Arthroscopic meniscectomy

Treatment costs and postoperative function in a historical perspective

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ABSTRACT – We report short-term data from 82 consecutive patients with arthroscopic meniscectomy 1995–1998 in stable knees and without severe cartilage changes. All patients were treated as outpatients, the operating time was, on average, 23 SD12 minutes and 3 of 4 patients were back at work within 1 week. Almost half of the patients still had some knee problems 3 months after surgery, but thereafter a substantial improvement was seen.

We also report original data from a consecutive series of patients having arthroscopic meniscectomy 1980–81. In that series, the frequency of total meniscectomies was higher, the operating time longer, but the time to recovery was shorter than in 1995–98. In contrast to 1995–98, most of the patients in 1980–81 were followed by the doctor and had supervised rehabilitation. However, sick leave was similar in the two series. The total costs for an arthroscopic meniscectomy in 1998 was less than half the costs in 1980–81.

We conclude that the improved technique for arthroscopic meniscectomy during the last 15–20 years and less supervised rehabilitation have reduced the costs, but not the recovery time.

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The shortness of rehabilitation time after arthroscopic meniscectomy was regarded as a sensation; several studies reported a return to sports within 3–4 weeks (Guhl 1979, Lysholm and Gillquist 1981, Pettrone 1982, Hamberg and Gillquist 1984). These studies mirror the situation at centers where the technique was being developed and the patients were followed carefully for research purposes. Today, arthroscopic meniscectomy has become routine, performed as an outpatient procedure and usually the patient receives only a simple printed training program for postoperative rehabilitation at home. In most cases, no further contact with the doctor is planned. It is well known that successful experimental programs are not equally successful when used on a routine basis (Nation 1997). The question is whether the results of arthroscopic meniscectomy have changed during the last 15 years.

Therefore we analyzed a series of patients undergoing arthroscopic meniscectomy 1995–1998. To make a historical comparison, we also studied original protocols/data from a series of previously reported patients with meniscectomy (Hamberg and Gillquist 1984).

Patients and methods

We prospectively collected data from 82 consecutive unilateral arthroscopic meniscectomies, performed at the County Hospital of Norrköping between January 1995 and January 1998 (Table 1).

A diagnostic arthroscopy, using a central approach, was performed as described by Gillquist and Hagberg (1976) and Gillquist et al. (1979). A protocol was used to record all findings concerning meniscus pathology, ligament and cartilage changes (Lundberg et al. 1984). The latter changes were classified according to a modified Outerbridge scale, later presented by Lysholm et al. (1987). Patients with unstable knees and severe cartilage changes (more than modified Outerbridge grade 2) were excluded from the study.

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Table 1. Patient characteristics

	1995–98	1980–81
n	82	86
Age mean *SD*	39 *12*	35 *13*
range	(16–72)	(15–67)
Sex (male/female)	65 / 17	77 / 9
Meniscus (medial/lateral/both)	66 / 7 / 9	74 / 11 / 1
Activity level (median/range)	3 (1–5)	3/ (1–4)

Activity level divided into 5 categories: (1) team sports on elite level, (2) other strenuous sports and heavy work, (3) recreational sports, (4) ordinary work, (5) low activity, retired.

All operations were performed under general or regional anesthesia, with the limb in a thigh-holding device, and the operating table at knee level so placed that both knees hung over the edge at 90° flexion. A tourniquet was applied but inflated only if bleeding blocked the view. In all operations, we used a video system for visualization and an inflow-outflow pump system with automatically-maintained intraarticular pressure was used.

The operations were performed by one and the same surgeon (PR). A simple printed training program was given to all patients postoperatively. No postoperative visit was planned but the patients were told to return if they did not improve or if any other problem arose.

At the postoperative unit, the patients received a questionnaire about the pre- and postoperative period and were asked to return it by mail after 3 months. On the basis of the questionnaire, we divided the activity level into 5 categories (Table 1). Knee function was assessed with the modified Lysholm score (Tegner and Lysholm 1985). The patient was also asked about time from injury to operation, sick leave, physiotherapy, recovery and own opinion.

71 of 82 patients returned the questionnaires after 3 months. Patients not completely recovered or satisfied at 3 months or who did not answer the questionnaire (n 50) were sent a second one a mean of 24 (12–44) months after the operation. This questionnaire included questions about the present activity level and knee function, own opinion, recovery and new operations. The patient was reminded by phone, if the questionnaire had not been returned. Finally, all patients returned the questionnaires.

Table 2. Time from injury to operation and number of postoperative visits within 10 months in 1995–98. Original data from patients operated on 1980–81 are also presented

	1995–98	1980–81
Time injury–operation, n	71[a]	86
Acute	8	9
1 week–3 months	15	20
3–6 months	16	23
> 6 months	32	33
Postoperative visits, n	82[b]	86
0	56	0
1	19	52
2–5	7	34

[a] Time from injury to operation is based on 71 patients returning their questionnaires after 3 months.
[b] Number of postoperative visits is based on all patients studied (n 82).

Statistics

For non-parametric data (Lysholm score, Activity level), the Wilcoxon signed rank test was used to analyze repeated measurements in the same patient. For parametric data (sick-leave), the unpaired t-test was used for differences between groups of patients. Differences in proportions were calculated with the chi-square test. The statistical evaluation was done with Statistica software (Statsoft Inc. Tulsa, OK, USA).

Results

Only 2 of 82 meniscectomies were subtotal. 9 patients had a meniscectomy on both the medial and lateral meniscus (Tables 1 and 3). The mean operation time, including diagnostic arthroscopy, was 23 minutes (Table 3) and all were treated as outpatients. Most had no postoperative visit (Table 2), 18 patients took part in a supervised physiotherapy program after the operation.

Three fourths of the patients were back at work within 1 week and almost 90% within 2 weeks. Sick leave was not affected by cartilage changes, type of tear or age at surgery (>< 40 years), type of meniscectomy or the side of the tear (medial/lateral).

Complications

1 patient needed aspiration, 1 had a superficial skin infection, 1 a deep venous thrombosis and 4

Table 3. Number of patients with different types of meniscectomy and operation time in minutes 1995–98. Original data from a series of patients operated on 1980–81 are also presented

Type of meniscectomy	1995–98 n	mean	SD	(range)	1980–81 n	mean	SD	(range)
All	82	23	12	(10–55)	86	33	13	(5–95)
Partial meniscectomy	66	22	7	(10–53)	54	29	14	(5–65)
Total meniscectomy	2	30	7	(25–35)	14	40	13	(20–75)
Bucket handle resection	14	26	11	(12–55)	18	37	18	(15–95)

Table 4. Average costs per patient for an arthroscopic meniscectomy 1995–98. The costs 1980–81 are theoretical and calculated by comparing the historical conditions in 1998 with the present costs. USD

	1995–98 USD	1980–81 USD
Operation		
694/operation	694	694
Extra op-time		
14/minute	0	135
Hospital stay		
574/day	0	234
Postoperative doctor's visit		
209/visit	94	293
Physiotherapy training session		
33/session	73	428
Total costs	861	1784

other patients complained about pain and tenderness at the patella tendon. 1 patient had an extended meniscectomy within the first 10 months.

Activity, knee function and patient's own opinion

The preinjury activity level was high; 3 of 4 patients were active in sports on a competitive or recreational level.

53 patients had regained their previous activity level 3 months after surgery and 73 after more than 12 months. No specific factor such as age or peroperative degenerative changes were related to a lower level of activity.

Sports-active patients seemed to recover their capacity slowly, because only 19 of 53 were back at the preinjury level at 4 weeks and 27 of 53 at 10 weeks. Information about early return to sports was available in 71 patients, of whom 53 had been active in sports before injury.

Almost half of the patients had knee problems in daily life activities (score < 85) 3 months after surgery, but at 12 months or more, nine tenths had a score > 84 ($p < 0.0001$). 2 patients regarded their knee problems as unchanged after surgery. A low Lysholm score was not related to age or to cartilage changes seen at the initial arthroscopy. When the patients were asked about time to complete recovery, 57 of 82 patients considered the knee have been completely recovered at the latest follow-up. Of these, half had recovered within 2 months and two thirds within 4 months.

However, 54 of 71 were satisfied with the result at 3 months and 73 of 82 were satisfied at the latest follow-up.

A common comment from the dissatisfied patients was that time to full recovery had been too long. Some patients said that they did not feel safe in the postoperative period and that a check-up would have been appropriate.

Historical patients with arthroscopic meniscectomy

Original protocols/data were available from a series of consecutive patients having unilateral arthroscopic meniscectomy from October 1980 to May 1981 at the University Hospital of Linköping, Sweden. These were included in a series of 100 patients with meniscectomy previously reported by Hamberg and Gillquist (1984). From this series, 86 patients who had no ACL-rupture and no severe cartilage changes were retrospectively selected.

In 78 of them, a follow-up examination had been carried out 10 (6–17) months after surgery; 8 had returned a questionnaire by mail. The pre- and postoperative activity level was assessed in 5 categories (Table 1). The activity levels 4 and 10 weeks after meniscectomy were available from the original protocols.

Knee function was evaluated with a scoring scale having a maximum of 95 where the maximum score for instability was 20 (Hamberg et al. 1984). The scores were individually corrected to the scale with a maximum score of 100 including 25 for instability (Tegner and Lysholm 1985).

Data about time from injury to operation, operation time, hospital stay, sick leave and physiotherapy were also available. Of 4 surgeons involved, 2 performed nine tenths of the operations.

14 of 86 meniscetomies were total but only 1 patient had meniscectomy on both the medial and lateral meniscus (Tables 1 and 3). The mean operation time was 33 minutes (Table 3). 56 of the 86 patients were treated as outpatients. All patients had one or more postoperative visits, excluding those for purposes of research, and four fifths of the patients took part in supervised physiotherapy program postoperatively.

Three fifths of the patients were back at work within 1 week and four fifths within 2 weeks. Sick leave was not affected by cartilage changes, type/side of meniscus tear or age at surgery. 1 patient had an extended meniscectomy within 10 months.

Similar to the series 1995–98, 3 of 4 patients were active in sports on a competitive or recreational level before injury. All patients except 2 had regained their activity level until the final follow-up. Sports-active patients quickly regained their activity level—i.e., 34 of 64 patients were back at the preinjury level after 4 weeks and 62 after 10 weeks. Only 4 patients had symptoms in daily life activities (Lysholm score < 85) and 23 had symptoms in sports activities (Lysholm score < 95) after 10 months, but only half regarded their knees as completely recovered at this time.

Comparison of costs 1980–81 and 1995–98

An attempt was made to compare costs related to surgery and rehabilitation in 1980–81 and 1995–98 (Table 4). When the conditions in 1980–81 regarding operation time, hospital stay, number of postoperative visits and physiotherapy were compared in 1998 with the present costs, the total cost for an arthroscopic meniscectomy was shown to be 50% less in 1998 than the theoretical calculated costs in 1980–81.

Discussion

Initial short-term follow-up studies of arthroscopic meniscectomy have shown a fast functional recovery and early return to sports (Guhl 1979, Lysholm and Gillquist 1981, Pettrone 1982, Hamberg and Gillquist 1984). Most of them mirror the developmental phase of the arthroscopic technique and report circumstances in research and development centers. The alternative to arthroscopic meniscectomy was an open procedure followed by a considerably longer rehabilitation period (Northmore-Ball et al. 1983, Bergström et al. 1984, Martens et al. 1986).

We report the outcome after today's routine, outpatient arthroscopic meniscectomy. The operating time has decreased by more than one third since 1980. The most plausible explanation is the explosive development of video-control systems for better visualization and systems for irrigation. Improvement in surgical instruments and increased technical skills of the surgeons are also factors which may have shortened the operation time.

More knowledge about the effects of meniscectomy and the importance of saving meniscus tissue (Fukubayashi and Kurusawa 1980, Baratz et al. 1986, Weiss et al. 1989, Fitzgibbons and Shelbourne 1995, Rockborn and Gillquist 1996, Roos et al. 1998) are shown by the 7 times lower frequency of total meniscectomies in the recent series, which cannot be explained by a difference in the distribution of types of tear. Despite a higher rate of total meniscectomies in 1980–81, the reoperation rate was the same in both series, a fact that further speaks for a tissue-preserving approach.

A delayed recovery in general and a delayed return to sports, in particular, was seen in the series from 1995–98 with only about one third returning to sports within 4 weeks, as compared to two thirds in 1980–81, but at the end a similar improvement was seen in the two series. Differences in attitudes to the operation may explain the earlier recovery in 1980–81. Then arthroscopic meniscectomy was a new technique, associated with enthusiasm. This phenomenon is called the Hawthorne effect (Nation 1997): the patients knowing that they had been subjected to a new and improved technique also wanted to show a sensa-

tional recovery. In answering the questionnaire, it was also easier for them to express even minor dissatisfaction in the later series (Lieberman et al. 1996, McGrory et al. 1996, Höher et al. 1997).

Another important factor influencing recovery is probably the postoperative care. In 1980–81, the patients had more supervised rehabilitation and more postoperative visits. During these visits, the surgeon could answer any questions the patients may have had and he probably also encouraged them to return to sports as soon as possible. In contrast, the patients in the 1995–98 series were left to rehabilitate themselves, without any contact with the hospital, unless they felt a need for it. Many patients today may have unrealistic expectations about recovery since previous reports and the media have stressed the early recovery after arthroscopic meniscectomy. With no guidance during rehabilitation the patient may start sports too early, which can result in a prolonged disability. These findings are also well in line with Vervest et al. (1999) who showed, in a randomized study, that physiotherapy improves the functional recovery of the knee after meniscectomy.

A thorough rehabilitation is probably needed, because abnormalities in joint motion and muscle strength have been found in the operated limb so long as 2–3 months after partial meniscectomy (Durand et al. 1993, Matthews and St-Pierre 1996). Contact with medical personnel may also be necessary to alleviate the patient's concerns and diminish apprehension caused by various minor symptoms in the postoperative period.

In 1982, Pettroni reported a 30% decrease in total costs, when meniscectomy changed from an open to a closed procedure. In our study, a further cost reduction of 52% for an arthroscopic meniscectomy, including postoperative rehabilitation, has occurred since 1980-81. Reductions in operation time, hospital bed occupancy and supervised rehabilitation have also freed substantial resources for other patients. The direct costs of the patients have been unchanged since 1980–81, as shown by similar access to operation and duration of sick leave.

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