

Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Detailed reasons for exclusion category of 'other' in Figure 1.

Reason for exclusion within 'other' category	n
Multiple injuries (bilateral ankle fracture or other significant injuries)	50
Participant entered into another research study	3
Post emergency reduction(s) acceptable (no need for further treatment under anesthetic)	114
Previously entered into AIM trial	1
Not an acute fracture (over 3 weeks from injury)	18
Other medical/limb issue resulting in patient being not suitable	138
No trial trained surgeon available	40
Received surgery in less than 24 hours	40
No research team available or team not notified	62
Surgeon decision not to enter patient into study	184
Patient had substantial memory capacity issues identified prior to formal screening	65
Declined approach by research team prior to screening	63
Patient indicated preference for a particular treatment	117
Other reason patient not suitable for study	38
Total:	933*

*one participant had two reasons marked therefore there were 932 patients with "other" exclusion reason in total.

eTable 2. Primary and secondary outcomes at 6 weeks follow-up (per protocol analysis)

Measure	Surgery		Casting		Treatment comparison
	n	Mean (95% CI)	n	Mean (95% CI)	Adjusted Difference (95% CI) ^a
Olerud and Molander Ankle Score (OMAS) ^b	297	37.9 (36.2, 39.5)	273	38.1 (36.2, 39.9)	0.3 (-2.1 to 2.7)
SF-12 mental score ^c	297	48.3 (47.0, 49.6)	274	48.6 (47.4, 49.9)	0.1 (-1.6 to 1.7)
SF-12 physical score ^c	297	33.3 (32.5, 34.1)	274	33.4 (32.6, 34.1)	0.2 (-0.8 to 1.3)
EQ-5D ^d	272	0.52 (0.49, 0.56)	248	0.48 (0.45, 0.51)	-0.04 (-0.08 to 0.01)
Ankle range of dorsiflexion, degrees	283	5.1 (4.1, 6.1)	262	3.7 (2.5, 4.9)	-1.4 (-2.7, -0.1)
Ankle range of plantar flexion, degrees	283	24.5 (23.0, 26.0)	262	22.7 (21.1, 24.3)	-1.9 (-4.0, 0.2)
Ankle range of eversion, % compared to uninjured ankle	277	50.2 (45.4, 55.0)	252	51.0 (43.8, 58.1)	0.6 (-7.7, 8.9)
Ankle range of inversion, % compared to uninjured ankle	281	47.9 (43.6, 52.2)	258	56.6 (49.8, 63.4)	9.0 (1.2, 16.8)
EQ-5D pain rating ^e	272	1.5 (1.5, 1.6)	248	1.5 (1.4, 1.6)	-0.03 (-0.12, 0.06)
OMAS pain rating ^f	298	1.7 (1.5, 1.8)	273	1.7 (1.6, 1.9)	0.1 (-0.1, 0.3)
Patient Satisfaction ^g	255	4.5 (4.4, 4.6)	232	4.5 (4.3, 4.6)	-0.02 (-0.2, 0.2)

CI = confidence interval.

^a Differences were adjusted for baseline outcome values, age, gender, recruitment hospital, fracture pattern (trans- and infra-syndesmotiic vs. supra-syndesmotiic). A negative value implies that the treatment effect is in favor of surgery.

^b range 0-100 higher scores indicating better ankle function.

^c range 0 to 100, higher scores indicating better functioning.

^d range typically from 0 (death) to 1 (perfect health); negative scores can be obtained, reflective of a patient's quality of life being worse than death.

^e Scores were from 1 to 3, with 1 indicating "no pain or discomfort" and 3 indicating "extreme pain or discomfort".

^f Scores were from 1 to 5, with 1 indicating "none" and 5 indicating "constant and severe".

^g Patient satisfaction with treatment was rated from 1 to 5, with 1 indicating "very dissatisfied" and 5 indicating "very satisfied".

eTable 3. Primary and secondary outcomes at 6 week and 6 month follow-up (ITT analysis)

Measure	6 Weeks					6 Months				
	Surgery		Casting		Treatment comparison	Surgery		Casting		Treatment comparison
	n	Mean (95% CI)	n	Mean (95% CI)	Adjusted Difference (95% CI) ^a	n	Mean (95% CI)	n	Mean (95% CI)	Adjusted Difference (95% CI) ^a
Olerud and Molander Ankle Score (OMAS) ^b	304	38.0 (36.4, 39.6)	301	38.0 (36.2, 39.8)	-0.01 (-2.3 to 2.3)	298	66.0 (63.6, 68.4)	294	64.7 (62.1, 67.2)	-0.2 (-3.3 to 2.9)
SF-12 mental score ^c	304	48.3 (47.1, 49.6)	302	48.7 (47.5, 49.9)	0.1 (-1.7, 1.5)	298	52.0 (50.8, 53.2)	294	52.2 (51.1, 53.3)	-0.1 (-1.5, 1.3)
SF-12 physical score ^c	304	33.4 (32.6, 34.2)	302	33.3 (32.6, 34.1)	0.1 (-0.9, 1.2)	298	45.6 (44.4, 46.7)	294	44.2 (43.0, 45.4)	-0.6 (-2.0, 0.9)
EQ-5D ^d	275	0.53 (0.50, 0.56)	275	0.48 (0.45, 0.51)	-0.04 (-0.08, 0.01)	268	0.76 (0.73, 0.79)	267	0.76 (0.73, 0.78)	-0.001 (-0.04 to 0.04)
Ankle range of dorsiflexion, degrees	290	5.0 (4.0, 6.0)	288	4.3 (3.2, 5.4)	-1.0 (-2.2, 0.3)	289	11.9 (10.7, 13.1)	282	11.9 (10.6, 13.3)	0.3 (-1.3, 1.9)
Ankle range of plantar flexion, degrees	290	24.5 (23.0, 26.0)	288	22.5 (21.0, 24.0)	-1.9 (-4.0, 0.1)	289	33.7 (32.2, 35.3)	282	31.3 (29.8, 32.8)	-2.2 (-4.2, -0.3)
Ankle range of eversion, % compared to uninjured ankle	284	49.4 (44.7, 54.1)	278	50.2 (43.7, 56.8)	-0.2 (-8.1, 7.7)	289	87.6 (78.1, 97.1)	277	86.8 (80.5, 93.1)	-0.7 (-11.8, 10.4)
Ankle range of inversion, % compared to uninjured ankle	288	47.9 (43.8, 52.1)	284	56.0 (49.7, 62.3)	7.8 (0.4, 15.3)	289	83.3 (75.9, 90.7)	282	83.6 (78.6, 88.5)	0.4 (-8.3, 9.1)
EQ-5D pain rating ^e	275	1.5 (1.5, 1.6)	275	1.5 (1.4, 1.6)	-0.02 (-0.11, 0.06)	269	1.6 (1.5, 1.7)	267	1.6 (1.5, 1.7)	0.01 (-0.08, 0.10)

	6 Weeks					6 Months				
OMAS pain rating ^f	305	1.6 (1.5, 1.8)	301	1.7 (1.6, 1.9)	0.1 (-0.1, 0.3)	298	2.0 (1.9, 2.1)	294	1.9 (1.8, 2.0)	-0.1 (-0.3, 0.1)
Patient Satisfaction ^g	259	4.5 (4.3, 4.6)	259	4.5 (4.3, 4.6)	-0.01 (-0.2, 0.2)	252	4.5 (4.4, 4.6)	250	4.5 (4.4, 4.6)	-0.03 (-0.2, 0.1)
Timed Up and Go mobility test, seconds ^h						283	18.0 (14.5 to 22.6)	267	18.3 (15.1 to 24.0)	-0.8 (-1.8, 0.1)

CI = confidence interval.

^a Differences were adjusted for baseline outcome values, age, gender, recruitment hospital, fracture pattern (trans- and infra-syndesmotic vs. supra-syndesmotic). A negative value implies that the treatment effect is in favor of surgery.

^b range 0-100 higher scores indicating better ankle function.

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^d range typically from 0 (death) to 1 (perfect health); negative scores can be obtained, reflective of a patient's quality of life being worse than death.

^e Scores were from 1 to 3, with 1 indicating "no pain or discomfort" and 3 indicating "extreme pain or discomfort".

^f Scores were from 1 to 5, with 1 indicating "none" and 5 indicating "constant and severe".

^g Patient satisfaction with treatment was rated from 1 to 5, with 1 indicating "very dissatisfied" and 5 indicating "very satisfied".

^h Collected at 6 months only. Data not-normally distributed, hence median (Interquartile range) presented instead of Mean (SD). Hodges-Lehmann estimate (95% CI) reported for the treatment comparison.

eTable 4. Comparison of mean 6-month Olerud and Molander Ankle Score (OMAS) by treatment arm for each type of malunion. Only the mean has been presented for the malunion types with small frequencies.

Malunion type	Surgery (open reduction and internal fixation)		Close Contact Casting	
	n	Mean OMAS ^a (95% CI)	n	Mean OMAS ^a (95% CI)
None	264	67 (64.5 to 69.5)	211	66 (63.5 to 69.5)
Talar shift	3	60 (22.7 to 97.3)	20	57 (47.6 to 66.9)
Talar tilt	1	45	-	-
Talar shift and tilt	1	70	15	49 (34.9 to 63.8)
Talar shift and diastasis	1	75	-	-
Talar tilt and diastasis	-	-	1	75
Talar tilt, shift and diastasis	2	7.5	2	45

^aOMAS score ranges from 0-100 where a higher scores indicates better outcome.

eTable 5. Comparison of mean 6 month Olerud and Molander Ankle Score (OMAS) for those who experienced and did not experience infection and/or wound breakdown for surgery (open reduction and internal fixation) (n=291) and Close Contact Casting (n=267). Frequencies are participants with the event and a 6 month OMAS score.

	Surgery (open reduction and internal fixation)		Close Contact Casting	
	n	Mean OMAS ^a (95% CI)	n	Mean OMAS ^a (95% CI)
Complication	29	62.6 (54.4 to 70.8)	4	50 (8.9 to 91.1)
No complication	262	66.4 (63.9 to 69.0)	263	64.7 (62.0 to 67.4)

^aOMAS score ranges from 0-100 where a higher scores indicates better outcome.

eTable 6. Resource use over the initial operating room procedure, additional operations during the initial hospital stay, readmission and the 6 month follow-up period (per protocol analysis).

	Surgery (open reduction and internal fixation) (n=272)	Close Contact Casting (n=248)	Difference (mean 95%CI)	P-value
Operating room time, mean (95%CI), mins/patient				
-Initial procedure	79 (22 to 136)	25 (4 to 46)	-54 (-58 to -50)	p<0.001
-All procedures	85 (20 to 151)	44 (-38 to 125)	-41 (-48 to -35)	p<0.001
Surgical implants (no./patient)	8.3 (3.0 to 13.6)	1.6 (0.0 to 8.3)	6.7 (6.1 to 7.3)	p<0.001
Anesthesia, no. (%) ^a				
-Initial procedure	272 (100)	248 (100)	0.00 (0 to 0)	1.00
-Additional procedures ^b	22 (65)	55 (80)	15 (7.7 to 22.3)	0.08
Casts, median (IQR) ^c , no./patient	0 (0 to 0)	1 (1 to 2)	1.5 (1.4 to 1.6)	p<0.001
Hospital length of stay, median (IQR) ^c , days	7 (4-11)	7 (4-12)	-0.01 (-3.2 to 3.2)	0.52
Community and intermediate care hospital length of stay, median (IQR) ^c , days	0 (0 to 0)	0 (0 to 0)	0.1 (-2.5 to 2.8)	0.14
General Physician consultation, median (95%CI) ^c , no./patient	0 (0 to 1)	0 (0 to 1)	-0.1 (-0.3 to 0.2)	0.46
Nurse consultation, median (IQR) ^c , no./patient	0 (0 to 1)	0 (0 to 0)	-0.3 (-2.7 to 2.2)	0.02
Physiotherapy consultation, median (IQR) ^c , no./patient				
- Inpatient	0 (0 to 0)	0 (0 to 0)	0.4 (-0.4 to 1.2)	0.52
- Outpatient	2 (0 to 5)	2 (0 to 5)	-0.2 (-0.9 to 0.5)	0.45
- Home	0 (0 to 0)	0 (0 to 0)	0.1 (-0.3 to 0.4)	0.89
Hospital specialist consultation, median (IQR) ^c , no./patient	0 (0 to 1)	0 (0 to 2)	0.3 (-0.2 to 0.7)	0.09
Orthopedic trauma outpatient consultation, median (IQR) ^c , no./patient	2 (0 to 3)	3 (0 to 4)	0.8 (0.4 to 1.2)	p<0.001
Hospital transport use, median (IQR) ^c , no./patient	0 (0 to 2)	0 (0 to 3)	0.8 (0.4 to 1.3)	0.001
Community care, median (IQR) ^c , no./patient	0 (0 to 0)	0 (0 to 0)	2.3 (-3.4 to 7.9)	0.06

^a Difference given as percentage point difference.

^b Restricted to those who had an additional procedure during initial inpatient stay or readmission.

^c Differences are displayed for the mean and 95%CI.

eTable 7. Resource use over the initial operating room procedure, additional operations during the initial hospital stay, readmission and the 6 month follow-up period (intention-to-treat analysis).

	Surgery (open reduction and internal fixation) (n=276)	Close Contact Casting (n=275)	Difference	P-value
Operating room time, mean (95%CI), mins/patient				
-Initial procedure	78 (21 to 137)	30 (0 to 77)	-48 (-53 to -44)	<0.001
-All procedures	84 (18 to 151)	48 (0 to 144)	-37 (-44 to -30)	<0.001
Surgical implants (no./patient)	8.2 (2.6 to 13.7)	2.0 (0.0 to 9.5)	-6.2 (-6.8 to -5.6)	<0.001
Anesthesia, no. (%) ^a				
-Initial procedure	274 (99)	269 (98)	-1.5 (-3.5 to 0.5)	0.18
-Additional procedures ^b	22 (63)	59 (79)	15.8 (8.3 to 23.3)	0.09
Casts, median (IQR) ^c , no./patient	0 (0 to 0)	1 (1 to 2)	1.4 (1.3 to 1.5)	<0.001
Hospital length of stay, median (IQR) ^c , days	7 (4 to 11)	7 (4 to 12)	0.3 (-2.9 to 3.4)	0.63
Community and intermediate care hospital length of stay, median (IQR) ^c , days	0 (0 to 0)	0 (0 to 0)	0.8 (-2.2 to 3.7)	0.12
General Physician consultation, median (IQR) ^c , no./patient	0 (0 to 1)	0 (0 to 1)	-0.1 (-0.3 to 0.2)	0.35
Nurse consultation, median (IQR) ^c , no./patient	0 (0 to 1)	0 (0 to 0)	-0.5 (-2.8 to 1.8)	0.02
Physiotherapy consultation, median (IQR) ^c , no./patient				
- Inpatient	0 (0 to 0)	0 (0 to 0)	0.7 (-0.4 to 1.7)	0.67
- Outpatient	2 (0 to 5)	3 (0 to 5)	-0.1 (-0.8 to 0.5)	0.98
- Home	0 (0 to 0)	0 (0 to 0)	0.3 (-0.3 to 0.8)	0.88
Hospital specialist consultation, median (IQR) ^c , no./patient	0 (0 to 1)	0 (0 to 1)	0.2 (-0.3 to 0.6)	0.22
Orthopedic trauma outpatient consultation, median (IQR) ^c , no./patient	2 (0 to 3)	2 (0 to 4)	0.7 (0.3 to 1.0)	0.003
Hospital transport use, median (IQR) ^c , no./patient	0 (0 to 2)	0 (0 to 3)	0.6 (0.2 to 1.0)	0.01
Community care, median (IQR) ^c , no./patient	0 (0 to 0)	0 (0 to 0)	2.7 (-3.2 to 8.6)	0.11

^a Difference given as percentage point difference.

^b Restricted to those who had an additional procedure during initial inpatient stay or readmission.

^c Differences are displayed for the mean and 95%CI.

eTable 8. Treatment related adverse events: complications and additional procedures in the operating theatre by treatment group (intention-to-treat analysis).

	Surgery (open reduction and internal fixation) (n=309)	Close Contact Casting (n=311)
	Participants affected – no. (%)	Participants affected – no. (%)
Complications, no. (%)		
Intra-operative fracture	1 (0.3%)	0
Neurovascular injury	3 (1.0%)	3 (1.0%)
Wound complications:		
-Infection	8 (2.6%) ^a	2 (0.6%)
-Breakdown	27 (8.7%) ^a	6 (1.9%)
Non-wound lower limb skin complication	13 (4.2%)	12 (3.9%)
Internal fixation complications:		
-implant failure	5 (1.6%)	0
-other clinical issue	4 (1.3%)	0
Casting complications:		
-Pain from cast	12 (3.9%)	16 (5.1%)
-Plaster sore	15 (4.9%)	22 (7.1%)
-Plaster saw laceration	1 (0.3%)	5 (1.6%)
Venous thromboembolism	4 (1.3%)	12 (3.9%)
Additional operating room procedures, no. (%)		
Revision of internal fixation	3 (1.0%)	1 (0.3%)
Wound washout	2 (0.6%)	1 (0.3%)
Wound debridement	1(0.3%)	0
Incision and drainage of haematoma	1(0.3%)	0
Removal of internal fixation implants:		
-syndesmosis screws	6 (1.9%)	1 (0.3%)
-other metalwork	4 (1.3%) ^a	2 (0.6%)

^a One affected participant experienced the event twice.

eTable 9. Summary of radiological malunion and non-union at 6 months follow-up (intention-to-treat analysis).

	n	Surgery (open reduction and internal fixation)	n	Close Contact Casting	P-value
Malunion	281	11 (3.9%)	275	42 (15.3%)	<0.001
Lateral malleolar non-union	281	0	274	8 (2.9%)	0.003
Medial malleolar non-union	281	3 (1.1%)	274	20 (7.3%)	<0.001