



Outcomes of a New Generation Fixed-Bearing Total Ankle Arthroplasty: A Retrospective Review

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STATEMENT OF PURPOSE

The purpose of this study is to evaluate our preliminary results with a new generation fixed-bearing total ankle replacement system. In this retrospective review, we report our early radiographic and clinical results of a new Total Ankle Replacement system, a fourth-generation constrained implant with minimal resection.

METHODOLOGY

Study Design: Chart Review

- A retrospective chart review was performed to identify consecutive patients who underwent total ankle arthroplasty with a new generation fixed-bearing total ankle replacement system. Twenty-three consecutive patients met inclusion criteria. The following outcome measures were collected post-operatively via telephone: Foot and Ankle Ability Measure (FAAM)¹ and Visual Analog Scale (VAS)².

Inclusion Criteria

- ≥18 years of age
- Undergone new generation fixed-bearing total ankle replacement
- Procedure performed by one surgeon (S.A.B.)
- Minimum one year follow-up

Outcomes

- Visual Analog Scale (VAS) (Table 1)
- Foot and Ankle Ability Measure (FAAM) (Table 1)

Hypothesis

We hypothesized that pain assessment and patient-reported outcomes would improve following implantation of new generation fixed-bearing total ankle arthroplasty,

PROCEDURE

All TARs were implanted by a single surgeon with an anterior approach. Patients were primary closed with 2.0 Monocryl and 3.0 Nylon without the placement of a drain. Patient were kept non-weight bearing for 3 weeks, sutures were removed. Following removal of sutures, patients were transitioned into sneakers and allow to weight bear and start physical therapy.

LITERATURE REVIEW

End stage ankle arthritis is a debilitating disease that affects millions of American annually². Ankle arthritis leads to pain and gait dysfunction which is often accompanied by a reduced quality of life². Literature has paralleled that of hip and knee arthritis by further reinforcing the effect end stage arthritis of the ankle on a patient's mental and physical disabilities related to inability to complete activities of daily living². While the quality of life is affected similar to that of knee and hip arthritis, the etiologies differ tremendously between the groups. Knee and hip arthritis is primarily a result of primary osteoarthritis, followed by inflammatory arthropathies and post-traumatic arthritis. With the ankle, post-traumatic arthritis is the primary etiology followed by inflammatory arthropathies and osteoarthritis⁴.

Traditionally, tibiotalar arthrodesis has been the gold standard for addressing end stage ankle arthritis surgically. However, research has consistently demonstrated that the joints proximal and distal the arthrodesis site have much higher contact pressures leading to degenerative changes in adjacent joints⁵. Over the last two decades, there has been a trend towards total ankle arthroplasty that has grown exponentially in the last 10 years due to this concern. Recent research has compared arthrodesis to arthroplasty which has demonstrated that arthroplasty is noninferior to that of arthrodesis^{6,7}. Total ankle implants have made tremendous strides over the last decade due to advancements in technology. Additive manufacturing, as well as, new designs have increased the longevity of the implants. We are at the cusp of a 4th generation implant which will further solidify the arthroplasty over arthrodesis debate.

As we have begun to develop of fourth-generation implants, ankle arthrodesis should no longer be considered the gold standard for surgically addressing end-stage ankle arthritis. There is only one fourth-generation implants currently on the market (Figure 1). The total ankle replacement is a two-component fixed bearing implant that utilizes a highly cross-linked ultra-high molecular weight polyethylene spacer. It is FDA cleared and available to the market in late 2016. One of the most notable characteristics of this implant is that it requires the least amount of bone resection on the market. The talar component only requires 4.3 mm of resection. It has a fibular recess on the tibial component that offers a more anatomical shape. All components are side specific to ensure ideal fit. It offers anterior and posterior bias polyethylene inserts to address sagittal plane subluxation⁹. In this study, we aim to demonstrate early results of this total ankle system by discussing clinical and radiographic outcomes after 1 year follow-up.

RESULTS

Table 1: Patient Data

| Patient | Age (years) | Sex | Body Mass Index (BMI) | Laterality | FAAM Score | | VAS Score | |
|---------|-------------|--------|-----------------------|------------|------------|---------|-----------|---------|
| | | | | | Pre-op | Post-op | Pre-op | Post-op |
| 1 | 51 | Male | 32 | Right | 3.57 | 1.00 | 8 | 0 |
| 2 | 47 | Female | 40 | Right | 3.24 | 1.95 | 5 | 5 |
| 3 | 60 | Female | 23 | Left | 3.90 | 2.00 | 6 | 2 |
| 4 | 60 | Female | 33 | Left | 3.19 | 3.76 | 8 | 9 |
| 5 | 88 | Male | 26 | Right | 3.00 | 1.10 | 10 | 1 |
| 6 | 78 | Female | 27 | Right | 0.76 | 0.00 | 3 | 0 |
| 7 | 64 | Male | 33 | Left | 3.00 | 0.00 | 10 | 1 |
| 8 | 57 | Male | 30 | Left | 3.79 | 2.84 | 10 | 7 |
| 9 | 72 | Male | 31 | Right | 1.10 | 0.00 | 0 | 3 |
| 10 | 76 | Female | 28 | Right | 3.16 | 0.00 | 9 | 0 |
| 11 | 65 | Male | 35 | Left | 2.86 | 0.33 | 10 | 1 |
| 12 | 72 | Male | 26 | Left | 3.10 | 0.05 | 9 | 1 |
| 13 | 58 | Female | 32 | Left | 3.71 | 0.71 | 8 | 1 |
| 14 | 58 | Male | 32 | Right | 3.62 | 0.57 | 8 | 1 |
| 15 | 71 | Male | 37 | Right | 2.35 | 0.70 | 7 | 2 |
| 16 | 58 | Male | 34 | Right | 2.86 | 0.00 | 7 | 0 |
| 17 | 73 | Male | 25 | Right | 2.26 | 0.00 | 7 | 1 |
| 18 | 67 | Male | 35 | Left | --- | --- | --- | --- |
| 19 | 68 | Male | 29 | Right | --- | --- | --- | --- |
| 20 | 52 | Male | 34 | Left | --- | --- | --- | --- |
| 21 | 72 | Male | 45 | Right | --- | --- | --- | --- |
| 22 | 49 | Female | 37 | Right | --- | --- | --- | --- |
| 23 | 60 | Male | 36 | Left | --- | --- | --- | --- |

Table 2: Post-operative Complications

| Patient | Subsidence | Wound Dehiscence | Deep Infection |
|---------|------------|------------------|----------------|
| 1 | No | No | No |
| 2 | No | No | No |
| 3 | No | No | No |
| 4 | No | No | No |
| 5 | No | Yes | No |
| 6 | No | No | No |
| 7 | No | Yes | No |
| 8 | No | No | No |
| 9 | No | No | No |
| 10 | No | No | No |
| 11 | No | No | No |
| 12 | No | No | No |
| 13 | No | No | No |
| 14 | No | No | No |
| 15 | No | No | No |
| 16 | No | No | No |
| 17 | No | No | No |
| 18 | No | No | No |
| 19 | No | No | No |
| 20 | No | No | No |
| 21 | No | No | No |
| 22 | No | No | No |
| 23 | No | No | No |

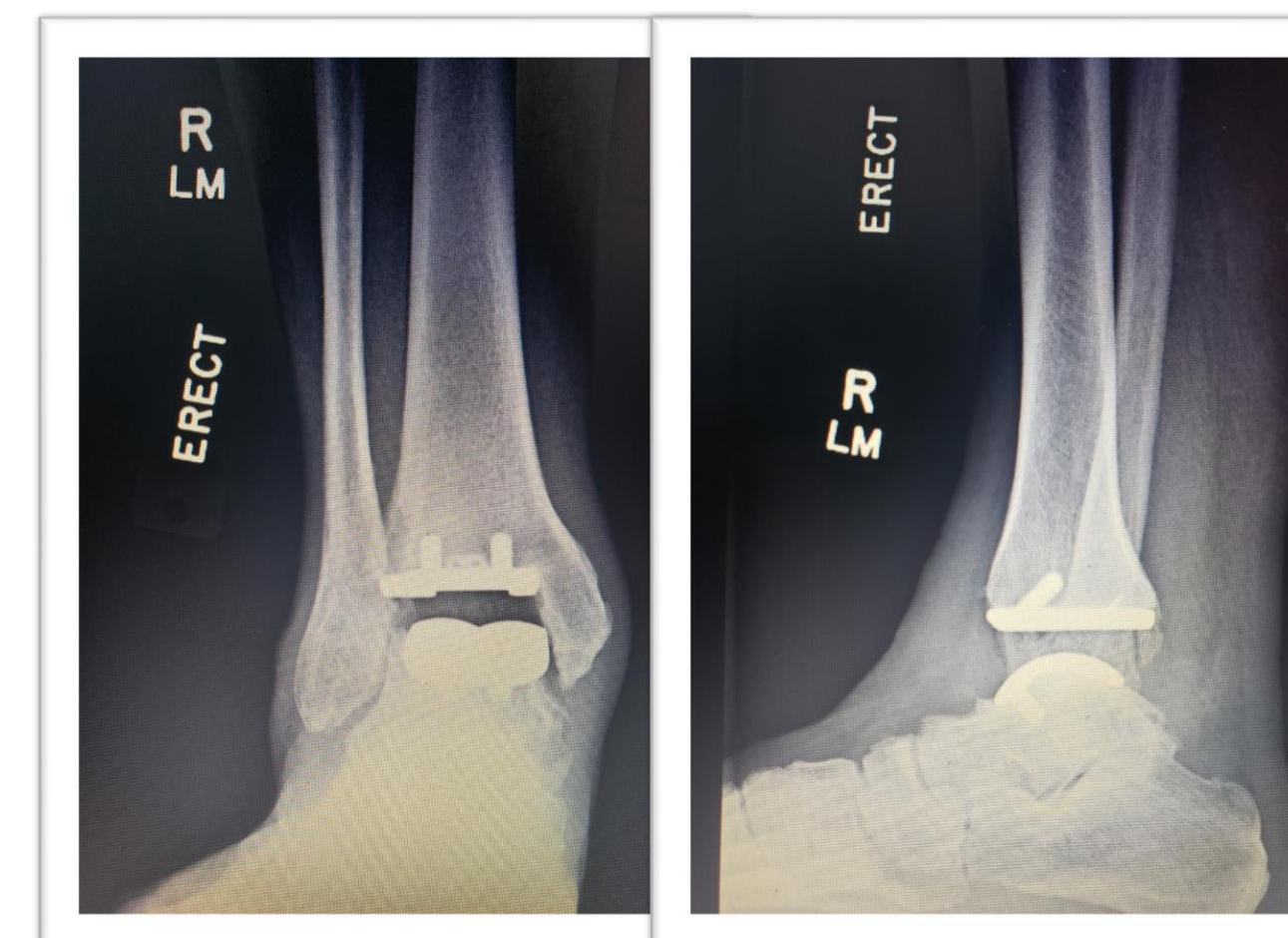


Figure 1. Fixed-bearing Total Ankle Replacement

ANALYSIS & DISCUSSION

Improvements in prosthetic design and surgical technique has made total ankle arthroplasty a viable alternative to ankle arthrodesis in end-stage arthritis. The total ankle replacement system utilized in this study offers many advantages such as minimal bone resection, more anatomic talar component and polyethylene inserts that address sagittal plane subluxation⁹. We presented twenty-three patients that underwent total ankle arthroplasty with a fourth-generation fixed-bearing total ankle system.

Seventeen patients responded to the patient-reported outcome questionnaire via telephone. The mean FAAM significantly improved from 2.91 pre-operatively to 0.88 post-operatively while the mean VAS improved from 7.35 pre-operatively to 2.06 post-operatively. There were only two patients with wound dehiscence which healed uneventfully (Table 2). No other complications were found to date.

While preliminary results are limited, our early data suggests this new generation fixed-bearing total ankle system has reproducible outcomes with minimal bone resection compared to prior implants. To date, our results demonstrate good patient outcomes with minimal to no complications rates and reproducible alignment with this particular fixed-bearing TAR system.

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