Health-Related Quality of Life and Functional Outcomes in Ankle Arthritis Patients Based on Treating with and without Total Ankle Replacement Surgery

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Background: *Little is known about health-related quality of life and functional outcomes in candidate patients with indications for total ankle replacement (TAR) when compared to patients without indications. This study is to compare the quality of life and functional outcomes in patients who have ankle arthritis and are with and without indications for TAR.*

Material and Method: *An evaluation was conducted on 40 patients who had developed ankle arthritis from various causes. Forty patients were divided into two groups in accordance with their indications for TAR; the TAR-indicated group (11 patients) and the non-TAR indicated group (29 patients). Medical records of each patient were reviewed to collect pre-treatment visual analogue scale (VAS-pain) scores, visual analogue scale foot and ankle (VAS-FA) scores, health-related quality of life scores as ascertained from short-form 36 (SF-36), and baseline data.*

Results: *VAS-pain, VAS-FA, and SF-36 scores were insignificantly poorer in TAR-indicated group ($p>0.05$). There were no significant differences in scores among the three groups of treatment as non-operative treatments, joint-preserving treatments, and joint-sacrificing treatments or between TAR-indicated group and arthrodesis group ($p>0.05$). There were significant correlations between VAS-pain and VAS-FA scores (Pearson's r-correlation-coefficient (r) = -0.389; p = 0.019) or between VAS-FA and SF-36 scores (r = 0.564; $p<0.01$). There were no significant correlations between VAS-pain and SF-36 scores ($p>0.05$). Only SF-36 scores were significantly negative correlated with radiographic grades in Takakura (r = -0.382; p = 0.015) and the author's (r = -0.378; p = 0.016) classifications.*

Conclusion: *Quality of life and functional outcomes in candidate patients with indications for TAR was insignificantly poorer than those in the patients without indications or patients in arthrodesis subgroup. Poorer radiographic grades of ankle arthritis were significantly correlated with poorer quality of life, which is reflected via SF-36 scores.*

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

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Arthritis in the ankle is a condition, which affects the patient's quality of life[1,2]. Total ankle replacement (TAR) is one option for the treatment of this condition. However, the indications for TAR are not of the consensus at this present time. Some indications are still controversial. These include the degree of radiographic joint destruction, coronal deformities etc. The quality of life is one of the important issues, which guides the patient in their decision to undergo a TAR. The quality of life of patients with ankle arthritis is poor and has been shown to be comparable to patients with hip osteoarthritis[1].

However, little is known about the health-related quality of life and functional outcomes in candidate patients with indications for TAR as compared to patients without indications. The present study is for comparisons of the quality of life and functional outcomes in patients with and without the indications for TAR. In addition, the present study is for comparisons of the quality of life and functional outcomes among patients with different modes of treatment in ankle arthritis such as non-operative, joint-preserving, joint-sacrificing treatments.

Material and Method

From January 2011 to July 2014, an evaluation was conducted on 45 patients, aged 18 or older, who had ankle arthritis from several causes. Some of these were; traumatic injuries, arthritis as a primary disease,

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rheumatoid arthritis, and other secondary causes (including gouty arthritis). Patients were excluded if they refused to participate with the data collection and patients who had incomplete medical records. Of the patients 45 reviewed, five patients were excluded from the study, as there were no available medical records. This resulted in 40 patients with 44 arthritic ankles recorded into the study. The 40 patients were divided into two groups according to their indications for TAR (Table 1)[3]: the TAR group (n = 11 patients; 13 ankles) and non-TAR group (n = 29 patients; 31 ankles). The medical records of each patient were reviewed to collect baseline data. These data include age, gender, side of extremity with ankle arthritis, cause of arthritis, radiographic findings, and treatment methods. This study was approved by the ethical committee of Thammasat University.

Clinical evaluation

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

Radiographic evaluation

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

Statistical methods

To assess differences between the groups, quantitative data were analyzed using the Student's t-

Table 1. Indications for total ankle replacement

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 midfoot joint

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

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 the medial gutter (2L) Narrowing of the joint space at the lateral gutter (3M) Obliteration of the joint space at the 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 lateral talar dome (4) Obliteration of the entire joint space with complete bone contact

test (normality) or the Mann–Whitney U-test (non-normality). Qualitative data were analyzed using the Chi-square test or Fisher's exact test. Correlations among clinical scores or between the radiographic grades of ankle arthritis in Takakura[6] or the author's classifications and clinical scores were determined using a Pearson's correlation analysis. A p-value <0.05 was considered statistically significant. Statistical analysis was performed using the 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 the groups in respect to age, gender, side of ankle's extremity, and causes of the arthritis (p>0.05). In the non-TAR group, the planned treatment methods were ankle debridement and osteophyte removal (10; 34.5%), supramalleolar osteotomy (4; 13.8%), ankle arthrodesis (3; 10.3%), tibiotalocalcaneal arthrodesis (2; 6.9%), and intra-articular injection or oral medication (10; 34.5%).

Clinical scores

The relevant clinical scores for each group are summarized in Table 4. Overall: the mean VAS-pain, VAS-FA, and SF-36 scores were 4.9 (best = 0; worst = 10), 59.9 (best = 100; worst = 0), and 70.1 (best = 100; worst = 0), respectively. The VAS-pain, VAS-FA, and SF-36 scores were insignificantly poorer in TAR indicated group (p>0.05, Table 4).

For the subgroup analyses, there were no significant differences of scores among the three groups of treatment as non-operative treatments: (mean VAS-pain = 6.4; mean VAS-FA = 60.4; mean SF-36 = 75.6) (intra-articular injection or oral medication), joint-preserving treatments (mean VAS-pain = 3.7; mean VAS-FA = 66.1; mean SF-36 = 73.0) (ankle debridement and osteophyte removal, supramalleolar osteotomy), and joint-sacrificing treatments (mean VAS-pain = 4.9; mean VAS-FA = 54.1; mean SF-36 = 64.0) (arthrodesis or total ankle replacement) (p = 0.091 for VAS-pain; p = 0.425 for VAS-FA; p = 0.236 for SF-36 scores). In

Table 3. Demographic data

	TAR group	Non-TAR group	p-value
Age (mean ± standard deviation, in years)	65.2±9.4	54.3±19.3	0.083
Gender (number; %)			0.583
Female	6 (54.5)	13 (44.8)	
Male	5 (45.5)	16 (55.2)	
Side (number; %)			0.536
Right	4 (36.4)	15 (51.7)	
Left	5 (45.5)	12 (41.4)	
Bilateral	2 (18.2)	2 (6.9)	
Cause of arthritis (number; %)			0.665
Post-traumatic	5 (45.5)	9 (31.0)	
Primary	3 (27.3)	11 (37.9)	
Gout	-	4 (13.8)	
Rheumatoid	1 (9.1)	1 (3.4)	
Others	2 (18.2)	4 (13.7)	

Table 4. The clinical scores in TAR-indicated group and non-TAR indicated group

Scores*	TAR group	Non-TAR group	p-value
VAS-pain score	5.5±2.7	4.7±3.1	0.496
VAS-FA score	52.0±19.8	62.8±26.0	0.219
SF-36 score	63.6±14.0	72.5±19.7	0.179

* Mean ± standard deviation; TAR = total ankle replacement

addition, The VAS-pain, VAS-FA, and SF-36 scores were insignificantly poorer in TAR indicated group (11 patients) (mean VAS-pain = 5.5; mean VAS-FA = 52.0; mean SF-36 = 63.6) when compared with arthrodesis group (5 patients) (mean VAS-pain = 3.5; mean VAS-FA = 58.7; mean SF-36 = 65.0) (p = 0.207 for VAS-pain; p = 0.578 for VAS-FA; p = 0.881 for SF-36 scores).

The correlations among the clinical scores were shown in Table 5. There were significant correlations between the VAS-pain and the VAS-FA scores or between the VAS-FA and SF-36 scores. However, there were no significant correlations between the VAS-pain and SF-36 scores (p>0.05).

Radiographic findings

The radiographic grades for each group are summarized in Table 6. There were significant differences in the radiographic grades in both the 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 obtained from the Takakura grades 3-4 or the author's grades 3-4 were significantly higher in the TAR group (Table 6, p<0.05). In overall, only SF-36 scores were significantly negative correlated with radiographic grades in Takakura (r = -0.382; p = 0.015) and the author's (r = -0.378; p = 0.016) classifications. There were no significant differences of the VAS-pain or the VAS-FA scores between the radiographic grades of ankle arthritis obtained in either the Takakura [6] or the author's (Table 2) classifications (p>0.05).

Discussion

The quality of life in patients with ankle osteoarthritis is comparable to that of patients with hip osteoarthritis[1]. Patients with ankle osteoarthritis would suffer a loss of ankle adduction[7]. These patients have lower, total plantar flexion movement than has been shown in non-arthritic patients[7]. These biomechanical changes lead these patients to develop difficulty in walking and ambulating in their daily life. These evidences are the cause of the deterioration of their quality of life.

The present study shows that the health-

Table 5. The correlations among the clinical scores

Scores	VAS-pain	VAS-FA	SF-36
VAS-pain	-	r = -0.389, p = 0.019	r = -0.231, p = 0.176
VAS-FA	r = -0.389, p = 0.019	-	r = 0.564, p<0.01
SF-36	r = -0.231, p = 0.176	r = 0.564, p<0.01	-

visual analogue scale (VAS-pain) score, visual analogue scale foot and ankle (VAS-FA) score, health-related quality of life score as ascertained from short-form 36 (SF-36), Pearson's r correlation coefficient (r)

Table 6. Radiographic grades in TAR-indicated group and non-TAR indicated group

Classifications	TAR group	Non-TAR group	p-value
The author's (number; %)			0.001
1	-	6 (20.7)	
2M	-	6 (20.7)	
2L	-	8 (27.6)	
3M	2 (18.2)	2 (6.9)	
3L	-	2 (6.9)	
4	9 (81.8)	5 (17.2)	
Takakura et al (Takakura) (number; %)			<0.001
1	-	6 (20.7)	
2	-	14 (48.3)	
3	2 (18.2)	4 (13.8)	
4	9 (81.8)	5 (17.2)	

TAR, total ankle replacement

related quality of life and functional outcomes in patients with indications for TAR was insignificantly poorer than patients without indications or patients in the arthrodesis subgroup. There were no significant differences among the three groups of treatment as non-operative treatments (intra-articular injection or oral medication), joint-preserving treatments (ankle debridement and osteophyte removal, supramalleolar osteotomy), and joint-sacrificing treatments (arthrodesis or total ankle replacement). However, there were significant differences in the radiographic grades in both the Takakura[6] ($p<0.001$) and Angthong ($p<0.001$) classifications between the TAR and non-TAR groups. The poorer radiographic grades such as Takakura grades of 3-4 or the author's grades of 3-4 were significantly higher in the TAR group (Table 6, $p<0.05$). These findings support the rationale of current indications for TAR in patients with late-stage ankle joint destruction[8]. Although the quality of life and functional outcomes in patients with indications for TAR was insignificantly poorer than the patients without indications, these patients have a greater severity of their ankle arthritis in terms of radiographic findings than others. They require TAR as the proper treatment to decrease their pain, limit their disabilities, help them to possibly regain near normal ankle motion, and to improve their quality of life[2,9-13]. The insignificant differences of the quality of life between the two groups or among the subgroups may be a result of the small number of patients in the present study.

In addition, the poorer radiographic grades as in Takakura or the author's classification were significantly correlated with poorer quality of life, which reflected via SF-36 scores[14,15]. The SF-36 scores should be a majority of outcome measures reflecting the actual effect of ankle arthritis when surgeons are making the decision to treat the patients with any option. At this point, the present study recommends the involved surgeons to utilize this scoring system to routinely evaluate the patients who have ankle arthritis in the clinical practice.

Conclusion

Based on limited number of patients, the quality of life and functional outcomes in candidate patients with indications for TAR was insignificantly poorer than seen in the patients without indications or patients in arthrodesis subgroup. Further study with a larger number of patients is needed to validate this conclusion. Poorer radiographic grades of ankle arthritis were significantly correlated with poorer quality of life, which is reflected via the SF-36 scores. This scoring system is recommended to use for clinical evaluation in the patients with ankle arthritis.

Potential conflicts of interest

None.

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คุณภาพชีวิตและผลต่อการใช้งานในผู้ป่วยข้อเท้าอักเสบเสื่อมที่กำลังจะได้รับการผ่าตัดเปลี่ยนข้อเท้าเทียมหรือการรักษาแบบอื่น

ชญานิน อ่างทอง

วัตถุประสงค์: *ข้อมูลจำนวนน้อยที่บอกถึงคุณภาพชีวิตและผลต่อการใช้งานในผู้ป่วยข้อเท้าอักเสบเสื่อมที่กำลังจะได้รับ การผ่าตัดเปลี่ยนข้อเท้าเทียมเมื่อเปรียบเทียบกับการรักษาแบบอื่นการวิจัยนี้ทำเพื่อเปรียบเทียบคุณภาพชีวิตและผล ต่อการใช้งานในผู้ป่วยข้อเท้าอักเสบเสื่อมที่มีและไม่มีข้อบ่งชี้สำหรับการผ่าตัดเปลี่ยนข้อเท้าเทียม*

วัสดุและวิธีการ: *การวิจัยนี้ได้ทำการประเมินผู้ป่วยข้อเท้าอักเสบเสื่อมจำนวน 40 คนที่มีอายุมากกว่า 18 ปี โดยแบ่งออกเป็น 2 กลุ่ม ได้แก่ กลุ่มที่มี (11 คน) และไม่มีข้อบ่งชี้ (29 คน) สำหรับการผ่าตัดเปลี่ยนข้อเท้าเทียม และทำการรวบรวมข้อมูลต่างๆ ก่อนทำการรักษาจากบันทึกทางการแพทย์ ได้แก่ คะแนนความปวด [visual analogue scale (VAS-pain) score], คะแนนเท้า-ข้อเท้า [visual analogue scale foot and ankle (VAS-FA) score], คะแนนของคุณภาพชีวิต [short-form 36 (SF-36)] รวมทั้งข้อมูลพื้นฐานอื่นๆ*

ผลการศึกษา: *ผู้ป่วยข้อเท้าอักเสบเสื่อมที่มีข้อบ่งชี้สำหรับการผ่าตัดเปลี่ยนข้อเท้าเทียมมีคะแนน VAS-pain, VAS-FA, และ SF-36 ที่แย่กว่าผู้ป่วยที่ไม่มีข้อบ่งชี้หรือผู้ป่วยในกลุ่มที่รักษาด้วยการผ่าตัดเชื่อมข้อเท้าอย่างไม่มีนัยสำคัญ ($p>0.05$) รวมทั้งไม่พบความแตกต่างอย่างมีนัยสำคัญระหว่างกลุ่มผู้ป่วยที่รักษาแบบไม่ผ่าตัดหรือแบบผ่าตัดที่ส่งวนผิวข้อเท้าหรือแบบผ่าตัดที่ไม่ส่งวนผิวข้อเท้า ($p>0.05$) นอกจากนี้พบว่ามีความสัมพันธ์อย่างมีนัยสำคัญระหว่างคะแนน VAS-pain และ VAS-FA (Pearson's r correlation coefficient (r) = -0.389; $p = 0.019$) หรือระหว่างคะแนน VAS-FA และ SF-36 ($r = 0.564$; $p<0.01$) อย่างไรก็ตามไม่พบว่ามีความสัมพันธ์อย่างมีนัยสำคัญระหว่างคะแนน VAS-pain และ SF-36 ($p>0.05$) คะแนน SF-36 เป็นคะแนนแบบเดียวที่มีความสัมพันธ์ในแง่ลบอย่างมีนัยสำคัญ กับระดับการเสื่อมที่มากขึ้นของข้อเท้าจากภาพถ่ายทางรังสีวิทยาตามการจำแนกของวิธี Takakura ($r = -0.382$; $p = 0.015$) และวิธีแบบของผู้นิพนธ์ ($r = -0.378$; $p = 0.016$)*

สรุป: *คุณภาพชีวิตและผลต่อการใช้งานในผู้ป่วยข้อเท้าอักเสบเสื่อมที่มีข้อบ่งชี้สำหรับการผ่าตัดเปลี่ยนข้อเท้าเทียมนั้น แย่กว่าผู้ป่วยที่ไม่มีข้อบ่งชี้หรือผู้ป่วยในกลุ่มที่รักษาด้วยการผ่าตัดเชื่อมข้อเท้าอย่างไม่มีนัยสำคัญ อย่างไรก็ตามพบว่าคะแนนคุณภาพชีวิต (SF-36) ของผู้ป่วยข้อเท้าอักเสบเสื่อมแย่ลงอย่างมีนัยสำคัญเมื่อระดับการเสื่อมของข้อเท้ามีมากขึ้นจากภาพถ่ายทางรังสีวิทยา การวิจัยนี้แนะนำให้ใช้คะแนนคุณภาพชีวิต (SF-36) เป็นเกณฑ์วัดสอบที่เหมาะสมในการประเมินทางคลินิกของผู้ป่วยข้อเท้าอักเสบเสื่อมต่อไป*