PARTIAL VERSUS TOTAL MENISCECTOMY

A PROSPECTIVE, RANDOMISED STUDY WITH LONG-TERM FOLLOW-UP

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Two hundred patients with a meniscal lesion were peroperatively allocated to partial or total meniscectomy in a random manner. The results were compared at one year and at 6.3 to 9.8 years (median 7.8).

After one year more patients with partial meniscectomy (90%) than with total meniscectomy (80%) had no complaints. At the later review these figures were 62% and 52%, respectively (p = 0.18). However, patients with partial meniscectomy had higher functional scores. The deterioration in function between the first review and the second showed no significant difference in the two treatment groups. The incidence of mediolateral instability rose from 8% to 47% and was more frequent after total than after partial meniscectomy. Between the two reviews the radiological signs of knee degeneration increased with no difference between the two treatment groups.

Partial meniscectomy has been considered to be superior to total meniscectomy as it may cause less secondary degeneration of the knee (Tapper and Hoover 1969; McGinty, Geuss and Marvin 1977; Northmore-Ball, Dandy and Jackson 1983).

We have undertaken a prospective, controlled study of 200 consecutive patients with meniscal tears who were allocated at operation to have partial or total open meniscectomy. From their functional and radiological results we have tried to delineate the risk factors for later dysfunction of the knee.

PATIENTS AND METHODS

Between 1978 and 1983, 437 patients were assigned for operation in the Department of Orthopaedic Surgery, Gentofte Hospital, Copenhagen, with the primary diagnosis of a meniscal lesion.

Patients with symptomatic chondromalacia of the patella, osteochondritis, ligament laxity, the sequelae of patellar dislocation, and those who previously had had an operation on the involved knee were excluded. All operations were performed by open arthrotomy and no patient had a diagnostic arthroscopy.

If a tear in the central three-quarters of the meniscus was found, and there was no other disorder of the knee, either a partial or a total meniscectomy was performed according to a system of random selection. Our surgical technique, postoperative care and rehabilitation have previously been published (Hede, Hejgaard and Larsen 1986).

Two hundred patients met the above criteria and 192 (96%) of them were reviewed one year after surgery. Of these, 189 patients attended for long-term follow-up at a median 7.8 years after the operation (range 6.3 to 9.8). Nine of these patients were examined in their homes, and long-term radiographs were therefore obtained in only 180 patients. Six of the original patients had died, and five resided outside Europe or could not be traced. Data on patients, types of meniscal lesions and operations performed are given in Table I. Patients who had any reoperation were excluded from the study.

The functional outcome of the operation in each patient was graded as excellent, good, fair, or poor according to Tapper and Hoover (1969). Information on their working capacity was obtained and the patients were examined clinically. Standing anteroposterior radiographs of both knees and unloaded anteroposterior radiographs of both knees and unloaded lateral projections were taken.

At the long-term review all the patients were

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0301-620X/92/1279 $2.00
examined by one of the authors (AH). The Lysholm point-scoring scale (Lysholm and Gillquist 1982), as adapted for meniscal lesions by Hamberg, Gillquist and Lysholm (1984) with a maximum score of 95 points, was used for additional evaluation of knee function. Patients' height (H) in metres and body-weight (W) in kilograms were obtained for the calculation of Body Mass Index (BMI), where BMI = W/H².

The radiographs were examined by a radiologist who did not know the clinical findings, which meniscus had been operated on, nor which surgical procedure had been performed. Joint line narrowing, osteophyte formation and flattening of the femoral condyle, as described by Fairbank (1948), were assessed and compared with the opposite normal knee. Patients who had had an operation on the other knee were therefore excluded from the radiographic assessment.

**Statistical methods.** Nonparametric methods were used. When considering a discrete response variable, contingency table analysis was performed. When analysing a continuous response variable, rank sum tests were used for paired or unpaired data. The correlation between two continuous variables was assessed with Spearman’s rank test. The level of significance chosen was 0.05.

### RESULTS

**Clinical.** At the short-term review (one year), six patients who had had a partial meniscectomy and four who had had total meniscectomy had been reoperated. At the long-term review (median 7.8 years), these figures were eight and five, respectively. Four of the five requiring reoperation after total meniscectomy had needed removal of a remnant of the posterior horn. No meniscal regeneration was seen.

At the first review, all patients had returned to their occupations. At the second review seven patients had changed their jobs and one had given up working due to symptoms from the involved knee.

After one year, 84 (91%) of the 92 patients with partial meniscectomy and 72 (80%) of the 90 patients with total meniscectomy had an excellent functional result (p = 0.029). At the later review, 55 (62%) of the 89 patients with partial meniscectomy and 45 (52%) of the 87 with total meniscectomy had excellent results. This difference is not significant (p = 0.18). However, the patients who had had partial meniscectomy had significantly higher Lysholm scores (p = 0.03, Fig. 1).

In the group of 175 patients attending both reviews (excluding those who had had reoperation), knee function had deteriorated (p < 0.0001, Table II): 105 were unchanged, 45 had deteriorated by one level, 14 by two levels and two had deteriorated three levels. Eight patients had improved by one level and one by two levels between the two reviews. Factors which correlated with deterioration were: young age (p = 0.01), female sex (p = 0.01) and a lateral meniscus lesion (p = 0.02). Deterioration did not relate to whether partial or total meniscectomy had been performed (p = 0.1).

Overall, patients who had had medial meniscectomy had higher Lysholm scores than those with lateral lesions (p = 0.03). In the smaller number of patients treated by total meniscectomy this difference was also significant (p = 0.03), but was not so after partial meniscectomy. Women had lower Lysholm scores than men (p = 0.03), but the difference was only significant in those who had total meniscectomy (p = 0.01). The duration of symptoms before the operation was not related to the functional result.
At the first review, four knees which had undergone partial meniscectomy, and eight which had had total meniscectomy displayed increased mediolateral instability in 5° to 10° of flexion compared to the other knee. One knee in each treatment group showed both mediolateral and anteromedial instability following medial meniscectomy. At the long-term review 46.8% of the knees had slight mediolateral laxity. More knees were stable after partial than after total meniscectomy (p = 0.007, Table III) and the Lysholm scores were higher in stable knees than in those with mediolateral laxity (p = 0.0003). Instability was more frequent after lateral than after medial meniscectomy (p = 0.02). Slight anteroposterior instability at 90° of knee flexion was seen in 28.3% of all the knees but there was no significant difference between the two treatment groups (p = 0.053).

**Radiological findings.** At the one-year review, there was radiological narrowing of the joint space in the compartment from which the meniscus had been excised in 26% of cases. At the late review 33% had joint line narrowing, and 13% had ridge formation or flattening of the femoral condyle. Narrowing of the joint space was related to a high BMI (p = 0.017) and was more often seen after lateral than after medial meniscectomy (p = 0.003). At neither review was there any radiological difference between the knees of the two treatment groups.

**DISCUSSION**

The number of reoperations was similar to that reported by others (Fox, Blazina and Carlson 1979), including those reporting arthroscopic surgery (Northmore-Ball et al 1983). Most reoperations were carried out within the first year, demonstrating the importance of leaving a stable meniscal remnant at partial meniscectomy, one which is able to withstand the altered distribution of load in the joint (Baratz, Fu and Mengato 1986). While we have excluded reoperations from this study, as have others (McGinty et al 1977; Northmore-Ball et al 1983) we recognise these cases as failures: they should certainly be considered when comparing the outcome of different types of meniscal surgery.

The progressive deterioration in knee function after meniscectomy in our patients corresponds to other reports (Jackson 1968; Allen, Denham and Swan 1984; Jørgensen et al 1987). However, Appel (1970) found no deterioration in knee function four to 22 years after meniscectomy.

In contrast to our findings at one year after operation, the number of patients with an excellent result at our late review did not differ significantly between the two treatment groups. However, partial meniscectomy did seem to benefit patients in whom the result was less than excellent since they had significantly higher functional scores than did those who had total meniscectomy. These observations are important, since the patients in this study were treated randomly and not according to the meniscal lesion encountered or the personal preferences of the surgeon.

Knee function following meniscectomy did not vary with the pre-operative duration of symptoms. No adverse effect of the damaged meniscus on condylar articular cartilage, which might prompt early meniscectomy (Dandy and Jackson 1975a,b) was found. The relation between meniscal tears and degenerative cartilage changes remains unsettled (Fahmy, Williams and Noble 1983).

The poorer late results following lateral meniscectomy are in accordance with other reports (Johnson et al 1974; Allen et al 1984), but the controlled design of our study has shown that this difference is only significant after total meniscectomy. The ill effects of the loss of the whole lateral meniscus may be explained by the finding of Seedhom, Dowson and Wright (1974) that the lateral meniscus carries 70% of the load in the lateral compartment, compared to the 50% borne by the medial meniscus in its compartment.

**Table III. Percentage of knees with mediolateral instability at late review after partial and total meniscectomy**

<table>
<thead>
<tr>
<th>Operation</th>
<th>Number (per cent)</th>
<th>Stable</th>
<th>Unstable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Varus</td>
</tr>
<tr>
<td>Partial meniscectomy</td>
<td>88 (50.9)</td>
<td>64.8*</td>
<td>21.6</td>
</tr>
<tr>
<td>Total meniscectomy</td>
<td>85 (49.1)</td>
<td>41.2*</td>
<td>31.8</td>
</tr>
<tr>
<td>All</td>
<td>173</td>
<td>53.2</td>
<td>26.6</td>
</tr>
</tbody>
</table>

* difference, p = 0.007

The reason for the finding that young age at the time of operation predisposes to a poor result may be that young patients tear their menisci by more violent injuries (Tapper and Hoover 1969) and therefore suffer simultaneous cartilage and capsular damage. In addition, young patients expect a higher level of performance and are more reluctant to accept a decrease in their level of activity.

The frequency of mediolateral instability found at our second review, including some anteromedial rotational instability, suggests that the meniscus has a spacer-like stabilising function. Loss of this function, especially likely after total meniscectomy, may lead to a gradual stretching of the capsule and ligaments which are subjected to repetitive episodes of strain. Laxity after meniscectomy is known to be influenced by the differences in the anatomical relationships between the two menisci and their corresponding collateral ligaments (Oetorp et al 1978).

Other authors also have reported anterior instability after the removal of a meniscus (Huckell 1965; Johnson et al 1974), but this was not confirmed by Bargar et al (1980). In cadaver knees, anterior instability was found.

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to depend mainly upon the state of the posterior horn of the medial meniscus (Levy et al 1989).

Many authors have reported a high frequency of radiographic changes in the knee after meniscectomy (Fairbank 1948; Appel 1970; Jones, Smith and Reisch 1978; Yocum et al 1979; Lotke, Lefkoe and Ecker 1981; Lynch, Henning and Glick 1983; Allen et al 1984). These reports are difficult to compare as different definitions of degenerative arthritis were used. The incidence of the changes described by Fairbank have been reported variously as between 30% and 62% of patients at different intervals from the operation (Fairbank 1948; Huckell 1965; Johnson et al 1974; Jørgensen et al 1987).

Joint line narrowing was seen especially in patients with a high BMI and suggests that they are at a greater risk of later joint deterioration.

**Conclusions.** A higher level of knee function was achieved after partial meniscectomy than after total meniscectomy. Partial meniscectomy produced less joint instability but did not prevent progressive decline of knee function. Continued observation of these patients will be needed to determine any difference in the frequency of osteoarthritis after the two types of meniscectomy.

The authors would like to thank Michael Davidson, MSc, Department for Data Processing in Medicine, Copenhagen County Hospital, Herlev, who performed the statistical analysis. This study was made possible by grants from the Danish Sports Research Council.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

**REFERENCES**


