CLOSED PARTIAL MENisceCTomy
EARLY RESULTS FOR SIMPLE TEARS WITH MECHANICAL SYMPTOMS

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A review is presented of early results of a consecutive series of 45 bucket-handle or flap tears of a meniscus treated by closed partial meniscectomy over a two-year period. The mean operating time was 45 minutes. All patients were treated in hospital and 39 of 41 assessable patients were discharged within 24 hours of operation. The mean time to return to work was 12.9 days. One patient later required arthroscopy to excise a residual nubbin of meniscal tissue which had been incompletely removed and caused pain. At follow-up at a mean of eight months after operation only one patient had temporary mechanical symptoms not explained by further injury or degenerative change. Seven patients who had undergone previous open meniscectomy reported improvement after closed meniscectomy in relation to both pain and disability. It is concluded that closed partial meniscectomy for these common meniscal tears is successful in the early relief of symptoms if all unstable fragments are excised. The technique is difficult to learn but is associated with rapid rehabilitation and a high rate of acceptance by the patient.

Partial meniscectomy for bucket-handle tears has been questioned by those who, in the absence of arthroscopy, have been able to view the meniscus by arthrotomy only. They have cited the undetected existence of double or multiple tears in the posterior horn of the meniscus remaining after excision of the accessible fragment as the major reason for recommending total meniscectomy (Du Toit and Enslin 1945; Smillie 1970; Andrews, Norwood and Cross 1975). Arthroscopic partial meniscectomy allows the detection and removal of multiple unstable fragments by probing the meniscal remnant under direct vision. It thus overcomes the major objection to partial meniscectomy which has been shown to have advantages over total meniscectomy in terms of recovery from operation (McGinty, Geuss and Marvin 1977), relief of symptoms (Tapper and Hoover 1969; Cargill and Jackson 1976; McGinty et al. 1977) and the late appearance of the radiographic changes described by Fairbank in 1948 (Cargill and Jackson 1976; McGinty et al. 1977).

Although reports of series of closed partial meniscectomies have appeared only since 1978, recent studies by Northmore-Ball and Dandy (1982) and Gillquist and Oetorp (1982) show that the early good relief of symptoms previously reported by these authors (Dandy 1978; Oetorp and Gillquist 1979) is maintained for at least 4 years after operation. One of these longer-term follow-up studies (Northmore-Ball and Dandy 1982) shows favourable results for bucket-handle tears where specific comparison with open methods (Tapper and Hoover 1969) is sought. Given these favourable longer-term results for relief of symptoms comparable to partial meniscectomy by open techniques, it would appear that the major potential advantage of closed meniscectomy lies in the immediate benefits of an early rehabilitation associated with a relatively pain-free recovery.

The aim of this study is to review the postoperative progress and early rehabilitation in a personal series of closed partial meniscectomies. Only patients with bucket-handle and flap tears with definite mechanical symptoms have been included to enable success to be measured by relief of symptoms, and allow comparison with the similar early study of Dandy (1978).

MATERIALS AND METHOD

In the two-year period between June 1980 and July 1982 the author performed closed partial meniscectomies on 50 knees with unstable bucket-handle or flap tears as defined by Dandy (1981). Patients who had closed procedures performed for complex, combined or degenerative tears during this time were excluded. Twenty-nine of the patients with bucket-handle tears had previously been studied in a comparison with similar tears treated by arthroscopy (Tregonning 1983). This earlier study also included eight patients excluded from the present study in whom closed procedures were attempted but technical difficulties necessitated arthroscopy under the same anaesthetic. Of the 50 consecutive operations five were performed on patients complaining
of pain only but without mechanical symptoms, and these were not included in the analysis. This left 45 knees in 44 patients who complained of jamming, a painful click or clunk, or had the symptom or sign of true locking.

The 44 patients consisted of 40 men and four women with 22 right knees and 23 left knees involved. The age range was from 15 to 54 years (mean 27 years); the age distribution is shown in Figure 1. There were 35 medial and 10 lateral meniscal tears. The distribution of tears according to type and site is shown in Table I. Displaced bucket-handle tears had the mobile fragment traversing the intercondylar notch as seen at the initial arthroscopy. Bucket-handle tears were classified as double where a second unstable longitudinal tear was discovered by manipulation of the meniscal remnant after the major unstable fragment had been excised. Detached bucket-handle tears had had one horn of the mobile fragment separated from either the anterior or posterior horn. Flap tears were found either in the posterior horn or in the mid-meniscus.

**Symptoms and signs.** The duration of symptoms ranged from two weeks to 10 years with a mean of 15.5 months. Thirty-eight knees were the site of recurrent episodes of locking or jamming, or were observed by the examiner to be clinically locked. In those patients without locking, painful clicks or clunks or the feeling of "something moving in the knee" was present in seven knees, three of which had completely displaced bucket-handle tears. For the purposes of this study, giving-way was not included as a mechanical symptom because of the confusion of this symptom with the effects of co-existent anterior cruciate insufficiency. However, of 16 patients who complained of giving-way, 11 showed a positive pivot-shift sign. The physical signs of locking, positive McMurray test, joint-line tenderness and effusion or a combination of these were present in 41 knees. Four knees had none of these signs, including one with a completely displaced bucket-handle tear.

**Associated injuries.** Evidence of previous ligamentous injury was present in 16 patients, all of whom showed anterior cruciate insufficiency with positive Lachman or pivot-shift signs. Three knees showed additional instability of the collateral ligaments. No patient has yet required reconstruction of a ligament after a meniscal operation.

Degenerative changes in the articular cartilage were graded I, II or III according to the appearance at arthroscopy: I, superficial fibrillation; II, deeper partial thickness erosion; and III, full thickness erosion down to bone. Although many patients showed superficial Grade I changes, only nine showed more significant tibiofemoral degenerative changes graded II or III in the weight-bearing areas of the tibia or the femur.

**Operative technique.** For bucket-handle tears a three-portal technique was used with the two standard anteromedial and anterolateral approaches combined with an additional variously sited third portal. This allowed the insertion of a grasping instrument to provide traction to the displaced meniscal fragment during its sharp division at either end with scissors or meniscectome. The central patellar-tendon approach was used as the third portal initially, but crowding of instruments at the joint line made the operation difficult. In later procedures the mid-patellar approach of Patel (1981) was used as the viewing portal and decreased this problem. For flap tears a two-portal technique allowed piecemeal excision of the flap using a punch and a rongeur. After excising the obviously unstable meniscal fragment, the residual meniscus was carefully manipulated with a hook in all knees. The three patients with double bucket-handle tears had the second unstable fragment completely excised.
**Clinical review.** Of the 44 patients five were lost to follow-up leaving 39 patients with 40 tears who were personally reviewed. All patients answered a questionnaire, 23 at personal interview and 16 by telephone. At review, emphasis was placed on enquiry into any recurrence of the specific mechanical symptoms which the patient had suffered before operation. A full examination of the knee was performed on those personally interviewed. The mean follow-up time was eight months (range 2 to 26 months).

**RESULTS**

**Duration of operation.** The operating time was calculated by the nursing staff as the time from initial skin puncture to final wound closure. The mean duration was 45 minutes, with a range of 10 to 90 minutes ($n=40$). Five operations were excluded from consideration because of the performance of additional procedures in the same or opposite knee (three), instrument breakage (one) or no time recorded (one). For bucket-handle tears the mean operating time in the first 12-month period covered by this study was 58 minutes ($n=8$) which decreased to 40 minutes ($n=20$) in the last six months.

**Hospital stay.** All patients in this series were admitted one day before operation. After operation a single crêpe bandage was applied over Dacron orthopaedic padding. All patients could raise the leg straight upon recovery from anaesthesia and most were able to walk immediately, usually without aids. Analgesia consisted of codeine when this was required. Instruction in physiotherapy was given to patients both before and after operation. No outpatient physiotherapy was prescribed and patients were cleared for work when comfortable.

In calculating time to discharge from hospital, three patients were excluded from consideration because their stay was prolonged awaiting transport to another town (two) or further investigation for an unrelated condition (one). Thirty-nine of the remaining 41 patients were discharged either on the same day (three) or within 24 hours of operation (36), the mean stay after operation being 1.0 days.

**Return to work.** Information on the work status of 40 patients was available at review. Of these, nine were excluded from consideration because they were either unemployed at the time of the procedure (six), on vacation (one), required a second operation (one), or were disabled for another unrelated condition (one). The remaining 31 patients were classified as strenuous (18) or sedentary (13) workers using similar criteria to those described by Dandy (1978). The mean times for return to work are shown in Table II where they are compared with Dandy's figures. The figures marked with an asterisk exclude one patient in the strenuous group who was employed as a roofer and whose time off work was great compared with all others in the series because of his peculiar requirement to kneel for long periods on the anterior stab wound scars which were tender while healing.

<table>
<thead>
<tr>
<th>Table II. Mean time for return to work (days)</th>
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<td><strong>Sedentary</strong></td>
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<tr>
<td>Mean</td>
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<tr>
<td>Range ($n=31$)</td>
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<td><strong>Dandy (1978)</strong></td>
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<td>Mean</td>
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<td>Range ($n=30$)</td>
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*Excluding one patient: see text for explanation

**Relief of symptoms.** At the time of review, three patients complained of mechanical symptoms on specific questioning.

*Case 1.* This patient had a medial bucket-handle tear, which was causing locking, excised from a knee with a deficient anterior cruciate ligament and was initially free of symptoms. Eight months later, at review, a painful click was reported which had followed an episode of giving way eight weeks previously. At repeat arthroscopy a bucket-handle tear of the previously intact lateral meniscus was excised by a closed procedure.

*Case 2.* A patient with significant arthroscopic and radiographic degenerative changes associated with a flap tear of the lateral meniscus complained of some painful clicking after operation which was less than before operation, but not severe enough to require further investigation.

*Case 3.* A patient with a flap tear of his medial meniscus had been cured of his locking episodes but a painful click persisted after operation. He did not attend for repeat arthroscopy scheduled after review because he stated that his symptoms had abated and he was playing active sport three months after operation.

The complaint of some aching pain after operation related to exercise or weather was not considered to indicate an unsuccessful operation in this group of patients whose main presenting symptoms were mechanical in nature. In fact, 38 patients reported reduction or elimination of pain. One patient with significant degenerative changes had his aching pain unchanged by operation. In Case 3, the patient reported at two months that his pain had increased, but his symptoms had abated four weeks later at the time scheduled for his repeat arthroscopy. One patient who suffered significant pain after operation was the first in the series and the first patient in whom closed meniscectomy was performed by the author. He underwent removal of a bucket-handle tear which was causing locking, leaving a nubbin anteriorly. Uncertainty with a new technique left sufficient doubt about the outcome for a "wait and see" attitude to be adopted. His locking disappeared, but he complained of anterior knee pain at heel-strike. Open operation was performed to excise the residual anterior
complications. There were none of the usually reported complications of meniscectomy: no obvious haemarthroses, infections, persistent effusions or persistent infrapatellar numbness. A technical problem encountered in one patient was that of instrument breakage where a Beaver blade had to be retrieved via a separate posteromedial portal under arthroscopic control.

**DISCUSSION**

Dandy (1978) has been the only other author to record the early postoperative progress in a group similar to that studied here, where closed partial meniscectomy had been performed for simple bucket-handle or flap tears presenting with mechanical symptoms. He claimed that the method gave relief of mechanical symptoms, was associated with a short stay in hospital, few visits for outpatient physiotherapy, and that time off work was markedly reduced in comparison with open meniscectomy. If these immediate results could be widely reproduced for these common tears large numbers of patients would benefit. The economic implications would also be great, particularly in countries like New Zealand where meniscectomy is the most common elective orthopaedic operation, and is performed predominantly in young men of working age (New Zealand Department of Health 1980, 1981).

There was only one patient in this series who suffered temporary persistence of modified mechanical symptoms not explained by concomitant degenerative change or by later injury to the other meniscus in an unstable knee. Relief of pain was also highly satisfactory apart from the first patient in the series in whom a prominent meniscal nubbin, although detected, was left untreated because of lack of experience with the technique. This emphasised early the importance of excising all residual unstable meniscal tissue after the major fragment had been removed. In three patients later in the series double bucket-handle tears were detected. The second tear was not obvious in any of the patients until a hook was used to manipulate the meniscal remnant which was properly visualised only after excision of the major fragment. The additional unstable meniscal tissue was successfully excised back to a stable meniscal rim with no subsequent recurrence of symptoms.

All patients in this series, like those of Dandy's, were treated as inpatients with a comparably short stay in hospital (1.0 compared with 1.3 days). This criterion of recovery is not accurately recorded in reported series of open meniscectomy. However, our recent comparative study of closed and open meniscectomy (Tregonning 1983) showed the need for a period of narcotic analgesia and graduated mobilisation on crutches in the open group which was not required in the closed group, accounting for a difference of 1.9 days in the length of hospital stay.

Although the value of outpatient physiotherapy after meniscectomy has been questioned (Seymour 1969; Forster and Frost 1982) it is still widely prescribed. All patients in this series were able to lift the straight leg and to flex the knee to some extent after operation; consequently no outpatient physiotherapy was prescribed beyond encouraging the patient to exercise at home. The cost of outpatient visits for physiotherapy after meniscectomy has recently been calculated (Forster and Frost 1982) and the savings from abandoning it are considerable.

The criterion most commonly used previously to assess rehabilitation after meniscectomy has been the mean time to return to work. The value for all occupations recorded here of 12.9 days (or 10.2 days excluding one exceptional case) compares well with that of Dandy (1978) of 10.5 days. Although the comparison of these times with those of the previous open meniscectomy series is impressive (Dandy 1978), such comparisons include many other factors besides differing methods of surgical approach. These variables are inherent in the differing population and occupation groups studied by a number of surgeons using different postoperative regimes for varying types of meniscal tear. However, our earlier comparative study (Tregonning 1983), eliminating many of these variables, showed statistically significant reductions in mean time off work for closed meniscectomy compared with the same operation performed by arthrotomy (13.3 days closed and 32.7 days open).

The major disadvantage of closed meniscal surgery is its technical difficulty while being learnt. Thus operations may be prolonged and frustrating, particularly initially when unsuccessful attempts at closed techniques may have to be salvaged by arthrotomy under the same anaesthetic (Oretoorp and Gillquist 1979; Gillquist and Oretoorp 1982; Tregonning 1983). However, as shown in this study operating times do improve with the experience of the operator, and may not suffer in comparison with open meniscectomy where this is routinely preceded by diagnostic arthroscopy (Oretoorp and Gillquist 1979; Tregonning 1983).

Acceptance of the closed techniques used in the series was high as evidenced by those patients who had had previous open meniscectomy. All such patients noted great differences in their levels of discomfort and disability when they made their own comparisons between the two types of operation.
ACKNOWLEDGEMENTS

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REFERENCES


