Long-term results of arthroscopic partial lateral meniscectomy in knees without associated damage

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We evaluated the outcome of partial lateral meniscectomy of 31 knees in 29 patients whose knees were otherwise normal. The mean follow-up was 10.3 years.

According to the Lysholm score, 14 knees were rated as excellent, four as good, five as fair and eight as poor, with a mean score of 80.5 points.

Radiologically, only one lateral compartment was classified as grade 0, eight as grade 1, nine as grade 2, 11 as grade 3, and two as grade 4 according to Tapper and Hoover. No significant (p < 0.05) correlation was found between the amount of tissue resected and the subjective, clinical and radiological outcome.

Although early results of lateral meniscectomy may be satisfactory, we have demonstrated that in the long term there was a high incidence of degenerative changes, a high rate of reoperation (29%) and a relatively low functional outcome score.

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The menisci perform several important tasks for the normal functioning of the knee. Different studies have determined their capacity for load transmission, shock absorption, and stabilisation. Menisci are composed of fibrocartilaginous tissue consisting of water (75%), collagen fibres (20%) and a small amount of proteoglycans and cells. When loaded in vitro, 70% and 50% of the loads in the lateral and medial compartments respectively, are transmitted through the corresponding menisci.

After removal of the menisci, the contact areas of the femorotibial joint are reduced and the peak stresses on the tibial cartilage are considerably increased. There is overwhelming evidence that total meniscectomy leads to degeneration of the joint. Removal of increasing amounts of tissue from the central part of the body of the meniscus results in a progressive increase in the peak stress in the tibial plateau in vitro. Thus partial meniscectomy should give better results than total meniscectomy. Clinicians have noticed, however, a high incidence of arthritic changes in the joint in mid- and long-term outcome studies of partial meniscectomy.

Many surgeons suggest that the outcome of partial lateral meniscectomy is worse than that of partial medial meniscectomy, but strong evidence is not available. Most clinical studies have concentrated on the medial meniscus, or have combined partial lateral and medial meniscectomy. They have been further complicated by the fact that most of the patients had associated ligamentous injuries or additional pathology of the articular cartilage.

Our purpose was to evaluate the long-term outcome of partial lateral meniscectomy in a group of patients whose knees were otherwise normal.

Patients and Methods

In 1984 and 1985 one surgeon (JB) performed 76 arthroscopic partial meniscectomies for lesions of the lateral meniscus. Only knees without any additional abnormality such as chondral damage, medial meniscal pathology, ligamentous injury, degenerative radiographic changes, with normal alignment and no previous operations were included. In addition, the patients had to live within a three-hour drive from the hospital. Of the 76 patients, 37 (48.7%) fitted these criteria; eight were lost to follow-up, leaving 29 (31 knees) in the study.

There were 24 men and five women with a mean age at follow-up of 43.8 ± 12.8 years.

Before clinical examination all patients were tested using the scoring system of Lysholm and Gillquist24 which provides a subjective evaluation of knee function and for
which the maximum score is 100 points. The knee was carefully examined. The alignment, laxity, range of movement, the presence of an effusion, and tenderness of the joint line were recorded. The patients’ clinical and operation records were reviewed and the amount of meniscal resection calculated from a detailed diagrammatic description (Fig. 1).

At review posteroanterior weight-bearing radiographs in 45° flexion and standard lateral films were taken and compared with preoperative views. Such projections have been shown to be more sensitive to early loss of cartilage than conventional anteroposterior views. Radiological changes in both the medial and lateral compartments were assessed according to the classification of Tapper and Hoover, and the presence and location of osteophytes were recorded.

Statistical analysis. We performed statistical analysis on subjective, clinical and radiological data. Student’s t-test was used for group comparisons and the Spearman rank correlation for determination of the relationships between radiological changes, the clinical and subjective evaluation and the amount of tissue resected. Significance was reported at the 95% confidence level (p < 0.05).

Results

The 31 knees were examined at a mean of 10.3 ± 0.6 (9.2 to 12.1) years after surgery. There were 21 records (67.7%) of a single traumatic episode which probably caused the meniscal injury. Half of these had occurred as a result of Australian football. In ten cases (32.3%) there was a gradual onset of symptoms.

At arthroscopy longitudinal (4), radial (7), horizontal (7), bucket-handle (6) and complex tears (7) were found. The site and location of the resection are shown in Figure 2. In 23 knees (74.2%) more than one-third of the total substance of the lateral meniscus was resected.

Clinical examination and subjective functional rating. Clinically, the alignment was normal in 21 knees (67.7%) and in ten (32.3%) there was increased valgus. An effusion was present in eight knees (25.8%). In four (12.9%) passive flexion was limited by 10° to 25°. Extension was limited in three knees (9.7%). There was mild to moderate tenderness on the lateral joint line in 12 knees (38.7%) and severe tenderness in four (12.9%).

The Lysholm score rated 14 knees (45.2%) as excellent, four (12.9%) as good, five (16.1%) as fair and eight (25.8%) as poor. The mean score was 80.5 ± 16.7 points.

Radiological examination. Only one lateral compartment (3.2%) of the 31 knees was classified as normal (grade 0). Eight (25.8%) were grade 1, nine (29.0%) grade 2, 11 (35.5%) grade 3, and two (6.5%) as grade 4. In 19 knees (61.3%) the lateral compartment joint space was rated as normal; in six (19.4%) there was narrowing of one-third in four (12.9%) and of two-thirds in two. Two knees (6.5%) had total loss of lateral articular cartilage. Osteophytes were present on the lateral femoral condyle on the intercondylar side in 21 knees (67.7%) (Fig. 3), and on its lateral margin in five (16.1%). Osteophytes were found on the intercondylar side of the lateral tibial condyle in four knees (12.9%) and on its lateral margin in 11 (35.5%).

The medial compartment was significantly less affected by degenerative changes, with all knees showing normal thickness of cartilage with no osteophytes. Five knees (16.1%) were classified as grade 0, 25 (80.6%) as grade 1, and one (3.2%) as grade 3.
No significant correlation was found between the amount of tissue resected and the subjective, clinical and radiological outcome.

Reoperations. Symptoms from the lateral compartment necessitated further operation including seven arthroscopies and two supracondylar varus osteotomies in nine knees (29%) during the follow-up period. In five of the seven arthroscopies, minor additional resection of the remnant of the lateral meniscus was performed. None of the reoperations was within the first five years. The Lysholm score for patients who had a further operation was significantly (p < 0.05) worse than for those who did not, 67.7 ± 20.8 compared with 85.6 ± 12.3 points. The radiological changes at follow-up were not significantly different between the two groups.

Discussion

Although arthroscopic partial lateral meniscectomy is frequently performed there is limited information concerning the long-term outcome. We were only able to study 29 patients because of the strict inclusion criteria and the length of follow-up, but it is the largest sample reported to date. At ten years after partial lateral meniscectomy, we found a high rate of degenerative change, increased valgus alignment, relatively low subjective functional scores, and a high rate of reoperation.

The short-term results of arthroscopic partial lateral meniscectomy suggest that patients do well and athletes have a high chance of returning to preinjury levels of sports participation, especially if there is no associated damage to the articular cartilage. The few studies with a longer-term follow-up have shown less favourable outcomes. In a report based on 26 patients, 5.5 to 11 years after arthroscopic partial lateral meniscectomy, the time of maximal improvement occurred at a mean of five months after surgery and lasted for about two years. At that time, 92% of patients had excellent or good Lysholm scores (mean 92.3 points). At the final follow-up at a mean of eight years after surgery, only 62% of the patients rated their knees as excellent or good, and the mean score was 83.3 points. We found that 56.1% of our patients thought their knees to be excellent or good (mean score 80.5 points) at the ten-year follow-up, confirming the deterioration in outcome over time.

We did not find a significant correlation between the amount of meniscal tissue resected and the clinical or radiological outcome. The increase in peak stress on the tibial plateau directly correlates with the amount of meniscal tissue resected in vitro, but this correlation is only true as long as the periphery of the meniscus and its insertions remain intact. If these structures are damaged, the load-bearing function of the meniscus may be lost, although most of it may remain intact. At arthroscopy, the amount to be resected with respect to a remaining functional peripheral rim can be difficult to judge and is therefore only of limited value in predicting the outcome. Many arthroscopic ‘partial’ meniscectomies may functionally represent a total meniscectomy. This may explain why the long-term clinical outcome may not be as good as anticipated. In future clinical studies on partial meniscectomy, more attention must be given to the amount of tissue resected and to its location. Currently, the lack of precise descriptive diagrams is a major limitation when comparing the results of studies. The varying appearance after partial meniscectomy could also explain some of the controversies concerning the outcome of lateral versus medial partial meniscectomy. Long-term studies on total meniscectomy have documented that the radiological and clinical results of lateral meniscectomy are worse than those of medial meniscectomy. In most studies, however, there was no significant difference in the clinical and radiological outcomes between compartments.

A further factor which may influence the outcome is the fate of the remaining meniscal tissue. Recent evidence suggests that the cells of the meniscus respond to their mechanical environment with alterations in the synthesis of the matrix. Stress and strain generated within the meniscus are determined by the external loads applied, the shape, the integrity of the attachments, and the material properties of the meniscal tissue. Meniscal tears, as well as subsequent operations such as partial meniscectomy, have the potential to alter any of these factors and may therefore also affect metabolic cellular activity. A reduction in the amount of collagenous and non-collagenous proteins accounts for the inferior mechanical quality of the tissue and its susceptibility to degeneration and damage. This may, in part, be responsible for the high incidence of...
References


