

Tibiototalcaneal nailing in ankle arthrodesis

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Abstract

Aim: Our objective in this study was to present the results of the patients who had retrograde tibiototalcaneal implants for different etiological causes. Ankle and forefoot deformities and traumatic osteoarthritis are important problems affecting the quality of life of patients. Many implants have been tried to prevent and fix these deformities. Tibiototalcaneal arthrodesis with retrograde intramedullary nail is one of these implants. While there are many studies in the literature on other systems, the low number of studies on intramedullary implants and low number of patients in this patient group encouraged us to undertake this study using the available data.

Material and Methods: Twelve patients who had intramedullary tibiototalcaneal nail installation between January 2009 and May 2013 were retrospectively evaluated. In their etiologies, 33.33% of the patients (n=4) had firearm-related injuries, 33.33% had (n=4) trauma-related arthrosis, 16.67% had (n=2) diabetic neuropathy, and 16.67% had rheumatoid arthritis. Patients were evaluated based on pre- and post-operative American Orthopedic Foot and Ankle (AOFAS) scores.

Results: Union was observed in all patients. The average union duration was found at 65.8 (45–124) days. Two of the patients who had arthrodesis due to firearm injuries had deep infections, and one had a superficial infection. No complications other than infections were observed. The average AOFAS pre- and post-operative scores were 48.7 (31–80) and 68.5 (40–96).

Conclusion: As a result, ankle arthrodesis with intramedullary nail is a useful and efficient method for patients with severe underlying arthritis and can produce good results.

Keywords: Ankle arthrodesis; intramedullary nail; subtalar joint; tibiotalar joint

INTRODUCTION

Ankle and forefoot deformities and traumatic osteoarthritis are important problems affecting the quality of patient life. Many implants have been tried for preventing and fixing these types of deformities. Retrograde intramedullary nail is one of these implants. Retrograde intramedullary nail fixation has the advantages of simple and easy surgeries and practical applications. It is an effective fixation method with fusion rates of 71% to 95%. However, this method requires reaming, which may increase the possibility of systemic inflammation, pulmonary embolism, and infections (1). Presentations such as diabetes, trauma, and inflammatory and neuropathic arthritis cause these deformities, and the pain associated with these presentations may severely impair the life quality of the patients. Until today, many methods have been defined and applied for ankle arthrodesis. While there are many studies in the literature on other implant systems, the low number of studies addressing intramedullary implants and the low number of patients in this patient group

encouraged us to undertake this study with the available data. Our objective in this study was to present the results of the patients who had ankle arthrodesis with retrograde tibiototalcaneal implant originating from different etiological causes.

MATERIAL and METHODS

The study was initiated after receiving approval from the ethics committee of the authors' institution. Twelve patients who had intramedullary tibiototalcaneal nail installations between January 2009 and May 2013 were retrospectively evaluated. Fifty percent of the patients were male (n=6), and 50% were female (n=6). The mean age was 46.9 (18–82) years. In the etiologies, 33.33% of the patients (n=4) had firearm injuries, 33.33% had (n=4) trauma-related arthrosis, 16.67% had (n=2) diabetic neuropathy, and 16.67% had rheumatoid arthritis. Ten of the patients previously had undergone surgery. Two patients had not undergone previous surgery. The patients who had not undergone previous surgeries had rheumatoid- and osteoarthritis-based arthrodesis.

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The patients were asked to preoperatively fill in the questionnaires of the American Orthopedic Foot and Ankle Society (AOFAS) and to a Visual Analog Scale (VAS). According to the AOFAS criteria, a patient can be classified with one of four functions: (1) poor (0-69); (2) fair (70-80); (3) good (80-90); or (4) excellent (90-100). The VAS criteria divide pain into five groups: (1) absent (0); (2) mild (1-3); (3) moderate (4-6); (4) high intensity (7-9); and (5) intolerable.

All patients received an intramedullary ankle arthrodesis nail (TRIGEN Hindfoot Fusion Nail, Smith & Nephew, Memphis, TN).

Patients underwent surgery with air tourniquets in the supine position.

Surgical Technique

The patients were placed on the operating table in the supine position. To indicate the entrance point of the intramedullary nail, a line was drawn between the second finger and heel and another between the malleoli and the entrance was made on the intersection point of the lines. The location was confirmed using a scope during the entrance. Cartilage from the tibiotalar joints were removed through the ankle anterior approach. The subtalar joint was not opened. Short leg splints were made for the patients after the operation. Postoperative anti-biotherapy was applied. For six weeks, no loads were applied to the patients whose stitches were removed on the fifteenth day. At the first, third, and sixth months, a radiograph was obtained. It was concluded that there was union in patients who had callus formation in three out of a total of four cortices in the front-rear and lateral planes. Pre and post-operative AOFAS scores of the patients were evaluated.

RESULTS

Union was observed in all patients. The average union duration was 65.8 (45-124) days. Two of the patients who had arthrodesis due to firearm injuries suffered deep infections, and one had a superficial infection. No complications other than infections were observed. The average pre- and post-operative AOFAS scores were found to be 48.7 (31-80) and 68.5 (40-96), respectively.

DISCUSSION

Ankle deformities and traumatic osteoarthritis are common causes of ankle arthrodesis (2). Locked plates (3,4), external fixators (5), retrograde intramedullary nails (6-8), or combined methods (9) can be used as fixation methods in ankle arthrodesis. Tibiotalocalcaneal arthrodesis with intramedullary nail is a recovery procedure for severe tibiotalar and subtalar joint deformities. The ideal position for the hind foot after ankle arthrodesis is a neutral position for dorsal/plantar flexion, 5° valgus, and 5° to 10° external rotation (10). These physiological values were acquired after many implants were used. Intramedullary nails have advantages, such as providing rigid fixation and compression while ordinary nails have advantages, such as load sharing.

This procedure has complications, including slow wound healing, superficial and deep infections, pseudo-arthrosis, neurovascular damage, misalignment, stress reactions, fractures, and persistent pain. Although complication ratios reaching 50% were reported in the literature, we did not observe any complications other than deep infections in our patient (11).

Infection is a common problem with intramedullary nails in tibiotalocalcaneal arthrodesis (12). Although there were patients who previously underwent surgery due to firearm injuries and who also had diabetes in our study, we found deep infections in two patients after the arthrodesis using the intramedullary technique, which we managed to solve this with anti-biotherapy.

In the literature, it has been reported that fractures occurred due to the stress formed by the nail in the tibia in patients who had arthrodesis with retrograde intramedullary nail implants (13). This problem was solved by using long intramedullary nails. We did not encounter such complications during the follow-ups in our study.

We used both the pre- and post-operative AOFAS scoring system to understand if this method was useful for our patients or not. Other authors also used the AOFAS criteria in their series but only post-operatively. This was the case of Boer et al. (14) with a mean of 70 points in this regard. Hammett et al. (15) obtained an average of 63 points. Chou et al. (16) found a mean of 66 points. In our study, the mean post-operative score obtained with the AOFAS criteria was 68.7 points.

Patients who had arthrodesis were generally those who didn't have any surgical intervention before. In our study, we had patients who were first followed up with external fixator due to firearm injury and then had arthrodesis. We have no evidence showing that this condition increases union durations or the infection tendency; however, all of our patients had a union.

In the literature, another method, total ankle arthroplasty, was also used in ankle arthritis. Studies comparing the two methods were performed. The comparison of total ankle arthroplasty and ankle arthrodesis in treatment of end-stage ankle osteoarthritis did not reveal any significant differences (17). Again, in another study comparing the biomechanical effect of both methods on forefoot, better effects were observed for total ankle arthrodesis (18).

Many diseases affect the ankle and cause arthritis in the region. Charcot neuropathic arthropathy is one of these diseases. There are studies addressing this disease in the literature. The results of tibiotalocalcaneal arthrodesis were investigated in a group of patients with Charcot arthropathy and tibiotalocalcaneal arthrodesis with retrograde intramedullary technique using the Expert Tibial Nail (ETN) system. The results demonstrated that this technique was a good option for ankle joint salvage with improvement of clinical and functional score (19).

Our study also has some limitations. First of all, this was a retrospective study. Also, no control group was included.

We do not have clear information on whether this system was superior over other systems as it lacked comparison with a control group. On the other hand, subtalar junction is also included in the fusion area in arthrodesis performed using a nail. We could not acquire any concise data on the way in which this condition affects our results in our study.

CONCLUSION

As a result, ankle arthrodesis is a quite good salvage method when trauma-, neuropathy- and infection-related causes are considered. When applied with the correct technique in the correct patient group, satisfactory results can be achieved for this group of patients.

Competing interests: The authors declare that they have no competing interest.

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