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Statement of Purpose

The purpose of this study was to report the radiographic, clinical, and functional outcomes of takedown of painful ankle arthrodesis to total ankle arthroplasty, and to outline the specific pitfalls for this challenging issue.

Methodology & Procedures

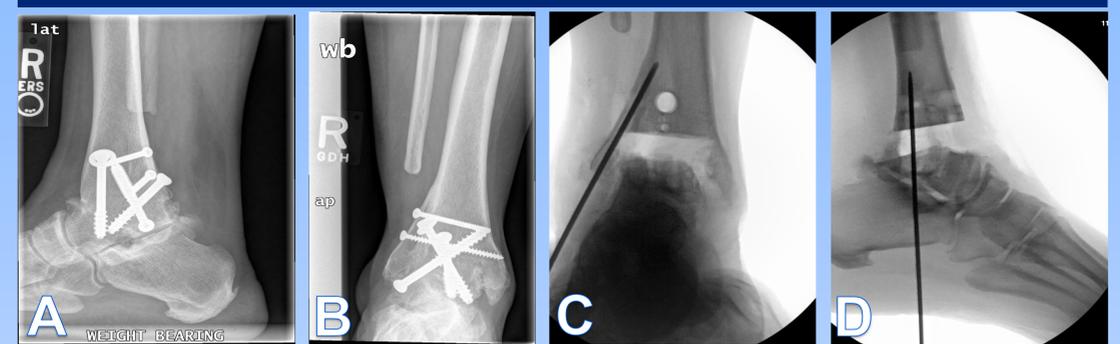
A retrospective analysis of consecutive patients who underwent a conversion of a painful ankle arthrodesis to a total ankle arthroplasty from 2003 to 2016 was performed. The patients' gender, comorbidities, age at the time of implantation, BMI at time of surgery, and years since fusion were recorded. Operative reports were evaluated for additional procedures performed prior to the takedown of the ankle arthrodesis, procedures performed with the takedown of the ankle arthrodesis, and implant type. Any postoperative complications as well as preoperative and postoperative AOFAS, VAS, and BP scores were recorded. Patients were followed for a minimum of 12 months clinically and radiographically. For the post operative protocol, patients were kept non-weight bearing in a posterior splint until sutures were removed at 10-14 days. At that time, a short-leg non-weight bearing cast was placed on the operative extremity. At 6 weeks, patients were placed into a removable boot and allowed to weight bear as tolerated with initiation of physical therapy and slow transition to shoe gear.

- Radiographic analysis was performed on the day of surgery and at 1.5, 3, 6, 12, and 24 months.
- Anterior-posterior and lateral alignment angles: intersection of the long axis of the tibia and a line paralleling the articular surface of the tibial component.
- Range of motion: maximum dorsiflexion and plantarflexion was measured using fluoroscopy at 1.5, 3, 6, 12, 18, and 24 months post operatively. Total range of motion was calculated by subtracting maximum dorsiflexion from maximum plantarflexion.
- Ancillary procedures included: subtalar arthrodesis, syndesmotic fusion, gastrocnemius recession, tendoachilles lengthening, lateral ankle ligament stabilization.

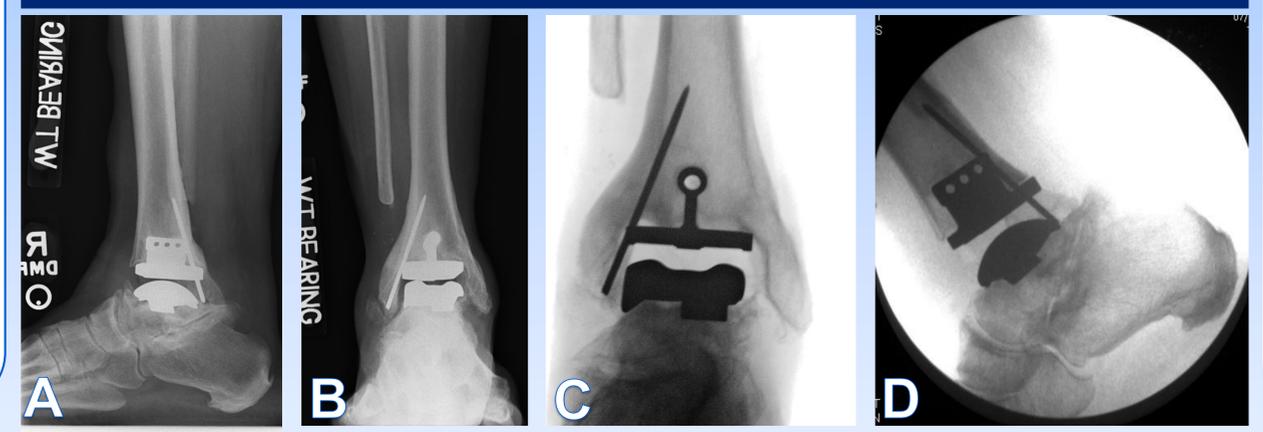
Literature Review

Ankle arthrodesis is a dependable procedure for end stage arthritis and has long been the gold standard.¹⁻² There are inherent sequelae associated with this procedure including impaired gait, adjacent joint arthritis, limitation in activity, and chronic foot and ankle pain.¹⁻⁵ Nonunion rates have ranged from 9-40%.⁶ Previously, there have been limited options in treating a painful ankle arthrodesis, including revision arthrodesis, realignment osteotomies, pantalar arthrodesis, and even below-knee amputation.³⁻⁵ Over the last few years, the conversion of ankle arthrodesis to ankle arthroplasty has become a more realistic option to relieve pain and restore some function, while reducing progression of adjacent joint arthritis.³⁻⁵ To date, the literature regarding this complex surgery is limited, and encompasses only four studies for a total of 92 patients.^{3-5,7} In all four studies, functional scores and patient satisfaction were improved.

Figures 1A-D - Ankle fusion takedown demonstrating creation of joint and gutters



Figures 2A-D - Post operative radiographs after placement of ankle implant



Results

Seventy-seven patients had conversion of an ankle arthrodesis to ankle arthroplasty at an average of 8.6 years after primary ankle arthrodesis. The patient characteristics are listed in Table 1. The average BMI at the time of surgery was 30 (20-51). Surgical characteristics are reported in Table 2. AOFAS scores increased from 33 (8-58) preoperatively to 75 (16-100) postoperatively. The BP score increased from 47 (27-55) to 80 (48-94). The VAS decreased from 8 (6-10) to 3 (2-9). Radiographic analysis is provided in Table 3. Range of motion increased from 16.5 degrees at 6 weeks postoperative to 20.1 degrees after 24 months. Patient outcomes are listed in Table 4. Complications are listed in Table 5. There were 42 total complications including 9 (12%) implant failures, leading to an implant survival rate of 88%. When looking at complications that may be related to the failure of the implant, there was 1 (1%) deep infection ($p=0.0057$) and 5 (6%) cases of talar subsidence ($p=0.04$). Gastrocnemius recession was the most common ancillary procedure followed by subtalar joint fusion.

Analysis and Discussion

Although ankle arthrodesis is the gold standard in treatment for painful ankle osteoarthritis, there are complications including nonunion, malunion, adjacent joint arthritis, and gait compensation that can lead to decreased function and increased pain, necessitating the consideration of additional surgical options, including revision arthrodesis, below knee amputation, or total ankle arthroplasty (3-7). There are four studies with a total of 92 patients which evaluate the complications, functional outcomes, and range of motion of the patients that underwent a conversion TAA after developing a painful ankle arthrodesis. The primary goal of a conversion of a painful ankle arthrodesis to a total ankle arthroplasty is to regain motion and decrease pain (7). The results from this study show there is decrease in pain and an increase in function with an implant survival rate of 88%, which are similar to prior studies. Talar subsidence and deep infection show a significant correlation with need for revision surgery. Special care should be used to control infection risks as well as prepare the talus to reduce chance of subsidence. With the largest patient population to date, the information collected from the current study contributes to this limited body of literature, increases the appreciation of this complex procedure, and adds to the understanding of the functional and radiographic changes following this challenging ankle procedure.

Table 1 - Demographics

	N (%)
Gender	
Female	42 (55)
Male	35 (45)
BMI	30
Comorbidities	
Diabetes	3 (4)
Osteoporosis	17 (22)
Rheumatoid arthritis	5 (6)
Current tobacco use	3 (4)

Table 2 - Characteristics

Characteristic	N (%)
Side of surgery	
Right	38 (49)
Left	39 (51)
Years since fusion	8.6
Implant Used	
Agility	23 (30)
Salto	14 (18)
Star	26 (34)
Infinity	3 (4)
Inbone	11/14

Table 3 - Radiographic Analysis

Category	Time	Immediate post op	1.5 months	3 Months	6 Months	12 Months	24 Months
AP alignment (°)	89.3	89.1	89.4	89.3	89.8	89.9	
Lateral alignment (°)	86.9	87	86.8	86.6	86.3	86.7	
ROM (°)	X	16.5	18.8	19.5	19.1	20.1	

Table 4 - Patient Outcomes

Scoring System	Preoperative Mean (minimum-maximum)	Postoperative Mean (minimum-maximum)
AOFAS	33 (8-58)	75 (16-100)
BP	47 (27-45)	80 (48-94)
VAS	8 (6-10)	3 (2-9)

Table 5 - Postoperative Complications

Complications	N (%)	Contributing to implant failure	P value
Superficial infection	10 (12)	1	0.86
Deep infection	1 (1)	1	0.0057
Impingement requiring debridement	7 (9)	1	0.82
Intra-operative fracture	8 (10)	1	0.94
Post operative fracture	2 (3)	0	0.60
Talar subsidence	5 (6)	2	0.04
Implant failure requiring surgery	9 (12)	--	

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