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Original Research

Radiologic Factors Affecting Ankle Pain Before and After Total Knee Arthroplasty for the Varus Osteoarthritic Knee

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ABSTRACT

The aim of the present study was to evaluate the radiologic factors related to ankle pain before and after total knee arthroplasty (TKA) among patients with a varus osteoarthritic knee. Fifty-five patients (65 ankles) with a varus osteoarthritic knee who had undergone TKA and were followed up for >24 months were enrolled. For clinical assessment, the visual analog scale for pain and the American Orthopaedic Foot and Ankle Society ankle-hindfoot scale were used. For radiologic assessment, the mechanical axis deviation angle, talar tilt, tibial anterior surface angle, distal medial clear space, medial tibiotalar joint space, frontal tibial ground angle, and hindfoot alignment view angle were measured. The patients with ankle pain before TKA (11 ankles) had a larger hindfoot alignment view angle (9.2° ± 2.6°) than that of patients without ankle pain before TKA (54 ankles; 5.5° ± 4.8°; $p = .007$). The patients with newly developed ankle pain or experienced an aggravation of existing pain after TKA (8 ankles) had a significantly larger degree of residual varus (5.1° ± 2.1°) than did the patients without ankle pain before and after TKA or those with ankle pain before surgery. However, the severity of the pain was not different during the follow-up period (52 ankles; 1.6° ± 2.5°; $p = .001$). The results of the present study showed that residual varus deformity was associated with ankle pain after TKA. Surgeons should perform evaluations of the ankles of patients who complain of pain before and after TKA and should give careful attention to the correction of alignment during TKA.

Severe degenerative arthritis of the knee joint is frequently accompanied by a varus or valgus deformity. Total knee arthroplasty (TKA) is a treatment method for end-stage osteoarthritis of the knee joint. The alignment of the lower extremity should change from a varus or valgus alignment to a neutral alignment after TKA (1). The alignment changes owing to the effect that the progress of osteoarthritis or TKA can have on other joints in the lower extremities, such as the ankle (2–5).

Recent studies have described the relationship between a knee deformity and hindfoot deformity in patients with advanced knee osteoarthritis and the radiologic changes of the ankle and hindfoot after TKA (2,6). According to these studies, the alignment changes resulting from the progress of osteoarthritis or TKA are likely to cause changes in the alignment of the ankle and hindfoot. However, the mechanism of how the change in the alignment at the knee level is compensated for in the ankle and hindfoot is not clear (4). Moreover, previous studies have mainly focused on radiologic changes. Hence, research on the clinical relevance of the radiologic changes of the ankle and hindfoot caused by the progress of osteoarthritis or TKA is required.

In our clinical experience, we have frequently encountered patients who complained of ankle pain before or after TKA. In addition to our own clinical experience, the lack of studies on the occurrence and changes in ankle pain after TKA and the clinical relevance of the radiologic changes in the ankle and hindfoot after TKA were the motivation for our study, the purpose of which was to investigate ankle pain before and after TKA among patients who had undergone TKA. We attempted to evaluate the radiologic factors related to ankle pain

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among the patients with a varus osteoarthritic knee before and after TKA. The present study differs from previous studies, which mainly assessed the radiologic changes after TKA, in that we focused on the patients with ankle pain before TKA and those who developed new ankle pain or whose ankle pain was aggravated after TKA. We believe this information is important for foot and ankle surgeons to consider, because many patients with osteoarthritis and varus deformity of the knee and those undergoing total knee replacement will be treated by foot and ankle surgeons.

Patients and Methods

Patients

The present study was a prospective study that was approved by the institutional review board of our institution (12-0027). In our institution, TKA was performed by a single surgeon on 63 patients (80 knees) who had end-stage arthritis of the knee from May to December 2012. The present study included patients who had undergone TKA for a varus osteoarthritic knee and had been followed up for >2 years (Fig. 1). The exclusion criteria included the presence of valgus alignment before TKA; TKA to treat inflammatory arthritis and posttraumatic arthritis; a history of complications after TKA, such as infection and periprosthetic fracture; surgical history on the ipsilateral ankle for trauma or chronic ankle instability; and osteoarthritis in the ankle before TKA.

A total of 55 patients (65 ankles) were finally enrolled in the present study (Fig. 2). To examine the correlation between ankle pain before and after TKA and the related radiologic parameters, the patients were classified as follows. The patients were divided into 3 groups after the final follow-up visit: group 1, patients who did not have ankle pain before TKA but developed new ankle pain after TKA and patients with ankle pain before TKA whose ankle pain worsened after TKA (8 ankles; 12.3%); group 2, patients without ankle pain before and after TKA and patients with ankle pain before TKA but without changes in ankle pain severity after TKA (52 ankles; 80%); and group 3, patients with ankle pain before TKA but with reduced ankle pain after TKA (5 ankles; 7.7%).

Fig. 1. Radiographs of the osteoarthritic varus knee.

Surgical Technique

Every operation was performed by 1 experienced knee surgeon (C.-W.K), and a single implant (B-Braun; Aesculap, Tuttlingen, Germany) was used. Surgery was performed using the medial paripatellar approach after a midline skin incision. The anterior and posterior cruciate ligaments were removed from all knees. Distal femoral cutting was performed at 5° to 7° of the valgus using the intramedullary alignment guide. Anterior, posterior, and chamber cutting of the femur for the femoral component was performed at an external rotation of 3° to 5° relative to the posterior condylar axis. Proximal tibial cutting was performed at a posterior tibial slope angle of 3° to 7° using the intramedullary or extramedullary alignment guide. For the tibial component, a size that would cover the largest part of the resected tibial surface without lateral overhang was chosen. The rotation of the tibial component was based on the medial one third of the tibial tubercle, and internal rotation was avoided. The flexion–extension gap was measured after placing a trial femoral and tibial component for which an insert of appropriate thickness was chosen. In the case of severe osteoarthritis in the patella, patellar resurfacing was performed. Massive irrigation was performed, and the resected bone surface was dried. After applying cement to the bone surface and the tibial and femoral components, each implant was placed in the order of the tibia, femur, and patella. During the saline irrigation, the knee was kept in full extension until the cement was completely hardened. The tourniquet was deflated, and bleeding control was performed. The wound was sutured layer by layer after drain insertion.

Rehabilitation

Straight leg raising and quadriceps exercises were implemented immediately after surgery. The drain was removed on the second postoperative day, and continuous passive motion exercises were begun. Weightbearing was allowed within a tolerable range after removal of the drain. A brace was not used during the rehabilitation period.

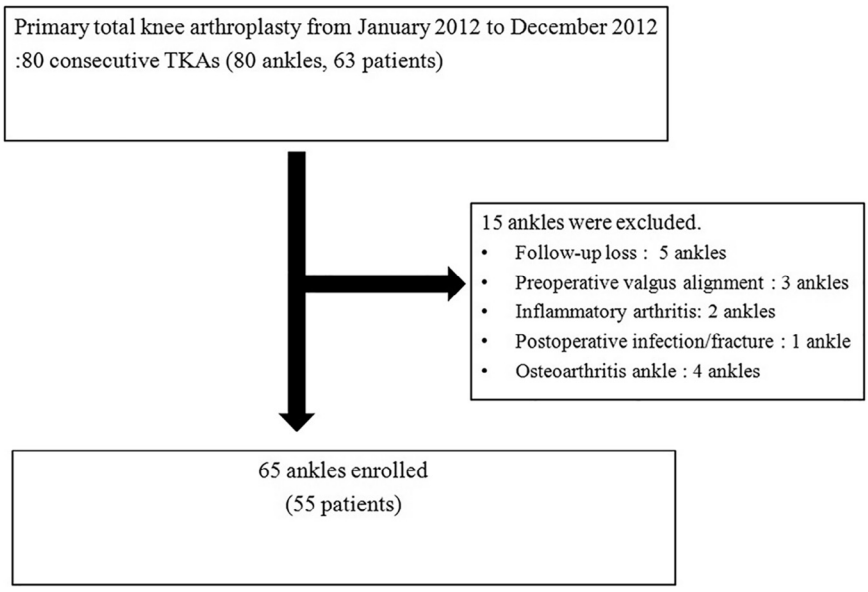

Fig. 2. Patient flow chart. TKA, total knee arthroplasty.