

CASE REPORT

Revision total knee arthroplasty for unexplained pain after unicompartmental knee arthroplasty : a case report

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Abstract : In this report, we present a case of a 64-year-old woman who underwent revision of knee arthroplasty after failed unicompartmental knee arthroplasty (UKA). She underwent UKA (Biomet Oxford Phase 3) for right localized medial knee pain at the age of 53 and the postoperative course had been uneventful. Eight years after UKA, she had right knee pain that gradually worsened. Tenderness was present over the medial femorotibial and patellofemoral (PF) joints. Plain radiograph showed small osteophytes on the intercondylar eminence and in the lateral compartment. However, these findings were not severe. Although several causes of knee pain after UKA have been reported, none of those causes were found in this case, so the diagnosis of unexplained pain was made. We performed knee arthroscopy and it revealed severe osteoarthritis of the PF joint, bone attrition and exposure of subchondral bone of the medial part of the lateral condyle together with severe synovitis. Revision surgery was performed in the same operation. The postoperative course was excellent and the severe knee pain resolved after surgery. Several registries revealed that revision for unexplained pain was more common after UKA than after total knee arthroplasty. We pointed out the possible causes of unexplained pain including pathological conditions, which were present in our case. Revision surgery may be unsuccessful if the cause of failure is not adequately considered. *J. Med. Invest.* 62 : 261-263, August, 2015

Keywords : unicompartmental knee arthroplasty (UKA), unexplained pain, total knee arthroplasty (TKA), revision

INTRODUCTION

Unicompartmental knee arthroplasty (UKA) is widely used to treat isolated unicompartmental knee osteoarthritis (OA) or osteonecrosis. UKA is a less invasive alternative compared with total knee arthroplasty (TKA), and several advantages of the former over the latter such as low morbidity, quick recovery and normal feeling of the knee have been reported (1). However, implant register data from Finland, Norway, Sweden, Australia, New Zealand and the United Kingdom revealed inferior midterm survival of UKAs compared with TKAs (2-6). Interestingly, a unicompartmental implant was four to six times more likely to be revised than a total knee implant associated with the same knee score (7). Several reasons for revision surgery such as aseptic loosening, malalignment, prosthesis fracture, instability, infection, bone fracture, contralateral compartment OA and unexplained pain have been reported. Unexplained pain is not a common reason for revision, although unicompartmental implants may be more susceptible to revision, especially in patients with unexplained pain (7).

We present a case of failed UKA with unexplained pain, for which TKA was performed after consideration of the cause of the pain.

CASE REPORT

A 64-year-old woman underwent UKA (Biomet Oxford Phase 3) for right localized medial knee pain at the age of 53. Preoperative plain radiograph showed medial unicompartmental OA and no

degenerative change in the other compartments (Fig. 1A, B). Magnetic resonance image (MRI) showed continuity of the anterior cruciate ligament (ACL) (Fig. 1C). Postoperative radiograph showed a well aligned knee and accurate implant positioning (Fig. 2A, B). The postoperative course was uneventful, and the pain in the right medial femorotibial (FT) joint improved.

She had recurrence of right knee pain 8 years after surgery which gradually worsened. Eleven years after UKA, the right knee pain was aggravated by walking and was present at night. She was not able to walk without a cane because of severe knee pain. Physical

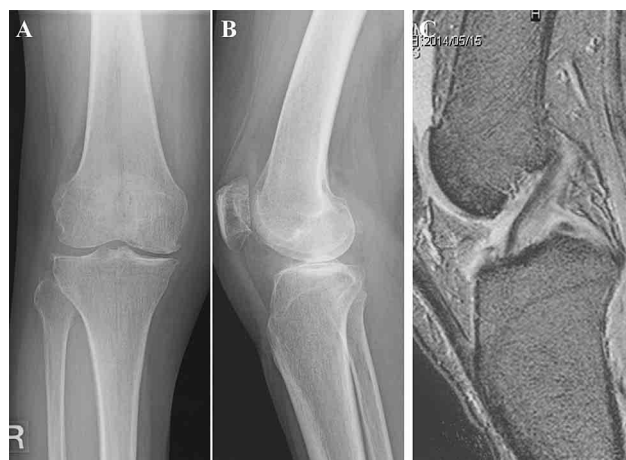


Fig. 1. A, B : Anteroposterior and lateral views of the right knee before unicompartmental knee arthroplasty (UKA), showing localized medial unicompartmental osteoarthritis (OA) of the knee joint. C : MR T2-weighted image showing intact ACL.

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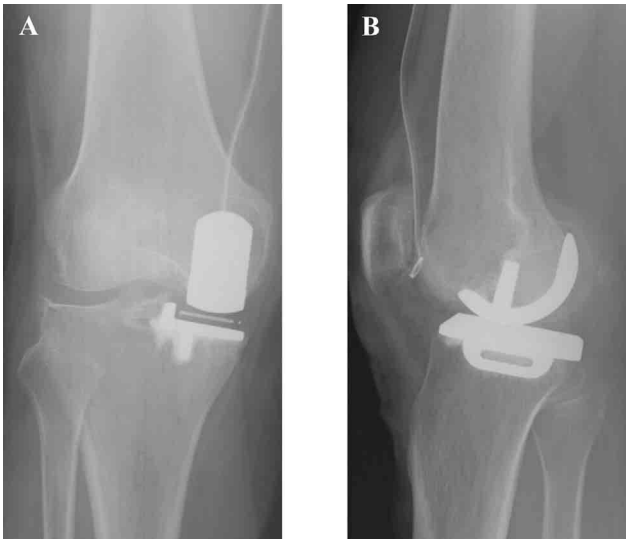


Fig. 2.
A, B : Anteroposterior and lateral views of the right knee immediately after UKA, showing good knee alignment and implant positioning.

examination revealed normal knee alignment, tenderness over the medial FT joint and medial patellofemoral (PF) joint, and ACL insufficiency as demonstrated by a positive anterior drawer test. The range of motion (ROM) was 120 degrees flexion and 0 degree extension. The Japanese Orthopedic Association (JOA) score of the right knee was 50 points (8). Plain radiograph showed small osteophytes on the intercondylar eminence and in the lateral compartment together with the joint space narrowing of the medial PF joint. The polyethylene insert had also slightly shifted medially (Fig. 3 A, B). However, such OA changes of the FT joint was not severe, because the joint space that indicates the existence of articular cartilage is still preserved. According to the Kellgren Lawrence classification (9), this finding corresponds to the very early stage of OA (grade 1). In addition, the OA of the PF joint is less likely to cause the weight bearing pain. Thus we consider that these nominal changes can not explain the sharp knee pain that made her walking difficult was unclear. Several causes of knee pain after UKA have been reported such as aseptic loosening, malalignment, prosthesis breakage, instability, infection, fracture, insert dislocation and OA in another compartment. Pain could not be attributed to any of these causes in this case, so the diagnosis of unexplained pain was made. We suspected that the cause of pain might be polyethylene bearing wear or synovitis, and knee arthroscopy was performed. Arthroscopy revealed severe OA of the PF joint, bone attrition and exposure of subchondral bone of the medial edge of the lateral condyle together with severe synovitis. We performed revision TKA in the same operation. No signs of infection, aseptic loosening, polyethylene bearing wear or prosthesis failure were observed intraoperatively, but OA of the PF joint and lateral compartment, disappearance of ACL and severe synovitis were found (Fig. 4). Surprisingly, bone attrition of the medial edge of the lateral condyle was not detected by the preoperative radiographs. We diagnosed the cause of knee pain as severe synovitis and OA of another compartments. After removal of the UKA prosthesis, the bone loss was relatively small and the posterior cruciate ligament was still functioning. Thus, we decided to perform the revision using cruciate-retaining-type total knee prosthesis (Fig. 5). The inflamed synovium was also resected. The postoperative course was excellent and the severe knee pain resolved after surgery. One year after revision TKA, she had a pain-free knee and could walk without a

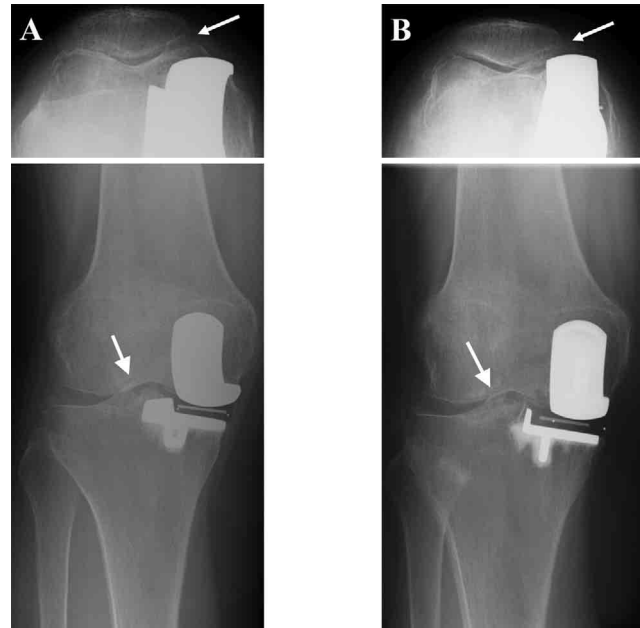


Fig. 3.
A : Plain radiograph on follow-up 8 years after UKA, showing slight OA of the intercondylar eminence (arrowhead) and patellofemoral (PF) joint (arrow). B : Plain radiograph on follow-up 11 years after UKA, showing slight progression of OA of the intercondylar eminence (arrowhead) and PF joint (arrow), and medial dislocation of the bearing. No finding indicating the cause of severe pain was evident.

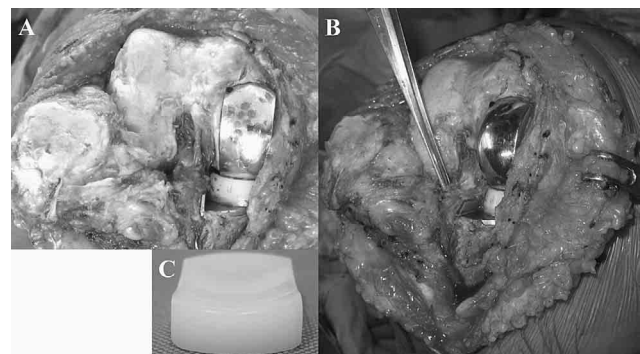


Fig. 4.
Intraoperative findings. A, B : No infection, aseptic loosening and prosthesis fracture was seen but severe OA of the intercondylar eminence and PF joint, disappearance of ACL, and synovitis were noted. C : No polyethylene insert wear was observed.

cane with a ROM of 0 degree of extension and 120 degrees of flexion. The JOA score at the latest follow-up 1 year after surgery had risen from 50 to 95 points (8).

DISCUSSION

OA commonly affects the knee joint, resulting in joint space narrowing and development of osteophytes and sclerosis of the underlying subchondral bone. UKA is widely used to treat isolated unicompartamental knee OA or osteonecrosis. UKA is a less invasive procedure than TKA because it preserves the cruciate ligaments, range of motion and more physiological function (1). Despite some attractive advantages, the early results of UKA were rather

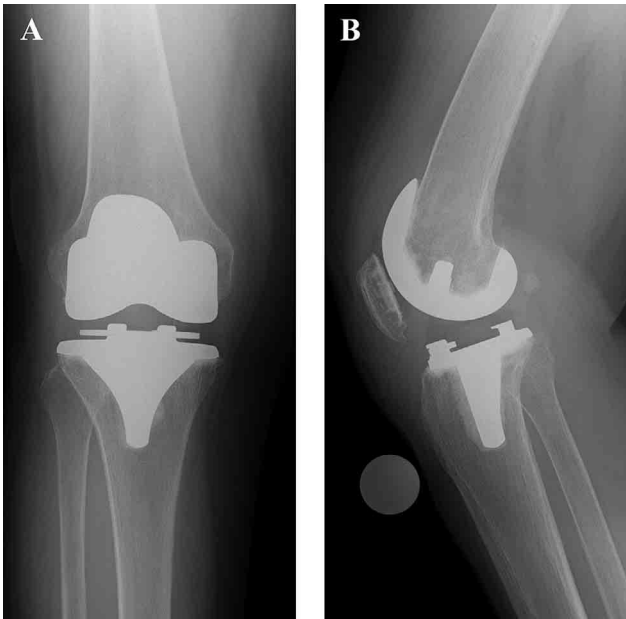


Fig. 5.
A, B : Anteroposterior and lateral views of the right knee 7 months after revision TKA.

discouraging (10, 11). After developing strict patient selection criteria, sophisticated surgical technique and better implant design, the clinical results improved (12-15). Since then, several advantages such as low morbidity, quick recovery and normal feeling of the knee have been reported.

However, several joint registries reported that the overall survival of UKA is still poor compared with TKA (2-6). The reasons for revision after UKA are aseptic loosening, malalignment, prosthesis breakage, instability, infection, bone fracture, and OA in another compartment (16-19). In the national registry, pain that cannot be explained by the abovementioned reasons were classified as unexplained pain. Revision for unexplained pain was more common after UKA than after TKA, so the risk of revision for unexplained pain is greater following UKA. Baker *et al.* reported that the percentage of revisions for unexplained pain was 23% in the post-UKA group compared with 9% in the post-TKA group. They stated that unexplained pain may be caused by subtle problems that could not be detected and/or documented on a standardized form by the surgeon (7).

In our case, however, we could not identify a definite reason for her knee pain. A few possible reasons exist such as mild radiographic OA change in another compartment or slight medial shift of the polyethylene insert. No other finding indicating the cause of severe knee pain was revealed in radiography or physical examination, so we diagnosed that the cause of pain as unexplained pain. We suspected that pain was generated by OA in another compartment and severe synovitis on arthroscopy and performed revision TKA, which lead to an excellent postoperative outcome. However, the medial shift of the polyethylene insert might be the cause of sharp pain by stimulating the medial collateral ligament. Furthermore, repetitive collision of the intercondylar eminence and the medial part of the lateral condyle caused ACL insufficiency. This might have induced OA progression.

As shown in previous reports, UKA had inferior long-term survivorship (16). In addition, based on the findings obtained from this case, UKA is now adapted for elderly people mainly aged over 75 in our department.

In conclusion, we presented a case of revision TKA after failed UKA and pointed out the possible causes of the unexplained pain,

namely, OA and synovitis. The cause of failure should be considered in order to avoid failure of revision surgery.

CONFLICTS OF INTEREST

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

REFERENCES

1. Laurencin CT, Zelicof SB, Scott RD, Ewald FC : Unicompartamental versus total knee arthroplasty in the same patient : a comparative study. *Clin Orthop* 273 : 151-156, 1991
2. The Australian National Joint Replacement Registry. Annual Report 2012. Accessed August 12, 2013
3. The Swedish Knee Arthroplasty Register. Annual Report 2012. Accessed August 10, 2013
4. The National Joint Registry of England, Wales and Northern Ireland. 9th Annual Report 2012. Accessed September 22, 2013
5. The Norwegian Arthroplasty Register. Annual Report 2011. Accessed August 10, 2013
6. The New Zealand Joint Registry. Thirteen Year Report : January 1999 to December 2011. Accessed August 10, 2013
7. Baker PN, Petheram T, Avery PJ, Gregg PJ, Deehan DJ : Revision for unexplained pain following unicompartmental and total knee replacement. *J Bone Joint Surg Am* 94 : e126(1-7), 2012
8. Koshino T : Japanese Orthopaedic Association knee rating system for osteoarthritis. *J Orthop Assoc* 62 : 901-902, 1988
9. Kellgren JH, Lawrence JS : Radiological assessment of osteoarthritis. *Ann Rheum Dis* 16(4) : 494-502, 1957
10. Marmor L : Unicompartmental knee arthroplasty. Ten- to 13-year follow-up study. *Clin Orthop* 226 : 14-20, 1988
11. Laskin RS : Unicompartmental tibiofemoral resurfacing arthroplasty. *J Bone Joint Surg Am* 60 (2) : 182-185, 1978
12. Scott RD, Cobb AG, McQueary FG, Thornhill TS : Unicompartmental knee arthroplasty. Eight- to 12-year follow-up evaluation with survivorship analysis. *Clin Orthop Relat Res* 271 : 96-100, 1991
13. Argenson JN, Chevrol-Benkedache Y, Aubaniac J-M : Modern unicompartmental knee arthroplasty with cement. *J Bone Joint Surg Am* 84-A (12) : 2235-2239, 2002
14. Murray DW, Goodfellow JW, O'Connor JJ : The Oxford medial unicompartmental arthroplasty : a ten-year survival study. *J Bone Joint Surg Br* 80 (6) : 983-989, 1998
15. Svard UC, Price AJ : Oxford medial unicompartmental knee arthroplasty. A survival analysis of an independent series. *J Bone Joint Surg Br* 83 : 191-194, 2001
16. Niinimäki T, Eskelinen A, Mäkelä K, Ohtonen P, Puhto AP, Remes V : Unicompartmental knee arthroplasty survivorship is lower than TKA survivorship : a 27-year Finnish registry study. *Clin Orthop Relat Res* 472(5) : 1496-1501, 2014
17. Lim HC, Bae JH, Song SH, Kim SJ : Oxford Phase 3 unicompartmental knee replacement in Korean patients. *J Bone Joint Surg Br* 94(8) : 1071-1076, 2012
18. Lisowski LA, Verheijen PM, Lisowski AE : Oxford phase 3 unicompartmental knee arthroplasty (UKA) : clinical and radiological results of minimum follow-up of 2 years. *Ortop Traumatol Rehabil* 6 (6) : 773-776, 2004
19. Choy WS, Kim KJ, Lee SK, Yang DS, Lee NK : Mid-term results of oxford medial unicompartmental knee arthroplasty. *Clin Orthop Surg* 3(3) : 178-183, 2011