

Total Ankle Replacements: An Overview

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KEYWORDS

- Total ankle replacement
- Ankle arthroplasty
- Ankle arthritis
- Ankle arthrodesis

First performed in the early 1970s, the total ankle replacement (TAR) gives patients who are affected by end-stage ankle arthritis an alternative to fusion. Like an ankle arthrodesis, the purpose of an ankle arthroplasty is to eliminate pain; however, the arthroplasty also looks to maintain function.¹⁻⁵ Total joint replacement, whether it is the hip, the knee, or the ankle, involves the removal of the arthritic joint and substituting it with an artificial joint to retain motion. Because of the biomechanics involved at the ankle joint, the TAR is a much more challenging procedure when compared with the hip and knee replacements. In addition, various conditions, if present, add to the level of surgical difficulty and decrease the chance of a successful outcome. These conditions include deformity from posttraumatic arthritis, diabetic neuropathy, and inadequate soft tissue envelope.^{4,6,7} Coetzee and DeOrio⁸ thought that the TAR will never become as commonplace as the knee and hip replacements because of the level of difficulty and the number of conditions that can adversely affect the outcome.

Since the first TAR was implanted, its short- and long-term benefits have been compared with those of an ankle arthrodesis, the traditional gold standard for end-stage ankle arthritis. Saltzman and colleagues⁶ pointed out that the primary indication for both the TAR and the ankle arthrodesis is pain. In their study, they compared the clinical findings of both procedures. They found a better outcome in pain relief and retained motion in those patients who had a TAR at the 2- to 6-year postoperative mark. In another study, the same authors showed a better level of function and a greater level of pain relief in those patients with a TAR compared with those with an arthrodesis.⁹ Furthermore, Barg and colleagues¹⁰ claimed that most patients with a TAR report favorable outcomes regarding pain relief and ankle function.

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The short-term results of an ankle fusion are generally very good, but the long-term results are not as clear and tend to be riddled with complications such as pseudoarthrosis, malunion/nonunion, gait abnormalities, and a long period of recovery. The most common complication is the development of arthritis in the adjacent joints, that is, the calcaneocuboid joint, talonavicular joint, subtalar joint, and knee. The subsequent arthritis may necessitate the need for further surgical intervention.^{1,9,11–13} Hintermann and colleagues¹³ pointed out that the chances of a young patient with an ankle arthrodesis developing premature degenerative arthritis in the hindfoot are very likely. This is because of the increase in the amount of stress and demand on the surrounding joints.^{4,13} Lagaay and Schuberth¹⁴ explained the manner the more distal joints compensate changes when the motion is taken away at the ankle, as in the case of a fusion. This has a significant effect on gait.

Because the outcomes of TAR are significantly improving, surgeons who are trained in TAR are more likely to perform a TAR than a fusion. For some surgeons, TAR is actually viewed to be superior over an arthrodesis because of the preserved motion and, more importantly, the decrease in stress and demand on the distal joints.^{3,15} The current ankle implants are proving to be a valuable treatment option for those patients with severe arthritis and those who meet the criteria for ankle replacement. Some surgeons now consider an ankle arthrodesis a salvage procedure.^{3,11} Even regarding patients with rheumatoid arthritis, Bonnin and colleagues¹⁶ recommended using a TAR over a fusion because of the increased chance of returning to normal or near-normal activity level. Steck and Anderson¹⁷ also recommended a TAR on patients who have already undergone a triple arthrodesis; however, they explained that a TAR can only be performed in those patients in whom a malaligned triple is not the reason for the ankle arthritis. If deformity is present, then the patient will need a pantalar fusion.

ADVANTAGES AND DISADVANTAGES

A major advantage of the TAR is the preservation of ankle motion. However, TAR typically only preserves the current level of motion in the ankle at the time of surgery. Other advantages include the decreased stress across the distal joints, which decreases the risk of developing premature degenerative arthritis; restoration of the dynamics of the ankle; increased comfort and functional recuperation; and having the option to revise the prosthesis or convert the prosthesis to a fusion if the original replacement fails.^{4,7,16,18} Bonnin and colleagues¹⁶ discovered that the use of a TAR can actually improve the patient's quality of life. TARs allow the return to recreational and/or light-impact activities and sports. A return to high-impact activities and sports, however, is not recommended and highly unlikely.

The risk of TAR includes significant complications and failure that may still then necessitate an arthrodesis.¹⁶ Patients who experience significant complications such as deep infection and wound problems require significant intervention, and the subsequent need for a below-knee amputation is a possibility.

INDICATIONS AND CONTRAINDICATIONS

TAR is indicated for patients with end-stage ankle arthritis. The pathologic condition of the arthritis can be either primary or secondary. Secondary osteoarthritis, that is, post-traumatic arthritis, accounts for most of the cases of ankle arthritis. Posttraumatic arthritis is the leading cause of ankle arthritis and can be because of a history of a fracture involving the ankle joint or even a history of ankle sprains leading to chronic lateral

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