



Arthroscopic medial meniscectomy on stable knees

A 12-YEAR FOLLOW-UP

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We reviewed 74 partial medial meniscectomies in 57 patients with stable knees, to assess the long-term functional and radiological outcome. The International Knee Documentation Committee score and the residual laxity were assessed in both knees. At the time of surgery the mean age of the patients was 36 ± 11 years and the mean follow-up was 12 ± 1 years. All had a limited medial meniscectomy. The anterior cruciate ligament was intact in all cases. The meniscal tear was vertical in 95% and complex in 5%. The posterior part of the meniscus was removed in 99%. A peripheral rim was preserved in all cases. After 12 years 95% of the patients were satisfied or very satisfied with their knee(s). Objectively, 57% had grade A function and 43% were grade B. The outcome correlated only with the presence of anterior knee pain at final follow-up. In the 49 cases of arthroscopic meniscectomy for which there was a contralateral normal knee there was narrowing of the 'joint-space' in 16% of the operated knees. There was no correlation between this and other parameters such as age or different meniscal pathologies.

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Long-term follow-up¹⁻⁵ after open total meniscectomy has shown a high incidence of degenerative changes and disappointing clinical results, confirming Fairbank's⁶ initial report that total meniscectomy is not a benign procedure and can lead to osteoarthritis. With better knowledge of meniscal function in load transmission across the knee^{7,8} and the introduction of new methods of treatment,⁹⁻¹² meniscal tears are now usually managed arthroscopically

with preservation of much of the meniscus.⁹⁻¹² The short-term results have been good,¹³ allowing early weight-bearing, return of function, significantly reduced morbidity and reduction of the cost of care.¹³ Reports of medium-term follow-up^{11,14-18} have also been promising, but there are few long-term studies covering ten years or more. Other factors such as an associated rupture of the anterior cruciate ligament, contribute to a poor outcome.¹⁸⁻²⁰

We describe a retrospective review of arthroscopic limited medial meniscectomy carried out on stable knees in order to assess the long-term functional and radiological outcome over a 12-year period.

Patients and Methods

Between 1982 and 1986, 305 limited medial meniscectomies in patients with an intact anterior cruciate ligament were undertaken in our institution. No other procedure was performed. All these patients were sent up to four letters of invitation to return for review. Telephone contact was also attempted. Only one-third replied. Their place of residence, distance to travel and the cost were some of the reasons why so few returned for re-examination. We therefore reviewed 74 knees in 57 patients (17 bilateral) at a minimum follow-up of at least ten years. Most of the patients were men (81%) and the right knee was involved in 59%. The mean age at operation was 36 ± 11 years with 34% being more than 40 years of age. At review, the mean age was 48 ± 10 years and the mean follow-up 12 ± 1 years.

Of these 57 patients, 31% undertook strenuous activities (class I) before surgery, 23% moderate (class II) and 46% only light activities (class III). There was a history of playing sport in 57% of the patients, mainly soccer (34%). Pivot and contact sports were undertaken in 43%. There was a history of trauma in 52%.

The patients were reviewed clinically and radiologically by an independent examiner. The follow-up clinical examination was based on the International Knee Documentation Committee (IKDC) score. Residual laxity in both knees was assessed for with a manual KT-1000 instrument (MEDmetric Corporation, San Diego, California). We graded patients A, B, C or D according to the IKDC score. Return to sports was evaluated at the five-year follow-up, but not at the final review.

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The unoperated knee was used as the control for radiological comparison. A total of 17 patients had bilateral limited meniscectomies and eight had subsequent surgery on the other knee, leaving 49 patients available for radiological comparison between the knees. An anteroposterior view in the standing position, a lateral view, and flexion posteroanterior weight-bearing tunnel views²¹ were taken of both knees. The IKDC compartmental grading was used; grade A (normal), grade B (remodelling),²⁰ grade C (narrowing of the joint by less than 50%) and grade D (narrowing of the joint by more than 50%). The worst grade from either the anteroposterior or posteroanterior film for each knee was used. The difference in grade between the operated and the non-operated knee was recorded.

Arthroscopic surgery was carried out as an outpatient under local anaesthesia without a tourniquet. The pattern of meniscal injury and the appearance of the anterior cruciate ligaments and articular cartilage were recorded. The French Arthroscopic Society system²²⁻²⁴ was used for assessing lesions of the articular cartilage. Five grades were recorded; grade 0 (normal), grade I (swelling and softening), grade II (superficial fibrillation), grade III (deep fibrillation), and grade IV (exposure of subchondral bone). The meniscal lesions were recorded according to Trillat's classification.²⁵ All patients had a limited medial meniscectomy with the concept of preserving the meniscus and using standard techniques.²⁶ Postoperatively, patients were allowed full weight-bearing and were advised to carry out isometric quadriceps contractions. Early return to work and sport was encouraged.

Statistical analysis, using Statview* 5.0 (Abacus Concepts, Berkeley, California), allowed for demographic, clinical, radiological and arthroscopic variables. Statistical analysis was conducted using a non-parametric chi-squared test, with Yates' and Bonferrini's corrections when necessary, and analysis of variance. The significance level was set at $p < 0.05$.

Results

At arthroscopy, the anterior cruciate ligament was found to be intact in all cases. Traumatic vertical tears were present in 95% and complex lesions of the medial meniscus in 5%. A small longitudinal tear of the posterior part of the meniscus was seen in 10%, a bucket-handle tear in 54% and a flap tear in 31%.

Some of the posterior part of the meniscus was removed in 99%, of the mid-third in 97% and of the peripheral rim in only 1%. Some of the mid-portion of the meniscus was removed because of damage to the inner third in 84%, to the mid-third in 80% and to the peripheral rim in 1%, and some of the anterior part of the meniscus because of damage to the inner third in 44%, to the mid-third in 44% and to the peripheral rim in 1%.

No knees showed exposure of the subchondral bone (grade IV) on the medial femoral condyle, the medial tibial

plateau or the patella. The medial femoral condyle was rated grade 0 in 82%, grade II in 11% and grade III in 7%. The medial tibial plateau was grade 0 in 69%, grade II in 13% and grade III in 18%, and the patella was grade 0 in 54%, grade II in 26% and grade III in 20%. Overall, only 36% of the knees had no chondral damage in the medial compartment.

At five-years, 53% of patients had returned to sporting activities, with 98% at the same level as before injury. A reduction of sporting activities was not related to the function of the operated knee, but was for personal reasons. At the final follow-up, 24% of the knees were class I, 26% class II and 50% were class III in respect of the level of activity.

When seen at 12 years, 72% of the patients were very satisfied, 23% were satisfied and only 5% were not satisfied. Only 5% would not wish to have the procedure again. Objectively, 57% were grade A (normal) and 43% were grade B (nearly normal). The range of movement of the knee was normal and there was no instability. There was no clinical laxity and the difference in the laxity of the two knees was between 1 and 2 mm as assessed by the KT-1000 (1.4 ± 0.5 mm). Men had the better results, with 62% rated A compared with 36% for the women. Age at the time of arthroscopy did not influence the outcome. Of the patients with a level of light activity (class III) at the time of arthroscopy, only 50% were grade A compared with 61% and 65% for those in class I and II, respectively. These patients had more anterior knee pain than the others. The clinical result only correlated with anterior knee pain at the final follow-up (chi-squared test, $p < 0.0001$). With the numbers available and with regard to other factors such as age, acute or chronic injury, gender, and level of activity, no significant differences were detected. Chondral damage was related to the age of the patients at the time of surgery, but did not influence the final result. No significant difference was detected between the different meniscal injuries (bucket-handle tear, small longitudinal tear, flap tear) and the clinical outcome for the IKDC final score, or the incidence of anterior knee pain.

Plain radiographs for all patients, including those with bilateral involvement, were normal in 74% and there was remodelling in 5% (grade B). The joint was narrowed in 21%, 19% with incomplete narrowing (grade C) and 2% with complete narrowing (grade D). In the operated knees there was narrowing in 21% compared with only 11% in the non-operated knees. Thus the difference in the incidence of osteoarthritis between knees was 10%. In the 49 patients who had arthroscopic limited meniscectomy and a radiologically normal contralateral knee, there was joint narrowing in 16% of the operated knees. Therefore 12 years after arthroscopic medial meniscectomy for a traumatic meniscal tear 16% of the patients had developed degenerative changes. There was a correlation between gender and radiography at the final follow-up. Men had normal radiographs in 83% of cases compared with only

57% for the women (chi-squared test, $p=0.0434$). No significant difference was detected between the other clinical and radiological parameters. The few complex lesions were not associated with greater degenerative change.

Discussion

Previous studies have shown an increased incidence of degenerative changes in knees after total open meniscectomy compared with a normal contralateral knee. The causes could be due to the removal of the entire meniscus, associated ligamentous laxity, or morbidity after open surgery.^{1,5,13} After partial meniscectomy, patients had better functional results than after total meniscectomy.^{27,28} Partial meniscectomy, whether performed open or arthroscopically, allows preservation of some normal meniscus.¹³

Arthroscopic meniscal resection offers early postoperative rehabilitation and low morbidity.^{9,12,14,15,199} Previous studies with a medium-term follow-up have shown good knee function, but radiological changes occurred in about half of the patients.^{14,15,29,30}

There are few long-term follow-up studies^{19,31,32} and comparison is difficult since the criteria for assessment differ. As recommended by the IKDC the radiological evaluation includes the flexion posteroanterior view. The development of arthritic changes may be most easily assessed by using the contralateral knee as a control.

Our study included only traumatic vertical tears in stable knees with an intact anterior cruciate ligament and a normal lateral meniscus. The subjective and objective functional results are similar to those of other long-term studies^{31,32} in which there were good or excellent functional results in 78% to 83%. The factor which had most influence on the long-term results was the presence of associated lesions of the articular cartilage, with good or excellent results in 94.8% if the meniscal tear was isolated. The previous studies referred to^{31,32} included knees with a deficient anterior cruciate ligament and those with lateral meniscectomy, thus further highlighting the effect of other intra-articular lesions on the functional results.

Another study¹⁹ described the radiological results after a mean follow-up of 14.7 years. For patients with intact anterior cruciate ligaments, there were excellent or good results in 89%, and no correlation with gender, age or damage to the articular cartilage. We also found no correlation with age and gender, but anterior knee pain at the final follow-up correlated with damage to the articular cartilage found during arthroscopy. The impact on sports activities was low, but in our study, the level of activity before surgery was also low, which could mask a knee with greater degenerative change as the patients may have been less demanding. It is possible that there would be more poor results if a younger population, less than 25 years old, who remain very active ten years later, was studied.

The radiological incidence of osteoarthritis (16%) was also similar to that in other studies.^{18,19,31} There was no

correlation between the incidence of articular damage and limb alignment. The lack of correlation between radiological and subjective results in our study, was supported by several of the parameters assessed. The radiological findings after arthroscopic partial meniscectomy did not differ significantly from studies after open meniscectomy carried out on stable knees. In one such study^{33,34} with a follow-up of 26.5 years there was an incidence of degenerative changes of 20%, when compared with the opposite knee.

Considering other procedures which are available, meniscal repair is an important treatment and the results with the same follow-up need to be assessed. The results are closely related to the state of the anterior cruciate ligament. In stable knees, De Haven, Lohrer and Lovelock³⁵ obtained a survival rate of 78% in repaired menisci. Also standing radiographs revealed no degenerative changes in 85% of compartments with successful repairs as compared with only 43% compartments with return menisci.

Our findings in stable knees support the view that arthroscopic meniscectomy with preservation of the meniscal rim is superior to open total meniscectomy for traumatic tears. After 12 years the population of patients which we reviewed is doing well. We appreciate that our sample was not necessarily representative of the whole population of our patients and therefore our conclusions should merely be regarded as an indication of outcome.

We conclude that an arthroscopic partial or subtotal medial meniscectomy is an effective treatment for a symptomatic meniscal tear in a stable knee. The incidence of osteoarthritis in the operated knee, as compared with 49 normal contralateral knees, was 16%. Age and cartilage fibrillation during surgery did not increase the incidence of degenerative changes. Women had a worse outcome than men.

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