
臨 床

Arthroscopic Resection of the Shelf (Mediopatellar Plica) in the Knee under Local Anesthesia in Outpatient Clinic

YOSHITAKA MATSUSUE, TOYOJI UEO, TAKAO YAMAMURO

Department of Orthopaedic Surgery, Faculty of Medicine, Kyoto University, Kyoto, Japan.

Received for Publication, Feb. 1, 1991.

Summary

Forty-two knees with symptomatic mediopatellar plicae (shelves) were managed using the operative method under local anesthesia. Of these, thirty-one knees had isolated mediopatellar plicae, and eleven had other associated intra-articular pathologic condition, such as meniscal tear, lateral patellar tracking, osteochondritis dissecans, and minor osteoarthritic changes. The clinical results were excellent or good in thirty-seven (88%) patients, fair in five patients after an average follow-up of twenty-five months. No case showed deterioration after surgery. Because there are no definitive criteria for the indication of shelf resection, arthroscopic resection of the shelf under local anesthesia is recommended if there is any possibility of it being the cause of knee pain.

Introduction

Several kinds of fold, pleats, or shelves of synovial membrane may exist in the knee joint^{3,4,13}. Of these, the medial plica is considered to be the one most likely to cause symptoms^{1,2,4,5,8,9,10,14}. The accurate diagnosis of medial plica syndrome, however, is not able to be obtained either from symptoms, physical findings, or conventional tests including arthrography.

Nowadays, it is obvious that with the help of endoscopy the diagnostic accuracy has improved considerably. During the last five years, we have exclusively carried out arthroscopies under local anesthesia in the out-patient clinic. Obtaining an accurate diagnosis in the early phase of the treatment process can reduce both the time and cost of the entire treatment process. The purpose of this study was to review the results of endoscopic surgery of the symptomatic mediopatellar plica under local anesthesia and to emphasize the fact that a shelf observed by chance during routine arthroscopic examination in the out-patient clinic should be resected arthroscopically even if the pathogenetic evaluation is not completely definitive.

Key words: Arthroscopic resection -shelf -knee -Local anesthesia -Outpatient clinic.

索引語: 鏡視下切除, 棚, 膝, 局所麻酔, 外来

Present address: 54 Kawahara-cho, Shogoin, Sakyo-ku, Kyoto, 606, Japan.

Materials and Methods

Arthroscopic resection of mediopatellar plica was performed in 51 knees (48 patients) during the period from 1984 to 1988. During this five-year period, all the 238 arthroscopic procedures were performed in the out-patient clinic under local anesthesia by one of the authors (Dr. UEO) at Kyoto University Hospital in Kyoto, Japan. Forty-two knees of 39 patients were reviewed, with follow-up periods ranging from 12 to 59 months (average, 25 months) after surgery. The age of the patients ranged from 11 to 53 years, with a mean of 25 years. Twenty-one were male and 18 were female. Of the patients operated on for the purpose of resecting their synovial shelf, thirty-one patients (73%) were under 30 years of age and eight patients (19%) were over 40 years of age. There patients had bilateral involvement. The duration of symptoms prior to arthroscopy averaged 25 months (1 to 210 months).

About one third of the patients had a history of continuous sports activity, and another one third of the patients have had a traumatic accident involving the knee. Thirty-eight percent of the patients had no unusual history of the knee.

Follow-up data were obtained through interviews and physical examinations in 31 knees, and through telephone interviews in 11 knees. Symptomatic results were graded by the patients themselves as excellent, good, fair, or poor.

A result of excellent was noted in patients with no symptoms and who showed full activity; a good result was noted in patients with improved symptoms after surgery, but who showed some intermittent symptoms during full activity; and a fair result was noted in patients with no change of symptoms. A poor result was used if symptoms worsened after arthroscopy.

Operative method

All arthroscopic examinations and surgical procedures were performed under local anesthesia in the outpatient clinic. One nurse, who prepares the operative field with drape, was sufficient to do the test, because the patient could move his leg freely. 20 cc of 1% Xylocaine with epinephrine and 20 cc of 2% Xylocaine without epinephrine were mixed to prepare the local anesthetic. After the skin and underlying soft tissue had been infiltrated with 7 cc of Xylocaine, 15 cc of Xylocaine was injected into the joint cavity. After 10 minutes of Xylocaine injection, the joint was filled with saline, and a Stroz 4 mm arthroscope was inserted into the joint through the anterolateral portal. When the need for resection of the shelf was indicated during arthroscopy, infiltration of the skin and underlying tissue of the antero-lateral suprapatellar region with Xylocaine was performed. The arthroscope was then removed from the knee and reinserted through a suprapatellar lateral portal, allowing the

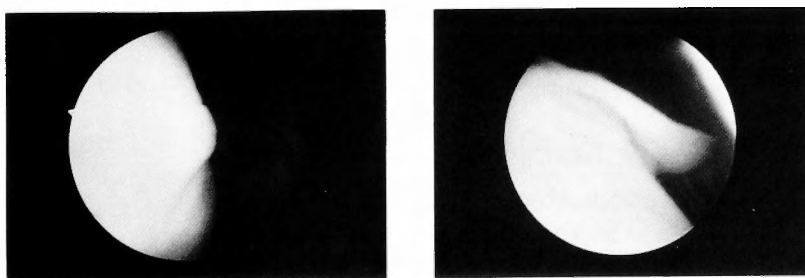


Fig. 1. These photographs show irregularity (left side) and flaking (right side) of the medial femoral condyle in conjunction with shelf (mediopatellar plica).

Table 1. Associated intra-articular pathologies (Group II).

Meniscus tear	3
After meniscal repair	1
Subluxation of the patella	2
ACL insufficiency	2
Osteoarthritis (mild)	2
Osteochondritis dissecans	1

plica to be viewed from above. A pair of basket forceps or scissors was inserted through the anterolateral portal, and subtotal resection of the shelf was performed under direct arthroscopic vision. The time for the arthroscopic shelf resection was not more than 15 minutes longer than a simple arthroscopic examination. Our indication to resect the shelf was based on such pathological findings of the medial femoral condyle as fibrillation irregularity, or flaking, that were detected in conjunction with the shelf (Fig. 1).

The series was divided into two groups based on the presence or absence of associated intra-articular pathologic conditions. Group I, consisting of 31 knees (28 patients), included knees in which the only pathologic finding was a hypertrophic mediopatellar plica. Group II, consisting of 11 knees (11 patients), included knees in which intra-articular pathologic conditions beyond the plica and localized chondromalacia were noted. Associated intra-articular pathologic conditions included meniscal tears, ACL, insufficiency, lateral patellar tracking, osteochondritis dissecans, and osteoarthritis. All these conditions were slight and needed for no additional surgical procedures (Table 1).

Table 2. Symptoms in 42 knees with shelves.

Pain when ascending or descending the stairs	71 %
Pain when walking	24 %
Pain during sports activities	27 %
Pain when standing up or sitting down	24 %
Pain during long periods of standing	12 %
Pain when resting	22 %
Pain when stretching the knee	2 %
Clicking during flexion or extension	41 %
Difficulties encountered when trying to sit in the correct Japanese manner	27 %
Giving-way	22 %
Joint effusion	5 %

Table 3. Physical findings in 42 knees with shelves.

Tenderness above the medial patello-femoral joint line	56 %
Tenderness on the medial or lateral femoro-tibial joint line	51 %
Positive McMurray test	33 %
Palpable fibrous band on the edge of the medial femoral condyle	23 %
Snapping	21 %
Atrophy of quadriceps muscle	15 %

Results

Symptomatology and physical findings

There was no significant difference in symptoms and physical findings between Group I and Group II, thus the symptoms and physical findings are discussed together.

Pain was the chief complaint in 87% of the patients, which was most often felt when ascending or descending the stairs (71%). Clicking was part of the symptom complex in 41% of the patients, but was noted in only 10% of the patients as chief complaint. Giving-way felt in 22%, and joint swelling was complained by only 5% of the patients (Table 2).

The most common physical findings in the present series were those related to the medial compartment of the knee. Tenderness at the lateral part of the femoro-tibial joint space was detected in only 5% of the patients. Palpable fibrous band on the edge of the medial femoral condyle was noted in 23%, snapping in 21%, and atrophy of quadriceps muscle in 15% of the patients (Table 3).

Table 4. Arthroscopic findings of the cartilage of the patella and medial femoral condyle.

Pathological findings of the patella		Pathological findings of the medial femoral condyle	
no particular change	62 %	fibrillation	41 %
fibrillation	24 %	irregularity	19 %
flaking	8 %	flaking	17 %
softening	6 %	softening	5 %
		no particular change	19 %

Table 5. Symptomatic results by Group.

	excellent	good	fair	poor
Total	23 (55%)	14 (33%)	5 (12%)	0
Group I	21 (68%)	8 (26%)	2 (6%)	0
Group II	2 (18%)	6 (55%)	3 (27%)	0

Table 6. Symptomatic results by age.

	excellent	good	fair	poor
Under 40 y.o. (34 joints)	22	9	3	0
Over 40 y.o. (8 joints)	1	5	2	0

Table 7. Symptomatic results by type of the shelves using Sakakibara's classification.

Type	excellent	good	fair
B (16 joints)	7	6	3
C (21 joints)	13	6	2
D (5 joints)	3	2	0

Radiographic findings

In radiography, Group I showed no particular findings. In Group II, one of the radiographs showed mild osteoarthritic findings in the medial compartment, one showed the healing stage of osteochondritis dissecans of the medial femoral condyle, and two showed mild patellofemoral subluxation. There was no marked joint space narrowing, osteophyte formation, or subchondral sclerosis in the involved compartment.

Arthroscopic findings

There was no significant difference in the pathological findings of the patella and medial femoral condyle between Group I and Group II. Overall results of arthroscopic findings are shown in Table 4. As to pathological findings of the patella, more than half of the cases (62%) showed no particular change, and fibrillation was noted in 24% of the cases. As to pathological findings of the medial femoral condyle, fibrillation was the most common finding (41%) and irregularity was detected in 19% of the cases. There was no particular change in 19% of the cases, thus much less extensive than in the patella (Table 4).

Symptomatic results

In total, excellent and good results were achieved in 88% of the patients and no poor result was obtained. In Group I, excellent and good results were obtained in 94% of the patients.

In Group II, excellent results were achieved in only 18%, but this method was effective in 73% of the patients in spite of the associated minor pathologic changes. No worse result was obtained (Table 5).

The results obtained for patients under 40 years or age were 65% for excellent and 26% for good. The results for those over 40 years of age were 12% for excellent and 63% for good; three quarter of the patients showed excellent and good results (Table 6).

Shelves were divided into three groups (B, C, and D) according to their shape using SAKAKIBARA's classification (13). More favorable results were obtained in patients who had highly developed shelf structure. Excellent or good results were obtained in 80% of B type shelves, 90% of

C type, and 100% of D type (Table 7).

Discussion

Today, most knee surgeons would agree that a mediopatellar plica can cause knee pain. Although the incidence of medial plica involvement has been reported to be from 20% to 45%^{1,9,13}, the indication of resection of symptomatic mediopatellar plica is not clearly defined and the results of plica surgery are at present controversial^{1,14}. In general, it is considered that a plica becomes pathologic if for any reason the fold is converted into a bowstring⁵. Trauma or strenuous sports activity is related to the cause of plica syndrome in more than half of the cases. In our study, one third of the patients had trauma involving the knee and another one third were involved in athletic sports activities. However, the remaining one third were not involved in either trauma or sports activities. No correlation was found in the clinical results between these three groups.

Arthroscopically, pathological findings of the medial femoral condyle were found to be more common than those in the patella in this study, although PATEL¹⁰ reported that medial facet chondromalacia was noted more frequently than anteromedial femoral chondral irregularity in conjunction with medial patellar plica. Only two patients showed no pathologic change both in the patella and the medial femoral condyle in this study.

Concerning the operative method, we performed release or segmental resection of the shelf in the early cases. However, we experienced five cases of recurrence of the symptomatic shelf, as confirmed by arthroscopy later. Therefore, subtotal resection of the shelf was routinely performed in most cases, and it is important that the medial capsule should not be injured so as not to cause pain by scar formation, and the distal attachment of the shelf to the fat pad is resected as much possible.

There have been many studies on arthroscopy under local anesthesia in recent years^{6,7,11}. The advantages of performing the arthroscopy under local anesthesia are as follow; 1) The burden to the patients is less than those under lumbar or general anesthesia. 2) The patient can observe the findings that are projected on the display and receive an adequate explanation of the findings from the doctor. 3) The pathology under dynamic conditions, as shown in Fig. 2, can be obtained when considering the patell-femoral relationship, including the extent of synovial shelf impingement. Therefore, the authors recommend that arthroscopy for patello-femoral disorders should be performed under local anesthesia.



Fig. 2. These photographs show the relationship between the synovial shelf and medial femoral condyle under dynamic conditions under local anesthesia; When the quadriceps muscle is relaxed, the shelf does not contact the medial femoral condyle (left side). On the other hand, the shelf impinges on the condyle (arrow) when the quadriceps is actively contracted (right side).

Some authors have emphasized that the diagnosis of plica syndrome must be done by exclusion of other associated intra-articular pathologic findings⁹⁾. It is no doubt that the excision of the typical symptomatic plica, which is larger, thick and tight and impinges on the medial femoral condyle, gives excellent results in most cases^{4,8,9,10)}. However, RICHMOND¹²⁾ reported that in patients with associated conditions, good to excellent results were obtained in 69% of those knees. In our series, good to excellent results were obtained in 88% of all knees and the resection of shelves was effective in 73% of the patients in spite of the combined minor intra-articular pathologic changes, although complete relief of pain was obtained in only two knees (18%). In symptomatic results, 75% of the patients over 40 years of age showed favorable outcome after the operation, thus it is emphasized that even in older patients the resection of the shelf was effective to some extent and there was no patients who complained of increased pain after surgery.

SAKAKIBARA¹⁴⁾ showed the existence of a shelf which shows no pathological condition but an irritable joint capsule due to some patellofemoral morbidity. He suggested that in this state stretching of the normal shelf might cause pain, and concluded that the indication of shelf surgery in this type should be limited because improvement of pain is inferior to that in the typical shelf syndrome. However, the authors advocate that the shelf be excised if there is any possibility of it being the cause of knee pain, because in the present study group a relatively favorable outcome was obtained after this operation and no adverse effects were observed. In addition, the excision of the shelf under local anesthesia requires minimal additional time, around 15 minutes, which is not a heavy burden to the patient.

References

- 1) Broom MJ, Fulkerson JP: The plica syndrome: a new perspective. *Orthop Clin North Am* 17: 279-281, 1986.
- 2) Hardaker WT, Whipple TL, Basset FH: Diagnosis and treatment of the plica syndrome of the knee. *J Bone Joint Surg* 62-A: 221-225, 1980.
- 3) Iino S: Normal arthroscopic findings of the knee joint in adult cadavers. *J Jpn Orthop Assoc* 14: 467-525, 1939.
- 4) Jackson RW, Marshall DJ, Fujisawa Y: The pathologic medial shelf. *Orthop Clin North Am* 13: 307-312, 1982.
- 5) Kinnard P, Levesque RY: The plica syndrome: a syndrome of controversy. *Clin Orthop* 183: 141-143, 1984.
- 6) Klein W, Schulitz KP: Outpatient arthroscopy under local anesthesia. *Arch Orthop Traumat Surg* 96: 131-134, 1980.
- 7) McGinty, JB, Matza RA: Arthroscopy of the knee: evaluation of out-patient procedure under local anesthesia. *J Bone Joint Surg* 60-A: 787-789, 1978.
- 8) Moller H: Incarcerating mediopatellar synovial plica syndrome. *Acta Orthop Scand* 52: 357-361, 1981.
- 9) Munzinger U, Ruckstuhl J, Scherrer H, Gschwend N: Internal derangement of the knee joint due to pathologic synovial folds: The mediopatellar plica syndrome. *Clin Orthop* 155: 59-64, 1981.
- 10) Patel D: Arthroscopy of the plicae: synovial folds and their significance. *Am J Sports Med* 6: 217-225, 1978.
- 11) Pevy JK: Outpatient arthroscopy of the knee under local anesthesia. *Am J Sports Med* 6: 122-127, 1978.
- 12) Richmond JC, McGinty JB: Segmental arthroscopic resection of the hypertrophic mediopatellar plica. *Clin Orthop* 178: 185-189, 1983.
- 13) Sakakibara J: Arthroscopic study on Iino's band (plica synovialis mediopatellaris). *J Jpn Orthop Assoc* 50: 513-522, 1974.
- 14) Sakakibara J: Pathogenesis of the shelf syndrome. First International Congress of Knee and Orthopaedic Sports Medicine Section of W.P.O.A. in Yokohama, Japan, 1989, Abstract: p. 96.

和文抄録

外来における局麻下タナ切除術

松末 吉隆, 上尾 豊二, 山室 隆夫

有痛性の42関節の内側膝蓋骨膜皺（タナ）を局所麻酔下の関節鏡視下に切除した。その内31関節が単独のタナで、11関節は、半月板損傷、膝蓋骨亜脱臼、離断性骨軟骨炎や軽度の関節症変化などの関節内病変を合併していた。術後平均25ヶ月の経過観察期間で、37例

（88％）に、臨床上優または良の成績が得られ、可は5例で悪化例は認められなかった。タナ切除の正確な適応が明らかでない以上、膝関節痛の原因として可能性が示唆されるならば、外来局所麻酔下での鏡視下タナ切除を行ってよいと考えられる。