Orthopaedics & Traumatology: Surgery & Research 100 (2014) 907–915

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Original article

# AKILE™ total ankle arthroplasty: Clinical and CT scan analysis of periprosthetic cysts

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ARTICLE INFO

*Article history:*
Accepted 9 September 2014

*Keywords:*
Total ankle replacement
Osteolysis
Survivorship
Arthroplasty

ABSTRACT

*Introduction:* Despite good clinical results following total ankle replacement (TAR), the development of large periprosthetic cysts (> 400 mm$^2$) in the medium-term is a source of concern.
*Objective:* The primary objective of this study was to detect any large periprosthetic cysts in a cohort of AKILE™ patients using radiographs and CT scans, and then to compare these findings to published ones.
*Material and methods:* A total of 127 TAR procedures were performed between June 1995 and January 2012. We retrospectively reviewed 68 cases with the newest AKILE™ implant design that had a minimum follow-up of 36 months. The average follow-up was 81 ± 33 months; eight patients were lost to follow-up. The outcomes consisted of analyzing radiographs (A/P and lateral weight bearing views, Meary view and lateral views of flexion/extension) and helical CT scans, performing clinical evaluations (range of motion, AOFAS score, Foot Function Index, pain levels) and determining the survivorship of TAR implants.
*Results:* TAR survival at 5 years was 79% for in situ implants and 62% for revision-free implants. The AOFAS score improved from 33.7 ± 14.7 to 77.1 ± 15.1 (out of 100) and the pain sub-score was 30.2 ± 9.7 (out of 40) at the last follow-up. The average ankle range of motion was 32.3° ± 12.7° on the radiographs. CT scan revealed Type A cysts (< 200 mm$^2$) under the talar implant in 52% of cases and in the tibia in 50% of cases; these cysts were smaller than 100 mm$^2$ in 80% of cases and had no effect on the implants. No periprosthetic cysts larger than 400 mm$^2$ in size were identified.
*Discussion:* The medium-term functional results and survivorship are comparable to those reported for other TAR designs. The incidence of cysts was low overall and there were no large-diameter cysts, which should improve long-term survival. The implant's design and materials likely played a role in preserving the periprosthetic bone stock. The AKILE™ TAR has distinctive features related to the low rate of large periprosthetic cysts in the medium-term.
*Level of evidence:* IV (retrospective case series).



## 1. Introduction

The functional benefits of mobile-bearing total ankle replacement (TAR) implants in the medium-term are significant [1,2]. But periprosthetic osteolysis and cysts in the medium and long-term are a source of concern and temper the excellent short-term results [3]. In some studies, the rate of radiolucent lines and cysts has reached 75%, with large cysts compromising implant stability [4–6]. The primary objective of the current study was to analyze the radiographic results in a cohort of existing AKILE™ TAR by looking for the presence of bone cysts and evaluating their size on CT scans. The secondary objective was to determine the clinical results and compare them to published results. Only patients who had undergone TAR with the newest AKILE™ implant design were reviewed.

## 2. Material and methods

### 2.1. Study design

This was a retrospective study of the AKILE™ TAR procedures performed by the surgeon designers (DC and OL, Bordeaux University Hospital) between June 1995 and January 2012. The inclusion criteria consisted of primary, post-traumatic or inflammatory ankle arthritis as graded by Morrey and Wiedemann [7], which had failed conservative treatment and had at least 10° range of motion with no equinus deformity. Exclusion criteria consisted of greater than 10°

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http://dx.doi.org/10.1016/j.otsr.2014.09.019
1877-0568/

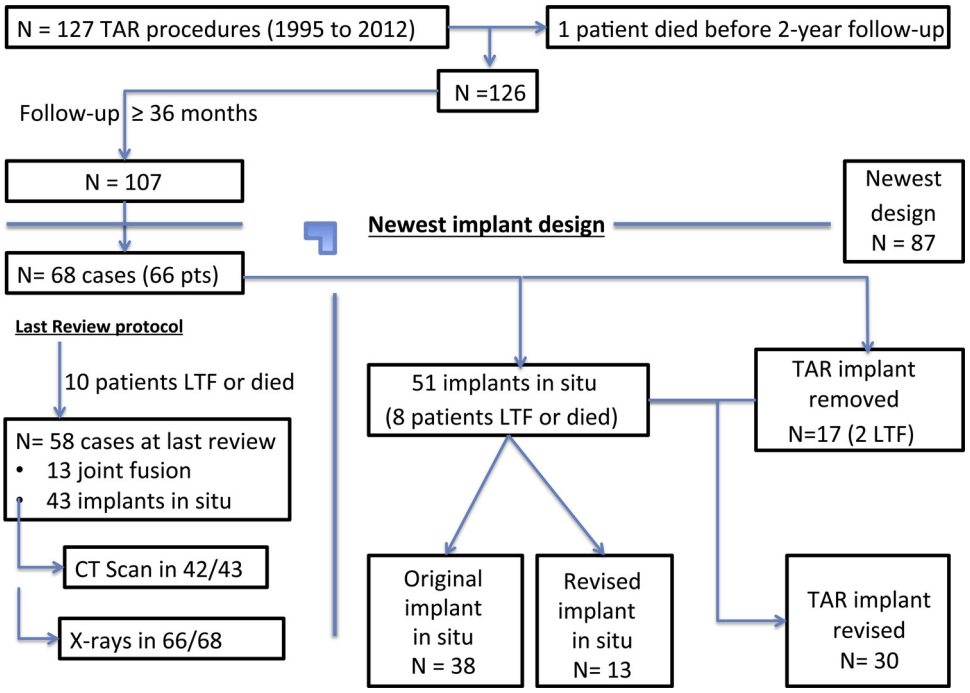


**Fig. 1.** Study design; TAR: total ankle replacement, LTF: lost to follow-up.

misalignment of the hindfoot, insufficient bone stock, significant risk to the skin, morbid obesity and poor peripheral vascularization. Although 127 TAR procedures were carried out during that time period, the clinical and radiology analyses were performed on only the patients who received the newest implant design and had at least 36 months of follow-up.

### 2.2. Patient series

The cohort consisted of 68 cases in 66 patients (41 men, 25 women) having an average age of 57 ± 12.2 years (range 26–77) at implantation; nine patients were lost to follow-up (LTF) and one had died before the last follow-up (Fig. 1). The average follow-up was 81 ± 33.3 months. The arthritis etiology was traumatic in 40 cases, primary in 11 cases and inflammatory in 17. Ten ankles were Grade 1, 34 were Grade 2 and 24 were Grade 3 based on the Morrey and Wiedeman classification (Grade 0: normal ankle, Grade 1: small osteophytes and minimal joint narrowing, Grade 2: moderate osteophytes and moderate joint narrowing, Grade 3: significant narrowing with joint deformation or fusion) [7]. The TAR procedure was performed on the left ankle in 35 cases (51.5%) and the right ankle in 33 cases (48.5%). The implant's modular design allowed the surgeon to determine if a tibial keel and/or cement were needed on a case by case basis (Fig. 2).

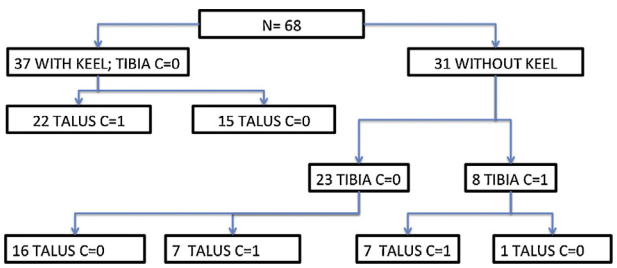


**Fig. 2.** Use of cement and tibial keel in the various implantations; C = cemented implant.

### 2.3. Implant and surgical technique

The newest AKILE™ prosthesis is a third-generation, spherical trochlear resurfacing implant with a high-molecular weight polyethylene (PE) mobile-bearing. It is made up of three components: a spherical tibial component, a trochlear-shaped talar component and a dual-curvature PE insert (Fig. 3). The tibial and talar components are made of ultra-strong high nitrogen stainless steel (ISO 5832-9). The surfaces in contact with the PE are coated with a diamond-like carbon material (Carbioceram™). This coating reduces the coefficient of friction of the metal surfaces and helps minimize PE debris [8–10]. An anterior approach was used in all cases and an additional tibial bone flap was used in cases where a tibial keel was implanted. Cementing of the implants was optional; one surgeon (DC) cemented all the talar components while the other surgeon (OL) did not. A locking tibial keel was added in cases where the surgeon's intra-operative assessment of bone quality led to doubts about the hold of the tibial component.

**Fig. 3.** The various components of the AKILE™ total ankle arthroplasty implant.