



Case report

Rapidly progressive osteoarthritis in the medial patellar facet due to lateral femoral placement after medial unicompartmental knee arthroplasty. A case report



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ABSTRACT

Introduction and importance: Factors that affect patellofemoral (PF) osteoarthritis (OA) after unicompartmental knee arthroplasty (UKA) remain unclear. We report a case in which the lateral placement of the femoral component resulted in rapidly progressive OA in the medial patellar facet.

Case presentation: The patient was an 84-year-old woman who had increased pain in the left knee due to varus knee OA for 1 year and underwent medial UKA. One month after the surgery, the patient complained of limited knee flexion of 90° with anterior knee pain, and around 7-mm lateral placement of the femoral component was observed on a postoperative radiograph and computed tomography scan. Six months after the surgery, rapidly progressive OA with subchondral bone depression in the medial facet was observed and this has been ongoing till the last follow-up of 3 years. The knee flexion is limited 105° now, and the patient complains of quadriceps weakness with anterior knee pain when stair-climbing and standing up from a chair.

Clinical discussion: Lateral placement of the femoral component in medial UKA may cause progressive PF OA with limited knee flexion and anterior knee pain, which could be attributed to impingement between the femoral component and the medial patellar facet.

Conclusion: Surgeons should be careful regarding the lateral placement to prevent symptomatic PF OA from occurring after medial UKA.

1. Background

Medial unicompartmental knee arthroplasty (UKA) is a widely accepted surgical treatment for medial knee osteoarthritis (OA) [1]. Favorable outcomes with high survival rates of over 10 years have been reported [2–4]. However, some researchers have expressed concerns about the postoperative progression of OA in the patellofemoral (PF) joint. In addition, they have recognized it as one of the important postoperative failures of UKA because it results in the need for revision surgery and may substantially limit the long-term results of UKA [5–7]. OA progression in the PF joint has been attributed to the ongoing disease process in the lateral patellar facet and postoperative articulating contact of the femoral component against the unresurfaced medial facet, of which rates in the reported series of fixed-bearing medial UKA range from 17% to 60% [5,7–11]. However, the causative factors of PF OA after UKA have been rarely reported [12], and the relationship between

the position of the femoral component and the progression of PF OA remains unclear.

Progressive PF OA with erosive bony changes in the medial patellar facet after UKA, which was also observed in the present case, was first reported by Hernigou and Deschamps [6]. They attributed the PF OA to the anterior placement of the femoral component beyond the watershed line of the femorotibial and PF joints, which causes impingement between the patella and the femoral component after UKA. Here, we describe a case of rapidly progressive PF OA after medial UKA, in which the femoral component was placed laterally and overhung the patellar groove; however, anterior placement of the component was not noted. This work has been reported in line with the SCARE 2020 criteria [13].

2. Case presentation

An 84-year-old woman, who had undergone medial UKA for the right

Abbreviations: UKA, unicompartmental knee arthroplasty; PF, patellofemoral; OA, osteoarthritis; CT, computed tomography.

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Fig. 1. Three direction radiographs of the right and left knee. A: Preoperative radiographs of the right knee. B: Postoperative ones of the right knee. The patient had undergone medial UKA for the right knee in our institute 2 years previously and been fully satisfied with the result. C: Preoperative ones of the left knee. An anteroposterior knee radiograph showed Kellgren-Laurence Grade 3 OA. A lateral radiograph showed osteophyte formation on the proximal portion of the PF joint and a skyline view showed joint space of the PF joint was maintained.

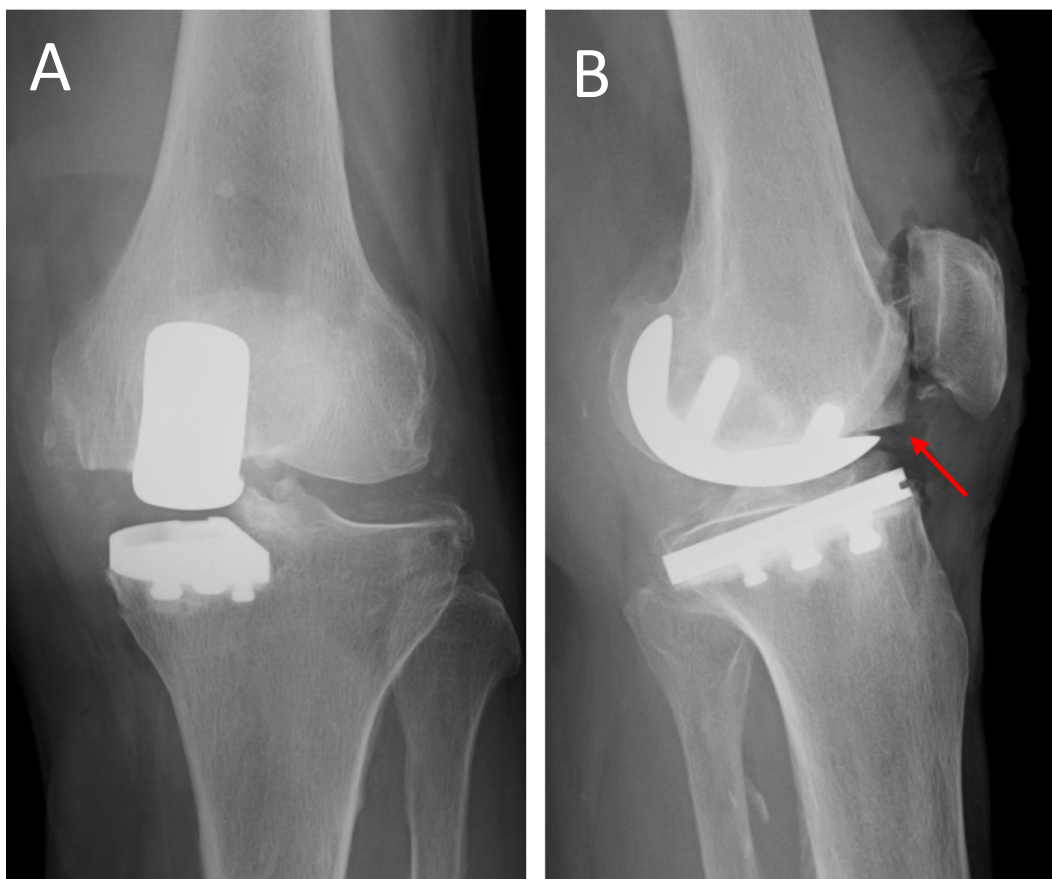


Fig. 2. Postoperative radiographs of the left knee one month after the surgery. A (anteroposterior): The femoral component is placed laterally. B (lateral): The anterior edge of the femoral component is not overhanging the anterior edge of the distal femoral cut surface (arrow).

knee in our institute 2 years previously (Fig. 1A and B), visited our hospital complaining of pain in the medial side of the left knee joint and gait disturbance. She had been treated for hypertension and diabetes with oral drugs. She was delighted with the results of the right knee and hoped to undergo the same surgery for the left knee. Tenderness was noted only on the medial joint line of the left knee, and the range of motion was from -10° extension to 140° flexion. An anteroposterior knee radiograph in the standing position showed Kellgren-Laurence Grade 3 OA (Fig. 1C). Although a lateral knee radiograph showed osteophyte formation on the proximal portion of the PF joint, a skyline view of the PF joint showed that joint space of the PF joint was maintained (Fig. 1C). Further, she did not complain of any anterior knee pain during her daily activities.

Medial UKA with the same implant as the right knee (TRIBRID® Unicompartmental Knee System; Kyocera Corp., Kyoto, Japan) was performed by S. I. using the so-called “tibia-cut first and spacer-block technique” through the medial parapatellar mini-incision. Radiographs immediately after surgery showed that the femorotibial angle was corrected to 177° , and the tibial implant was placed with a 3° varus and 9° posterior slope (Fig. 2A and B). The anterior edge of the femoral component did not overhang the anterior edge of the distal femoral cut surface in the lateral view (Fig. 2B). The patient was allowed to walk with a walker on the third postoperative day and could walk with a T-cane on the 10th postoperative day. Passive range of motion (ROM) exercise was started from the second postoperative day. However, she could not bend the left knee over 90° due to anterior knee pain. She was discharged from our hospital with a stick gait on the 14th postoperative day.

One month after the surgery, she had the first postoperative visit to the outpatient clinic in our hospital and complained of disturbance in

standing-up from a chair and stair-climbing due to anterior knee pain. Physical examinations revealed that knee flexion was limited to 90° , and anterior knee pain was elicited during maximum knee flexion. At that time, we noticed for the first time a possibility that the femoral component placed laterally jeopardized the patellar tracking. The skyline view showed slight subchondral sclerosis in the medial facet of the patella (Fig. 3A). We suggested a revision surgery to the patient, although she refused it because she could walk with a T-cane. Three months after the surgery, the knee flexion improved to 100° after intense physical therapy of the passive ROM in a local orthopedic clinic. Six months after the surgery, the subchondral sclerosis with a slight subchondral bone collapse is observed in the skyline view (Fig. 3B), and a computed tomography (CT) scan demonstrated that the femoral component was placed 9.4 mm laterally from the anatomical position and overhung the intercondylar notch (Fig. 4B). The passive ROM exercise in the local clinic was finished at this time. At the last follow-up (3 years after the surgery), the knee flexion was 105° , and the patient complained of the same anterior knee pain and muscle weakness. Compared to the skyline view of one year after the surgery (Fig. 3C), there was a further progression of the subchondral bone collapse in the medial facet (Fig. 3D). It seems that the limitation of the knee flexion and quadriceps weakness with the anterior knee pain continue in the future.

3. Discussion and conclusions

Some previous studies have reported that PF OA after medial UKA is radiographically observed by long-term follow-up, and this radiographic evidence is not always associated with clinical symptoms [5,12]. In this case, knee flexion limitation with anterior knee pain and radiographic

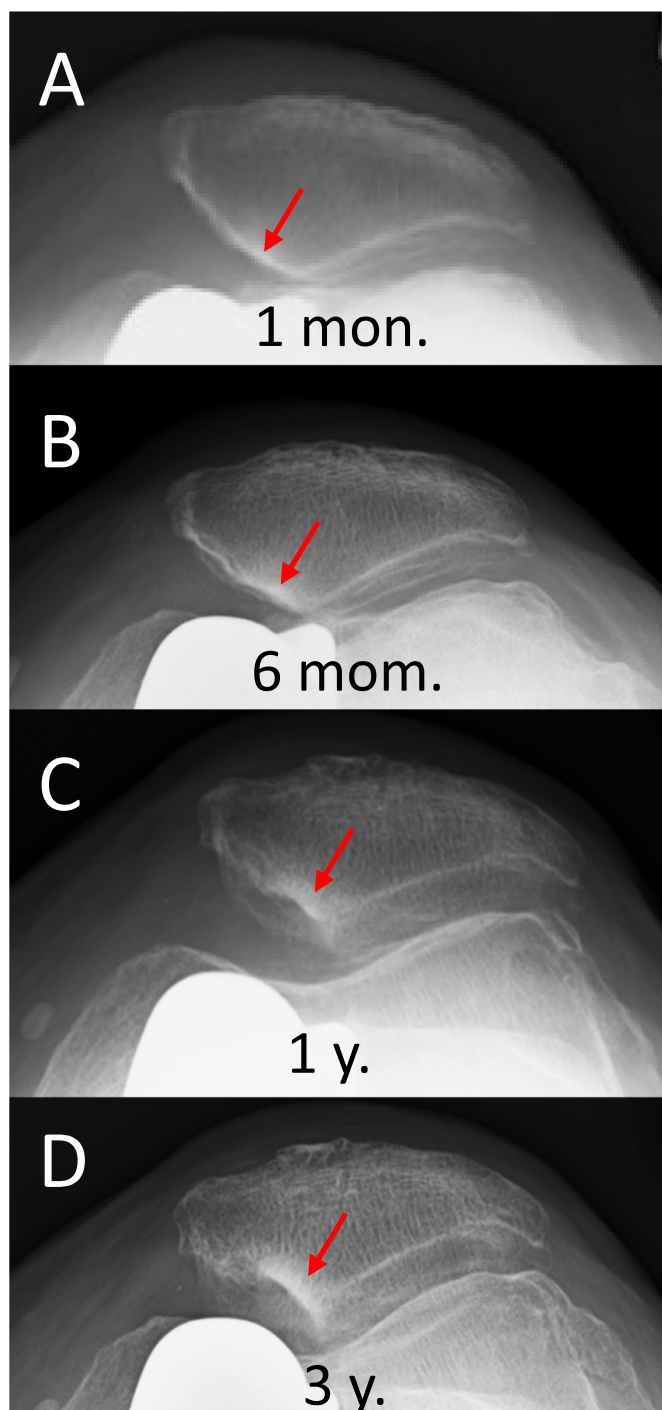


Fig. 3. Changes observed at different follow-up times in the medial patellar facet of the left knee. A: One months after the surgery. Slight subchondral sclerosis is observed in the medial facet (arrow). B: Six months. The subchondral sclerosis with a slight subchondral bone collapse is observed (arrow). C: One year. The subchondral collapse with sclerosis is evident. D: Three years. The subchondral collapse has further progressed (arrow).

findings of rapidly progressive OA in the PF joint were observed from the early days after the surgery. Postoperative radiographs and CT scan showed that the femoral component in the left knee was placed around 7 mm laterally compared to that in the right medial UKA performed 2 years before with full patient satisfaction. Impingement between the femoral component and the medial patellar facet due to alteration of the anatomical shape in the patellar groove caused by the lateral femoral

deviation is thought to result in the patient's complaints and the radiographic changes from the early postoperative days. It is possible that osteoporosis affected the rapidly progressive subchondral collapse in the medial facet of the patella although she had not been given diagnosis and treatment of osteoporosis. To the best of our knowledge, this is the first case report to clearly demonstrate that lateral placement of the femoral component in medial UKA can accelerate PF OA with significant symptoms.

Such a large lateral deviation in the femoral placement, as observed in the left knee, may be rare. However, surgeons may tend to place the femoral component laterally to avoid peripheral femoral contact on the tibial polyethylene because it may cause medial subluxation of the femoral component [14,15] and medial tibial condylar fracture [16]. The femoral lateral deviation of various degrees may cause limitations of various degrees in knee flexion and anterior knee pain of different intensities due to impingement between the femoral component and the medial patellar facet. We considered that the lateral deviation of the femoral component might be an important factor that adversely affected the PF joint kinematics and clinical outcomes after medial UKA. Surgeons should pay sufficient attention to the medial-lateral position of the femoral component to restore the anatomical shape of the distal femoral condyle and patellar groove. To verify our hypothesis mentioned above, a clinical study with many cases is needed to clarify the relationship between the lateral placement of the femoral component and the clinical outcomes after medial UKA.

We report a case of rapidly progressive PF OA after medial UKA due to the lateral placement of the femoral component. Surgeons should be careful not only concerning the anterior placement of the component [6] but also regarding the lateral placement to prevent symptomatic PF OA from occurring after medial UKA.

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Ethical approval

Not applicable, this is not a research project.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Research registration

Not applicable.

Guarantor

Masao Akagi, M.D., Ph.D.

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CRediT authorship contribution statement

All authors have made substantial contribution to the article. Study concept and design were created by Masao Akagi and Shinji Inoue. Attending doctors for the patient treatment were Shinji Inoue, Kotaro Yamagishi, Koichi Nakagawa and Masao Akagi. All data was collected by Kazuhiko Hashimoto and Shinji Inoue, and interpreted by Masao Akagi, Shinji Inoue and Kazuhiko Hashimoto. The paper was written by

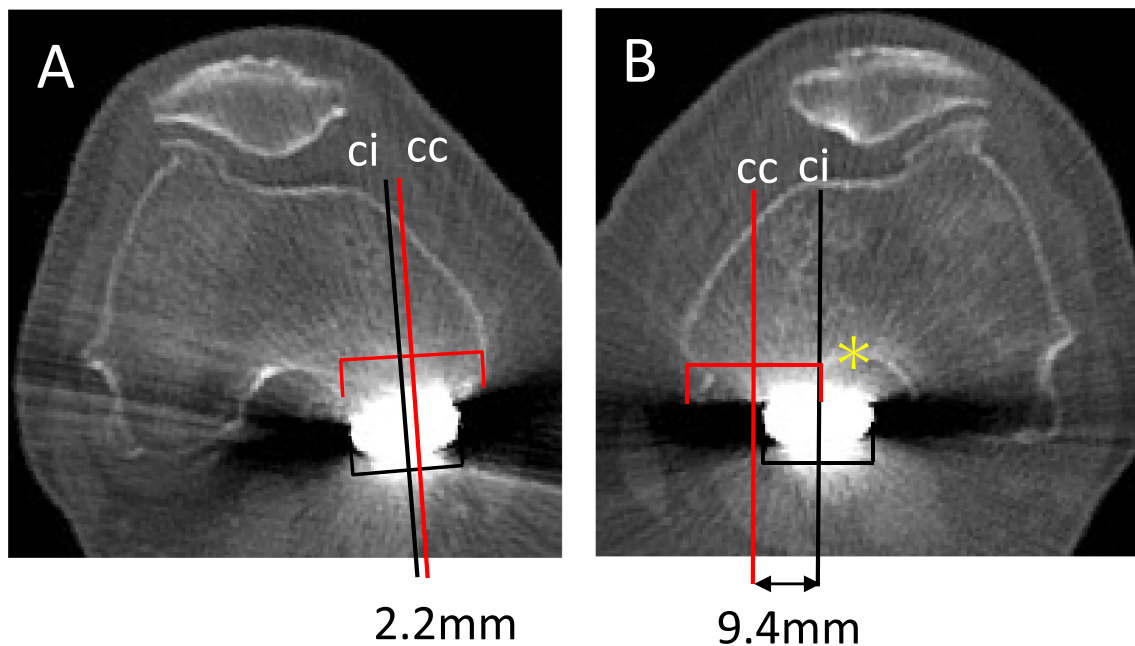


Fig. 4. Computed tomography axial views of both knees 6 months after the left knee surgery. A: The right knee. The femoral component is placed 2.2 mm lateral to the center of the medial condyle. B: The left knee. The femoral component is placed 9.4 mm lateral to the center and overhangs the intercondylar notch (*). ci: center line of the implant, cc: center line of the medial condyle.

Shinji Inoue and Masao Akagi. All authors have read and approved the manuscript.

Declaration of competing interest

None declared.

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