The Benefit of Arthroscopy for Symptomatic Total Knee Arthroplasty

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Thirty-one knees with symptomatic total knee arthroplasty were diagnosed and treated arthroscopically. There were 18 knees with soft tissue impingement and 13 knees without. There were 16 knees with painful arthroplasty and range of motion (ROM) greater than 90°. Hypertrophied synovitis with or without impingement was more easily found by arthroscopy in this group than in the other 15 knees with the chief complaint of limited ROM, where more remarkable fibrotic tissue with intra-articular adhesion was found. Overall, the average improvement in ROM was 43.1° immediately after arthroscopy, and 20° at the final follow-up. Symptoms improved in 90.3% of patients, and 58.1% were satisfied with the outcome of their surgery. Arthroscopy is helpful for intra-articular diagnosis, obtaining a specimen for histopathologic analysis, culture for subclinical infection, and better improvement in ROM. In our experience, arthroscopy for symptomatic knee arthroplasty is reliable, safe and effective.

Key Words: arthroscopy, total knee arthroplasty
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Total knee arthroplasty (TKA) is a popular and successful treatment for knee-joint problems. However, a subset of patients will suffer from persistent pain, with or without insufficient range of motion (ROM), after TKA. The results of arthroscopic evaluation of TKA vary considerably among published reports [1–4]. The purpose of our study was to assess the benefit of arthroscopic diagnosis and treatment of symptomatic TKA.

Patients and Methods

Between August 1999 and May 2002, 44 patients (44 knees) who had symptoms of persistent pain after TKA, with or without insufficient ROM, were arthroscopically diagnosed and treated at our institution. Clinical investigations with detailed history review, physical examination, and radiographic studies (anteroposterior, lateral and Merchant views) to detect possible pathologic conditions (e.g. malpositioned prosthesis, osteophytes, cementophytes, loosening of prosthesis and intra-articular loose bodies) were performed.

Patients with non-infectious cases of TKA were put on a regimen of medication and physical therapy. Laboratory examinations, including erythrocyte sedimentation rate and C-reactive protein, were carried out in patients with suspected infection. Patients who suffered from painful and limited motion after TKA were included in this study. Arthroscopic surgery was recommended if symptoms persisted after medication and physical therapy, or if there was suspected subclinical infection.

All patients were evaluated clinically and radiographically. Knee-joint ROM was measured preoperatively. Patients were questioned on the state of their symptoms: completely subsided; persisting; remained but improved; exacerbated. Subjective satisfaction of arthroscopic surgery was evaluated as excellent, good, fair or poor. Preoperative and postoperative radiographs were also reviewed.

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Under general or spinal anesthesia, the knee was flexed gently. In the cases of limited ROM, gentle and careful manipulation was then performed, and further manipulation was carried out after the arthroscopic procedure. The amount of knee flexion under anesthesia, after manipulation, and after arthroscopic arthrolysis was recorded. Surgical arthroscopy was performed through two portals with routine instrumentation. A third portal was added when necessary. The arthroscope was introduced carefully into the knee via the anterior lateral portal. Joint fluid was sent for bacterial culture, and debrided soft tissue for histopathologic analysis.

Examination of the joint was undertaken in a systematic fashion to inspect for polyethylene wear, component loosening, malposition of the components, cementophytes, intra-articular adhesions, fibrotic bands, loose bodies, impingement or infection. Each compartment was inspected statically and during knee motion for soft tissue impingement. The patellofemoral joint was also evaluated by inspection on passive flexion and extension maneuvers. Hypertrophied synovitis and fibrotic tissue were resected by motorized shaver while extreme caution was taken to avoid iatrogenic damage to the polyethylene.

All procedures were done with tourniquet control. Patients received prophylactic antibiotics for 24–48 hours. Immediate ROM exercises using a continuous passive motion machine were started on the same day as the operation. Supervised physical therapy was arranged for most patients before they were discharged.

Results

Arthroscopy was undertaken in five knees with the preoperative impression of infection: four knees were found to be infected, and one knee had polyethylene wear. During the postoperative follow-up period, one patient suffered from periprosthetic fracture, three patients died, and four were lost to follow-up. Hence, 13 patients were excluded and the results of the remaining 31 patients were available for analysis.

Follow-up evaluation included an interview of the patient (by phone or in person), physical examination, and preoperative and postoperative radiographic studies. There were 16 males and 15 females; mean age was 68.7 years (range, 27–91 years). The mean time interval between TKA and arthroscopy was 15.7 months (range, 0.7 months to 8.5 years). The mean follow-up period was 2.6 years (range, 4.7 months to 4.1 years). The mean duration of hospital stay was 6 days (range, 3–19 days). The indications for symptomatic TKA were: primary osteoarthritis in 27 patients; osteonecrosis of the medial tibial condyle with secondary osteoarthritis in one patient; hemophilic arthropathy in one patient; gouty arthritis in one patient; and previous knee fusion with suspected septic arthritis in one patient.

There were 13 knees with no soft tissue impingement. However, 18 knees had soft tissue impingement in different compartments of the prosthesis (Figure): three in the patellofemoral compartment; five medially; two laterally; six in both the medial and lateral compartments; one in both the patellofemoral and lateral compartments; and one in all compartments (medial, lateral and patellofemoral). Lateral retinacular release was done in 14 knees, posterior cruciate ligament release for tight posterior cruciate ligament in five knees, adhesiolysis in 26 knees, and synovectomy in all knees.

The mean improvement in ROM was 43.1° immediately after arthroscopy, and 20° at final follow-up. Although ROM improved very much immediately after arthroscopy, we found, during the follow-up, that ROM decreased with time. Two patients experienced complications related to their arthroscopic procedures (Table). One received revision arthroscopic debridement and drainage for hemarthrosis 10 days after previous arthroscopic surgery. One initially had poor wound healing, but healed after adequate treatment.

There were 16 knees with painful arthroplasty and ROM greater than 90° (group I). Hypertrophied synovitis with or without impingement was more easily found by arthroscopy in this group than in the other 15 knees with the chief complaint of limited ROM (< 90°) but less pain (group II), where the operative findings were fibrotic tissue with intra-articular adhesion. We analyzed these two groups separately.

In group I patients, pathologic examination or operative findings revealed 13 cases of synovitis and three cases with fibrotic tissue. The mean preoperative ROM was 97.8° (range, 90–130°). Mean ROM immediately after arthroscopy was 123.4° (range, 105–130°), and at final follow-up was 104.1° (range, 45–130°). Hence, mean improvement in ROM was 25.6° immediately after arthroscopy, and 6.3° at final follow-up. Symptoms had completely subsided in three cases, persisted in two cases, and remained but improved in 11; there were no cases of exacerbated symptoms. Three patients evaluated their arthroscopic procedure as excellent, six as good, five as fair, and two as poor.

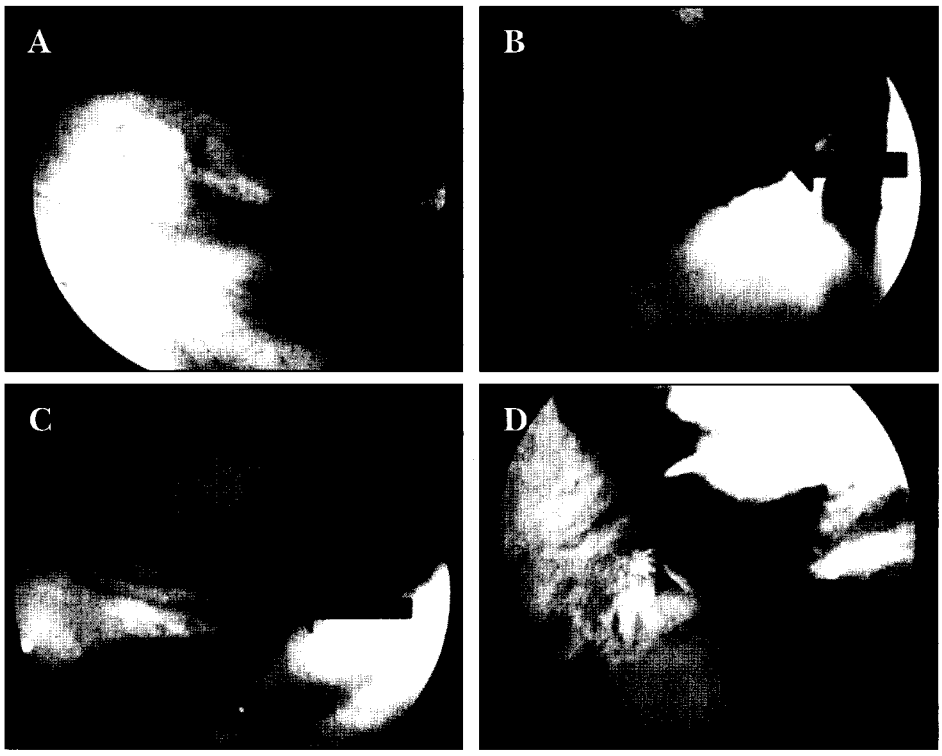


Figure. *Examples of gross pathologic findings observed by arthroscopy: (A) soft tissue impingement in the medial compartment; (B) soft tissue impingement in the lateral compartment; (C) soft tissue impingement in the patellofemoral compartment; (D) hypertrophied synovitis in the knee joint.*

In group II, five patients had synovitis and 10 had fibrotic tissue. The mean preoperative ROM was 48.0° (range, 25–80°). Mean ROM immediately after arthroscopy was 109.7° (range, 90–130°), and at final follow-up was 82.7° (range, 45–120°). Hence, mean improvement in ROM was 61.7° immediately after arthroscopy, and 34.7° at final follow-up. Symptoms had completely subsided in two patients, persisted in one, and remained but improved in 12; there were no cases of aggravated symptoms. Three patients evaluated their arthroscopic procedure as excellent, six as good, six as fair, and none as poor.

Overall, the symptoms in 16.1% (5/31) of patients had completely subsided, and symptoms had improved in 74.2% (23/31) of patients. Regarding patient satisfaction, 19.4% (6/31) of patients evaluated their arthroscopic procedure as excellent, and 38.7% (12/31) as good.

Table. Summary of postoperative results

	Group I (n = 16)	Group II (n = 15)
Mean preoperative ROM	97.8°	48.0°
Mean follow-up, yr	2.5	2.7
Operative finding		
Synovitis	13	5
Fibrosis	3	10
PF malalignment	8	6
Soft tissue impingement	8	10
Postoperative result		
Improvement in pain	14	14
Improvement in ROM*	6.3°	34.7°
Complications	1	1

*At the final follow-up appointment. ROM = range of motion; PF = patellofemoral.

Discussion

Arthroscopic treatment of knee disorders is a popular procedure in orthopedics. However, knee arthroscopy in patients with symptomatic knee arthroplasty is not a common procedure due to the risk of damaging the polyethylene and the technical difficulty of the procedure [2,5]. The reported advantages of arthroscopy over arthrotomy for symptomatic TKA include: visualization of all the compartments; lower rate of morbidity; decreased postoperative disability; reduced risk of infection [4]. Prosthesis malalignment, patellar subluxation or dislocation, patellar clunk, intra-articular adhesion, cementophyte, loose

bodies, soft tissue impingement, component loosening, arthrofibrosis, inadequate selection of prosthesis size, poor preoperative ROM, postoperative wound problem, infection, inadequate postoperative physical therapy, and the patient's pain threshold should be considered predisposing factors for symptomatic knee arthroplasty [6].

Although ROM improved in the early postoperative period following arthroscopic surgery, it was not maintained. The benefits of arthroscopy declined over time. In our series, mean knee-joint ROM increased by 43.1° after arthroscopy, and by 20° at final follow-up. Some reports have found that ROM is not significantly improved by arthroscopic treatment [2,3]. However, we found that knee-joint ROM after arthroscopy was more improved in group II – which had more patients with arthrofibrosis, compared with group I – which had more patients with synovitis. For the TKA patients with poor ROM and less pain, a better progression of ROM was achieved. In group I patients, we believe that the major cause of recurrent symptoms and reduced motion is related to recurrent synovitis. On the other hand, for intra-articular adhesion, aggressive physical therapy could reduce the recurrent rate of intra-articular fibrosis, and this may be a possible cause of the better results in group II.

Postoperative physical therapy is important to maintain good results following arthroscopy, as inadequate physical therapy is one of the causes of symptomatic knee arthroplasty. However, to maintain and prolong the beneficial effects of arthroscopy, patient education and determination to adhere to a regimen of physical therapy will also significantly affect the results. As we have previously reported, patients who received more aggressive and persistent physical therapy achieved better results [7].

Since the causes of symptomatic TKA are multifactorial, it has been suggested that arthroscopy should not be performed if physical examination or radiographic studies have not yielded a preoperative diagnosis [4]. However, soft tissue impingement cannot be evaluated preoperatively by physical examination and radiographic studies. In this study, 58.1% of patients were found to have soft tissue impingement on arthroscopic investigation. Hence, we believe that arthroscopic investigation is valuable in patients with painful knee arthroplasty. For subclinical infection of TKA, arthroscopy is useful in that it enables intra-articular debridement and a specimen for culture to be obtained. Although open revision is sometimes necessary, arthroscopic management may be an effective alternative treatment with less postoperative morbidity.

In this series, improvement in pain was achieved in 28 patients (90.3%) after arthroscopy, but only 18 patients (58.1%) were satisfied with their surgery. Although pain and ROM were improved after arthroscopy, the objective assessments by the surgeons and the subjective feelings of the patients do not correlate. The causes of painful TKA are multifactorial, and patients' expectation of arthroscopy may be total resolution of pain. This could be one of the reasons for the relatively low satisfaction rate.

Without a preoperative diagnosis, the indications for arthroscopy in painful knee prostheses are limited. Although painful knee arthroplasty without major intra-articular pathology does not respond well to arthroscopic treatment, arthroscopy is useful for intra-articular diagnosis (e.g. suspicion of polyethylene wear, loosening of components, cementophytes, loose bodies), obtaining a specimen for histopathologic analysis or culture for subclinical infection cases, and better improvement in ROM. Adhesiolysis under arthroscopy is better than manipulation alone or arthrotomy. We found that adhesiolysis and synovectomy, in addition to manipulation, and aggressive regular physical therapy leads to better and prolonged postoperative results. To avoid the complications of arthrotomy, arthroscopy is a good alternative. In our experience, arthroscopic treatment for symptomatic knee arthroplasty is reliable, safe and effective.

References

1. Bocell JR, Thorpe CD, Tullos HS. Arthroscopic treatment of symptomatic total knee arthroplasty. *Clin Orthop* 1991;271:125–34.
2. Campbell ED Jr. Arthroscopy in total knee replacements. *Arthroscopy* 1987;3:31–5.
3. Sprague NF 3rd, O'Connor RL, Fox JM. Arthroscopic treatment of postoperative knee fibroarthrosis. *Clin Orthop* 1982;166: 165–72.
4. van Mourik JB, Verhaar JA, Heijboer RP, et al. Limited value of arthroscopic evaluation and treatment of painful knee prostheses: a retrospective study of 27 cases. *Arthroscopy* 1998;14:877–9.
5. Vernace JV, Rothman RH, Booth RE Jr, et al. Arthroscopic management of the patellar clunk syndrome following posterior stabilized total knee arthroplasty. *J Arthroplasty* 1989;4:179–82.
6. Bae DK, Lee HK, Cho JH. Arthroscopy of symptomatic total knee replacements. *Arthroscopy* 1995;11:664–71.
7. Teng HP, Lu YC, Hsu CJ, et al. Arthroscopy following total knee arthroplasty. *Orthopedics* 2002;25:422–4.

關節鏡手術對於治療有症狀之全人工膝關節置換術之成效

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31 個全人工膝關節置換術後仍有症狀的病患，經過關節鏡診斷與治療後發現 18 個膝關節內發現在關節腔不同的部位有軟組織嵌入的情形。16 位病患之患側手術後仍有疼痛的症狀，而且膝關節活動範圍大於 90 度。關節鏡下發現這類病患之膝關節內有明顯的滑液囊膜增生性發炎現象。然而，另有 15 位病患其疼痛症狀較不明顯，但是有膝關節活動範圍不良且小於 90 度的情形。這類病患在關節鏡下易發現以纖維組織為主。經過關節鏡手術治療後，平均膝關節活動範圍初期改善 43.1 度，最終追蹤時改善 20 度。90.3% 的病患其疼痛症狀改善，有 58.1% 的病患滿意關節鏡手術後的效果。對於治療有症狀之全人工膝關節置換術的病例，關節鏡手術的優點包括有助於診斷關節內病變；標本取得作為組織病理分析；對於疑似感染病例取得標本作為細菌培養；以及改善膝關節活動範圍。因此我們認為，對於這類病患之治療，關節鏡手術是一種可靠；安全及有效的方法。

關鍵詞：關節鏡，全人工膝關節置換術

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