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Case Report

Persistent Symptomatic Knee After Total Knee Replacement. Is Knee Arthroscopy Helpful?
全膝關節置換術後的持續性症狀:關節鏡有用嗎?

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ABSTRACT

Persistent symptoms following total knee replacement (TKR) could be diagnostically challenging. We present three cases of knee arthroscopy following TKR to illustrate the effectiveness of arthroscopy for the diagnosis and treatment of persistent symptomatic knee. It is concluded that arthroscopy after TKR is a relatively safe and effective procedure for well selected cases with persistent symptoms following TKR.

中 文 摘 要

診斷全膝關節置換術後的持續性症狀具挑戰性. 我們提出三個全膝關節置換術後的膝關節鏡手術案例, 以顯示關節鏡於診斷及治療方面對全膝關節置換術後的持續性症狀之有效性. 結論: 全膝關節置換術後的關節鏡是一種相對安全和有效的程序

Introduction

The demand for total knee replacement (TKR) has been increasing as a result of the aging population. Excellent outcomes[1,2] have been achieved after decades of improvements in technology, surgical techniques, and modifications of implant design. Nevertheless, there are still a small proportion of patients complaining of knee pain and swelling after TKR.[3]

Knee arthroscopy allows diagnosis and treatment of persistent symptoms following TKR in selected cases.[7] In this article, we present three cases of diagnostic and therapeutic knee arthroscopy for painful knee following TKR.

Case reports

Case 1

A 69-year-old lady received right TKR in 2005 for degenerative osteoarthritis. The procedure was complicated by deep venous thrombosis 4 days after the operation. Warfarin therapy was given for 6 months.

During the initial follow-up, she complained of right knee pain localized at the lateral aspect of the inferior pole of the patella and the medial femoral condyle. The right knee range of motion (ROM) was 5–95°. There was no effusion. Patellar tracking was normal. Biochemical and radiological findings were unremarkable. Bone scan and white cell scan did not show evidence of infection.

The right knee symptoms persisted for 3 years despite analgesics and physiotherapy. Repeated radiological examinations did not reveal any abnormalities (Figure 1).

Right knee arthroscopy was performed 3 years and 9 months after the index operation. Intraoperative findings revealed an extensive fibrotic scar inside the intercondylar notch resulting in femoral notch stenosis (Figure 2A). There were also some inflamed tissues in the retropatellar tendon region (Figure 2B). The fibrotic scar and inflamed tissue were debrided using a motor shaver.

Soon after the arthroscopy, there was significant subjective improvement in the right knee pain at the lateral inferior pole of the patella, while the pain at the medial femoral condyle improved with analgesics and physiotherapy. During the latest follow-up 3 years after the knee arthroscopy, she was grossly asymptomatic except for mild pain at the medial femoral condyle of the right knee.

Case 2

A 70-year-old healthy lady suffered from bilateral knee degeneration with the left side being more painful. Left TKR was

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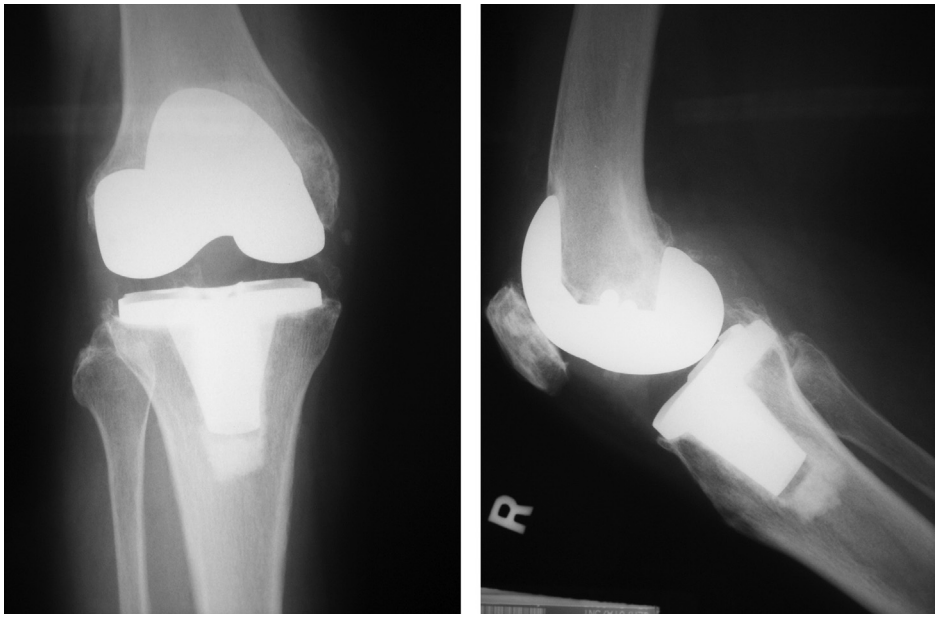

Figure 1. Postoperative radiographs of Case 1.

performed in 2006. The operation was uneventful and she was satisfied with the left knee function after the operation.

She subsequently received right TKR in 2008. The preoperative right knee ROM was 0–110°. Intraoperatively, the flexion and extension gaps were balanced and the patella tracking was good.

Early follow-up for the right TKR was unremarkable and the right knee pain had subsided (Figure 3). However, she was admitted through the emergency department 4 months after the operation for increasing right knee pain and swelling. She was afebrile. There was right knee effusion and the ROM was 5–90°. White cell count was normal. C-reactive protein was mildly elevated. Radiological examination showed no signs of implant loosening. Arthrocentesis of the right knee yielded only a trace amount of blood stained fluid. The culture of the knee aspirate was negative. Analgesics and physiotherapy were given and she was discharged home.

She was admitted again 1 year later for persistent right knee symptoms since the last admission. There was right knee effusion and 25 mL of old blood was aspirated for culture, which was negative.

In view of the frequent and disturbing symptoms, right knee arthroscopy was performed 18 months after the operation. Operative findings revealed irregular and laminated soft tissue entrapped between the lateral femoral condyle and the articular surface that was hindering the knee flexion (Figure 4). Joint fluid was turbid. The entrapped soft tissue was debrided using a motor shaver (Figure 5). The tissue cultures were negative and the section showed fragments of dense hypocellular fibrous tissue with chronic inflammatory infiltrate.

There was progressive improvement in right knee symptoms after the arthroscopy. Comparing to the preoperative state, the Knee Society knee score and function score at 1 year after arthroscopy had improved from 66 to 77 and from 70 to 85, respectively. During the latest follow-up 3 years after the arthroscopic procedure, there was mild right knee pain occasionally. The ROM of the right knee was 0–120°.

Case 3

An 83 year-old gentleman suffered from left knee pain since 2009. He managed to walk with one stick. The left knee ROM was 10–110° and there was varus deformity. Radiological examination confirmed tricompartmental osteoarthritis. Left TKR was performed in June 2010.

Postoperatively, he complained of mild medial left knee pain after prolonged walking. There was a focal tender spot at the medial joint line. There was no knee effusion and the ROM was 10–120°.

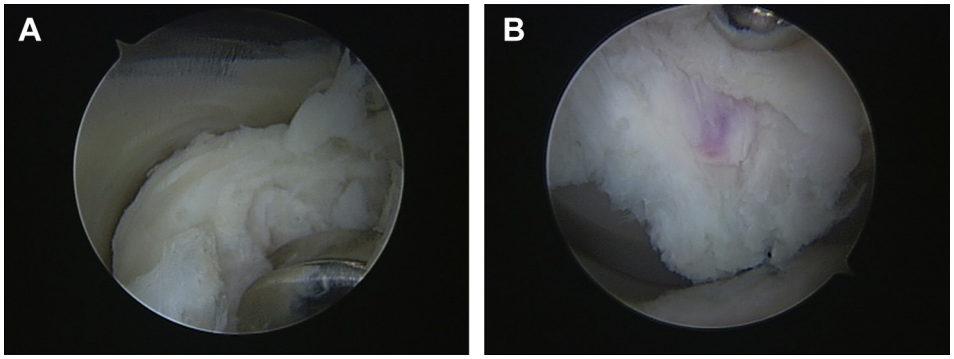

Figure 2. Fibrous nodule occupying most of the intercondylar notch of the femoral component. (A) Extensive fibrotic scar inside the intercondylar notch resulting in femoral notch stenosis. (B) Inflamed tissues in the retropatellar tendon region.

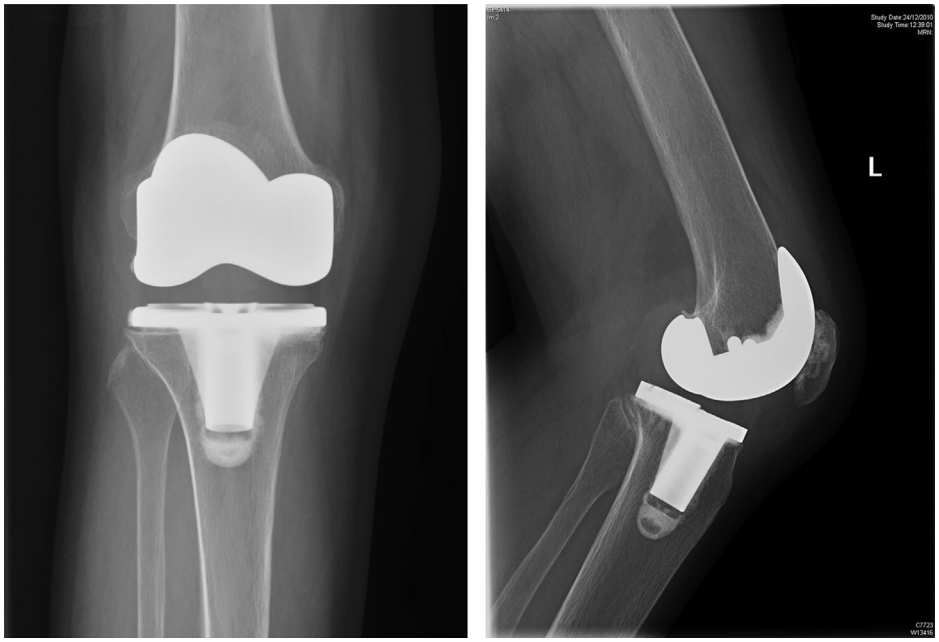

Figure 3. Radiograph of the right knee 1 month after the operation.

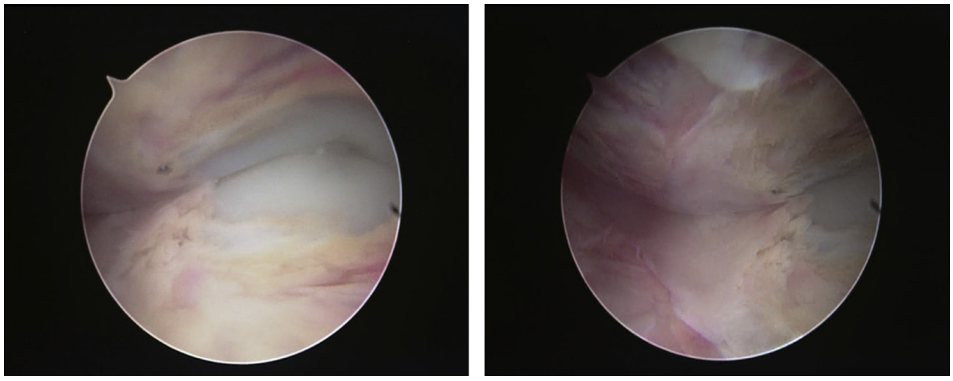

Figure 4. Increase in impingement of the meniscus-like flap from knee extension to flexion.

Patellar tracking was normal. A radiograph of the left knee showed satisfactory implants alignment (Figure 6).

At 1-year follow-up, the left medial knee pain became worse and was even more severe than that of the preoperative period. There was no rest pain or night pain. The pain did not respond to analgesics and physiotherapy. Repeated radiographs, blood tests, and bone scan were unremarkable.

At 23 months after the left TKR, he was admitted through the emergency department for severe left knee pain. The left knee ROM was 0–110°. This gentleman declined the offer of left knee

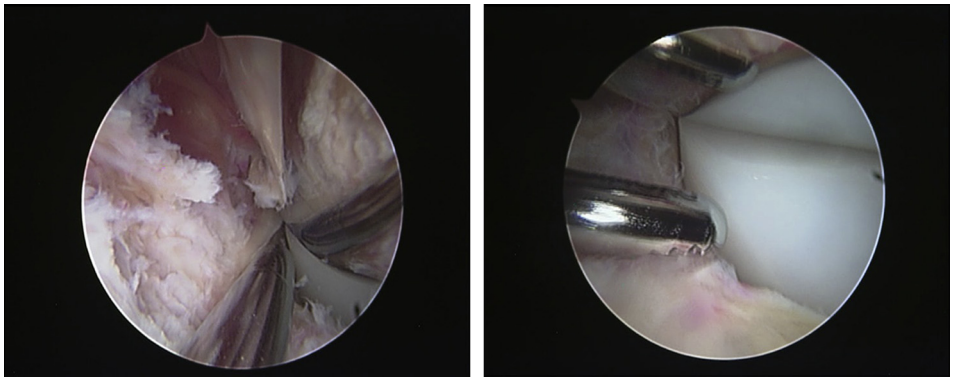

Figure 5. No more impingement after arthroscopic debridement of the redundant soft tissue.

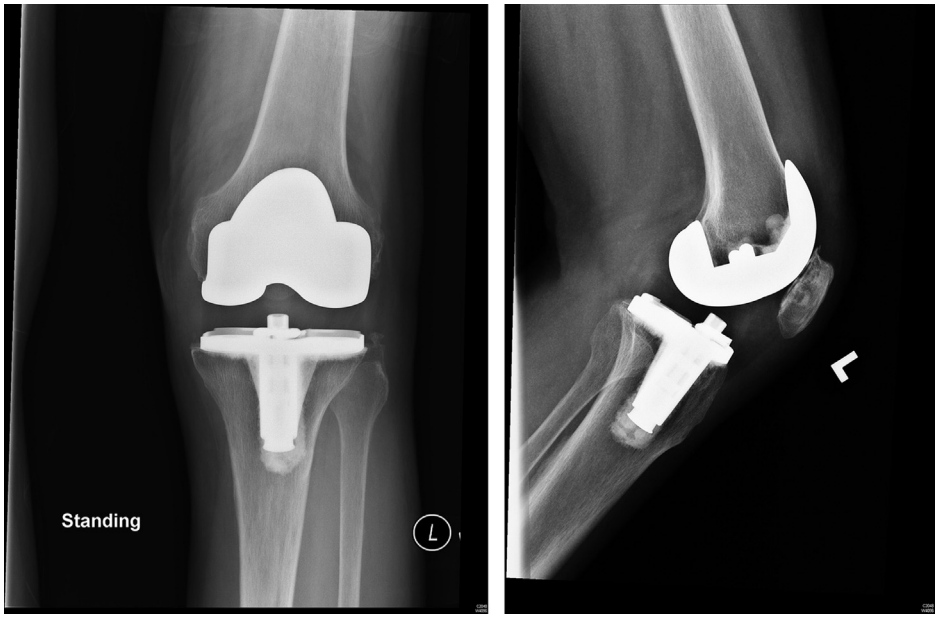

Figure 6. Postoperative radiographs of Case 3.

arthroscopy. He managed to walk with one stick and was discharged with analgesics.

The left knee pain persisted and he eventually agreed for left knee arthroscopy. It was performed 2 years after the initial operation. Intraoperatively, a thin flap-like soft tissue was found entrapped between the medial femoral-tibial articulation during knee flexion (Figure 7). The entrapped soft tissue was debrided completely. The biopsy showed fragments of dense fibrous tissue and fibrocartilage without any inflammation.

The latest follow-up was 6 months following the arthroscopy. The left knee pain had subsided and the medial joint line was non-tender. There was no effusion and the ROM was 5–115°. The Knee Society knee score had improved from 78 to 94, while the function score remained at 70 before and after the knee arthroscopy.

Discussion

Persistent symptoms following TKR defeat the purpose of the operation. The approach to this condition should include a detailed history, thorough physical examination, biochemical, and radiological investigation.[4] White cell count and inflammatory markers such as C-reactive protein and erythrocyte sedimentation rate should be checked. Frontal and lateral radiographs of the affected knee should be taken and comparison with previous radiographs is important for any progressive changes of implant position or loosening. Bone scan, white-cell scan, and knee aspiration are helpful if infection is suspected.[4] Common causes of persistent knee pain after TKR such as acute or chronic infection, implant loosening or malposition, abnormal patella tracking, or clunk can usually be diagnosed following the mentioned pathway. Some cases, however, can be diagnostically challenging.

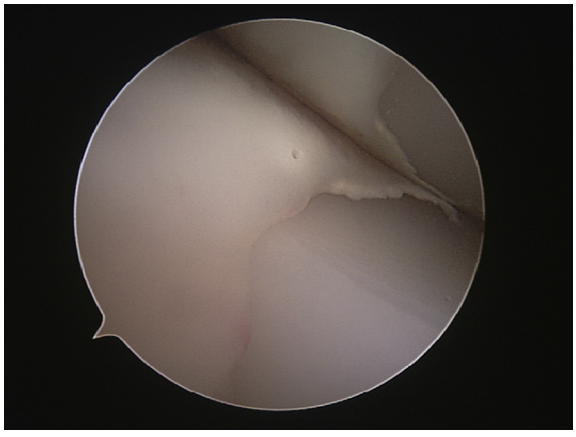

Figure 7. Entrapped soft tissue found under arthroscopy of the left knee.

Although the role of arthroscopy in knee pain following TKR is not well established, there are a growing number of studies showing the efficacy of knee arthroscopy as both a diagnostic and therapeutic means.[7,8]

For the TKR in the three cases, the Zimmer NexGen LPS model was used in the first case, whereas the Zimmer NexGen LPS-flex model was used in the second and the third case. Both models were posterior stabilized with intercondylar open-box designed and fixed bearing implants. Antibiotic-loaded cement was used and the patellae were replaced. All three arthroscopic procedures were performed using 30° arthroscopes, 5 mm plastic trocars and cannulas, standard anteromedial portal and anterolateral portal, with additional superomedial or superolateral portals when necessary.

Prophylactic intravenous antibiotics were given for 48 hours postoperatively in our cases. A high infection rate of 6% after post-TKR arthroscopy was reported in Sisto's group.[9] These patients had only received one dose of preoperative prophylactic antibiotics. It was suggested that intravenous prophylactic antibiotics should be administered 24–48 hours perioperatively to decrease the risk of infection.[7,8]

The first case is a case of femoral notch stenosis resulting in persistent knee pain. Bonutti et al[10] had previously reported a 19-case series with similar conditions presented with progressive loss of extension and increase in knee pain at a mean of 12 months after the index TKR. The author suggested that this late complication is the result of repetitive regional soft tissue trauma in implants with posterior stabilized box impinging against the tibial post during motions of the knee, and thorough resection of all soft tissue in the intercondylar notch during TKR may prevent this condition.

In both the second and third cases, there were soft tissue impingements in the articular surfaces affecting the knee motions. Possible causes include retained meniscus, synovial overgrowth, or pseudomeniscus. Wigren et al[5] had reported a condition of pseudomeniscus in which there was meniscal regeneration following unicondylar knee arthroplasty. It was postulated that the development of this fibrocartilage tissue might be related to the compressive forces triggering the cellular response of mesenchymal-derived cells.[6] This condition should be suspected when patients with initially asymptomatic TKR develop persistent pain localizing at either joint line 3–6 months later. The presentation is compatible with our second case. Although we cannot identify the exact nature of the impinging soft tissue according to the histological report, the morphology of the debrided soft tissue in the second case was irregular and laminated, which further supports the diagnosis of pseudomeniscus. This is in contrast to the third case, in which the debrided soft tissue was smooth, well defined and flap-like, which is more suggestive of retained meniscus. In our opinion, intraarticular pathology such as adhesion bands or retained meniscus may be diagnosed more easily by dynamic arthroscopic assessment as compared to open arthrotomy. During open arthrotomy, the entrapped or impinged soft tissue may be displaced or resected before it was noticed, resulting in false negative findings.

The intraarticular pathology found in our cases was potentially preventable. It is of crucial importance that complete excision of menisci and any impinging soft tissues should be performed. Frequent inspection for soft tissue bands or flaps in the intercondylar notch and interarticular surface should be performed throughout the surgical procedure.

In our centre, knee arthroscopy is performed in patients with persistent symptomatic knee following TKR if the symptoms are not improved with a reasonable period of conservative treatment and if there is suspicious soft tissue impingement. Up to the time of paper submission, there were only four cases performed as the incidence of painful TKR is very low. However, the last one has been followed-up for 1 month only and it was too early to comment on the outcome. Klinger et al[7] reported a series of knee arthroscopies following TKR. In the series, 18/27 cases had improvement in the Knee Society knee score and function score following therapeutic arthroscopy. There was one infection. They concluded that knee arthroscopy provides reliable improvement in symptoms and function in most patients with symptomatic TKR. A similar conclusion was drawn by Diduch et al,[8] which had a series of 38 cases.

Arthroscopy following TKR is technically more demanding. Special care should be taken to avoid scratching the metallic implants and polyethylene during insertion of instruments. Plastic trocar and cannula should be used. Inflating the knee joint by injecting normal saline before insertion of instruments may also help. Mirror-like effects[7] caused by the light reflecting off the metallic components should be anticipated, and therefore, control of arthroscopic instruments should be cautious throughout the procedure.

We conclude that arthroscopy after TKR is a relatively safe and helpful procedure for selected patients with persistent symptoms after TKR. It is important to appreciate that arthroscopy should not be performed for all patients with symptomatic TKR. Patients must be carefully selected and should have received adequate nonoperative treatments before surgical intervention is considered.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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