

## Supplemental Online Content

Rämö L, Paavola M, Sumrein BO, et al; the FISH Investigators. Outcomes with surgery vs functional bracing for patients with closed, displaced humeral shaft fractures and the need for secondary surgery: a prespecified secondary analysis of the FISH randomized clinical trial. *JAMA Surg*. Published online April 14, 2021. doi:10.1001/jamasurg.2021.0906

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

**eTable 1 Inclusion and Exclusion Criteria Used in the FISH Trial**

Inclusion criteria

1. Age: 18 years or older
2. Unilateral displaced humeral shaft fracture
3. Displacement was at least the amount of the thickness of the cortex or in transverse fractures diastasis of the half of the thickness of the cortex was required
4. The fracture was lying in a zone delimited proximally by the superior border of the pectoralis major tendon attachment and distally by the line lying 5 cm from the upper border of the olecranon fossa as evaluated from the x-ray
5. The fracture was less than 10 days old
6. The patient was willing to accept both treatment options and willing to participate in all follow-up visits
7. Patient spoke and read fluently either Finnish or Swedish (due to language used in data forms)

Exclusion criteria

1. Bilateral fracture
2. Fracture type where pectoralis major and deltoid muscle tendon insertions were in different fracture fragments causing typically significant fracture gap between the fragments
3. Other concomitant trauma affecting the same upper extremity (fracture, tendon injury, significant soft tissue injury)
4. Other fracture, thoracic or abdominal injury requiring surgery
5. Open fracture
6. Pathologic fracture
7. Polytraumatized patient
8. Significant vascular injury warranting operative treatment
9. Plexus injury
10. History of trauma of the same upper extremity causing functional deficit
11. Trauma or condition that warranted use of walking aid (crutches, wheelchair etc.)
12. Disease that significantly affected general condition of the patient
13. Significantly impaired ability to co-operate for any reason (substance abuse, mental disorder, dementia)
14. Operative treatment unable to be performed within 14 days of trauma
15. Unwilling to accept both treatment methods

<b>eTable 2 Rehabilitation protocol</b>	
Surgery group	
Weeks	Treatment
0-3	Active non-weight bearing exercises of the upper extremity, guided by physiotherapist before discharge.
3-6	Visit to physiotherapist at 3 weeks, previous exercises continued.
6-9	Gradual weight-bearing started.
9-12	Visit to physiotherapist at 9 weeks. Scapulohumeral rhythm exercises.
12-	Free mobilization if no problems with consolidation.
Bracing group	
Weeks	Treatment
0-3	Active non-weight bearing exercises of the elbow and hand. Pendulum exercises of the shoulder. The exercises were taught to the patient at the emergency department if the patient was discharged and illustrated instructions were given. Patients were instructed to tighten the brace daily as the swelling resolved.
3-6	Visit to physiotherapist at 3 weeks. Passive range of motion (ROM) exercises of the shoulder started.
6-9	Active exercises of the upper extremity. Gradual weight bearing started.
9-12	Visit to physiotherapist at 9 weeks. Scapulohumeral rhythm exercises introduced.
12-	Free mobilization if no problems with consolidation.

<b>eTable 3 Interventions</b>
<b>Surgery group</b>
The operation was done within 14 days after the injury using open reduction and internal fixation with 4.5mm Locking Compression Plate (DePuy Synthes, Raynham, USA). The surgical approach, use of locking or non-locking screws, and use of bridging plate or dynamic compression with anatomic reduction was left at the discretion of the treating surgeon.
<b>Bracing group</b>
<p>The functional brace was applied in the emergency department at the time of admission if the patient tolerated the application of the brace. In a few cases the patient first had a U-splint which was changed to a functional brace within 7 days after the admission.</p> <p>Braces used in the study:</p> <ul style="list-style-type: none"> <li>• Helsinki University Hospital: A custom-made functional orthosis at the beginning of the trial, replaced by a ready-made Humerus Comfort brace (NordiCare, Viken, Sweden) in 2014.</li> <li>• Tampere University Hospital: A Humerus Splint (GeniMedical, Houten, Netherlands) throughout the trial.</li> </ul>

eTable 4 Schedule of enrollment, interventions and assessments								
	STUDY PERIOD							
	Enrolment	Allocation	Post-allocation <sup>b</sup>					
TIMEPOINT	Within 10 days after trauma	Within 10 days after trauma	Within 14 days after trauma	6 weeks	12 weeks	6 months	12 months	2 years
ENROLMENT:								
Eligibility screen	X							
Informed consent	X							
Allocation		X						
INTERVENTIONS:								
Surgery			X					
Bracing			◆	-----	◆			
ASSESSMENTS:								
Baseline data, 15D, DASH	X	X						
Assessment for recovery <sup>a</sup> , DASH, Pain-NRS, 15D				X	X	X	X	X
Constant-Murley score, patient questionnaire, x-ray				X	X	X	X	X

<sup>a</sup> Recovery is considered achieved when scoring maximum of 10 points more in Disabilities of Arm, Shoulder and Hand (DASH) score compared to preinjury DASH score. Also, the proportion of patients scoring equal or less in DASH score compared to preinjury level is calculated and this score is considered as a definition of a conservative or a 'safe' estimate of recovery to preinjury status.

<sup>b</sup> The measure of time was deployed as nominal time. The median differences between the actual time and nominal time were 2 (IQR - 1 to 5), 4.5 (1 to 10), 2 (-1 to 10), (2 to 13.5), and 14 (4 to 28) days at 6, 12, 26, 52, and 104 weeks post-randomization, respectively.

<b>eTable 5 Reasons for exclusion in 181 patients<sup>a</sup></b>	
<b>Reason for exclusion</b>	<b>No. of patients having this reason</b>
Too Proximal Fracture	56
Too Distal Fracture	35
Compliance problem	30
Significant health problem	30
Other trauma affecting the same upper limb	14
History of older trauma or disease affecting the same upper limb	13
Polytrauma	10
Language problem	8
Pathological fracture	7
Open fracture	6
Fracture between deltoid and pectoralis major attachment	5
Other fracture warranting operation	4
Periprosthetic fracture	3
Advancing radial nerve palsy	3
Needs walking aid	3
Foreign patient	2
Fracture not dislocated enough	2
Plexus injury	1
Fracture older than 10 days	1
Bilateral fracture	0
Floating shoulder	0
Floating elbow	0
Vascular injury	0
<b>Total</b>	<b>233</b>

<sup>a</sup> Some of the patients had more than one reason for exclusion.

<b>eTable 6 Missing data items (no. of patients)</b>						
Outcome	Baseline		12 months		2 years	
	Surgery Group	Bracing Group	Surgery Group	Bracing Group	Surgery Group	Bracing Group
DASH score <sup>a</sup>	1 <sup>c</sup>	0	2	2	5	3
Pain at rest	N/A	N/A	3	2	5	3
Pain at activity	N/A	N/A	3	2	5	3
15D score <sup>b</sup>	0	0	5	2	6	5
Constant-Murley score	N/A	N/A	3	3	8	3
X-rays not available for assessing union status	N/A	N/A	1	0	1	0

<sup>a</sup> DASH score is considered missing data, if more than 3 values are missing making DASH score calculation impossible.

<sup>b</sup> 15D score is considered missing data, if one or more value is missing.

<sup>c</sup> Patient had reported very high values in DASH questionnaire as a baseline data. The values of this patient after 6 weeks were much lower compared to baseline which seems implausible considering the fact that fracture cannot heal that quickly. The Study Group decided to exclude the values this patient gave in baseline data since patient should have reported the situation before the fracture. The patient has died due to reasons not related to the fracture during the trial and it was not possible to obtain corrected values for the baseline data.

eTable 7 Primary and Secondary Outcomes at Different Time Points <sup>a</sup>						
	Randomized to surgery (N=38)	Randomized to functional bracing (N=44)				
Outcomes	Initial surgery group (N=38) mean (95% CI)	Bracing group (N=30) mean (95% CI)	Secondary surgery group (N=14) mean (95% CI)	Between-group mean difference Initial surgery – Bracing (95% CI)	Between-group mean difference Initial surgery – Secondary surgery (95% CI)	Between-group mean difference Bracing – Secondary surgery (95% CI)
<b>6 weeks</b>						
<i>Primary outcome</i>						
DASH score <sup>b</sup>	39.8 (35.4 to 44.1)	47.9 (43.0 to 52.7)	53.3 (46.2 to 60.3)	-8.1 (-14.7 to -1.5)	-13.5 (-21.8 to -5.3)	-5.4 (-14.0 to 3.2)
<i>Secondary outcome</i>						
Pain at rest <sup>c</sup>	2.1 (1.6 to 2.6)	1.8 (1.2 to 2.4)	2.2 (1.3 to 3.1)	0.3 (-0.5 to 1.1)	-0.1 (-1.1 to 1.0)	-0.4 (-1.4 to 0.7)
Pain on activities <sup>c</sup>	4.4 (3.7 to 5.2)	5.1 (4.3 to 5.9)	6.6 (5.3 to 7.9)	-0.7 (-1.8 to 0.5)	-2.2 (-3.6 to -0.7)	-1.5 (-3.0 to 0.0)
Constant-Murley score <sup>d</sup>	53.3 (47.9 to 58.7)	23.7 (17.7 to 29.7)	20.3 (11.5 to 29.1)	29.6 (21.6 to 37.7)	33.0 (22.7 to 43.3)	3.4 (-7.3 to 14.0)
Elbow ROM – degrees <sup>e</sup>	125 (120 to 130)	100 (94 to 106)	88 (79 to 96)	25 (17 to 33)	37 (27 to 47)	12 (2 to 22)
15D score <sup>f</sup>	0.85 (0.81 to 0.89)	0.87 (0.85 to 0.89)	0.82 (0.78 to 0.86)	-0.02 (-0.08 to 0.04)	0.02 (-0.04 to 0.08)	0.04 (-0.02 to 0.10)
DASH work module score <sup>g</sup>	62.5 (53.0 to 72.0)	77.2 (64.0 to 90.3)	95.3 (76.7 to 100)	-14.7 (-30.9 to 1.6)	-32.8 (-53.7 to -11.9)	-18.1 (-40.9 to 4.6)
DASH sports/performing arts module score <sup>g</sup>	78.6 (67.8 to 89.4)	95.4 (82.1 to 100)	100 (78.4 to 100)	-16.8 (-34.1 to 0.5)	-30.6 (-63.0 to -1.8)	-13.8 (-47.4 to 19.9)
Patients with acceptable symptomatic state <sup>h</sup> – % Group comparisons: relative risk ratio, RRR (95% CI)	24 (11 to 40)	13 (4 to 31)	7 (0 to 34)	RRR 1.78 (0.61 to 5.21) <sup>k</sup>	RRR 3.32 (0.46 to 23.85) <sup>k</sup>	RRR 1.87 (0.23 to 15.21) <sup>k</sup>
Adequate clinical recovery <sup>i</sup> – % Group comparisons: RRR (95% CI)	6 (1 to 19)	3 (0 to 18)	0 (0 to 23)	RRR 1.61 (0.15 to 16.90) <sup>k</sup>	∞ <sup>k</sup>	∞ <sup>k</sup>
Satisfaction with shoulder function <sup>j</sup>	7.1 (6.4 to 7.7)	6.1 (5.3 to 6.9)	5.2 (4.1 to 6.3)	0.9 (-0.1 to 2.0)	1.9 (0.5 to 3.2)	0.9 (-0.5 to 2.3)
Satisfaction with elbow function <sup>j</sup>	7.3 (6.6 to 7.9)	6.4 (5.7 to 7.1)	6.6 (5.6 to 7.6)	0.9 (-0.1 to 1.8)	0.6 (-0.5 to 1.8)	-0.2 (-1.5 to 1.0)
Satisfaction with upper limb function <sup>j</sup>	6.5 (5.8 to 7.2)	4.9 (4.1 to 5.7)	4.0 (2.8 to 5.2)	1.6 (0.5 to 2.7)	2.5 (1.2 to 3.9)	1.0 (-0.5 to 2.4)
Patients able to return to activities of daily living – % Group comparisons: RRR (95% CI)	68 (51 to 82)	67 (47 to 83)	64 (35 to 87)	RRR 1.03 (0.74 to 1.43) <sup>k</sup>	RRR 1.06 (0.68 to 1.66) <sup>k</sup>	RRR 1.04 (0.65 to 1.65) <sup>k</sup>



Patients able to return to previous hobbies – % Group comparisons: RRR (95% CI)	16 (6 to 32)	17 (6 to 35)	0 (0 to 23)	RRR 0.97 (0.33 to 2.88) <sup>k</sup>	∞ <sup>k</sup>	∞ <sup>k</sup>
<b>3 months</b>						
<i>Primary outcome</i>						
DASH score	23.7 (19.2 to 28.2)	29.4 (24.5 to 34.3)	42.8 (35.6 to 50.0)	-5.7 (-12.3 to 1.0)	-19.1 (-27.6 to -10.6)	-13.4 (-22.1 to -4.7)
<i>Secondary outcome</i>						
Pain at rest	1.5 (1.0 to 2.1)	1.1 (0.5 to 1.7)	1.5 (0.6 to 2.4)	0.4 (-0.4 to 1.2)	0.0 (-1.0 to 1.0)	-0.4 (-1.5 to 0.7)
Pain at activities	3.5 (2.8 to 4.3)	3.6 (2.8 to 4.5)	5.7 (4.5 to 7.0)	-0.1 (-1.3 to 1.1)	-2.2 (-3.7 to -0.7)	-2.1 (-3.7 to -0.6)
Constant-Murley score	61.9 (56.4 to 67.3)	52.3 (46.3 to 58.3)	35.5 (26.7 to 44.3)	9.6 (1.5 to 17.7)	26.4 (16.1 to 36.8)	16.9 (6.2 to 27.5)
Elbow ROM – degrees	134 (129 to 140)	129 (123 to 135)	103 (94 to 111)	5 (-3 to 13)	31 (21 to 41)	26 (16 to 37)
15D score	0.87 (0.83 to 0.91)	0.91 (0.89 to 0.93)	0.81 (0.77 to 0.85)	-0.04 (-0.10 to 0.02)	0.06 (0.00 to 0.12)	0.10 (0.04 to 0.16)
DASH work module score	33.4 (23.9 to 42.9)	35.2 (22.0 to 48.5)	64.4 (45.8 to 83.0)	-1.9 (-18.2 to 14.5)	-31.0 (-51.9 to -10.1)	-29.2 (-52.0 to -6.3)
DASH sports/performing arts module score	56.2 (44.5 to 67.9)	81.3 (68.4 to 94.1)	74.3 (43.8 to 100)	-25.1 (-42.7 to -7.5)	-18.2 (-50.8 to 14.5)	6.9 (-26.3 to 40.2)
Patients with acceptable symptomatic state – % Group comparisons: RRR (95% CI)	47 (30 to 65)	27 (12 to 46)	8 (0 to 36)	RRR 1.76 (0.88 to 3.53)	RRR 6.12 (0.90 to 41.58)	RRR 3.47 (0.48 to 24.97)
Adequate clinical recovery – % Group comparisons: RRR (95% CI)	24 (11 to 42)	14 (4 to 32)	8 (0 to 36)	RRR 1.76 (0.59 to 5.24)	RRR 3.15 (0.44 to 22.76)	RRR 1.79 (0.22 to 14.52)
Satisfaction with shoulder function	6.8 (6.1 to 7.5)	7.1 (6.3 to 7.8)	4.0 (2.9 to 5.2)	-0.3 (-1.4 to 0.8)	2.7 (1.4 to 4.1)	3.0 (1.7 to 4.4)
Satisfaction with elbow function	7.6 (6.9 to 8.2)	7.9 (7.2 to 8.5)	6.5 (5.5 to 7.6)	-0.3 (-1.2 to 0.7)	1.1 (-0.2 to 2.3)	1.3 (0.1 to 2.6)
Satisfaction with upper limb function	7.0 (6.3 to 7.8)	6.3 (5.5 to 7.1)	3.6 (2.4 to 4.8)	0.7 (-0.4 to 1.8)	3.5 (2.1 to 4.9)	2.7 (1.3 to 4.2)
Patients able to return to activities of daily living – % Group comparisons: RRR (95% CI)	79 (62 to 91)	87 (69 to 96)	62 (32 to 86)	RRR 0.92 (0.87 to 1.08)	RRR 1.29 (0.81 to 2.05)	RRR 1.41 (0.90 to 2.21)
Patients able to return to previous hobbies – % Group comparisons: RRR (95% CI)	39 (23 to 58)	30 (15 to 49)	23 (5 to 54)	RRR 1.31 (0.66 to 2.62)	RRR 1.71 (0.58 to 5.02)	RRR 1.30 (0.42 to 4.04)
<b>6 months</b>						
<i>Primary outcome</i>						
DASH score	13.5 (9.0 to 18.0)	13.3 (8.5 to 18.2)	29.1 (21.9 to 36.3)	0.2 (-6.4 to 6.8)	-15.6 (-24.1 to -7.1)	-15.8 (-24.5 to -7.1)
<i>Secondary outcome</i>						
Pain at rest	1.0 (0.4 to 1.5)	0.6 (0.0 to 1.1)	0.9 (0.0 to 1.8)	0.4 (-0.4 to 1.2)	0.1 (-1.0 to 1.1)	-0.3 (-1.4 to 0.7)

Pain at activities	2.4 (1.6 to 3.2)	1.8 (1.0 to 2.6)	4.1 (2.8 to 5.4)	0.6 (-0.6 to 1.8)	-1.7 (-3.2 to -0.2)	-2.3 (-3.8 to -0.8)
Constant-Murley score	73.1 (67.6 to 78.5)	71.4 (65.4 to 77.4)	48.8 (39.8 to 57.8)	1.7 (-6.4 to 9.8)	24.2 (13.7 to 34.7)	22.5 (11.7 to 33.3)
Elbow ROM – degrees	139 (133 to 144)	136 (130 to 142)	125 (117 to 134)	3 (-5 to 10)	13 (3 to 23)	11 (0 to 21)
15D score	0.91 (0.87 to 0.95)	0.93 (0.91 to 0.95)	0.85 (0.79 to 0.91)	-0.02 (-0.08 to 0.04)	0.07 (-0.01 to 0.15)	0.09 (0.03 to 0.15)
DASH work module score	12.6 (3.1 to 22.1)	15.7 (4.6 to 26.9)	49.7 (31.1 to 68.3)	-3.2 (-17.8 to 11.5)	-37.1 (-57.9 to -16.2)	-33.9 (-55.6 to -12.2)
DASH sports/performing arts module score	20.2 (9.1 to 31.2)	27.4 (15.3 to 39.4)	91.9 (61.3 to 100)	-7.2 (-23.7 to 9.3)	-71.8 (-100 to -39.3)	-64.6 (97.5 to -31.6)
Patients with acceptable symptomatic state – % Group comparisons: RRR (95% CI)	71 (53 to 85)	63 (44 to 80)	23 (5 to 54)	RRR 1.11 (0.79 to 1.58)	RRR 3.06 (1.11 to 8.45)	RRR 2.74 (0.98 to 7.68)
Adequate clinical recovery – % Group comparisons: RRR (95% CI)	67 (48 to 82)	63 (44 to 80)	15 (2 to 45)	RRR 1.05 (0.73 to 1.51)	RRR 4.33 (1.18 to 15.86)	RRR 4.12 (1.12 to 15.16)
Satisfaction with shoulder function	8.3 (7.6 to 9.0)	7.7 (7.0 to 8.5)	5.4 (4.3 to 6.6)	0.6 (-0.5 to 1.6)	2.9 (1.5 to 4.2)	2.3 (0.9 to 3.7)
Satisfaction with elbow function	8.9 (8.3 to 9.6)	8.5 (7.8 to 9.2)	6.7 (5.7 to 7.8)	0.4 (-0.6 to 1.3)	2.2 (1.0 to 3.4)	1.8 (0.5 to 3.0)
Satisfaction with upper limb function	8.3 (7.6 to 9.1)	7.5 (6.7 to 8.3)	5.3 (4.0 to 6.5)	0.8 (-0.3 to 1.9)	3.1 (1.7 to 4.5)	2.3 (0.8 to 3.7)
Patients able to return to activities of daily living – % Group comparisons: RRR (95% CI)	94 (80 to 99)	97 (83 to 100)	85 (55 to 98)	RRR 0.97 (0.87 to 1.08)	RRR 1.11 (0.87 to 1.42)	RRR 1.14 (0.90 to 1.45)
Patients able to return to previous hobbies – % Group comparisons: RRR (95% CI)	74 (56 to 87)	70 (51 to 85)	38 (14 to 68)	RRR 1.05 (0.77 to 1.43)	RRR 1.48 (0.92 to 2.39)	RRR 1.82 (0.88 to 3.76)
<b>12 months</b>						
<i>Primary outcome</i>						
DASH score	8.9 (4.5 to 13.3)	6.7 (1.8 to 11.7)	22.6 (15.5 to 29.6)	2.1 (-4.5 to 8.8)	-13.7 (-22.0 to -5.4)	-15.8 (-24.4 to -7.2)
<i>Secondary outcome</i>						
Pain at rest	1.0 (0.4 to 1.5)	0.5 (0 to 1.1)	1.0 (0.1 to 1.8)	0.4 (-0.4 to 1.3)	0.0 (-1.1 to 1.0)	-0.5 (-1.5 to 0.6)
Pain at activities	2.2 (1.4 to 3.0)	0.8 (0 to 1.7)	3.7 (2.4 to 4.9)	1.4 (0.3 to 2.6)	-1.5 (-2.9 to 0.0)	-2.9 (-4.4 to -1.4)
Constant-Murley score	78.1 (72.6 to 83.5)	83.0 (76.8 to 89.2)	63.1 (54.3 to 71.9)	-4.9 (-13.2 to 3.3)	15.0 (4.6 to 25.4)	19.9 (9.2 to 30.7)
Elbow ROM – degrees	143 (138 to 149)	138 (132 to 144)	135 (126 to 143)	6 (-2 to 14)	9 (-1 to 19)	3 (-7 to 14)
15D score	0.92 (0.88 to 0.96)	0.94 (0.92 to 0.96)	0.88 (0.84 to 0.92)	-0.02 (-0.08 to 0.04)	0.04 (-0.02 to 0.10)	0.06 (0.00 to 0.12)
DASH work module score	5.5 (0 to 14.7)	2.8 (0 to 14.0)	18.1 (0.9 to 35.3)	2.7 (-11.8 to 17.2)	-12.6 (-32.1 to 6.9)	-15.3 (-35.8 to 5.2)

DASH sports/performing arts module score	7.5 (0 to 18.6)	13.1 (0.7 to 25.6)	72.4 (50.0 to 94.8)	-5.6 (-22.5 to 11.3)	-64.9 (-89.7 to -40.1)	-59.3 (-85.1 to -33.5)
Patients with acceptable symptomatic state – % Group comparisons: RRR (95% CI)	83 (66 to 93)	82 (63 to 94)	43 (18 to 71)	RRR 1.01 (0.80 to 1.27)	RRR 1.93 (1.04 to 3.61)	RRR 1.92 (1.02 to 3.60)
Adequate clinical recovery – % Group comparisons: RRR (95% CI)	89 (73 to 97)	89 (72 to 98)	43 (18 to 71)	RRR 0.99 (0.83 to 1.18)	RRR 2.07 (1.12 to 3.83)	RRR 2.08 (1.12 to 3.87)
Satisfaction with shoulder function	8.5 (7.8 to 9.2)	9.0 (8.2 to 9.7)	6.1 (4.9 to 7.2)	-0.5 (-1.5 to 0.6)	2.9 (1.5 to 4.3)	2.4 (1.1 to 3.8)
Satisfaction with elbow function	9.0 (8.4 to 9.7)	9.4 (8.7 to 10)	7.5 (6.5 to 8.5)	-0.4 (-1.4 to 0.6)	1.6 (0.4 to 2.8)	2.0 (0.7 to 3.2)
Satisfaction with upper limb function	8.6 (7.8 to 9.3)	8.8 (8.0 to 9.6)	5.3 (4.1 to 6.4)	-0.2 (-1.3 to 0.9)	3.3 (1.9 to 4.7)	3.5 (2.1 to 5.0)
Patients able to return to activities of daily living – % Group comparisons: RRR (95% CI)	97 (84 to 100)	100 (88 to 100)	79 (49 to 95)	RRR 0.97 (0.92 to 1.03)	RRR 1.24 (0.93 to 1.63)	RRR 1.27 (0.97 to 1.67)
Patients able to return to previous hobbies – % Group comparisons: RRR (95% CI)	94 (80 to 99)	93 (76 to 99)	57 (29 to 82)	RRR 0.91 (0.77 to 1.09)	RRR 1.48 (0.92 to 2.39)	RRR 1.63 (1.02 to 2.59)
Patients willing to repeat the same treatment <sup>†</sup> – % Group comparisons: RRR (95% CI)	97 (84 to 100)	89 (72 to 98)	36 (13 to 65)	RRR 1.09 (0.94 to 1.25)	RRR 2.72 (1.34 to 5.50)	RRR 2.50 (1.22 to 5.11)
<b>2 years</b>						
<i>Primary outcome</i>						
DASH score	6.8 (2.3 to 11.4)	6.0 (1.0 to 11.0)	17.5 (10.5 to 24.5)	0.8 (-6.0 to 7.6)	-10.7 (-19.1 to -2.3)	-11.5 (-20.1 to -2.9)
<i>Secondary outcome</i>						
Pain at rest	0.6 (0.0 to 1.1)	0.4 (0 to 1.0)	0.7 (0 to 1.6)	0.1 (-0.7 to 1.0)	-0.1 (-1.2 to 0.9)	-0.3 (-1.3 to 0.8)
Pain at activities	1.7 (0.9 to 2.5)	0.5 (0 to 1.4)	3.3 (2.1 to 4.6)	1.1 (-0.1 to 2.3)	-1.7 (-3.1 to -0.2)	-2.8 (-4.3 to -1.3)
Constant-Murley score	81.7 (76.0 to 87.5)	85.0 (78.8 to 91.2)	71.7 (62.9 to 80.5)	-3.3 (-11.7 to 5.1)	10.0 (-0.5 to 20.5)	13.3 (2.6 to 24.1)
Elbow ROM – degrees	144 (138 to 149)	140 (134 to 146)	137 (129 to 146)	4 (-4 to 12)	7 (-3 to 17)	3 (-8 to 13)
15D score	0.90 (0.84 to 0.96)	0.95 (0.93 to 0.97)	0.87 (0.81 to 0.93)	-0.05 (-0.11 to 0.01)	0.03 (-0.05 to 0.11)	0.08 (0.02 to 0.14)
DASH work module score	5.3 (0 to 14.6)	0.8 (0 to 11.9)	15.3 (0 to 31.4)	4.4 (-10.1 to 19.0)	-10.0 (-28.6 to 8.5)	-14.5 (-34.0 to 5.1)
DASH sports/performing arts module score	4.0 (0 to 16.1)	5.8 (0 to 18.2)	40.0 (9.4 to 70.5)	-1.8 (-19.3 to 15.7)	-36.0 (-68.8 to -3.2)	-34.2 (-67.3 to -1.1)
Patients with acceptable symptomatic state – % Group comparisons: RRR (95% CI)	82 (65 to 93)	85 (66 to 96)	43 (18 to 71)	RRR 0.96 (0.77 to 1.20)	RRR 1.91 (1.02 to 3.57)	RRR 1.99 (1.06 to 3.71)
Adequate clinical recovery – % Group comparisons: RRR (95% CI)	88 (71 to 96)	93 (76 to 99)	50 (23 to 77)	RRR 0.95 (0.80 to 1.12)	RRR 1.75 (1.02 to 3.00)	RRR 1.85 (1.09 to 3.16)

Satisfaction with shoulder function	9.0 (8.3 to 9.8)	9.2 (8.4 to 10)	7.9 (6.7 to 9.0)	-0.2 (-1.3 to 0.9)	1.2 (-0.1 to 2.5)	1.4 (0.0 to 2.8)
Satisfaction with elbow function	9.0 (8.3 to 9.6)	9.4 (8.7 to 10)	8.3 (7.2 to 9.3)	-0.4 (-1.4 to 0.6)	0.7 (-0.5 to 1.9)	1.1 (-0.1 to 2.4)
Satisfaction with upper limb function	8.4 (7.6 to 9.1)	8.7 (7.8 to 9.5)	7.3 (6.1 to 8.4)	-0.3 (-1.4 to 0.9)	1.1 (-0.3 to 2.5)	1.4 (-0.1 to 2.8)
Patients able to return to activities of daily living – % Group comparisons: RRR (95% CI)	97 (84 to 100)	100 (87 to 100)	93 (66 to 100)	RRR 0.97 (0.91 to 1.03)	RRR 1.04 (0.89 to 1.22)	RRR 1.08 (0.93 to 1.25)
Patients able to return to previous hobbies – % Group comparisons: RRR (95% CI)	94 (80 to 99)	100 (87 to 100)	62 (32 to 86)	RRR 0.94 (0.86 to 1.02)	RRR 1.53 (0.98 to 2.37)	RRR 1.63 (1.06 to 2.50)
Patients willing to repeat the same treatment <sup>l</sup> – % Group comparisons: RRR (95% CI)	84 (67 to 95)	85 (76 to 99)	36 (13 to 65)	RRR 0.99 (0.80 to 1.23)	RRR 2.36 (1.15 to 4.85)	RRR 2.39 (1.16 to 4.90)

<sup>a</sup> The point estimates are derived from the MMRM ANOVA model using all available data. Patients who were able to follow the protocol until healing are included in the surgery and bracing groups as they were randomized. The patients in the secondary surgery group were randomized to bracing but underwent secondary surgery to promote the healing of the fracture during the follow-up.

<sup>b</sup> Disabilities of Arm, Shoulder and Hand (DASH) score is a widely used and validated tool assessing upper-extremity related deficits and symptoms in daily life reported by the patient. The instrument consists of 30 items. The range of the score is from 0 (no disability) to 100 (extreme disability). Values under 10 points represent a mean value in a randomly selected population aged between 20 and 60 years. 10 points is generally regarded as a minimal important difference in DASH score. A DASH score may not be calculated if there are greater than 3 missing items.

<sup>c</sup> Pain at rest and on activities was reported on 0-10 numerical rating scale where 0 is no pain and 10 is the worst imaginable pain.

<sup>d</sup> The Constant-Murley score is a widely used instrument assessing various conditions affecting shoulder function. It has two subjective (pain, 0-15 points; activities of daily living, 0-20 points) and two objective (shoulder range of motion, 0-40 points; strength, 0-25 points) subscales. The range of the score is from 0 to 100 with higher score denoting better function. Values around 85 points are considered normal in individuals aged 40 to 60. The measurements were performed by a physiotherapist unaware of the treatment group.

<sup>e</sup> Elbow ROM was measured by the physiotherapist using goniometer and calculated using the difference in degrees between full flexion and full extension.

<sup>f</sup> The 15D instrument is a generic health-related quality-of-life instrument comprising 15 dimensions. The maximum 15D score is 1 (full health), and the minimum score is 0 (death). Values over 0.9 are comparable to randomly selected Finnish population of individuals aged 30 years and over.

<sup>g</sup> DASH work and sports/performing arts modules are optional modules comprising of four questions assessing the effect of upper extremity condition on the work and sports/performing arts. The range of the score is from 0 (no disability) to 100 (extreme disability). Values under 10 points mean the individual can do work or perform sports with minimal limitations, at most. An optional module score may not be calculated if there are any missing items. MMRM ANOVA can have values over 100 and those are truncated to 100 (highest possible value of DASH) and this is the reason why between-group mean differences do not match with the group means at 6 weeks.

<sup>h</sup> Patients with acceptable symptomatic state was determined using patient's global assessment of satisfaction regarding the injured arm and was elicited with the question, "How satisfied are you with the overall condition of your injured upper limb and its effect on your daily life?" Responses were given on a 7-point Likert scale. "Very satisfied" and "Satisfied" were categorized as having acceptable symptomatic state and "Somewhat satisfied", "Neither satisfied nor dissatisfied", "Somewhat dissatisfied", "Dissatisfied," and "Very dissatisfied" as not having acceptable symptomatic state.

<sup>i</sup> Patients reporting a DASH score within a minimal important difference (10 points) of their preinjury score were considered to have adequate clinical recovery.

<sup>j</sup> Satisfaction with shoulder, elbow and upper extremity function was reported on 0-10 numerical rating scale where 0 is the worst and 10 is the best condition.

<sup>k</sup> Group comparisons with proportions of patients are given with relative risk ratio with associated 95% CI. Values over 1.00 indicate better result in initial surgery group compared to either bracing or secondary surgery group and better results in bracing group compared to secondary surgery group in the last column. If some of the groups has 0 %, the risk ratio in the comparison field is given as infinity ( $\infty$ ).

<sup>l</sup> Patients were asked whether they would like to have the same treatment again if they sustained a similar kind of injury later. Responses were given as "Yes" or "No".

<b>eTable 8 Sensitivity analyses: DASH score in As-treated<sup>a</sup> and Intention-to-treat<sup>b</sup> analyses</b>						
<b>DASH score</b>	<b>As-treated</b>			<b>Intention-to-treat</b>		
	<b>Surgery group mean (95% CI)</b>	<b>Bracing group mean (95% CI)</b>	<b>Between-group mean difference (95% CI)</b>	<b>Surgery group mean (95% CI) (N=38)</b>	<b>Bracing group mean (95% CI) (N=44)</b>	<b>Between-group mean difference (95% CI)</b>
6 weeks	41.9 (37.8 to 46.1)	48.0 (44.0 to 52.0)	-6.1 (-11.5 to -0.6)	39.7 (35.1 to 44.2)	49.6 (45.4 to 53.8)	-9.9 (-16.1 to -3.7)
3 months	25.9 (21.7 to 30.1)	32.5 (28.3 to 36.6)	-6.5 (-12.1 to -1.0)	23.7 (19.0 to 28.3)	33.7 (29.5 to 37.9)	-10.0 (-16.3 to -3.7)
6 months	16.1 (12.1 to 20.0)	16.2 (11.8 to 20.6)	-0.1 (-5.7 to 5.5)	13.4 (8.8 to 18.1)	18.3 (14.1 to 22.4)	-4.8 (-11.1 to 1.5)
12 months	11.6 (7.9 to 15.4)	8.7 (4.0 to 13.4)	2.9 (-2.8 to 8.6)	8.8 (4.2 to 13.4)	12.0 (7.8 to 16.2)	-3.2 (-9.4 to 3.1)
2 years	9.2 (5.4 to 13.0)	7.1 (2.2 to 11.9)	2.1 (-3.6 to 7.9)	6.8 (2.0 to 11.5)	9.8 (5.6 to 14.0)	-3.1 (-9.4 to 3.3)

<sup>a</sup> In as-treated analysis groups were analyzed per latest treatment modality (surgery/nonoperative) at the different follow-up time points. The number of patients in surgery group increased in subsequent follow-up points as patients allocated to functional bracing were operated during the 2 years.

<sup>b</sup> In intention-to-treat analysis the patients were analyzed as randomized.

<b>eTable 9 Results of the intention-to-treat analyses at 2 years.*</b>			
	Surgery group N=38	Bracing group N=44	Between-group mean difference (95% CI)
<i>Primary outcome</i>			
DASH score	6.8 (2.0 to 11.5)	9.8 (5.6 to 14.0)	-3.1 (-9.4 to 3.3)
<i>Secondary outcome</i>			
Pain at rest	0.6 (0.0 to 1.1)	0.5 (0 to 1.0)	0.1 (-0.7 to 0.8)
Pain at activities	1.7 (0.8 to 2.5)	1.4 (0.7 to 2.2)	0.2 (-0.9 to 1.4)
Constant-Murley score	81.7 (75.7 to 87.7)	80.7 (75.4 to 86.0)	1.0 (-7.1 to 9.0)
Elbow ROM – degrees	144 (138 to 149)	139 (134 to 144)	5 (-3 to 12)
15D score	0.94 (0.92 to 0.96)	0.92 (0.90 to 0.94)	0.01 (-0.03 to 0.05)
DASH work module score	5.1 (0 to 14.7)	5.7 (0 to 15.1)	-0.6 (-14.0 to 12.9)
DASH sports/performing arts module score	3.4 (0 to 16.7)	12.9 (0.3 to 25.5)	-9.5 (-27.9 to 9.0)
Patients with acceptable symptomatic state – % Group comparisons: RRR (95% CI)	82 (65 to 93)	71 (54 to 84)	RRR 1.16 (0.90 to 1.49)
Adequate clinical recovery – % Group comparisons: RRR (95% CI)	88 (71 to 96)	78 (62 to 89)	RRR 1.12 (0.91 to 1.38)
Satisfaction with shoulder function	9.0 (8.3 to 9.8)	8.8 (8.1 to 9.5)	0.3 (-0.8 to 1.3)
Satisfaction with elbow function	9.0 (8.3 to 9.7)	9.0 (8.4 to 9.6)	0.0 (-0.9 to 0.9)
Satisfaction with upper limb function	8.4 (7.6 to 9.2)	8.2 (7.5 to 8.9)	0.2 (-0.9 to 1.3)
Patients able to return to activities of daily living – % Group comparisons: RRR (95% CI)	97 (84 to 100)	98 (87 to 100)	RRR 0.99 (0.92 to 1.07)
Patients able to return to previous hobbies – % Group comparisons: RRR (95% CI)	94 (80 to 99)	88 (73 to 96)	RRR 1.07 (0.93 to 1.24)
Patients willing to repeat the same treatment <sup>†</sup> – % Group comparisons: RRR (95% CI)	84 (67 to 95)	68 (52 to 82)	RRR 1.24 (0.96 to 1.60)

\* See Rämö et al (JAMA 2020) for the earlier follow-up time points.  
† Trajectories of the outcomes (Baseline - 6 wks - 3 mo - 6 mo...2 years) are given in eFigure 2.

<b>eTable 10 Adverse events and reasons for secondary surgery<sup>a</sup></b>			
<b>Description</b>	<b>Initial surgery group (N=38)</b>	<b>Bracing group (N=30)</b>	<b>Secondary surgery group (N=14)</b>
<b>Serious adverse event</b>			
Cardiovascular event <sup>b</sup>	1	1	0
<b>Minor adverse event</b>			
Fracture non-union <sup>c</sup>	0	2	9
Refracture <sup>d</sup>	0	0	1
Secondary temporary radial nerve palsy <sup>e</sup>	3	0	1
Superficial wound infection <sup>f</sup>	2	0	1
Wound seroma	1	0	0
Shoulder adhesive capsulitis	1	1	0
Loss of reduction <sup>g</sup>	0	0	1
Sensory disturbance in the forearm <sup>h</sup>	0	0	1
<b>Reason for secondary surgery</b>			
Operation due to non-union (time range 3-14 months)			9
Operation due to loss of reduction (at 6 weeks)			1
Operation due to refracture (at 8 months)			1
Operation due to intolerable pain in the fracture site (at 1 week)			1
Operation due to failure to tolerate bracing (at 1 and 6 weeks)			2

<sup>a</sup> Bracing and secondary surgery groups were randomized to functional bracing. The patients in the secondary surgery group had surgery to promote the healing of the fracture.

<sup>b</sup> The 70-year-old male patient in Surgery group had a cardiac arrhythmia warranting cardioversion in the recovery room after the operation. The patient has a history of cardiac arrhythmias. The 72-year-old female patient in bracing group had a pulmonary embolism 4 weeks after the initial trauma and the reason for embolism was evaluated to be decreased mobility and staying mainly in bed because of the humeral fracture.

<sup>c</sup> The definition for non-union and indication for an operation promoting union was no bridging fracture callus in 3 of the 4 cortices in x-ray (ap- and lateral view) and clinically tested mobility in the fracture site at 12 weeks or later after the fracture.

<sup>d</sup> The fracture was deemed united with 35 varus malunion at 6 months but the patient had a refracture while doing bench press at 8 months.

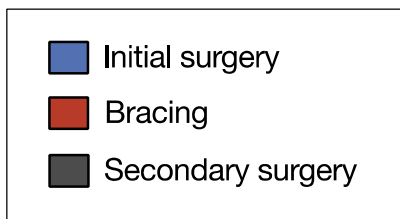
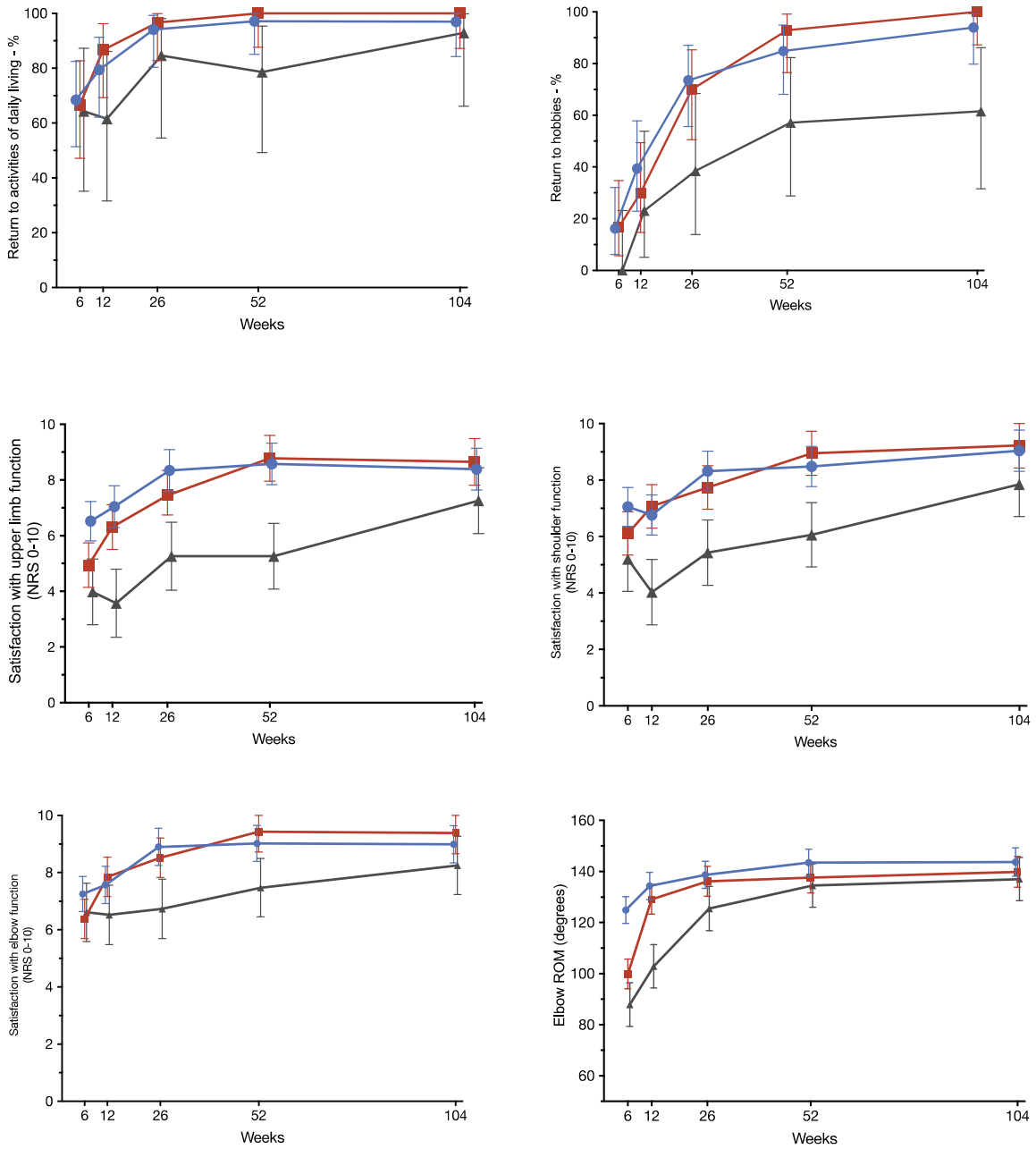
<sup>e</sup> All secondary radial nerve palsies resolved completely within 12 months.

<sup>f</sup> All superficial wound infections healed with oral antibiotics without surgical intervention.

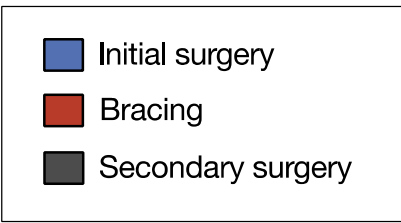
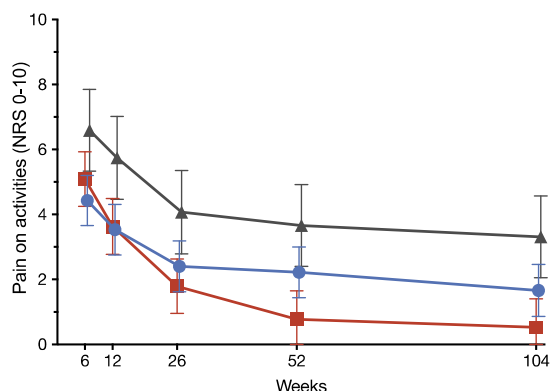
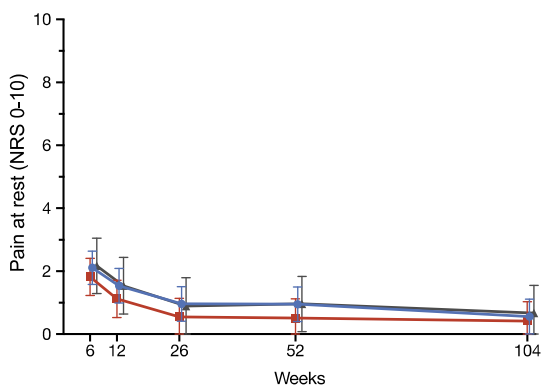
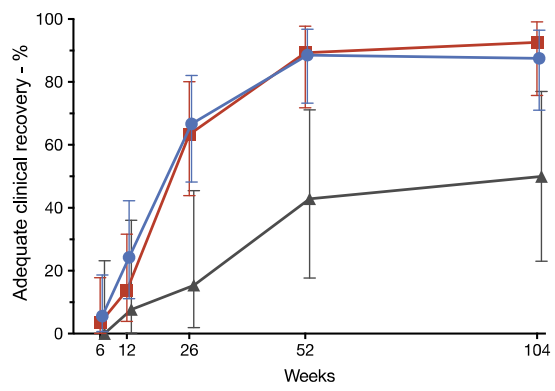
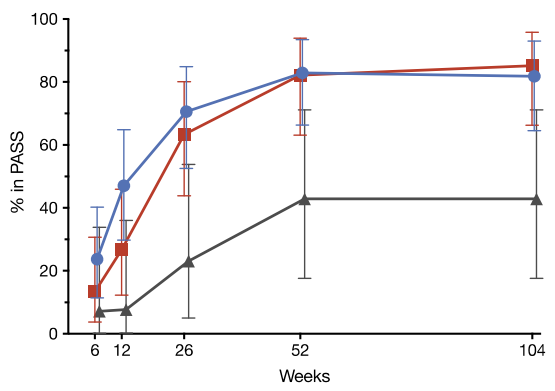
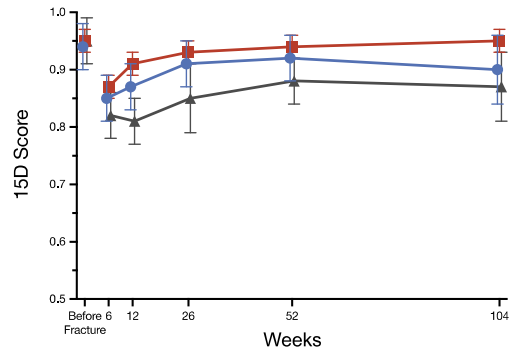
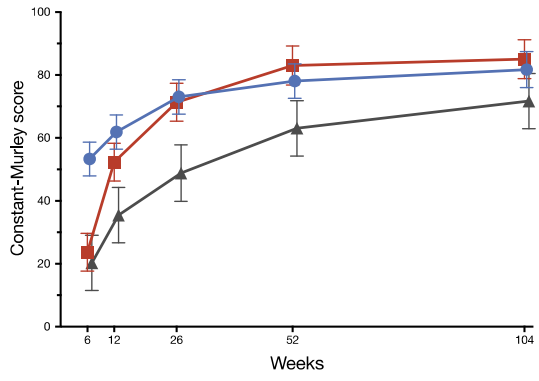
<sup>g</sup> The patient was operated at 6 weeks after the initial trauma. The proximal side of the fracture was threatening the skin integrity.

<sup>h</sup> The patient had a minor sensory disturbance of lateral antebrachial cutaneous nerve after the operation, which was done due to intolerable pain at the fracture site at one week after the initial trauma. The sensory disturbance was permanent.

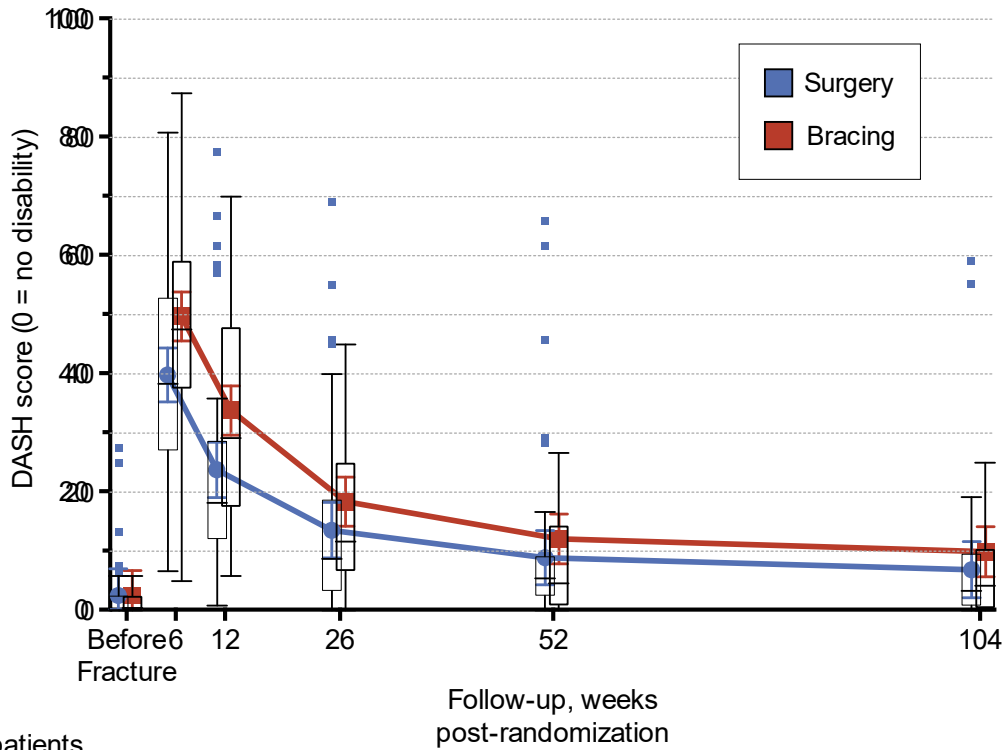
**eFigure 1 Trajectories of secondary outcomes – Per Protocol analysis with secondary surgery group**





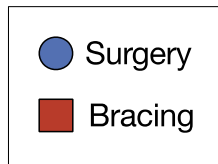
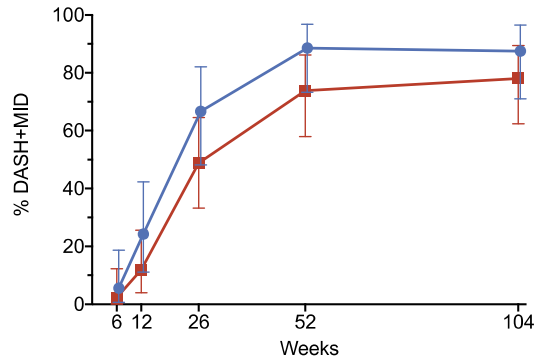
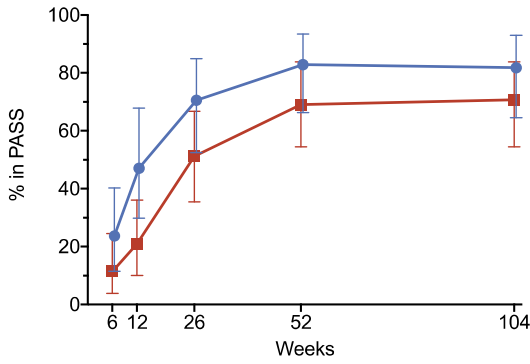
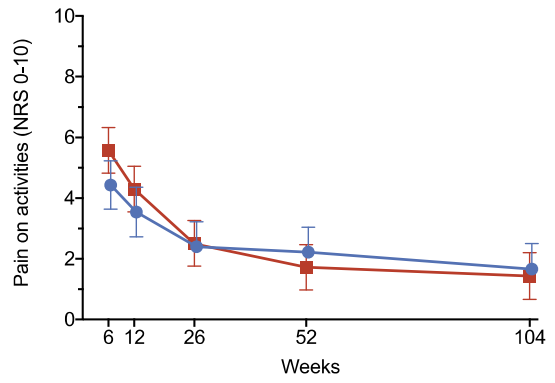
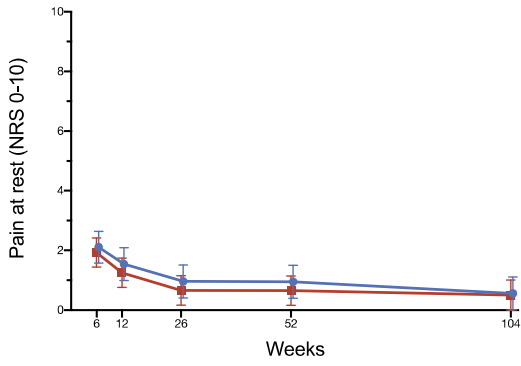
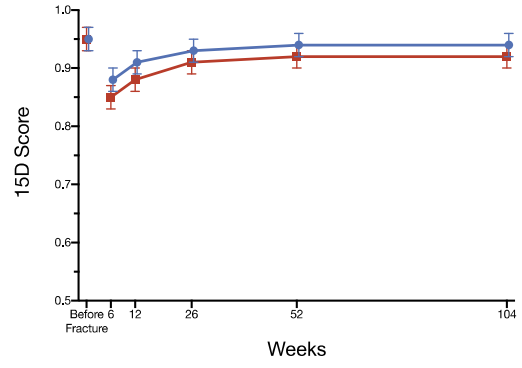
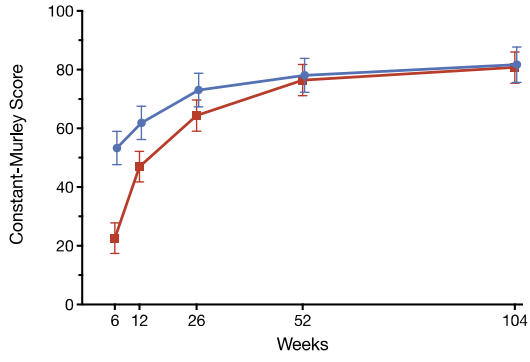


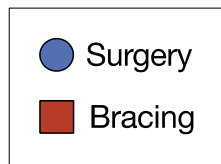
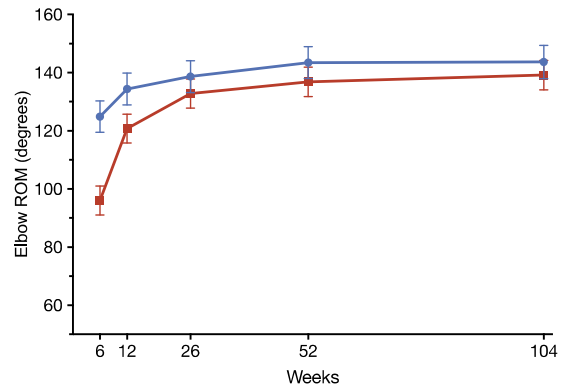
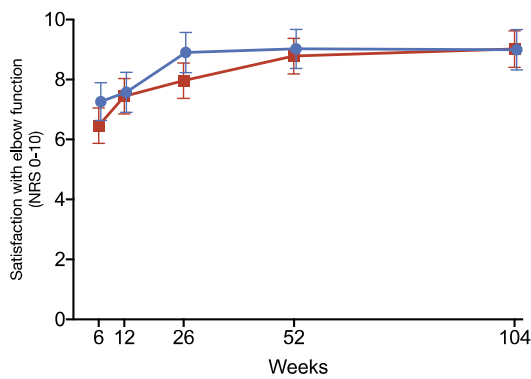
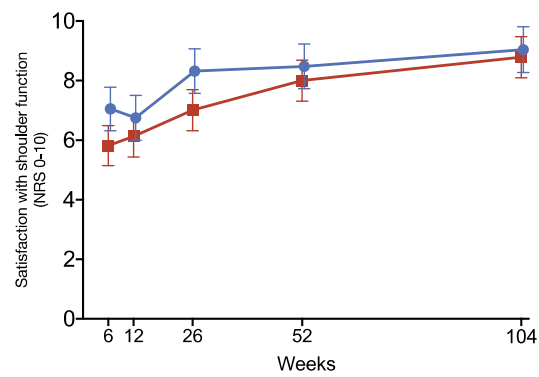
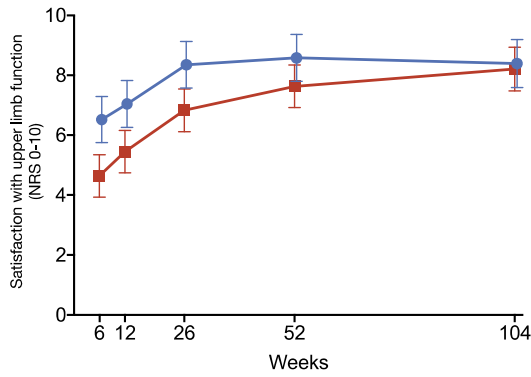
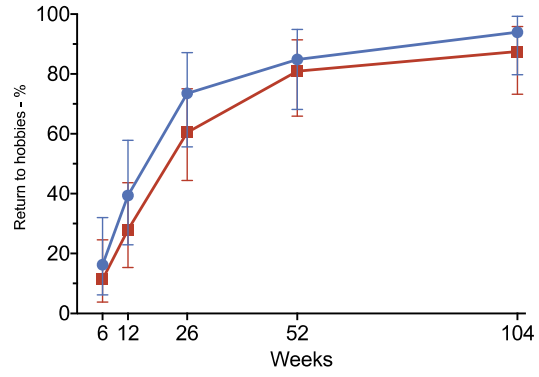
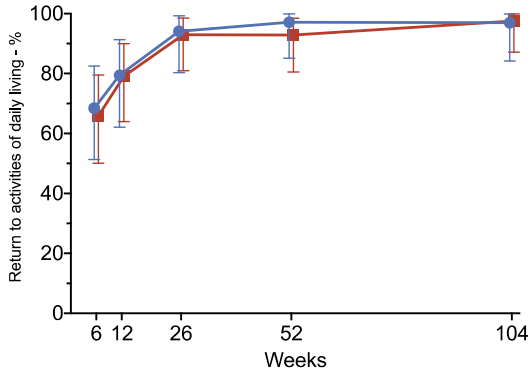
**eFigure 2 Trajectories of Intention to Treat analysis – Groups presented as randomized**



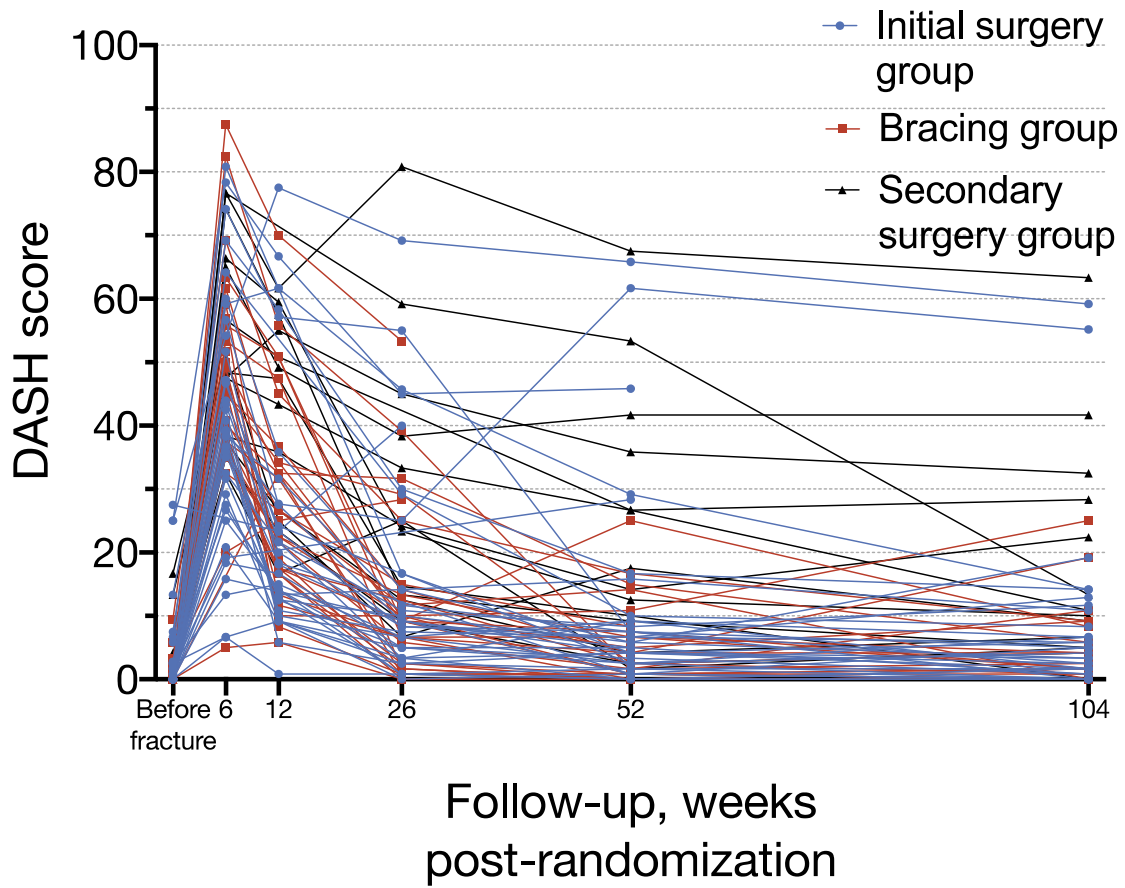
No. of patients reporting DASH

Surgery	37	37	34	34	36	33
Bracing	44	43	42	43	42	41





eFigure 3 Parallel line plot of the initial surgery, bracing and secondary surgery groups<sup>a</sup>



<sup>a</sup> 14 patients originally randomized to bracing underwent surgery during the 2 years and are here categorized as secondary surgery group. See reasons for secondary surgery in eTable 9.