류마티스 환자의 발목 인공관절 치환술 이후 발생한 정복되지 않는 충전물의 아탈구: 증례 보고

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Irreducible Spacer Subluxation after Total Ankle Replacement Arthroplasty in a Patient with Rheumatoid Arthritis: A Case Report

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End-stage ankle arthritis is a debilitating condition that causes functional limitations and consequently a poor quality of life. Total ankle replacement arthroplasty is a good alternative to arthrodesis for preserving the ankle's range of motion. However, many complications can occur in patients with rheumatoid arthritis and with poor soft tissue and bone conditions. A 61-year-old female experienced spacer subluxation after surgery, which was not reduced by medial soft tissue release and spacer change. Buttress plating was found to be a good treatment option to prevent spacer subluxation and can be considered in patients with rheumatoid arthritis with bone erosion and soft tissue damage.

Key Words: Rheumatoid arthritis, Total ankle replacement arthroplasty, Spacer subluxation, Buttress plate

Rheumatoid arthritis is a systemic disease that commonly involves multiple joints and has numerous complications. Ankle joint arthritis occurs in 15% to 52% of adult-onset rheumatoid arthritis patients.¹⁾ Patients usually have osteoporosis, fragile skin, and poor soft tissue around the ankle.²⁾ The difference between rheumatoid and osteoarthritic arthritis is that the coexistence of severe degenerative changes in the ankle and hindfoot can occur in the former.³⁾ There-

fore, the ankle and hindfoot joints could be damaged simultaneously, as another study mentioned that 90% of patients had obvious radiological arthritic changes in the hindfoot, and 30% had spontaneous fusion of the subtalar joint.^{2,3)} Standard treatment for an ankle with rheumatoid arthritis is arthrodesis with acceptable outcomes and fewer complications.⁴⁾ However, arthrodesis makes climbing steps and walking on uneven surfaces difficult.³⁾ For the present case, we planned total ankle arthroplasty to preserve ankle motion as other peritarsal joints were all spontaneously fused. However, irreducible spacer subluxation occurred after the operation, even after revision with additional soft tissue release and spacer change. Our report focuses on the reduction of subluxation with buttress plating after total ankle arthroplasty in a patient with rheumatoid arthritis.

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CASE REPORT

The relevant institutional review board approved this study. A 61-year-old female presented with chronic pain in both ankle joints. The patient had a 30-year history of rheumatic arthritis and a satisfactory result in the left ankle joint after total ankle arthroplasty. Due to the severe progression of her rheumatoid arthritis, her right midfoot joints and subtalar joint were spontaneously fused (Fig. 1). We believed that total ankle arthroplasty would be more suitable for preserving the range of motion in the ankle joint, which was the remaining

Figure 1. Preoperative plain radiographs show narrowed ankle joint space and spontaneous fusion of subtalar and midtarsal joints (A: standing anterior-posterior; B: standing lateral).

Figure 2. Immediate postoperative anterior-posterior ankle plain radiograph shows asymmetrical ankle joint space, absence of bone fragment of anterior tibiofibular ligament attachment, and laterally subluxated polyethylene spacer.

mobile joint among the patient's middle and hindfoot joints. The operation was performed under spinal anesthesia with a HINTEGRA (Integra lifesciences, Plainsboro Township, NJ, USA) total ankle replacement system. The soft tissue around the ankle joint was severely tight after the distal tibia was cut. Medial and lateral soft tissue release was performed with deltoid ligament release, osteotomy of the tip of the medial malleolus, and soft tissue release around the lateral malleolus. An old avulsed bony fragment in the anterior tibiofibular ligament fibular attachment was missed during the procedure. Stability was checked after the insertion of the trial implant and polyethylene spacer.

The spacer was mildly subluxated laterally with hindfoot inversion and foot supination. We thought that excessive hindfoot inversion and foot supination would be postoperatively diminished with soft tissue closure and spontaneous soft tissue adhesion. Careful sutures and a short leg splint were applied to prevent spacer subluxation. However, lateral subluxation of the spacer (Fig. 2) was observed on immediate postoperative plain radiography. An increased anterior slope (16°) of the distal tibia was also observed.

A revision operation was planned for spacer reduction and soft tissue management. We rechecked the gap balance, and a tight medial joint was observed. To reduce excessive force around the medial ankle joint, additional soft tissue release was performed. However, this was not sufficient in creating a balanced joint gap. Additional Z-plasty on the posterior tibi-

Figure 3. Polyethylene spacer was subluxated laterally. It was not reduced when the edge of space was locked on the ridge of talus implant (A: intraoperative photo; B: a schematic diagram).

Figure 4. Polyethylene spacer was not subluxated with buttress plating when ankle inversion and foot supination force was applied (A: intraoperative photo; B: a schematic diagram).

alis tendon was performed, which resulted in a balanced and widened joint space. The polyethylene spacer was changed from 6 mm to 9 mm in height to adapt to and realign with the widened joint space. However, the spacer was still subluxated with hindfoot inversion and forefoot supination. The subluxated spacer was not reduced spontaneously when the edge of the spacer was locked outside the ridge of the talar implant (Fig. 3). A buttress plate was fixed on the anterolateral side of the distal tibia to prevent the crossing of the spacer edge over the ridge of the talus implant. Spacer subluxation was not provoked by hindfoot inversion or foot supination (Fig. 4). At the 2-year follow-up, the ankle joint showed symmetrical space, and the polyethylene spacer did not show recurrent subluxation or wear in standing ankle plain radiographs (Fig. 5).

DISCUSSION

Ankle arthritis is a common condition that causes chronic disability and decreased quality of life.⁵⁾ Total ankle arthroplasty has become a popular treatment option with better outcomes with advanced implant designs.^{6,7)} However, rates of reoperation, revision, and other complications are still concerns associated with this operation.⁸⁾ A meta-analysis has reported that the early failure and revision rate of total ankle arthroplasty after an average of 5 years, ranges from

Figure 5. At the two-year follow-up plain radiographs, spacer was located appositely in the ankle joint (A: standing anterior-posterior; B: standing lateral).

1.3% to 32.3% (mean, 9.8%).⁹⁾

Polyethylene spacer dislocation is a complication. It can occur in various conditions, such as a preoperative coronal malalignment greater than 5°, thinner insert height, and unaddressed ankle ligament laxity at the time of surgery.¹⁰⁻¹²⁾ The edge loading of the prosthesis is frequent in ankles treated with mobile-bearing prosthesis and coronal plane deformity.^{10,13)} Total ankle arthroplasty in coronal plane deformity showed a lower survival rate in inflammatory joint disease (48%) compared to that of neutrally aligned ankles (90%) after 8 years.¹⁴⁾ Deltoid ligament release or lateral ligament reconstruction was introduced to manage coronal plane deformities. Some authors recommended medial malleolar osteotomy after skin necrosis with deltoid release and recurrent laxity with lateral ligament reconstruction.¹⁵⁾

In our patient, the main reason for spacer subluxation was a tight medial joint gap due to insufficient medial soft tissue release. However, lateral subluxation of the spacer still existed with hindfoot inversion and foot supination after medial soft tissue release and spacer change. We thought that this recurrent subluxation was mostly due to spontaneous hindfoot and midtarsal fusion. In this situation, the range of motion normally achieved by the hindfoot and midtarsal joints might be concentrated only in the ankle joint. Furthermore, a decreased elasticity of soft tissue due to multiple adjacent degenerative changes in rheumatoid arthritis could be a

contributing factor to this motion concentration. Additionally, the absence of fibular bone stock to which the anterior tibiofibular ligament is attached could be another reason.¹⁶⁾ This bony stock could act as a lateral static stabilizer to prevent lateral movement of the spacer. Finally, the increased anterior slope of the distal tibia cutting could also be another reason. An anterior slope of approximately 7° is recommended, as this is perpendicular to the tibial axis.¹⁷⁾ In these patients, an increased anterior slope (16°) was observed on postoperative plain radiography. However, the slope was not corrected because spacer subluxation was managed with buttress plating. Crossing of the spacer edge to the talus implant ridge was effectively prevented.

Soft tissue management for ligament balancing is critical for preventing polyethylene complications. Careful assessment of subtalar and midtarsal joint motion to prevent prosthesis subluxation and dislocation is also necessary in patients with rheumatoid arthritis with poor soft tissue and bone condition.^{2,3)} Buttressing plating could be one of the options to prevent polyethylene spacer subluxation in cases wherein almost the whole range of motion, except that of the ankle, is restricted in patients with rheumatoid arthritis. Complications such as polyethylene wear were a concern in this patient because friction between the plate and spacer was anticipated. However, there are insufficient studies to date on wear in total ankle arthroplasty.¹⁸⁾ Therefore, careful long-term follow-up is needed with concerns of polyethylene fracture, wear, and osteolysis.

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