperative scores in women in the current study may also be attributed to preexisting early-stage osteoarthritis.4

### Table 2
Comparison of Pre- and Postoperative Scores Between Genders

<table>
<thead>
<tr>
<th>Lysholm Knee Scoring Scale</th>
<th>Visual Analogue Scale</th>
</tr>
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<tbody>
<tr>
<td><strong>Gender</strong></td>
<td><strong>Mean (Range) Score</strong></td>
</tr>
<tr>
<td><strong>Preoperative</strong></td>
<td><strong>Postoperative</strong></td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>69 (30-100)</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>64.2 (32-95)</td>
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</tbody>
</table>

### Table 3
Patients With Chondral Lesions (Graded by ICRS) by Group

<table>
<thead>
<tr>
<th>Chondral Lesion</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No lesion</td>
<td>54 (62.8)</td>
</tr>
<tr>
<td>Grade I</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>Grade II</td>
<td>13 (15.1)</td>
</tr>
<tr>
<td>Grade III</td>
<td>11 (12.8)</td>
</tr>
<tr>
<td>Grade IV</td>
<td>7 (8.1)</td>
</tr>
</tbody>
</table>

**Abbreviation:** ICRS, International Cartilage Repair Society.
to older age and higher body mass index. Studies that have found worse outcomes in women who underwent meniscectomy have speculated that women would report worse knee-related symptoms due to anatomical difference: more valgus alignment, lesser muscle strength, or increased laxity.\(^6\) As mentioned, female gender is associated with higher prevalence and greater severity of osteoarthritis.\(^13\) This has led to hypotheses regarding the role of estrogen in osteoarthritis, such as the belief that estrogen can potentially enhance pain sensitivity; however, results from observational studies and clinical trials have been conflicting regarding estrogen effects.\(^15,16\)

A review of gender differences in imaging features of osteoarthritis and biomarkers of joint metabolism noted variable findings.\(^17\) Women may have thinner knee cartilage and a reduced knee cartilage volume than men, but whether women have a more accelerated rate of cartilage volume loss than men is not clear.

The strength of this study is its design as a prospective comparison between genders. An additional strength is the fact that each cohort had no lateral meniscal tears or cruciate ligament ruptures, which can be possible confounders. The clinical relevance of the results is that surgeons can expect similar improvements in both genders after arthroscopic medial meniscectomy but with a somewhat lower functional improvement in women possibly due to the higher incidence of associated chondral lesions.

A weakness of the study is its short-term follow-up of an average of 2 years; however, this is the authors’ first report from a longer follow-up that they are conducting and intend to report data from in the future.

**CONCLUSION**

This comparative study shows no significant difference between men and women in terms of clinical improvement following arthroscopic partial meniscectomy of complex tear types in stable knees with intact lateral meniscus. Women had lower functionality pre- and post-operatively, which was correlated to more severe chondral degeneration compared to men.

**REFERENCES**