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Bilateral Arthrodesis of the Ankle Joint

Self-Reported Outcomes in 35 Patients From the Swedish Ankle Registry

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1 **Title**

2 Bilateral Arthrodesis of the Ankle Joint.

3 Self-reported Outcomes in 35 Patients from the Swedish Ankle Registry

4

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10

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14 measures

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18 the Swedish Association of Local Authorities and Regions.

19 Conflict of interest: None reported.

20

21 **Abstract**

22 Bilateral ankle arthrodesis (AA) is seldom performed, and results concerning
23 outcome and satisfaction are only sparsely found in the literature. We analyzed 35
24 patients with bilateral AA in the Swedish Ankle Registry with patient-reported generic
25 and region specific outcome measures (PROM). Of 36 talocrural (TC) arthrodeses
26 and 34 tibio-talar-calcaneal (TTC) arthrodeses, 6 ankles had undergone re-
27 arthrodesis due to non-union. After mean 47 months follow-up time we found the
28 following mean scores: SEFAS 33, EQ-5D 0.67, EQ-VAS 70, SF-36 physical 39 and
29 mental 54. Patients with rheumatoid arthritis (RA) seemed to have similar SEFAS but
30 possibly lower EQ-5D and SF-36 scores. TC arthrodeses scored higher than TTC
31 arthrodeses in EQ5D and SF-36 ($p=0.03$ and $p=0.04$). In 64/70 cases the patients
32 were satisfied or very satisfied with the outcome. In conclusion we consider bilateral
33 AA to be a reasonable treatment, with high post-operative mid-term satisfaction and
34 fairly good PROM scores, when no other treatment option is available.

35

36 **Introduction**

37 In Sweden with a population of about 10 million, 400 ankles or 4 in 100.000
38 inhabitants are either replaced or fused annually. 96 % of these procedures are
39 reported to the Swedish Ankle Registry. A limited number of patients undergo
40 bilateral but staged procedures. The knowledge concerning outcome and satisfaction
41 in patients with bilateral ankle arthrodesis (AA) is very sparse. Recently, a report of a
42 small number of bilateral AA showing high patient satisfaction was published (1). Our
43 aim of this study was to analyze patient-reported function and outcome in AA patients

44 with a minimum follow-up of 1 year, using validated generic and ankle specific
45 questionnaires.

46 **Patients and Methods**

47 Fifty-one patients with bilateral AA as a primary procedure were identified in the
48 Swedish Ankle Registry. Of these one had died of unrelated reason and 6 had a too
49 short follow-up (<12 months).

50 Minimum one year after the most recent arthrodesis the 44 patients were asked to
51 report their general health status using the Short Form-36 (SF-36), the EuroQol-
52 5D(EQ-5D) and the EuroQol Visual Analogue Scale (EQ-VAS) scores. EQ-5D scores
53 from 0 to 1 and EQ-VAS from 0-100. The lower the scores the worse general
54 health, Sf-36 physical and SF-36 mental both score from 0-100. A score of zero
55 implies maximum disability and 100 no disability. For ankle function we used the
56 validated Self-reported Foot and Ankle Score (SEFAS). SEFAS contains 12 items
57 with 5 response options; each scoring from 0 to 4 where a sum of 0 points represents
58 the most severe disability and 48 represents normal function (2). For each patient the
59 average SEFAS score of the left and the right ankle was used to estimate overall foot
60 and ankle function (Fig 1).

61 The patients also reported their satisfaction with the result of each ankle on a 5-
62 grade Likert scale as: very satisfied, satisfied, neither satisfied or dissatisfied,
63 dissatisfied, very dissatisfied (3). Very satisfied corresponds to 1 point and very
64 dissatisfied to 5 points.

65

66 8 did not return the questionnaires and the answers of one patient were not
67 applicable because of a paraplegic condition meaning that the different scores were
68 not specific for the ankles. Thus 35 patients (70 ankles) were available for analysis.

69 There were 15 women and 20 men with a mean age of 63 (range 38-80) years.
70 The reason for surgery was primary osteoarthritis in 10 patients, rheumatoid arthritis
71 in 14, posttraumatic arthritis in 5, diabetic arthropathy in 4, psoriatic arthritis in one
72 and secondary osteoarthritis (pes cavo-varus) in one. Thirty-six ankles had a talo-
73 crural (TC) arthrodesis and the other 34 a tibio-talo-calcaneal (TTC) arthrodesis.
74 Three patients had a TC arthrodesis in one side and a TTC arthrodesis in the other
75 side.

76 Six ankles in 5 patients (8 %) had undergone re-arthrodesis because of non-union.
77 No re-re-arthrodeses were reported to the registry.

78 Follow-up time was mean 47 months (range 12-194). Seventeen ankles in 13
79 patients had a follow-up time longer than 5 years. The mean time between the first
80 and second arthrodesis was 27 months (5-94). In rheumatic patients the interval was
81 28 months (5-94) and in the remaining patients 27 months (10-111).

82 For comparison between groups the Wilcoxon sign rank test was used. We
83 refrained from extensive sub group analyses due to small numbers in groups and
84 only analyzed differences between TC and TTC arthrodesis patients.

85

86 **Results**

87 Previous subtalar fusion was performed in one patient with rheumatoid arthritis. No
88 secondary subtalar fusions were reported in the TC group.

89 All patients answered the questionnaires but one who did not answer the SF-36
90 properly.

91 The PROM (SEFAS, SF-36 physical and mental component summary scales, EQ-
92 5D, EQ-VAS) values are presented in Table 1. The mean follow-up SEFAS score
93 was 33 out of 48. The score was about the same irrespective of diagnosis, but
94 somewhat lower in the 15 patients with bilateral TTC-fusions. The difference was not
95 statistically significant ($p=0.10$). Also the SF-36 physical component summary scale
96 and EQ-5D were lower in TTC-fusions and these differences were statistically
97 significant ($p=0.04$ and 0.03 respectively). The 7 patients with bilateral TTC-fusions
98 and rheumatoid arthritis had a mean SEFAS score of 31 (22-40).

99 Ten patients were very satisfied with both their ankles and 19 were either very
100 satisfied or satisfied with both ankles. The satisfaction grades are listed in Table 2.

101 **Discussion**

102 This study shows a very high degree of satisfaction (89% very satisfied or satisfied)
103 in patients with bilateral AA. This is consistent with the findings of Vaughan et al. (1),
104 who found that 7 out of 8 patients (88%) were very satisfied or satisfied.

105 There are so far no normative data of the SEFAS score. However, the mean
106 SEFAS score in our study of 33 out of a possible maximum of 48 corresponds well
107 with values in earlier reports. Cöster et al. (4) found a mean SEFAS score of 29 after
108 surgery for hindfoot and ankle disorders. In patients operated for adult acquired
109 flatfoot Cöster et al. (5) found a mean SEFAS score 2 years postoperatively of 33.
110 The only SEFAS score of primary ankle arthrodeses in the literature is from a small
111 series by Henricson et al. (6). In patients with a total ankle replacement and a
112 contralateral ankle arthrodesis they found a mean SEFAS score of 27 for the

113 arthrodesis side. In salvage ankle arthrodesis after failed total ankle prostheses
114 Kamrad et al. (7) found a mean SEFAS score of 22.

115 In the present study patients with rheumatoid arthritis had about the same SEFAS
116 score as patients with other diagnoses, although SF-36 scores and the EQ-5D score
117 were lower. This most probably reflects that patients with rheumatoid arthritis
118 frequently have other problems apart from those in the foot and the ankle.

119 We also found that the SEFAS score, the SF-36 physical summary scale score,
120 and the EQ-5D score of patients in the TTC group was lower than in the TC group.
121 The difference was only statistically significant for the two latter scores. However, in
122 the TTC group 8 patients (53 %) belong to the group of rheumatoid patients, which at
123 least to some extent may explain their lower scores.

124 The physical component summary scale of SF-36 was somewhat lower than the
125 score of 43 reported by Hendrickx et al. (8) in a follow-up study of unilateral AA. The
126 mental component score of 54 was however the same in our study and in the study
127 by Hendrickx et al. (8).

128 Few studies address patients with bilateral ankle arthritis. Bilateral total ankle
129 replacement has previously been found to result in a high degree of patient
130 satisfaction (9, 10). Results from bilateral AA is only reported in few patients in
131 studies concerning unilateral ankle arthrodesis (11, 12). In these studies patients with
132 bilateral AA are noted to have difficulty with stairs, inclines and walking in uneven
133 terrain. In a small series of patients with a total ankle replacement in one side and a
134 contralateral ankle arthrodesis the majority were satisfied with their ankles (6).

135 Long-term studies of unilateral AA have shown multiple problems. Coester et al.
136 (13) found in a 22 years follow-up of 23 patients difficulties with climbing stairs and

137 standing upright, the patients also had swelling and pain, altogether leading to
138 increased foot disability. However, 67 percent of their patients were satisfied with the
139 procedure. Fuchs et al. (14) in another long-term study of unilateral AA in 17 patients
140 (one with bilateral AA) found that all their patients were happy with their ankles. In a
141 9-year follow-up study of unilateral AA Hendrickx et al. (8) found good functional
142 outcome with 91 % of the patients satisfied although many experienced some pain in
143 the ankle. Their SF-36 scores were in accordance with the SF-36 scores in our study.

144 Limitations of this study include the concern of incomplete reporting to the registry.
145 However, the procedure-based coverage of reporting AA is about 96 %. Also, this is
146 a registry study and we have no information regarding immobilization time, and
147 indeed no radiological reports. We also lack reports of return to job and sports
148 activities. The non-union rate of 8 % in the present study is similar to other reports (8,
149 15) although there might be asymptomatic non-unions.

150 The strength of our study is the nationwide inclusion of cases and surgeries
151 performed by different surgeons in different hospitals. This gives the study an
152 objective evaluation of real clinical results of the procedures but not necessarily best
153 possible results. There are few studies on bilateral AA and our study includes
154 relatively many cases with mid-term follow-up time.

155 In conclusion we found that patients with bilateral AA have a high degree of
156 satisfaction in a mid-term perspective. The SEFAS and SF-36 scores are at
157 reasonably good levels. Usually, the condition of bilateral AA wants to be avoided but
158 our results show that, when no alternative options are available, bilateral AA might be
159 reasonable option with satisfying outcome. However, no long-term outcome data are
160 available.

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Table 1					
PROM values					
	SEFAS	SF-36, phys	SF-36, ment	EQ-5D	EQ-VAS
	mean (range)	mean (range)	mean (range)	mean (range)	mean (range)
All patients (n=35)	33 (11-48)	39 (16-58) (n=34)	54 (17-71) (n=34)	0.67 (-0.07-1)	70 (20-95)
RA (n=14)	32 (11-43)	36(17-59) (n=13)	48 (17-71) (n=13)	0.59 (-0.11-1)	70 (30-90)
Other diagnoses (n=21)	34 (10-48)	40 (16-58)	54 (31-66)	0.75 (-0.07-1)	70 (20-95)
TC (n= 17)*	36 (11-45)	43 (21-58)	53 (22-64)	0.73 (-0.11-1)	68 (30-95)
TTC (n= 15)*	30 (10-40)	33 (16-44) (n=14)	57 (17-71) (n=14)	0.62 (-0.07-1)	67 (20-90)
FU> 5 years (n= 13)	31 (10-48)	39 (27-58)	49 (23-66)	0.73 (-0.11-1)	66 (20-95)
* The numbers refer to cases with bilateral TC- and TTC-fusions respectively					

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Table 2					
Grade of satisfaction					
		Number of ankles	Very satisfied/Satisfied	Neither/nor	Dissatisfied/ Very dissatisfied
	All patients	70	64	5	1
	RA	28	23	5	1
	Other diagnoses	42	41	1	
	TC	36	34	2	
	TTC	34	29	4	1
	FU> 5 years	17	15	2	

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Figure 1

SELF-REPORTED FOOT & ANKLE QUESTIONNAIRE (SEFAS)

We would like you to answer the 12 questions below. Each question is graded from 0- 4
4 = the mildest or least troublesome and 0 = the most severe or most troublesome.

Please cross the box that best describes your condition during the last 4 weeks

<p>1. How would you describe the pain you usually have from the foot/ankle in question?</p> <p>4 <input type="checkbox"/> None 3 <input type="checkbox"/> Very mild 2 <input type="checkbox"/> Mild 1 <input type="checkbox"/> Moderate 0 <input type="checkbox"/> Severe</p>	<p>5. How much has the pain from the foot/ankle in question interfered with your usual work including housework and hobbies?</p> <p>4 <input type="checkbox"/> Not at all 3 <input type="checkbox"/> A bit 2 <input type="checkbox"/> Moderately 1 <input type="checkbox"/> Greatly 0 <input type="checkbox"/> Totally</p>
<p>2. For how long have you been able to walk before severe pain arises from the foot/ ankle in question?</p> <p>4 <input type="checkbox"/> No pain up 30 min. 3 <input type="checkbox"/> 16-30 minutes 2 <input type="checkbox"/> 5-15 minutes 1 <input type="checkbox"/> Around the house only 0 <input type="checkbox"/> Unable to walk at all because of severe pain</p>	<p>6. Have you been limping when walking because of the foot/ankle in question?</p> <p>4 <input type="checkbox"/> No days 3 <input type="checkbox"/> Only one or two days 2 <input type="checkbox"/> <i>Some days</i> 1 <input type="checkbox"/> Most days 0 <input type="checkbox"/> Every day</p>
<p>3. Have you been able to walk on uneven ground?</p> <p>4 <input type="checkbox"/> Yes, easily 3 <input type="checkbox"/> With little_difficulty 2 <input type="checkbox"/> With moderate difficulty 1 <input type="checkbox"/> With extreme_difficulty 0 <input type="checkbox"/> No impossible</p>	<p>7. Have you been able to climb <i>a flight of stairs</i>?</p> <p>4 <input type="checkbox"/> Yes, easily 3 <input type="checkbox"/> With little_difficulty 2 <input type="checkbox"/> With moderate difficulty 1 <input type="checkbox"/> With extreme trouble 0 <input type="checkbox"/> Impossible</p>
<p>4. Have you had to use an orthotic (shoe insert), heel lift or special shoes?</p> <p>4 <input type="checkbox"/> Never 3 <input type="checkbox"/> Occasionally 2 <input type="checkbox"/> Often 1 <input type="checkbox"/> Most of the time 0 <input type="checkbox"/> Always</p>	<p>8. Have you been troubled by pain from the foot/ ankle in question in bed at night?)</p> <p>4 <input type="checkbox"/> No night) 3 <input type="checkbox"/> Only one or two nights 2 <input type="checkbox"/> Some nights 1 <input type="checkbox"/> Most nights 0 <input type="checkbox"/> Every night</p>
<p>9. How much has pain from the foot/ankle in question affected your usual recreational activities?</p> <p>4 <input type="checkbox"/> Not at all 3 <input type="checkbox"/> A bit 2 <input type="checkbox"/> Moderately 1 <input type="checkbox"/> Greatly 0 <input type="checkbox"/> Totally</p>	<p>11. After a meal (sat at a table) how painful has it been for you to stand up from a chair because of the foot/ankle in question?</p> <p>4 <input type="checkbox"/> Not at all painful 3 <input type="checkbox"/> Slightly painful 2 <input type="checkbox"/> Moderately painful 1 <input type="checkbox"/> Very painful 0 <input type="checkbox"/> Unbearable</p>
<p>10. Have you had swelling of your foot?</p> <p>4 <input type="checkbox"/> None at all 3 <input type="checkbox"/> Occasionally 2 <input type="checkbox"/> Often 1 <input type="checkbox"/> Most of the time 0 <input type="checkbox"/> All the time</p>	<p>12. Have you had a severe sudden pain shooting, stabbing or spasms from the foot/ankle in question?</p> <p>4 <input type="checkbox"/> No days 3 <input type="checkbox"/> Only one or two days 2 <input type="checkbox"/> Some day 1 <input type="checkbox"/> Most days 0 <input type="checkbox"/> Every day</p>

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