



## Functional outcome following an ankle or subtalar arthrodesis in adults

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Arthrodesis surgery aims to give pain relief by abolishing the movement of the joint concerned. Few studies describe the outcome as appreciated by the patient. This was the major concern of the authors, when they set up this retrospective study about the outcome after ankle fusion or subtalar fusion. Inclusion criteria were : pre-existing idiopathic and posttraumatic osteoarthritis, leading to joint pain unresponsive to conservative treatment, clinically and radiologically fused with an open approach between 2007 and 2011. Exclusion criteria were : pre-existing joint infection, diabetes, rheumatoid arthritis, nonunion, age below 18 years, decease, and arthroscopic fusion. Fifteen ankle fusions and 18 subtalar fusions fulfilled the criteria. The mean age of the patients was 77 and 69 years, respectively ; the average follow-up period was 3 and 4 years. A telephone questionnaire showed that the average patients' satisfaction was 7.86/10 in the ankle group and 7.94/10 in the subtalar group. All patients driving a car prior to surgery were able to do so afterwards. Forty percent walked unaided and without problems (excellent). Fifty-one percent were able to mobilise, but their walking distance was limited and a stick was required (good or fair). Nine percent were unable to mobilise out of their homes (poor), however it was generalized osteoarthritis which limited their mobility. Forty-five percent were involved in sports including judo, swimming, cycling, jogging, gardening, bowling, golf, and boules.

**Keywords :** ankle ; subtalar joint ; fusion ; outcome ; questionnaire.

### INTRODUCTION

Patients undergoing ankle or subtalar fusion aim for pain relief and improved overall function (1). Currently little or no data or guidelines exist on how to advise patients about sports participation and functional outcome after arthrodesis of the ankle or subtalar joint (8). Some arthrodeses will preclude certain functions as they limit the patients' ability to perform movements vital to the activity (8). Moreover, patients should be aware that fusion is a salvage procedure, which will cause persistent alterations in gait, with a potential for deterioration due to the development of neighbouring joint arthritis.

### METHODS

The authors identified all open ankle and subtalar fusions, performed in the Norfolk and Norwich

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University Hospital NHS Trust between 2007 and 2011. Inclusion criteria were : pre-existing idiopathic and posttraumatic osteoarthritis, leading to joint pain irresponsive to conservative treatment, with clinical and radiological union. Exclusion criteria were : pre-existing joint infection, diabetes, rheumatoid arthritis, nonunion, age below 18 years, decease, and arthroscopic fusion. Open ankle fusion consisted of a lateral or anterior approach with joint débridement and insertion of two or three compressing 6.5mm partially threaded titanium cannulated screws. Subtalar joint fusion was through a standard lateral incision. The middle and posterior facets of the subtalar joint were débrided, and two compressing 6.5 mm partially threaded titanium cannulated screws. Immobilization was maintained for 6 weeks non-weightbearing and 6 weeks partial-weightbearing. The case records and the radi-

ographs (standing anteroposterior and lateral weight bearing) were reviewed to assess if the fusion had successfully united. A telephone questionnaire was used to assess the patients' current function (table I and II).

## RESULTS

### Ankle fusion (Table I)

Fifteen patients were identified. The male/female ratio was 11/4. The mean age was 77 years (range, 60-86). The average follow-up period was 3 years. Radiological healing was noted after a mean period of 5 months (range, 3-6 months). The mean satisfaction score was 8/10. All 10 patients driving a car prior to ankle pathology were able to drive after the ankle fusion, regardless of the side involved and the

Table I. — Function after ankle fusion (n = 15). Follow-up : +/- 3 years.

Age/ Gender	Satisfaction	Driving	Walking	Daily activities	Stairs	Recreation	Sports
77/m	7	yes	good	yes	yes	yes	judo
75/f	9	yes	fair	yes	yes	no	
85/m	9	yes	good	no	yes	yes	swimming
60/m	10	yes	good	yes	difficulty	yes	swimming, cycling
78/m	5	motorbike	fair	difficulty	difficulty	no	
82/m	10	yes	fair	yes	difficulty	no	jogging
64/m	10	yes	excellent	yes	difficulty	yes	swimming
67/f	5	not a driver	poor	yes	no	no	
84/f	6	not a driver	fair	no	difficulty	yes	gardening, swimming
75/f	5	not a driver	poor	no	difficulty	no	
86/m	10	yes	excellent	yes	yes	yes	
81/m	9	yes	excellent	yes	yes	yes	bowling
70/m	7	yes	excellent	yes	difficulty	yes	
83/m	8	yes	excellent	yes	difficulty	yes	
81/m	8	motorbike	excellent	yes	yes	yes	
+/- 77 11m/4f	+/- 7,86/10		6 exc  3 good 4 fair 2 poor				

Excellent : walks as far as he wishes without aid, or runs / Good : distance more than ½ mile, able to do kerbs, one stick/ Fair : up to 100 yards, with a stick or without / Poor : unable to walk out of house.

Table II. — Function after subtalar fusion (n = 18). Follow-up : +/- 4 years.

Age/Gender	Satisfaction	Driving	Walking	Daily activities	Stairs	Recreation	Sports
73/m	10/10	not a driver	good	yes	yes	difficulty	
66/m	8/10	yes	fair	yes	difficulty	yes	golf, cycling
71/m	7/10	yes	excellent	yes	yes	yes	gardening
68/f	10/10	yes	excellent	yes	yes	yes	swimming, gardening
80/m	10/10	yes	excellent	yes	yes	yes	golf, boules
45/f	10/10	not a driver	excellent	yes	yes	yes	
83/m	0/10	yes	poor	difficulty	difficulty	no	
53/m	7/10	yes	fair	yes	yes	no	
77/m	7/10	yes	good	yes	yes	yes	golf
68/m	10/10	yes	good	yes	yes	difficulty	
76/m	10/10	yes	excellent	yes	yes	yes	jogging
78/f	7/10	not a driver	fair	yes	yes	yes	gardening
72/f	8/10	not a driver	fair	yes	yes	yes	
73/m	8/10	yes	excellent	yes	yes	yes	
65/m	10/10	yes	excellent	yes	yes	yes	jogging, swimming
71/m	5/10	yes	fair	yes	yes	yes	
54/f	10/10	yes	good	difficulty	difficulty	difficulty	
70/m	6/10	yes	good	yes	difficulty	difficulty	
+/-69 13m/5f	+/- 7.94/10		7 exc 5 good 5 fair 1 poor				

Excellent : walks as far as he wishes without aid, or runs / Good : distance more than ½ mile, able to do kerbs, one stick / Fair : up to 100yards, with a stick or without / Poor : unable to walk out of house.

type of the car (mechanical or automatic gears). Three other patients were non-drivers, and 2 men were using motorbikes after their ankle fusion. Six patients walked independently without any aids, but 9 patients used a stick. Two of these 15 patients were unable to mobilise out of their homes, but further questioning revealed that generalised arthritis also limited their mobility. Eleven had no problems with daily activities, one had difficulties, and 3 were unable. Six were able to manage stairs without problems, eight had difficulties and one was not able. Ten took part at recreational activities, such as shopping, but 5 were unable to do so. Seven out of 15 patients were involved in sports, including judo, swimming, cycling, jogging, gardening and bowling.

### Subtalar fusion (Table II)

Eighteen patients were identified with a subtalar fusion. The male/female ratio was 13/5. The mean age was 69 years (range, 45-83). The average follow-up was 4 years. Radiological healing was obtained after a mean period of 6 months (range 4-9 months). The mean satisfaction score was 8/10. All patients driving prior to subtalar pathology (14 out of 18) were able to drive after subtalar fusion surgery. Seven patients walked without any aids (excellent), 11 patients used a stick (good, fair or poor). One patient was unable to mobilise out of his home, but on further questioning generalised arthritis also limited this patient's mobility. Daily activities were not problematic, except in 2. Fourteen

were able to manage stairs without problems, but 4 had difficulties. All patients, except 4, were able to take part in recreational activities, such as shopping. Eight out of 18 patients were involved in sports including golf, cycling, gardening, swimming, boules, and jogging.

## DISCUSSION

Pain relief, fusion rates and complication rates following arthrodesis surgery are well documented (1,3). However, the functional outcome in everyday terms for patients is less well known. This study used a questionnaire asking for patient reported outcomes on satisfaction, driving ability, walking, daily activities, stairs, recreational activities, and sports following ankle or subtalar fusion. Several authors claim that no existing outcome measure is able to capture the full patient experience following foot surgery (5,6).

The recruitment area of the authors' hospital is mainly rural, and many elderly people rely on their cars for transport. All patients who were able to drive prior to their fusion were able to drive after their surgery. Brake reaction times in ankle fusion patients have been shown to be within safe limits (4).

This study showed that, after an ankle or subtalar fusion, most patients are able to walk and do daily activities such as washing, dressing and cooking. Only 3 out of 33 were unable to walk out of their homes, but these 3 patients complained of generalised arthritis affecting their mobility.

Despite the loss of ankle or subtalar movement a third of the patients was involved in sports. These sports were non-contact sports, except for one patient doing judo. No patients were doing sports involving jumping. A previous study looking at sports involvement after ankle fusion and ankle replacement showed little difference between the two groups (7).

Fuchs *et al* (2) noted degenerative changes in neighbouring joints, 20 years after ankle fusion in patients younger than 50 years (except one, who was older), and thus still very active. The follow-up period of the current study was much shorter (3 and 4 years on an average), and the age at operation was

above 50 (except one, who was younger), so that adjacent osteoarthritis was not likely to be present to the same degree.

It is acknowledged this is a retrospective study of patient notes with the use of a telephone questionnaire to collect the current patients' functional data. However, no single questionnaire captures all the concerns of the patients and standardized questionnaires differ largely in content (7). None of the existing outcome measures can claim to be a valid measure of the patients' perception of outcome (6).

In summary following a clinically and radiologically fused ankle or sutalar joint there is a high satisfaction rate and more than 90% are able to mobilise for daily activities. Approximately, a third of patients are able to be involved in sports. All drivers were able to continue driving.

## REFERENCES

1. **Coester LM, Saltzman CL, Leupold J, Pontarelli W.** Long-term results following ankle arthrodesis for post-traumatic arthritis. *J Bone Joint Surg* 2001 ; 83-A : 219-228.
2. **Fuchs S, Sandmann C, Skwara A, Chylarecki C.** Quality of life 20 years after arthrodesis of the ankle. A study of adjacent joints. *J Bone Joint Surg* 2003 ; 85-B : 994-998.
3. **Haddad SL, Coetzee JC, Estok R, Fahrback K, Banel D, Nalysnyk L.** Intermediate and long-term outcomes of total ankle arthroplasty and ankle arthrodesis. A systematic review of the literature. *J Bone Joint Surg* 2007 ; 89-A : 1899-1905.
4. **Jeng CL, Lin JS, Amoyal K, Campbell J, Myerson MS.** Driving brake reaction time following right ankle arthrodesis. *Foot Ankle Int* 2011 ; 32 : 896-899.
5. **Parker J, Nester CJ, Long AF, Barrie J.** The problem with measuring patient perceptions of outcome with existing outcome measures in foot and ankle surgery. *Foot Ankle Int* 2003 ; 24 : 56-60.
6. **Pinsker E, Daniels TR, Inrig T, Warmington K, Beaton DE.** The ability of outcome questionnaires to capture patient concerns following ankle reconstruction. 2013 ; 34 : 65-74.
7. **Schuh R, Hofstaetter J, Krismer M, Bevoni R, Windhager R, Trnka HJ.** Total ankle arthroplasty versus ankle arthrodesis. Comparison of sports, recreational activities and functional outcome. *Int Orthop* 2012 ; 36 : 1207-1214.
8. **Vertullo CJ, Nunley JA.** Participation in sports after arthrodesis of the foot or ankle. *Foot Ankle Int* 2002 ; 23 : 625-628.