

## A Case of Severe Posterior Tibial Sagging Treated by Total Knee Arthroplasty

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A 70-year-old woman had suffered from right knee pain without any history of trauma or infection for 30 years. The pseudoanterior drawer sign was positive, as were posterior sagging and the posterior drawer sign. Radiographic findings identified the Kellgren-Lawrence grade as 4. We performed total knee arthroplasty (TKA) under the method of first using the cutting guide to make a posterior condylar cut, the size of which was bigger than that of the implant. This technique was very useful to cut the tibia side in this case because the neurovascular bundle was very close to the posterior tibial margin. Good clinical and radiographic outcomes were observed without any complications at one year after TKA.

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Key words: posterior sagging, total knee arthroplasty (TKA), pre-cut

### INTRODUCTION

Although total knee arthroplasty (TKA) has become a common procedure in treating knee joint diseases, there are some trouble cases undergoing severely deformity [1, 2]. In addition, posterior tibial sagging case with osteoarthritis treated by TKA was rare. Here we present this case treated by TKA regarding the technical tips. We obtained the informed consent from the patient before publication this case.

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### CASE REPORT

The patient was a 70-year-old woman who had suffered from right knee pain for 30 years. She could not recall any trauma to or infection of the affected site. She had visited many hospitals and was treated conservatively with hyaluronic acid injections, an insole brace, quadriceps training and weight loss; however, her knee pain did not disappear. She was referred to our hospital on 30 September, 2010. She felt pain on motion, and no pain at rest or at night.

The intercondylar distance of the knee was 3 finger breadth. The right knee had a slight effusion, but no redness nor local hot sensation. The range of motion was 0° in extension and 90° in flexion. Tenderness was seen in the medial and lateral joint lines. The patellar compression test was positive for pain and negative for retropatellar crepitus. The pseudoanterior drawer sign was positive, as were posterior sagging and the posterior drawer sign. Varus and valgus instability were not identified. The patient's body mass index (BMI) was 22.0 kg/m<sup>2</sup> (height = 143 cm, weight = 45 kg).

Radiographic findings showed that the joint space at the tibiofemoral joint had apparently disappeared, and identified the Kellgren-Lawrence grade as 4 [3] (Fig. 1). In contrast, the left knee was Kellgren-Lawrence grade 3 (Fig. 2). The femorotibial angle of the right knee was 184° in the supine position and 187° in the standing position. A lateral view was used to measure the patellar height as described by Insall and Salvati [4], and its value was 1.2. The radiological measurement of anterior and posterior drawer of affected knee joint (intact knee) was 42.7% (56.5%) in the anterior drawer (Fig. 3A), 29.

0% (51.5%) in sagging (Fig. 3B) and 27.8% (51.5%) in the posterior drawer (Fig. 3C) [5].

The posterior condylar angle, which was defined as the difference between the transepicondylar axis and the posterior condylar line, was also evaluated using axial CT and MRI, and its value was  $6^\circ$ . Three dimensional -CT images showed many osteo-

phytes around the femur and tibia (Fig. 4).

Laboratory values were as follows: white blood cells (WBC) 7000  $\mu$ l (neutrophils 60%), C-reactive protein (CRP) 0.02 mg/dl, and erythrocyte sedimentation rate (ESR) 10 mm (1h). Furthermore, the synovial fluid was negative for bacteriological examination.

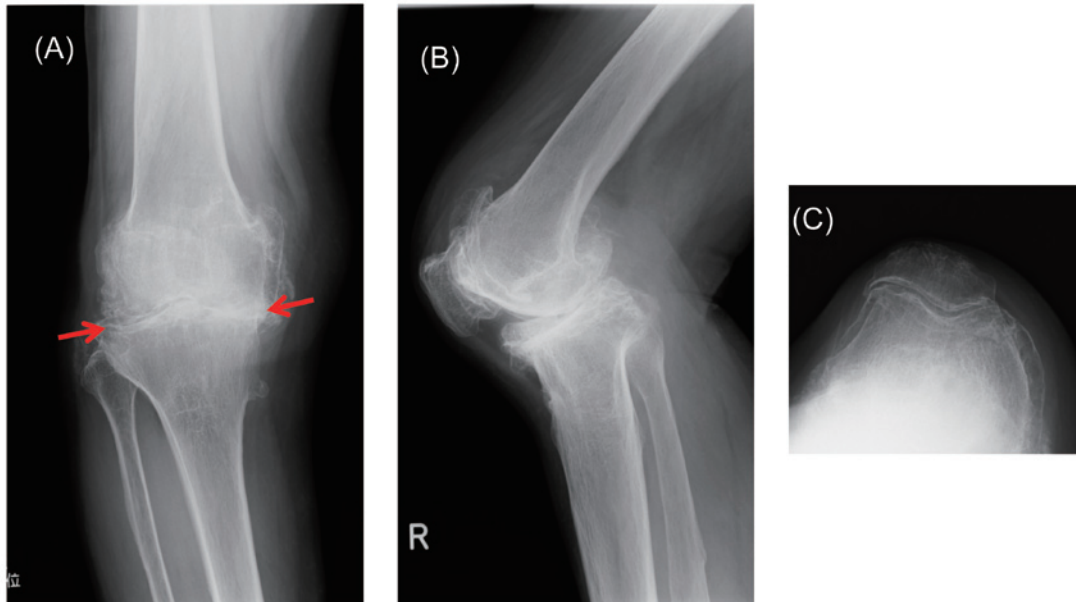


Fig. 1. Pre-operative X-ray images of the affected side  
The red arrow shows the disappearance of medial and lateral femorotibial joint space.

- (A) anteroposterior view
- (B) lateral view
- (C) axial view at  $45^\circ$  of knee flexion

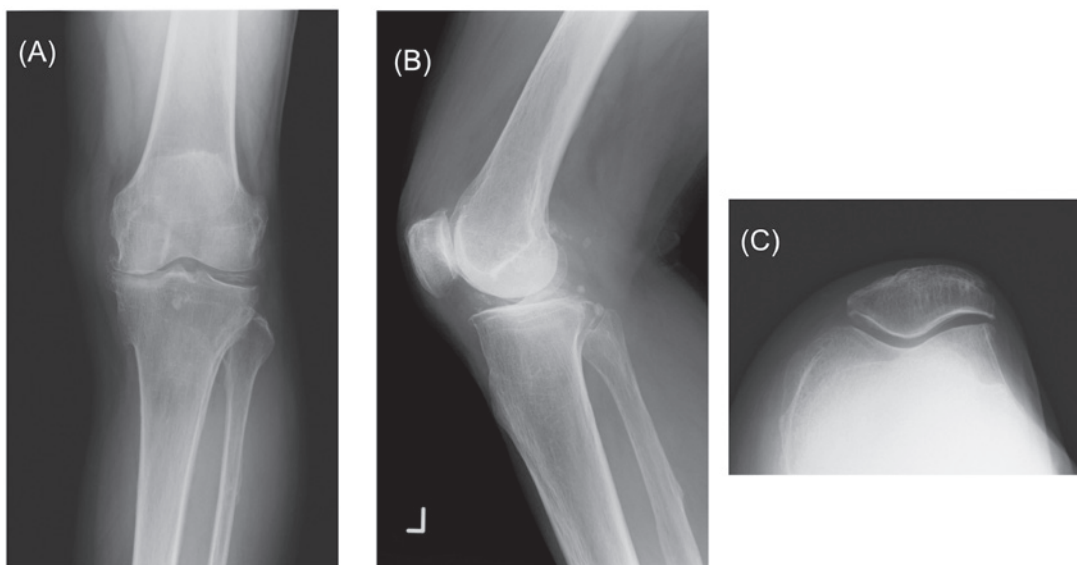


Fig. 2. Plain X-ray images of the intact side

- (A) anteroposterior view
- (B) lateral view
- (C) axial view at  $45^\circ$  of knee flexion

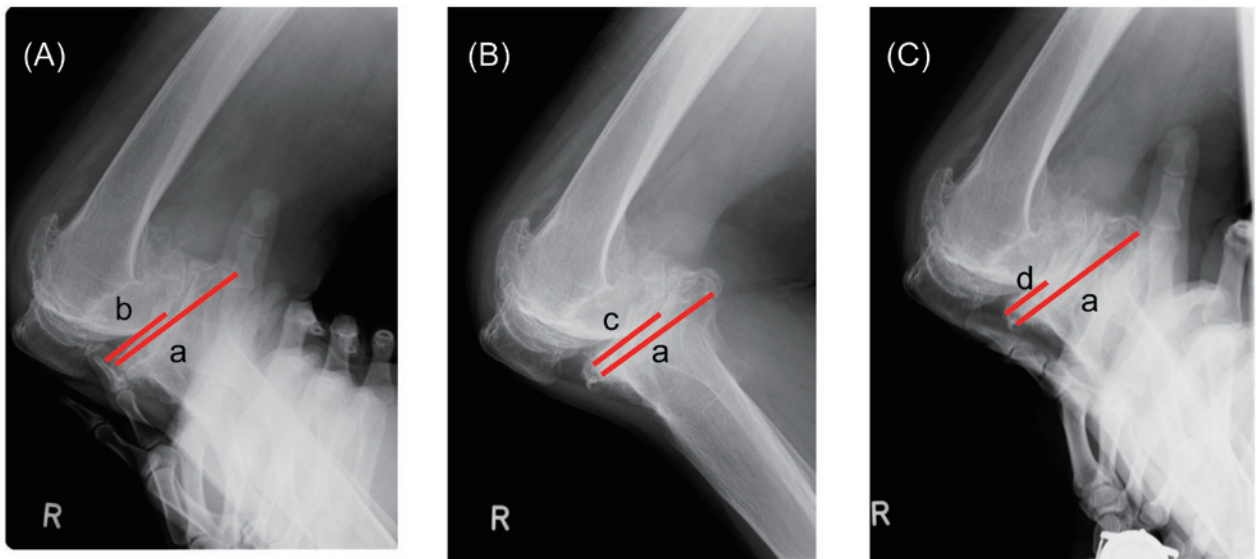


Fig. 3. Plain X-ray images of the lateral side of the affected side

(A) anterior drawer view

“a” means the distance between the anterior cortex and posterior cortex of tibia. “b, c and d” mean the distance between the anterior cortex of tibia and the femur point contact of tibia. The data was measured by dividing b by a.

(B) lateral view

The data was measured by dividing c by a.

(C) posterior drawer view

The data was measured by dividing d by a.

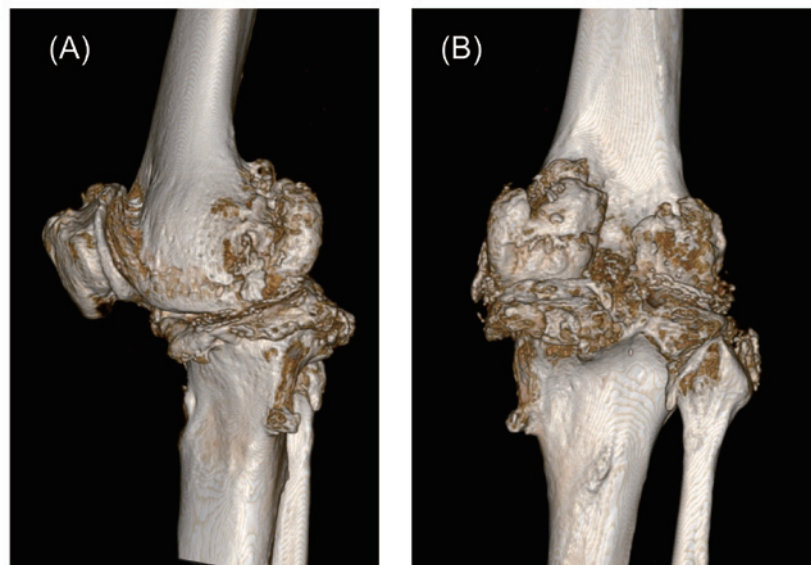


Fig. 4. Three-dimensional CT images of the affected side

(A) lateral view

(B) posterior view

From these findings, we diagnosed her condition as secondary osteoarthritis of the knee, and decided to perform TKA at our hospital.

Surgery was conducted under femoral and sciatic nerve block with the patient in a prone position. A straight 15-cm skin incision was made, and a

parapatellar approach was used to incise the capsule. The subchondral bone of the medial femoral condyle and the patella was exposed. The lateral femoral cartilage was damaged (International Cartilage Repair Society [ICRS] classification grade 3) [6]. The anterior cruciate ligament (ACL) was

gone, and the posterior cruciate ligament (PCL) was prominently gone. We used independent cuts. First, a 10-mm cut was made in the distal femur. Second, the tibia was cut as usual; however, the tibia was sagging posteriorly, and the cut was very difficult. Therefore, a femoral posterior condyle pre-cut was made at a 5-mm length using a size

4 bone cutting guide (Fig. 5A), and the visibility between joint spaces was improved. As a result, the tibia became easy to move anteriorly by pushing its posterior edge with a retractor. The tibia was cut perpendicular to its functional shaft line. The femoral posterior condyle was lastly cut using a size 2 bone cutting guide (Fig. 5B). We used a

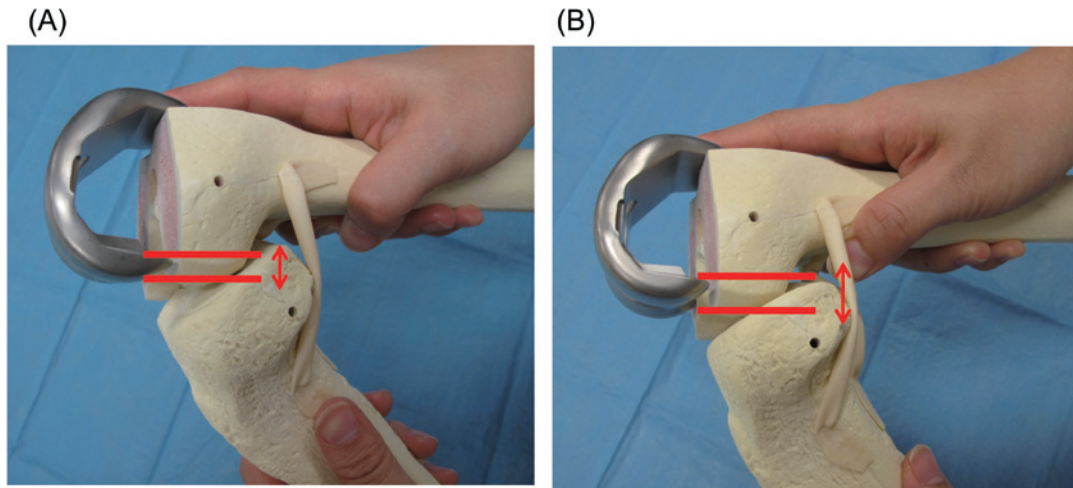


Fig. 5. The step-by-step method of bone cutting of femoral posterior condyle. Double red arrow means the distance of femoral posterior condyle cut.

- (A) pre-cut of femoral posterior condyle  
(B) actual-cut of femoral posterior condyle

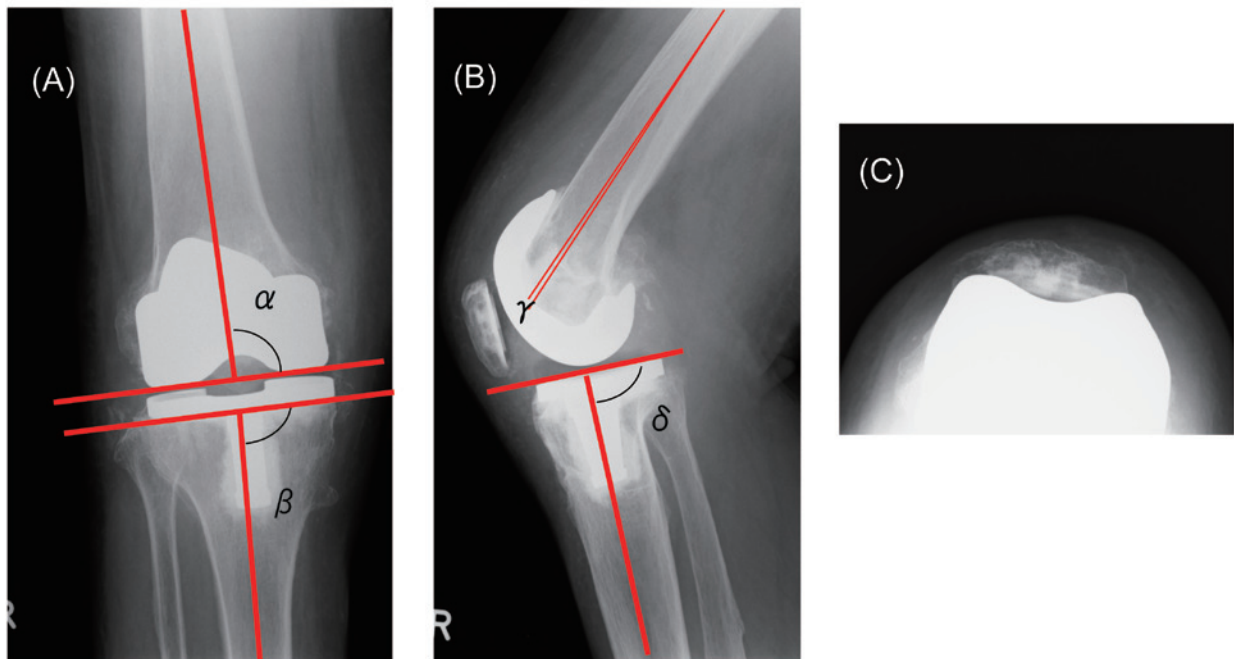


Fig. 6. Plain X-ray images one year after TKA. The angle of  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  were presented on the figure, respectively.

- (A) anteroposterior view  
(B) lateral view  
(C) axial view at 45° of knee flexion

cemented Low Friction Anatomic (LFA<sup>®</sup>, PS type, Femur size 2, Tibia size 2, Patella medium, Kyocera Corporation, Osaka, Japan) prosthesis. This implant was made of Zirconia Ceramics and adjusted with anatomical morphology of Japanese [7]. The patellar tracking course was checked with the “no thumb” method, and no lateral release was done.

The drain was removed two days after TKA. Range of motion exercise was started three days after TKA, and partial weight bearing was started one week after TKA. The patient was discharged one month after TKA.

At one year after TKA, the patient can walk without a crutch and feels no pain in the right knee. The extension and flexion angles changed postoperatively from 0° and 90° to 0° and 100°, respectively. The femorotibial angle and posterior condylar angle were 174° and 0°, respectively, after TKA. The measurement of the central point was 50% in sagging.

Radiographic evaluation after TKA was carried out according to the knee society grading scale [8]. These items were evaluated the position of components. Knee society radiological findings were as follows:  $\alpha$ : 95.3°,  $\beta$ : 90.4°,  $\gamma$ : 0.9° and  $\delta$ : 88.3° (Fig. 6 A-B). All items were within normal limits. The Japanese Orthopaedic Association (JOA) [9] and Lysholm scores [10] improved from 40 and 53 to 75 and 80, respectively.

## DISCUSSION

Severe deformity of the knee joint in TKA is troublesome to restore normal alignment in terms of the surgical procedure (bone cutting and soft tissue balancing) [1, 2], and needed to care the post operative complications (wound complications, infection, and deep venous thrombosis). In our case, a good clinical outcome was observed without any complications during the follow-up period, in spite of severe posterior tibial sagging. Furthermore, the implant position and orientation might be appropriate.

There has been no report of this type of deformity in a patient treated by TKA. Our case was rare, although the cause of this deformity remains unknown. Our method of first using the cutting guide to make a posterior condylar cut, the size of which

was larger than that of the implant, was very useful to cut the tibia side in this case. In our case, the posterior sagging was severe, and the neurovascular bundle was very close to the posterior tibial margin. If the tibia was cut in a case with no anterior drawer by the retractor, the neurovascular bundle would have been injured by the bone saw.

The cause of this deformity must be considered: the deformity of the right knee was much worse than that of the left knee. Three possible reasons were considered. First, the medial tibial slope was seen anteriorly, and the proximal medial physal line might have closed early due to trauma. Second, the PCL injury may have been injured due to a traffic accident or other such trauma, and osteoarthritis would have occurred gradually, similar to a previous report [11]. Last, infection may have occurred, and deformity would have resulted, although the area was negative for signs of infection at the primary TKA. We are not sure which cause may be appropriate. A long follow-up period is needed for this case.

In conclusion, our technique of TKA in a patient with severe posterior sagging was a useful alternative method.

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