

# Indications of Total Ankle Replacement for Ankle Arthritis: The Evaluation of Quality of Life and Radiographic Findings

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## Abstract

**Objectives:** Little is known about the quality of life and clear cut radiographic grades of ankle arthritis in patients with indication for the total ankle replacement (TAR) comparing with patients without indication for TAR. This study was to compare the quality of life and radiographic grades of ankle arthritis in patients who had ankle arthritis with and without indication for TAR.

**Methods:** From January 2010 to November 2013, the evaluation was conducted on 23 patients aged 18 or older who had ankle arthritis from several causes. The 23 patients were divided into two groups according to their indications of TAR: TAR group (n=7 patients) and non-TAR group (n=16 patients). The medical records of each patient were reviewed to collect for the pre-treatment visual analogue scale (VAS-pain score), visual analogue scale foot and ankle (VAS-FA) score, health-related quality of life score via short-form 36 (SF-36), baseline data including age, gender, side of ankle arthritis, cause of arthritis, radiographic findings, and treatment methods.

**Results:** There were no significant differences in the mean VAS-pain, VAS-FA, and SF-36 scores between the TAR and non-TAR groups ( $p > 0.05$ ). Poorer radiographic grades as Takakura grades 3-4 or the author's grades 3-4 were significantly higher in TAR group ( $p < 0.001$ ). SF-36 scores were significantly lower in patients with poorer radiographic grades in both Takakura ( $p = 0.023$ ) or Anghong ( $p = 0.042$ ) classifications.

**Conclusion:** Although quality of life in patients with indication for TAR was not significantly poorer than patients without indication for TAR, radiographic grades in patients with indication for TAR were significantly poorer than patients without indication for TAR. Radiographic grades of ankle arthritis as Takakura grades 3-4 or the author's grades 3-4 are the clear cut criteria in combination with other accepted criteria to be indications for TAR.

**Keywords:** Total ankle replacement; Arthroplasty; Indication; Radiograph; Quality of life

## Introduction

Ankle arthritis is a condition which affects the patient's quality of life [1,2]. Total ankle replacement (TAR) is the option for the treatment of this condition. However, the indications of TAR are not the consensus at the present time. Some indications are still controversial such as degree of radiographic joint destruction or coronal deformities, etc. The quality of life is one of the important issues which let the patient decide to undergo the TAR. The quality of life of patients with ankle arthritis was poor and comparable with patients with hip osteoarthritis [1].

However, little is known about the quality of life and clear cut radiographic grades of ankle arthritis in patients with indication for TAR comparing with patients without indication for TAR. This study was to compare the quality of life and radiographic grades of ankle arthritis in patients who had ankle arthritis with and without indication for TAR.

## Patients and Methods

From January 2011 to November 2013, the evaluation was conducted on 28 patients aged 18 or older who had ankle arthritis from several causes as post-traumatic, primary, rheumatoid arthritis, and other secondary causes including gouty arthritis. Patients were excluded if they did not want to participate with data collection, and patients who had no available medical records or imaging to review. Of the patients 28 reviewed, five patients were excluded from the study because of none of available medical records, leaving 23 patients with 24 ankles in the study. The 23 patients were divided into two groups according to their indications of TAR (Table 1) [3]: TAR group (n=7 patients; 7 ankles) and non-TAR group (n=16 patients; 17 ankles). The medical records of each patient were reviewed to collect baseline data including age, gender, side of ankle arthritis, cause of arthritis, radiographic findings, and treatment methods. This study was approved by the ethical committee of our institute.

Indications
Age more than 45 years
Reasonably mobile patient with no significant co-morbidities
Adequate bone stock

Well-aligned and stable hindfoot
Good soft tissues conditions
No neurovascular impairment of the lower extremity
Bilateral ankle arthritis
Previous fused subtalar or mid-foot joint

**Table 1:** Indications for total ankle replacement

### Clinical evaluation

In pre-treatment assessment, the clinical assessment included the ankle pain, which was graded according to a visual analogue scale (VAS-pain score: 0, no pain; 10, maximum pain), the validated visual analogue scale foot and ankle (VAS-FA) score [4], and health-related

Classification	Description of grade/stage
The author's classification	(1) No joint space narrowing but early sclerosis and osteophyte formation
	(2M) Narrowing of the joint space at medial gutter
	(2L) Narrowing of the joint space at lateral gutter
	(3M) Obliteration of the joint space at medial gutter with subchondral bone contact with or without advancement to the roof of the medial talar dome
	(3L) Obliteration of the joint space at lateral gutter with subchondral bone contact with or without advancement to the roof of the medial talar dome
	(4) Obliteration of the whole joint space with complete bone contact

**Table 2:** Radiographic grading systems for osteoarthritis of the ankle used in this study

### Statistical methods

To assess differences between the groups, quantitative data were analyzed using Student's t-test (normality) or Mann-Whitney U-test (non-normality). Qualitative data were analyzed using the  $\chi^2$  test or Fisher's exact test. Correlations among clinical scores or between the radiographic grade of ankle arthritis in Takakura [6] or the author's classifications and clinical scores were determined using Pearson correlation analysis. A p-value<0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 13.0 software program (SPSS, Chicago, IL, USA).

### Results

#### Baseline characteristics

The relevant clinical variables for each group are summarized in Table 3. There were no significant differences between groups with respect to age, gender, ankle side, and causes of arthritis (p>0.05). In non-TAR group, the planned treatment methods were ankle debridement and osteophyte removal (10; 43.5%), supramalleolar osteotomy (1; 4.3%), and other options or means of reconstruction (5; 21.7%).

	TAR group	Non-TAR group	P-value
Age (mean $\pm$ standard deviation, year)	65.3 $\pm$ 7.9	55.3 $\pm$ 19.6	0.246

quality of life score via short-form 36 (SF-36) [5]. Other variables were recorded in terms of planned treatment methods such as TAR, ankle debridement, supramalleolar osteotomy, injection, etc.

### Radiographic evaluation

Standardized weight-bearing anteroposterior (AP) and lateral radiographs were taken in pre-treatment phase. Ankle radiographs were evaluated for the grading of ankle arthritis by an orthopaedic foot and ankle surgeon (CA). The present study collected the grading of ankle arthritis in accordance with Takakura [6] and the author's classifications (Table 2), respectively. The author's classification was established to classify the radiographic grading of ankle arthritis with neutral or valgus or varus alignment. The Takakura's classification classifies the radiographic grading of ankle arthritis with only neutral or varus alignment.

Gender (number; %)	5 (71.4)	7 (43.8)	0.371
Female	2 (28.6)	9 (56.2)	
Male			
Side (number; %)	3 (42.9)	10 (62.5)	0.650
Right	4 (57.1)	6 (37.5)	
Left			
Cause of arthritis (number; %)	2 (28.6)	5 (31.3)	0.708
Post-traumatic	5 (71.4)	7 (43.8)	
Primary	-	3 (18.8)	
Gout	-	1 (6.3)	
Rheumatoid			

**Table 3:** Demographic data.

### Radiographic findings

The radiographic grades for each group are summarized in Table 5. There were significant differences in the radiographic grades in both Takakura [6] (p<0.001) and the author's (p<0.001) classifications between the TAR and non-TAR groups. The poorer radiographic grades as Takakura grades 3-4 or the author's grades 3-4 were significantly higher in TAR group (Table 5, p<0.001). SF-36 scores were significantly lower in the patients with poorer radiographic grades in both Takakura [6] (p=0.023) or the author's (p=0.042) classifications. However, there were no significant differences of VAS-

pain or VAS-FA scores between the radiographic grades of ankle arthritis in Takakura [6] or the author's (Table 2) classifications ( $p>0.05$ ).

### Clinical scores

The relevant clinical scores for each group are summarized in Table 4. In overall, mean VAS-pain, VAS-FA, and SF-36 scores were 4.3, 64.0, and 72.5, respectively. There were no significant differences in the mean VAS-pain, VAS-FA, and SF-36 scores between the TAR and non-TAR groups ( $p>0.05$ , Table 4). There was significant correlation between VAS-pain and VAS-FA scores (Pearson's  $r$  correlation coefficient=-0.521;  $p=0.022$ ). However, there were no significant correlations between VAS-pain and SF-36 scores or between VAS-FA and SF-36 scores ( $p>0.05$ ).

Scores <sup>*</sup>	TAR group	Non-TAR group	P-value
VAS-pain score	3.4 ± 2.1	4.6 ± 3.3	0.466
VAS-FA score	64.1 ± 22.0	64.0 ± 25.5	0.993
SF-36 score	73.9 ± 19.3	71.9 ± 16.3	0.807

**Table 4:** The clinical scores in each group. \*Mean ± standard deviation

Classifications	TAR group	Non-TAR group	P-value
The Author's (number; %)			<0.001
1	-	6 (37.5)	
2M	-	5 (31.3)	
2L	-	4 (25.0)	
3M	1 (14.3)	1 (6.3)	
3L	-	-	
4	6 (85.7)	-	
Takakura et al [6] (number; %)			<0.001
1	-	6 (37.5)	
2	-	9 (56.3)	
3	1 (14.3)	1 (6.3)	
4	6 (85.7)	-	

**Table 5:** Radiographic grades in each group

### Discussion

Quality of life in patients with ankle osteoarthritis was comparable with patients with hip osteoarthritis [1]. Patients with ankle osteoarthritis would loss of ankle adduction [7]. These patients had lower total plantar flexion movement than non-arthritic patients [7]. These biomechanic changes lead these patients to have the difficulty in walking and ambulation in their daily livings. These evidences are the causes of the deterioration of their quality of life.

The present study showed that mean quality of life of patients with ankle arthritis was quite better than patients with general foot and

ankle conditions [4]. The quality of life in patients with indication for TAR was not significantly lower than patients without indication for TAR. However, there were significant differences in the radiographic grades in both Takakura [6] ( $p<0.001$ ) and Anghong ( $p<0.001$ ) classifications between the TAR and non-TAR groups. The poorer radiographic grades as Takakura grades 3-4 or the author's grades 3-4 were significantly higher in TAR group (Table 5,  $p<0.001$ ). These findings supported the rationale of current indications for TAR in patients with late-stage ankle joint destruction [8]. Although the quality of life in patients with indication for TAR was not significantly poorer than patients without indication for TAR, these patients had more severity of ankle arthritis in terms of radiographic findings than others and they deserve the TAR as the proper treatment to decrease their pain, disabilities, possibly regain some ankle motions, and improve their quality of life [2,9-11]. The insignificant difference of quality of life between the two groups may be derived from small number of patients in this study. In addition, the poor radiographic grades as Takakura grades 3-4 or the author's grades 3-4 should be one of the clear cut criterions of the indications for TAR when surgeons make a decision to treat the patients with this option. At this point, surgeons may consider the patients who have these radiographic grades of ankle arthritis with other criteria as in Table 1 to be the candidate for TAR.

### Conclusion

Although the quality of life in patients with indication for TAR was not significantly poorer than patients without indication for TAR, the radiographic grades in patients with indication for TAR were significantly poorer than patients without indication for TAR. Surgeons may consider the patients who have the radiographic grades of ankle arthritis as Takakura grades 3-4 or the author's grades 3-4 with other accepted criteria to be the candidate for TAR.

### References

1. Glazebrook M, Daniels T, Younger A, Foote CJ, Penner M, et al. (2008) Comparison of health-related quality of life between patients with end-stage ankle and hip arthrosis. J Bone Joint Surg Am 90: 499-505.
2. Esparragoza L, Vidal C, Vaquero J (2011) Comparative study of the quality of life between arthrodesis and total arthroplasty substitution of the ankle. J Foot Ankle Surg 50: 383-387.
3. Total ankle replacement. Orthopaedics One Articles.
4. Anghong C, Chernchujit B, Suntharapa T, Harnroongroj T (2011) Visual analogue scale foot and ankle: validity and reliability of Thai version of the new outcome score in subjective form. J Med Assoc Thai 94: 952-957.
5. Jirarattanaphochai K, Jung S, Sumananont C, Saengnipanthkul S (2005) Reliability of the medical outcomes study short-form survey version 2.0 (Thai version) for the evaluation of low back pain patients. J Med Assoc Thai 88: 1355-1361.
6. Tanaka Y, Takakura Y, Hayashi K, Taniguchi A, Kumai T, et al. (2006) Low tibial osteotomy for varus-type osteoarthritis of the ankle. J Bone Joint Surg Br 88: 909-913.
7. Valderrabano V, Nigg BM, von Tscharnar V, Stefanyshyn DJ, Goepfert B, et al. (2007) Gait analysis in ankle osteoarthritis and total ankle replacement. Clin Biomech (Bristol, Avon) 22: 894-904.
8. Shinomiya F, Okada M, Hamada Y, Fujimura T, Hamada D (2003) Indications of total ankle arthroplasty for rheumatoid arthritis: evaluation at 5 years or more after the operation. Mod Rheumatol 13: 153-159.
9. Wood PLR, Clough TM, Jari S (2000) Clinical comparison of two total ankle replacements. Foot Ankle Int 21: 546-550.

10. Valderrabano V, Hintermann B, Dick W (2004) Scandinavian total ankle replacement: a 3.7-year average followup of 65 patients. *Clin Orthop Relat Res* : 47-56.
11. Nunley JA, Caputo AM, Easley ME, Cook C (2012) Intermediate to long-term outcomes of the STAR Total Ankle Replacement: the patient perspective. *J Bone Joint Surg Am* 94: 43-48.