Postoperative Outcomes in Total Ankle Arthroplasty vs. Ankle Arthrodesis: A Retrospective Comparative Study of Contributing Factors

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INTRODUCTION:

Total ankle arthroplasty (TAA) and ankle arthrodesis (AAD) are major primary surgical procedures commonly performed for the management of ankle pain and deformity caused by osteoarthritis (OA) and rheumatoid arthritis (RA). While ankle arthrodesis has traditionally been the treatment of choice for end-stage ankle arthritis following the failure of conservative management, increasing concerns about adjacent joint arthritis have contributed to the growing popularity of ankle implants. The primary advantage of TAA over AAD is its ability to preserve ankle joint function. However, TAA has been reported to have relatively high complication rates compared with AAD. The comparative benefits and drawbacks of AAD and TAA remain one of the most controversial topics in foot and ankle surgery.

The aim of this study was to compare the postoperative outcomes of TAA and AAD and to investigate the differences in factors associated with these outcomes.

METHODS:

This study included patients who underwent primary TAA (15 feet) or AAD (22 feet) at our hospital since 2014 and who were followed for at least two years postoperatively. Thirty feet were affected by ankle osteoarthritis which had Takakura-Tanaka classification: stage 3B or 4, and 7 feet by rheumatoid arthritis. All TAA procedures utilized two-component implants, whereas AAD was fixed with three cannulated cancellous screws.

The total range of motion (ROM) from plantar flexion to dorsiflexion and the Japanese Society for Surgery of the Foot (JSSF) ankle/hindfoot scale were evaluated preoperatively and two years after surgery. ROM was measured based on lateral plain radiographs taken in maximum plantarflexion and maximum dorsiflexion positions (Fig. 1 and 2). Operative wound complications and the need for revision surgeries were also documented. Patient demographic data included age, sex, height, weight, and body mass index (BMI).

Differences in demographics, complications, and clinical outcomes were compared between the TAA and AAD groups. Furthermore, we analyzed the factors related to postoperative outcomes in each group.

RESULTS:

The postoperative JSSF scale scores showed significant improvement compared with preoperative scores in both the TAA group (median: 18 to 79 points, $p<0.01$) and the AAD group (median: 16 to 83 points, $p<0.01$).

In terms of ROM, the TAA group showed a non-significant increase in ROM (mean: 26.7° to 31.7°, $p=0.089$). The AAD group demonstrated a significant decrease in ROM (mean: 21.3° to 10.5°, $p=0.017$).

Comparison between the TAA and AAD groups revealed no significant differences in age, sex, preoperative ROM, preoperative JSSF scores, operative duration, or postoperative JSSF scores. However, significant differences were observed between TAA and AAD groups in intraoperative blood loss (mean 68.1 ml, and 257.6mL, respectively) ($p<0.01$), and postoperative ROM (mean 31.7°, and 10.5°, respectively) ($p<0.01$).

As factors related to postoperative outcomes, a significant correlation was found between the postoperative and preoperative JSSF scale scores across all patients (correlation coefficient: 0.480, $p=0.032$). In the TAA group, no significant factors were associated with the postoperative JSSF scale score. However, postoperative ROM was significantly correlated with preoperative ROM (correlation coefficient: 0.717, $p<0.01$). In the AAD group, postoperative JSSF scale scores were significantly correlated with postoperative ROM (correlation coefficient: 0.730, $p=0.010$).

In the TAA group, one case of wound dehiscence and two cases of hypertrophic scar formation were observed. Revision to tibiotalocalcaneal arthrodesis was required in one patient in the TAA group due to aseptic loosening, and in one patient in the AAD group due to nonunion.

DISCUSSION AND CONCLUSION:

Postoperative outcomes following TAA and AAD are influenced by preoperative clinical scores. In the TAA group, preoperative ROM was associated with postoperative ROM, while in the AAD group, postoperative ROM was significantly associated with clinical outcomes. This suggests that in AAD, the preservation of residual motion in the midfoot and hindfoot, such as through the Chopart and subtalar joints, plays a crucial role in postoperative function despite fusion of the tibiotalar joint.

These findings emphasize the importance of timing in surgical intervention and indicate that surgery should be considered before the patient's condition deteriorates severely.

In conclusion, both TAA and AAD can achieve favorable clinical outcomes postoperatively. However, the factors that influence postoperative improvement differ depending on the surgical procedure employed.

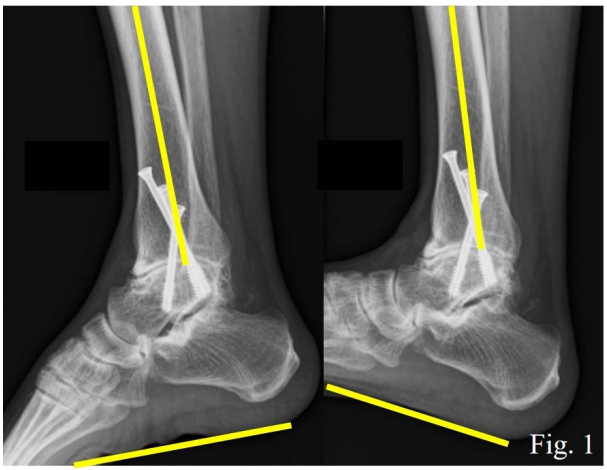

Fig. 1

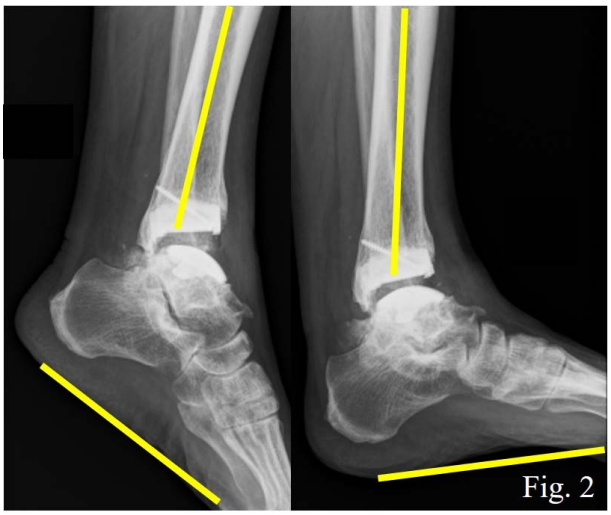

Fig. 2