

# Comparison total joint replacement (STAR) with arthrodesis of the ankle – clinical follow-up study including pedography

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No conflict or interest

## Background

Total joint replacement (TJR) and arthrodesis (A) are treatment options for severe osteoarthritis of the ankle. The aim of this study was to compare outcome (clinical and pedographic) of TJR (STAR, Stryker, Airview Boulevard, MN, USA) and A of the ankle.

## Methods

All patients that completed follow-up of at least 24 months after TJR and A of the ankle before November 5, 2017 were included in the study. The data was extracted from a prospectively acquired database starting November 1, 2011 including all operatively treated patient at the authors' institution. Exclusion criteria were bilateral treatment (n=14), extensive additional procedures such as arthrodesis at other joints (n=54), A for revision of TJR (n=8), TJR exchange (n=10), and not completed minimum-24-month-follow-up (n=26). Preoperatively and at follow-up, radiographs (Figure 1 and 3) and/or weight-bearing computed tomographies (WBCT) (Figure 2 and 3) were obtained. Degenerative changes were classified in four degrees. Standard dynamic pedography was performed (percentage force at hindfoot and forefoot from force of entire foot). Visual-Analogue-Scale Foot and Ankle (VAS FA) and ankle range of motion for dorsi-/plantarflexion (ROM) were registered. All parameters were compared between TJR and A and between preoperatively and follow-up.

## Results

From October 11, 2011 until October 31, 2015, 36 TJR and 28 A were performed (Table 1). Parameters (average values if not stated otherwise) for TJR/A were preoperatively age 61/52 years; 20(56%)/14(50%) male; height 171/175 cm; weight 83/87 kg; degree degenerative changes 3.5/3.6; ROM 5.6/0/22.8°/4.8/0/22.1°; percentage force hindfoot/forefoot 45.5/38.3//48.4/34.5; VAS FA 43.8/40.3. Follow-up time on average 35.8/33.1 and range 25.4-66.4/24.1-71.3 months. VAS FA at follow-up was 68.6/61.3; percentage force hindfoot/forefoot 64.3/22.3//53.5/28.5; ROM 15.4/0/33.6°//0/0/0. Parameters did not differ between TJR and A (each p>.05) except lower age for A, higher VAS FA, hindfoot force percentage and ROM for TJR at follow-up (each p<.05). VAS FA and pedography parameters improved for TJR and A between preoperatively and follow-up, ROM increased for TJR and decreased for A (each p<.05).

Table 1. Parameter STAR versus ankle arthrodesis

	STAR	Arthrodesis	p
n	36	28	
<b>Surgery</b>			
Age at time of surgery (years)	61	52	0.05
Male	20 (56%)	14 (50%)	0.8
Degree of osteoarthritis (1-4)	3.5	3.6	0.9
Range of motion (ROM) Dorsiflexion/Plantarflexion (°)	5.6/0/22.8°	4.8/0/22.1°	0.7
Force percentage Hindfoot / Forefoot (%)	45.5/38.3	48.4/34.5	0.8
VAS FA	43.8	40.3	0.7
Wound healing delay	5 (13%)	4 (14%)	0.9
<b>Follow-up</b>			
Revisions (n)	0	0	-
Follow-up time (Months)	35.8 (25.4-66.4)	33.1 (24.1-71.3)	0.6
Range of motion (ROM) Dorsiflexion/Plantarflexion (°)	15.4/0/33.6	0/0/0	0.01
Force percentage Hindfoot / Forefoot (%)	64.3/22.3	53.5/28.5	0.05
VAS FA	68.6	61.3	0.05

VAS FA: Visual Analogue Scale Foot and Ankle

## Conclusions

TJR and A were performed in similar patient cohorts regarding demographic parameter (except lower age for A), degree of degenerative changes, ROM, pathological pedographic pattern, and validated clinical scores (VAS FA). Both improved pathological pedographic pattern and VAS FA at minimum follow-up of 24 months. TJR additionally improved ROM and showed better pedographic pattern (and not different than physiological pattern) and VAS FA than A. TJR resulted in better clinical outcome including ROM and pedographic pattern. Survival rate of TJR was 100% up to 5.5 years. In this study, TJR outperformed A for treatment of severe ankle osteoarthritis.



Figure 1. Weight-bearing radiographs of STAR at 66.4 months follow-up Same patient as figure 2.

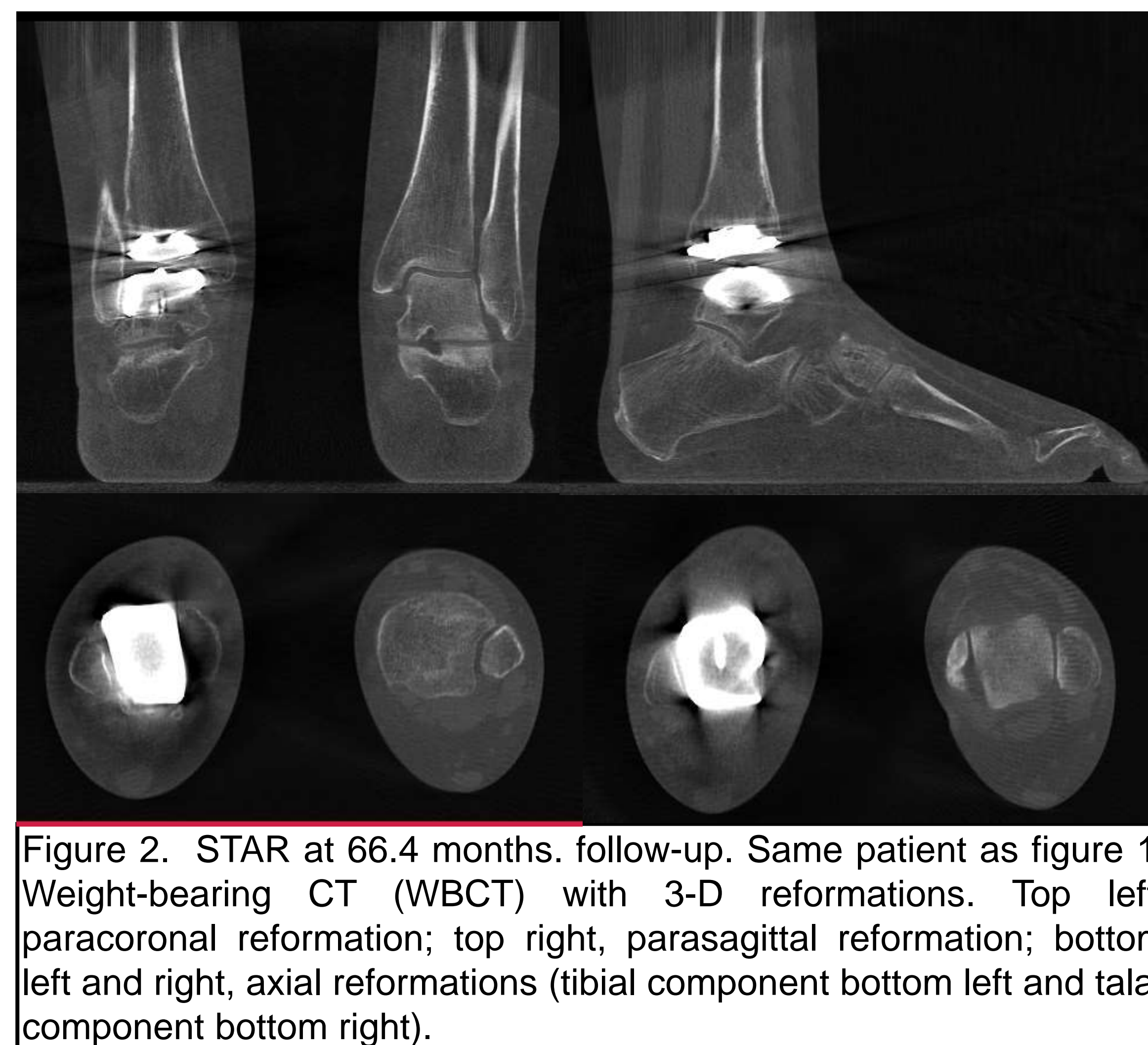


Figure 2. STAR at 66.4 months. follow-up. Same patient as figure 1. Weight-bearing CT (WBCT) with 3-D reformations. Top left, paracoronal reformation; top right, parasagittal reformation; bottom left and right, axial reformations (tibial component bottom left and talar component bottom right).



Figure 3. Ankle fusion at 71.3 months follow-up. Top left and top middle, weight-bearing radiographs. Bottom left and right column, weight-bearing CT (WBCT) with 3-D reformations. Bottom left, paracoronal reformation; top right, parasagittal reformation; Middle and bottom right, axial reformations.