

TABLE E-1 STAR Studies Including Patient Ages, Causes of Arthritis, Follow-up, Failures, and Kaplan-Meier Survivorship Analysis*

Study	Study Design	TAR	Mean Age (range) (yr)	Cause of Ankle OA (no. of ankles)				Prostheses	Mean Duration of Follow-up (range) (yr)	Failures (no. of ankles)	Reasons for Failures (no. of ankles)	Mean Time Until Revision (range) (yr)	Kaplan-Meier Survivors hip Analysis	Treatment of Failures (no. of ankles)	Results of Revision
				Primary	Secondary	Posttraumatic	Others								
Present study	PS, SC	77	56.9 (22-85)	9 (12%)	14 (18%)	54 (70%)	—	STAR	12.4 (10.8-14.9)	29 (39%)	Loosening (9), painful subsidence (11), cyst formation (5), instability (2), inlay fracture (1), infection (1)	7.4 (1.8-13.4)	70.7% at 10 yr, 45.6% at 14 yr	Revision TAR (28), ankle arthrodesis (1)	1 further revision (ankle arthrodesis) due to infection
Our previous study, Valderrabano et al. ¹³ , (2004)	PS, SC	68	56.1 (22-85)	9 (13%)	11 (16%)	48 (71%)	—	STAR	3.7 (2.4-6.2)	9 (13%)	Loosening (2), pain (7)	NA	NA	Revision TAR (2), PE exchange (7)	All successful
Anderson et al. ²⁵ (2003)	RS, SC	51	57 (27-76)	13 (25%)	28 (55%)	10 (20%)	—	STAR	(3-8)	12 (24%)	Loosening (7), fx of PE (2), others (3)	2.8 (0.1-5.3)	70% at 5 yr	Revision TAR (5), ankle arthrodesis (5), PE exchange (2)	3 revision TAR with excellent function, 1 with good function, 1 pt died
Christ and Hagena ³⁸ (2005)	RS, SC	144	57.7 (24-82)	42 (29%)	36 (25%)	66 (46%)	—	STAR	4.8	9 (6%)	Malalignment (2), loosening (2), impingement (1), instability (1), fracture (1), deep infection (2)	NA	NA	Revision TAR (7), ankle arthrodesis (2)	NA
Hagena et al. ³⁹ (2003)	PS, SC	83	57.7 (24-82)	28 (34%)	21 (25%)	34 (41%)	—	STAR	3.6 (0.5-5)	6 (7%)	Loosening (4), instability (2)	NA	NA	Ankle arthrodesis (6)	NA
Hobson et al. ⁴⁰ (2009)	RS, SC	123	64 (33-83)	65 (53%)	23 (19%)	35 (28%)	—	STAR	4 (2-8)	18 (15%)	NA	NA	NA	Revision TAR (16), ankle arthrodesis (2)	NA

Karantana et al. ⁴¹ (2010)	RS, SC	52	62 (33-81)	26 (50%)	14 (27%)	12 (23%)	—	STAR	6.7 (5.0-9.2)	8 (15%)	Stress fracture (2), stiffness (2), insert fractures (2), talar subsidence (1), loosening (1)	NA	90% (76.8-95.5) at 5 yr, 84% (68.9-92.2) at 8 yr	Revision TAR (6), ankle arthrodesis (2)	NA
Kofoed ⁴² (1995)	RS, SC	28	57 (22-76)	5 (18%)	14 (50%)	8 (29%)	1 (4%)	STAR	NA	7 (25%)	Technical error (1), ankle instability (2), pain (3), late deep infection (1)	NA	70% at 12 yr	Revision TAR (3), ankle arthrodesis (4)	NA
Kofoed and Sørensen ⁴³ (1998)	PS, SC	52	58 (34-83)	25 (48%)	27 (52%)	—	—	STAR	9 (6-14)	11 (21%)	Loosening (10), deep infection (1)	4.5 (0.8-8.8)	72.2% at 14 yr	Revision TAR (5), ankle arthrodesis (6)	NA
Kumar and Dhar ⁴⁴ (2007)	RS, SC	50	63.3 (33-80)	27 (54%)	16 (32%)	7 (14%)	—	STAR	3 (1.5-5)	3 (6%)	Malalignment (2), pain (1)	NA		Revision TAR (3)	Good results in 2 pt, and arthrodesis using ring fixator in 1 pt
Mann et al. ² (2011)	PS, SC	84	61.4 (33-86)	21 (25%)	16 (19%)	47 (56%)	—	STAR	9.1 (2.6-11.1)	6 (7%)	Aseptic loosening (2), implant failure (4)	5.5 (3.0-8.3)	96% at 5 yr, 90% at 10 yr	Revision TAR (4), ankle arthrodesis (2)	All 4 revision TARs had high function (average AOFAS score of 78) at mean of 6 yr after revision
Murnaghan et al. ⁴⁵ (2005)	RS, SC	22	60 (31-77)	14 (64%)	8 (36%)	—	—	STAR	2.2 (0.7-3.8)	2 (9%)	Malalignment (2)	NA	NA	Revision TAR (2)	Good results

Schönherr et al. ⁴⁶ (2008)	RS, SC	49	62.5 (42-79)	17 (35%)	7 (15%)	25 (50%)	—	STAR	2.5 (0.5-4.3)	3 (6%)	Impingement (1), aseptic loosening (1), malalignment (1)	NA	NA	Revision TAR (2), ankle arthrodesis (1)	NA
Schutte and Louwerens ⁴⁷ (2008)	PS, SC	49	57.1 (37.2-81.2)	5 (10%)	32 (65%)	12 (24%)	—	STAR	2.3 (1.0-5.6)	4 (8%)	Septic (2) and aseptic (2) loosening	NA	NA	Revision TAR (1), ankle arthrodesis (3)	NA
van der Heide et al. ⁴⁸ (2009)	RS, SC	58	55 (27-82)	—	58 (100%)	—	—	STAR (37), BP (21)	2.7 (1-9)	5 (9%)	Periop. fx (2), early infection (1), late infection (2)	NA	NA	Ankle arthrodesis (4), BKA (1)	NA
Wood and Deakin ⁴⁹ (2003)	PS, SC	200	60 (18-83)	56 (28%)	119 (60%)	25 (13%)	—	STAR	3.8 (2.0-8.4)	14 (7%)	NA	NA	92.7% at 5 yr	Revision TAR (3), ankle arthrodesis (11)	NA
Wood et al. ²⁶ (2008)	PS, SC	200		56 (28%)	119 (60%)	25 (13%)	—	STAR	7.3 (5-13)	24 (12%)	Major delay to wound-healing (1), intraop. fx (1), postop. fx (2), aseptic loosening (14), edge-loading (5), broken PE (1)	NA	93.3% at 5 yr, 80.3% at 10 yr	Revision TAR (4), ankle arthrodesis (20)	1 revision TAR failed after 5 yr and converted to ankle arthrodesis
Wood et al. ⁵⁰ (2009)	PS, SC	200	64 (29-84), BP; 65 (23-83), STAR	54 (BP), 56 (STAR)	31 (BP), 31 (STAR)	15 (BP), 13 (STAR)	—	BP (100), STAR (100)	4.1 (0.1-7.1)	12 (BP), 4 (STAR)	BP: aseptic loosening (5), recurrent deformity (6), implant failure (1) STAR: early infection (1), aseptic loosening (1), broken PE (2)	NA	79% (BP) and 95% (STAR) at 6 yr	Revision TAR (2), ankle arthrodesis (14)	NA

*PS = prospective; RS = retrospective; SC = single-center, OA = osteoarthritis, BP = Buechel-Pappas, TAR = total ankle replacement, fx = fracture, pt = patient(s), PE = polyethylene, BKA = below-the-knee amputation, and NA = not applicable.

TABLE E-2 Studies Describing Polyethylene Insert Fractures in STAR Ankle Prostheses

Author(s)	Year	STAR-Replaced Ankles	PE-Related Complications* (no. of ankles)	Revision Surgery* (no. of ankles)
Anderson et al. ²⁵	2003	51	Broken PE insert (2)	PE replacement (2)
Wood and Deakin ^{49*}	2003	200	Edge-loading of PE (9)	PE replacement (3), ankle arthrodesis (3)
Harris et al. ⁵¹	2009	Case report	Edge-loading and wear debris cyst, subsequent fracture of fibula	ORIF fibula, PE replacement, medial release, and lateral ligament reconstruction
Scott and Nunley ⁵²	2009	93	Broken PE insert (3)	PE replacement (3)
Wood et al. ^{53†}	2007	171	Broken PE insert (2)	NA
Wood et al. ²⁶	2008	200	Broken PE insert (1)	Ankle arthrodesis (1)
Wood et al. ⁵⁰	2009	100	Broken PE insert (2)	Ankle arthrodesis (2)
Karantana et al. ⁴¹	2010	52	Broken PE insert (2) with edge-loading	PE replacement (1), talar component and PE replacement (1)

*PE = polyethylene, and ORIF = open reduction and internal fixation. †The patient cohort of study presented in 2007 was a part of the patient cohort from the study presented in 2003.