

## Treatment for chronic synovitis of knee: arthroscopic or open synovectomy

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**Abstract** Chronic synovitis of knee joints that cannot be treated by conservative measure effectively can be treated successfully by the operations through resecting the inflamed synovium. The operations include open synovectomy and arthroscopic synovectomy. The purpose of this study is to compare the two operations in alleviating symptoms and cosmetic effect. There were 42 patients in this study, and they suffered from chronic synovitis of knee joints, including rheumatoid arthritis and non-specific synovitis. Twenty-two knees of 22 patients underwent arthroscopic synovectomy with two to five approaches whose lengths were about 1.0 cm, and 20 knees of 20 patients underwent open synovectomy with two approaches whose lengths were more than 10.0 cm. Patients were evaluated by visual analog scale for pain at the 24th hour after operation. Patients were followed up for 16–20 months and were evaluated by the Ogilvie–Harris scoring system. This study showed that both arthroscopic synovectomy and open synovectomy successfully alleviated the symptoms and the short-term results are similar after operation. However, the scars in the patients of the former group were much shorter than the latter group. Pain intensity of patients underwent arthroscopic synovectomy was less than that of open synovectomy at the 24th hour after operation. Both operations could treat chronic

synovitis successfully. However, the arthroscopic synovectomy is the preferred operation due to fast recovery, less postoperative pain, and excellent cosmetic effect.

**Keywords** Knee · Synovitis · Arthroscopic synovectomy · Open synovectomy · Cosmetic

### Introduction

Patients with chronic synovitis of knee joints, including rheumatoid arthritis and non-specific synovitis, have the main symptoms of pain and swelling, which lead to dysfunction of the joints and the conservative measures may not be effective on all affected knees. Many studies have demonstrated that synovectomy can effectively relieve the symptom and improve the function of the affected joints because of removing actively inflamed synovium [1–4]. Open synovectomy is the traditional effective surgery in treating chronic synovitis. Another choice is arthroscopic synovectomy which is effective too. Here, the therapeutic effects of open synovectomy and arthroscopic synovectomy were compared. Moreover, the cosmetic effects were compared.

### Patients and methods

The surgery was performed between January 2003 and January 2009 on 42 patients. Arthroscopic synovectomy was performed on 22 knee joints in 22 patients, including six men and 16 women with a mean age of  $36.05 \pm 17.34$  years (range, 12–66 years). There were rheumatoid arthritis in fifteen knees and non-specific synovitis in seven knees. Open synovectomy was performed on 20 knee joints

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in 20 patients, including seven men and 13 women with a mean age of  $44.70 \pm 15.14$  years (range, 19–78 years). There were rheumatoid arthritis in eighteen knees and non-specific synovitis in two knees. The diagnosis was established by histological examination after operation. Only nonsteroidal anti-inflammatory drugs were used to control pain after operation. There were no significant differences between the two groups in terms of gender, age, and proportion of diseases ( $P > 0.05$ ). The protocol was approved by the Institutional Review Board at the medical college of ShangHai JiaoTong university.

All patients were followed up for 16 to 20 months and were evaluated by the Ogilvie–Harris scoring system [5] before the operation and at the latest follow-up after operation. Patients were evaluated by visual analog scale (0 = no pain to 10 = worst) for pain at the 24th hour after the operation. Statistical analysis was performed using the Student's *t*-test for continuous variables and using the chi-square test for nominal variables. A difference was considered to be significant if the *P* value was less than 0.05.

### Surgical technique

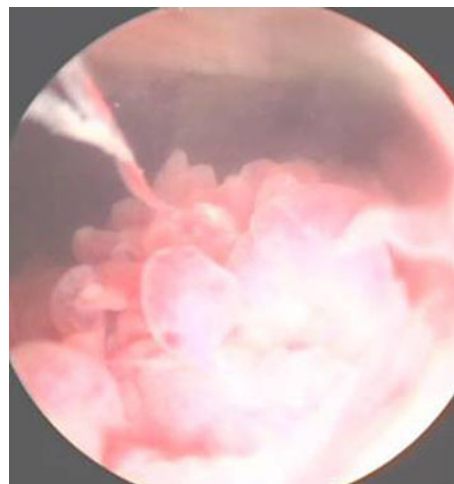
A tourniquet was applied high around the thigh under epidural anesthesia in arthroscopic surgery. The knee joints were usually punched through medial and lateral infrapatellar approaches. The joints were irrigated throughout with 5,000 ml of saline. If the irrigation and drainage were not unobstructed, the lateral suprapatellar approach would be done to let saline inpour in joints. In the first step, the joints were inspected under a  $30^\circ$  arthroscope. In the second step, the actively inflamed synovium was resected by the shaver totally in the order of suprapatellar bursa, lateral and medial gutters, medial and lateral apartments of the joint, and intercondylar fossa of the joint in which actively inflamed synovium should be resected carefully since it was around the cruciate ligaments. If the synovium was also active in the posterolateral and posteromedial apartments of the joint, which was often found in the rheumatoid arthritis, the posterolateral and posteromedial approaches must be taken. Using these approaches, the actively inflamed synovium might be conveniently and safely resected. After operation, drainage was not used and the pressure bandages were applied from the foot to the thigh. Active movement was started on the first postoperative day. Walking with crutches was allowed on the same day.

A tourniquet was applied high around the thigh under epidural anesthesia in open surgery. The patients took the supination position. Firstly, an anterior longitudinal incision was made on the skin and subcutaneous tissue of the knee joint from the suprapatellar bursa to the tibial

tubercle. Secondly, the patella was turned over from medial side after the medial patellar retinaculum being incised. The actively inflamed synovium in the suprapatellar bursa, lateral and medial gutters, lateral and medial apartments, and intercondylar fossa could be exposed easily and be resected easily and totally. Then, the patients were turned over to pronation position. An s-shaped incision was made which crossed from proximal–lateral to distal–medial at the level of the knee joint. It must be careful about the neurovascular structures of the popliteal fossa which, including the popliteal vessels, and the peroneal and tibial nerve, should be identified and mobilized aside. After the posterior capsule of the joint was exposed and incised, the posterolateral and posteromedial apartments were exposed. Then, the actively inflamed synovium was resected. After the operation, the drainage was used and was removed in 24 h. Passive movement was started on the second postoperative day.

### Results

In the surgical process, it was found that the synovium was thickened slightly to a medium degree and straw-colored synovia in knee joints of the non-specific synovitis; It was found that there were numerous villi, swollen masses of redundant synovial tissue, and the greenish and turbid synovia in the knee joints of rheumatoid arthritis, and the synovium frequently appeared congested and edematous (Fig. 1). Sometimes the free fibrinoid masses were found in the knee joint of this disease. After operation, the scars of the incision of the arthroscopic synovectomy, each of whose lengths was about 1.0 cm (Fig. 2), were much shorter than that of the open synovectomy each of whose



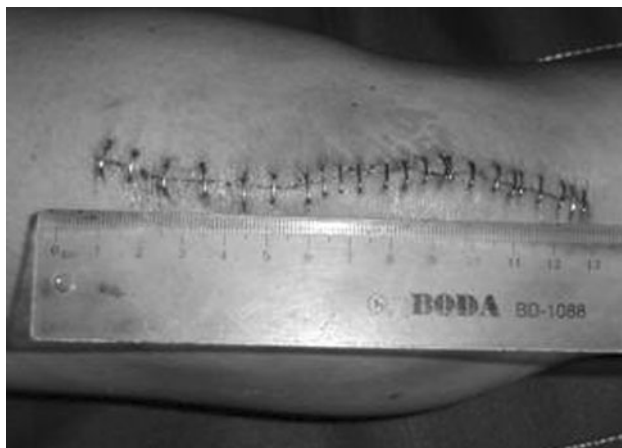
**Fig. 1** Numerous villi and swollen masses of redundant synovial tissue in the knee joints of rheumatoid arthritis



**Fig. 2** The scars of the incision of the arthroscopic surgery on a knee, each of which was about 1.0 cm



**Fig. 4** Posterior scar of the incision of open surgery on a knee, which was more than 10 cm



**Fig. 3** Anterior scar of the incision of open surgery on a knee, which was more than 10 cm

lengths was more than 10 cm (Figs. 3, 4). The scores of visual analog scale between the arthroscopic synovectomy group ( $3.44 \pm 0.86$ ) and the open synovectomy group ( $4.83 \pm 0.91$ ) were significantly different ( $P < 0.05$ ). In each group, the scores before and after operation were significantly different according to the Ogilvie–Harris scoring system (Table 1). The difference of the scores of the Ogilvie–Harris scoring system before and after the operation was  $5.82 \pm 1.01$  in the arthroscopic synovectomy group and was  $5.25 \pm 0.97$  in the open synovectomy group, and it was not significantly different between the two groups ( $P > 0.05$ ). There were no complications or infections in both groups. There were no recurrent cases within follow-up period.

**Table 1** The scores of the Ogilvie–Harris scoring system before and after operation

	Scores of the Ogilvie–Harris		<i>P</i> value
	Preoperative	Postoperative	
Arthroscopic synovectomy	$3.41 \pm 0.91$	$9.23 \pm 1.07$	$<0.05$
Open synovectomy	$3.70 \pm 1.13$	$8.95 \pm 1.32$	$<0.05$

## Discussion

This study demonstrated that the chronic inflamed synovitis in knees, including rheumatoid arthritis and non-specific synovitis, had been successfully treated by either arthroscopic synovectomy or open synovectomy in a short term. And the study demonstrated that the efficacy of both methods for treating the chronic inflamed synovitis in knees was similar in the short term. N. Matsui et al. [3] reported similar results in the long term. At the 24th hour, after the operation, patients in the arthroscopic synovectomy group experienced less pain than the open synovectomy group. Less pain would be helpful for the recovery. Many studies reported that the method of arthroscopic synovectomy had some advantages, such as reducing blood loss following surgery, short duration of hospitalization, faster recovery, little postoperative pain, minimal loss of the range of movement, and repeated operations being feasible [1, 3, 6–9]. However, the recurrence rate of synovitis was higher in the group treated with arthroscopic synovectomy than the group treated with open synovectomy and insufficient removal of the inflamed synovial membrane was the main cause for recurrence [10, 11]. It is certain that complete and sufficient removal of the inflamed synovium is the key factor to prevent recurrence of synovitis. If the inflamed synovium is found in the posterolateral and posteromedial apartments of the knee joints of

chronic inflamed synovitis during arthroscopic operation, it usually cannot be resected completely and sufficiently only through medial and lateral infrapatellar approaches. This may be the reason for an increasing recurrence rate. In order to aggressively resect the inflamed synovium in the posterolateral and posteromedial apartments, the posterolateral and posteromedial approaches must be added though the more difficult technique is demanded. Through these approaches, the inflamed synovium in the two apartments can be resected completely and sufficiently. So, the recurrence rate may be reduced. It has been reported that less severely damaged joints deteriorate less rapid after synovectomy [2], so when conservative therapies have failed, the surgical synovectomy should be performed quickly in rheumatoid arthritis [8, 12].

As was mentioned in this study, there are two to five approaches, each of whose lengths is about 1.0 cm on the skin in the arthroscopic synovectomy. However, there are two approaches, each of whose lengths is more than 10 cm on the skin in the open synovectomy. Obviously, according to cosmetology, the arthroscopic synovectomy is superior to the open synovectomy. The long scars on anterior and posterior surfaces of the knee in the patients of open synovectomy will make the patients more depressed about their appearance, but the two to five so short scars in the patients of arthroscopic synovectomy will not do. This make us prefer to take the arthroscopic synovectomy to treat the chronic inflamed synovitis of the knee joints if the patients pay more attention to their appearance.

In conclusion, the chronic inflamed synovitis of the knee joint may be treated successfully by the method of the arthroscopic synovectomy or open synovectomy. The method of arthroscopic synovectomy has more advantages, such as faster recovery, less postoperative pain, excellent cosmetic result, and so on. Thus, the method of arthroscopic synovectomy is the preferred operation for treating the chronic inflamed synovitis.

**Conflict of interest** The authors declare that they have no conflict of interest.

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