■ WRIST & HAND

Clinical effectiveness of early surgical fixation versus cast immobilization for adults with a scaphoid waist fracture: five-year follow-up of the Scaphoid Waist Internal Fixation for Fractures Trial

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Aims

In the Scaphoid Waist Internal Fixation for Fractures Trial (SWIFFT), surgical fixation was compared with cast immobilization using the Patient-Rated Wrist Evaluation (PRWE) score at one year as the primary endpoint. The aim of this longer-term study was to assess the clinical effectiveness of the two treatment pathways at a five-year follow-up.

Methods

Patients who had not withdrawn from the trial were invited for a clinical assessment at five years after randomization and asked to complete a patient-reported questionnaire in the clinic, or by post or telephone. The PRWE was collected along with the grip strength, range of motion (ROM), imaging data, EuroQol five-dimension three-level questionnaire (EQ-5D-3L) score, and the use of health resources. The repeated measures analysis model used at one year was repeated to include the five-year timepoint.

Results

A total of 344 patients provided a valid PRWE score at five years (78.4% of the original cohort). There was no significant difference between the groups at five years (mean difference 0.6 (95% CI -2.4 to 3.6); p = 0.709). These results were robust to sensitivity analyses, restricting data collection windows. Neither the pain and function subscales of the PRWE score nor the overall estimate of the treatment effect showed a significant difference between the groups. Neither non-compliance with allocation of treatment, the displacement of the fracture, nor the patient's preferred treatment at baseline had an effect on the PRWE scores between groups. Only seven patients for whom imaging was collected at five years had a nonunion, three of 146 (2.1%) in the fixation group and four of 121 (3.3%) in the immobilization group. Grip strength and ROM were similar between the groups.

Conclusion

The clinical effectiveness of the two forms of treatment remained similar at five years. The recommendation that adult patients with a fracture of the waist of the scaphoid which is displaced by ≤ 2 mm should be treated inially with immobilization in a cast, followed by early fixation of a nonunion, is further corroborated by these findings.

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Introduction

Scaphoid fractures account for 90% of all carpal fractures and most (64%) involve the waist (defined as the middle 60%) of the scaphoid.[1] They predominantly occur in young, active individuals in their most productive working years.[2] Despite insufficient evidence, costly invasive surgery is commonly

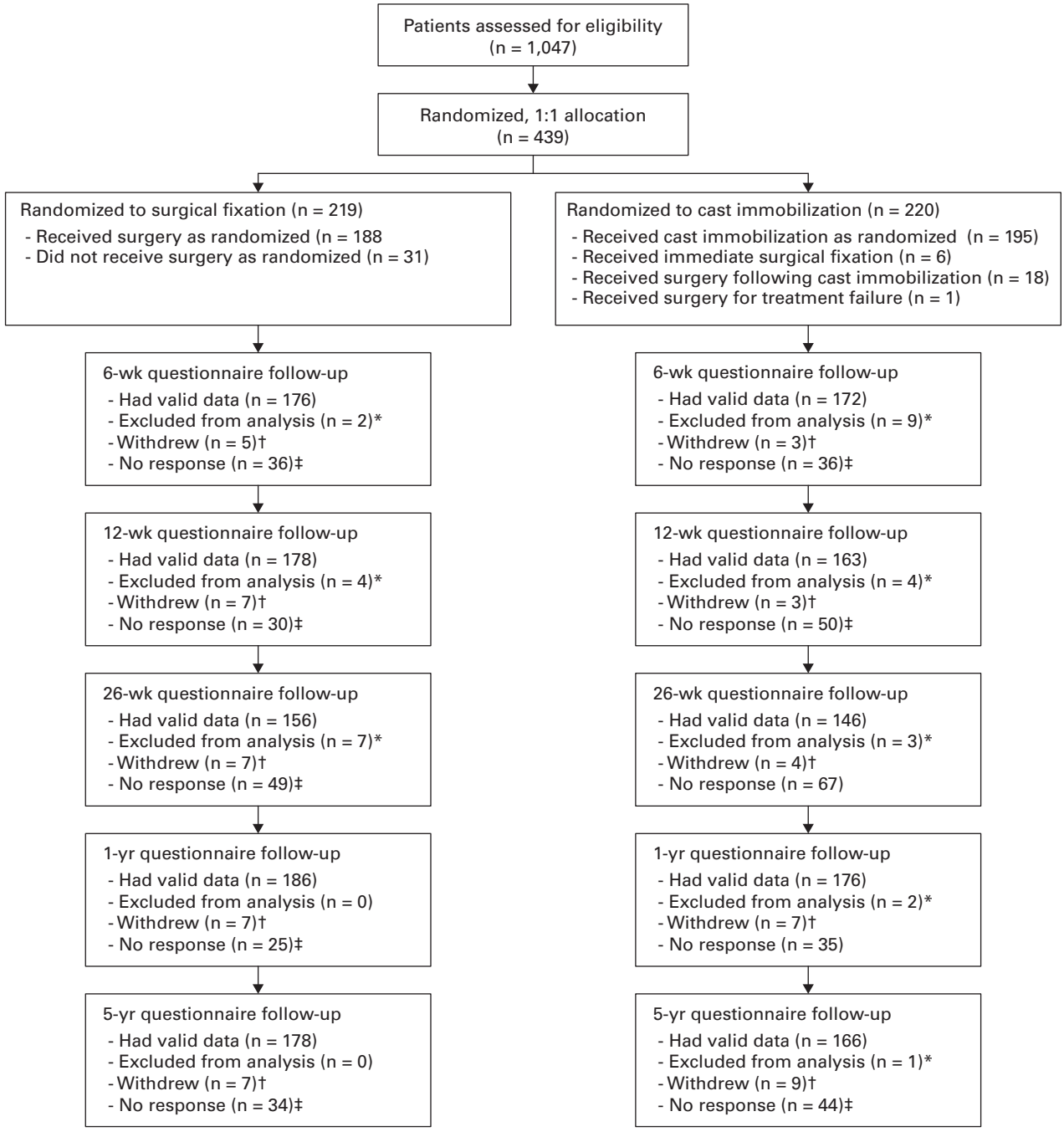

Fig. 1

The flow of patients through the study. *Missing/partial Patient-Rated Wrist Evaluation data; †withdrawals cumulative at each given timepoint; ‡applicable at that timepoint only (the patient responded intermittently).

undertaken. This puts demand on service delivery requiring theatre time compared with the minimal intervention of cast immobilization.

The Scaphoid Waist Internal Fixation for Fractures Trial (SWIFFT) was a multicentre randomized trial in which patients aged ≥ 16 years, with a clear bicortical fracture of the waist of the scaphoid on plain radiographs which was displaced by ≤ 2 mm, were recruited. Surgical fixation was compared with cast immobilization and early fixation of fractures which failed to unite, and the conclusion was that the latter is as effective as early fixation.[3]

At present, little high-quality information is available about the longer-term outcomes for patients who sustain a fracture of the waist of the scaphoid.[4] The aim of this study was to

report the clinical effectiveness outcomes of the SWIFFT trial, the largest randomized trial dealing with this issue to date, for patients who agreed to take part in the five-year follow-up.

Methods

SWIFFT was a pragmatic, parallel-group, multicentre, open-label, two-arm, randomized superiority trial, in which patients were recruited from orthopaedic departments in 31 NHS hospitals in England and Wales between July 2013 and July 2016. Eligible patients were randomly assigned 1:1 to surgery, by percutaneous or open fixation, or to a comparative group who were treated in a below-elbow cast for six to ten weeks with or without inclusion of the thumb. Patients were initially followed for one year after randomization. A full description of SWIFFT was published in 2016.[5] The clinical outcomes at five years' follow-up are reported in this study.

The study and all amendments were approved by the East Midlands Research Ethics Committee (13/EM/0154). The protocol and the planned statistical analysis is shown in the Supplementary Material of the original paper and protocol.[3,5] Patients provided written consent, and the trial was overseen by an independent steering committee during the five-year follow-up.

A total of 439 eligible patients were initially randomly allocated to the fixation (n = 219) or cast group (n = 220). At the five-year follow-up, 423 who continued to participate were asked to complete a case report form (CRF) and 419 attended for clinical and radiological review. The flow of the patients during the study is shown in Figure 1.

A total of 344 patients (78.4%) completed the Patient-Rated Wrist Evaluation (PRWE)[6] questionnaire at five years and had similar baseline characteristics to those of the whole cohort (Table I).

The PRWE score at 52 weeks after randomization was the primary outcome measure for the initial trial and was also collected at five years. The PRWE measures wrist pain and disability and contains 15 items, each with an 11-point scale. The total score ranges from 0 (no disability) to 100 (maximum loss of function and marked pain). The patients also reported changes in their job, sport, or lifestyle caused by their fracture and the number of operations to their wrist. These responses were collected by post, in the clinic, or by telephone. They also completed the EuroQol five-dimension three-level questionnaire (EQ-5D-3L)[7] and details about missed working days because of the injury, which will be presented in a separate publication in which the cost-effectiveness is reported.

Patients were invited to attend hospital at five years for a clinical examination and imaging. This included inspection and evaluation of the sensitivity of the scar, where applicable, and tenderness in the scaphoid region. Range of motion (ROM; extension, flexion, radial and ulnar deviation of both wrists, and pronation and supination of both forearms in degrees) was measured using a goniometer, and grip strength in both hands was assessed using a Jamar dynamometer. An overall ROM score was calculated as a summation of the six measurements. Whether the patient had an operation to their wrist for any further problems since the original injury was recorded. In response to the COVID-19 pandemic, many clinics were held remotely (by video or telephone) and subjective assessment of grip strength was substituted, in which the patients were asked 'how do you rate your injured hand grip strength compared to what it was before your injury?' on a scale from 0 to 100 (equal to or better than before).

Standardized plain radiographs (posterior-anterior, lateral, semi 45° prone, semi 45° supine, and an elongated scaphoid view) and a CT scan were taken to assess union of the fracture and osteoarthritic changes. The CT appearances were used to determine union and if the scans were missing this was assessed on radiographs. The union of the fracture is dealt with in this study, and a detailed analysis of the imaging is presented in another publication.[8]

Statistical analysis. In order to detect a six-point improvement in PRWE score, assuming a SD of 20 (effect size of 0.3), with 80% power using a two-sided significance level of 5%, and allowing for 20% attrition at one-year, the recruitment target was 438 patients in SWIFFT.[3,7] Allowing for a further 20% attrition at five years (i.e. a 66% response rate), 280 patients would need to be followed up to provide 70% power to detect an effect size of 0.3.

Analysis strictly followed a pre-specified plan which was provided as Supplementary Material in the original paper,[3] and was undertaken in Stata v. 17 (StataCorp, USA) on an intention-to-treat basis, using two-sided statistical tests at the 5% significance level. Baseline and outcome data were summarized descriptively by allocation, using mean, SD, minimum and maximum values for continuous data, with median and IQR given for skewed data, and counts and percentages for categorical data.

The primary analysis at five years repeated that undertaken at one-year including the new timepoint. The total PRWE scores between the two groups were compared using a covariance pattern mixed-effects linear regression model incorporating all timepoints (six, 12, 26, and 52 weeks, and five years). Treatment group (surgical or cast immobilization), age at the time of randomization, displacement of the fracture at baseline (< 1 mm or 1 to 2 mm), and dominance of the injured wrist (dominant, not dominant) were included as fixed effects, with the patients included as a random effect to account for the repeated measures. The raw scores at baseline and five years and estimates of the adjusted mean difference in total PRWE scores at five years (primary) and overall timepoints (secondary) with 95% CIs and associated p-values are presented.

A pre-planned sensitivity analysis was undertaken in which only patients who completed the PRWE within 12 weeks (pre or post) of the five-year due date were included, as well as restricting the week six data to one-week, the week 12 data to two weeks, the week 26 data to six weeks, and the week 52 data to eight weeks before or after the date on which they were due. A complier average causal effect (CACE) analysis was also undertaken using a two-stage least squares approach, in which the instrumental variable was the randomized form of treatment, to provide an unbiased estimate among compliers of fixation group relative to patients who would have engaged with this treatment in the comparative group. Compliance was defined as in the one-year follow-up study.[3]

Table I. Baseline characteristics of the patients as randomized, and for those who provided valid Patient-Rated Wrist Evaluations (PRWEs) at five years, overall and by group.

Characteristic	As randomized			Provided valid PRWE at year 5		
	Total	Surgical fixation	Cast immobilization	Total	Surgical fixation	Cast immobilization
Patients, n	439	219	220	344	178	166
Sex, n (%)						
Male	363 (82.7)	180 (82.2)	183 (83.2)	281 (81.7)	144 (80.9)	137 (82.5)
Female	76 (17.3)	39 (17.8)	37 (16.8)	63 (18.3)	34 (19.1)	29 (17.5)
Age, n	439	219	220	344	178	166
Mean yrs (SD)	32.9 (12.7)	32.9 (13.2)	32.9 (12.2)	33.3 (13.2)	33.6 (13.7)	33.0 (12.6)
Range	16.1 to 80.6	16.1 to 80.6	16.4 to 76.4	16.1 to 80.6	16.1 to 80.6	16.4 to 74.5
Ethnicity, n (%)						
White	400 (91.1)	205 (93.6)	195 (88.6)	317 (92.2)	169 (94.9)	148 (89.2)
Black	5 (1.1)	0 (0.0)	5 (2.3)	3 (0.9)	0 (0.0)	3 (1.8)
Asian	17 (3.9)	7 (3.2)	10 (4.6)	14 (4.1)	5 (2.8)	9 (5.4)
Other	15 (3.4)	5 (2.3)	10 (4.6)	10 (2.9)	4 (2.3)	6 (3.6)
Missing	2 (0.5)	2 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Education, n (%)						
No formal qualifications	51 (11.6)	24 (11.0)	27 (12.3)	32 (9.3)	15 (8.4)	17 (10.2)
Some qualifications/no degree	280 (63.8)	151 (69.0)	129 (58.6)	223 (64.8)	124 (69.7)	99 (59.6)
Degree or higher	105 (23.9)	41 (18.7)	64 (29.1)	89 (25.9)	39 (21.9)	50 (30.1)
Missing	3 (0.7)	3 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Employment status, n (%)						
Part-time	38 (8.7)	20 (9.1)	18 (8.2)	35 (10.2)	18 (10.1)	17 (10.2)
Full-time	247 (56.3)	127 (58.0)	120 (54.6)	201 (58.4)	109 (61.2)	92 (55.4)
Self-employed	57 (13.0)	21 (9.6)	36 (16.4)	41 (11.9)	16 (9.0)	25 (15.1)
Student	41 (9.3)	20 (9.1)	21 (9.6)	35 (10.2)	17 (9.6)	18 (10.8)
Retired	12 (2.7)	7 (3.2)	5 (2.3)	11 (3.2)	7 (3.9)	4 (2.4)
Looking after family	7 (1.6)	1 (0.5)	6 (2.7)	3 (0.9)	0 (0.0)	3 (1.8)
Not employed but seeking work	14 (2.3)	9 (4.1)	5 (2.3)	8 (2.3)	6 (3.4)	2 (1.2)
Other	20 (4.6)	11 (5.0)	9 (4.1)	9 (2.6)	4 (2.3)	5 (3.0)
Missing	3 (0.7)	3 (1.4)	0 (0.0)	1 (0.3)	1 (0.6)	0 (0.0)
Type of employment, n (%)						
Unskilled manual	48 (10.9)	25 (11.4)	23 (10.5)	35 (10.2)	20 (11.2)	15 (9.0)
Skilled manual	123 (28.0)	63 (28.8)	60 (27.3)	97 (28.2)	54 (30.3)	43 (25.9)
Unskilled non-manual	31 (7.1)	19 (8.7)	12 (5.5)	28 (8.1)	18 (10.1)	10 (6.0)
Skilled non-manual	79 (18.0)	33 (15.1)	46 (20.9)	69 (20.1)	32 (18.0)	37 (22.3)
Professional	39 (8.9)	20 (9.1)	19 (8.6)	34 (9.9)	18 (10.1)	16 (9.6)
Other	49 (11.2)	19 (8.7)	30 (13.6)	35 (10.2)	12 (6.7)	23 (13.9)
Missing	70 (16.0)	40 (18.3)	30 (13.6)	46 (13.4)	24 (13.5)	22 (13.3)
Current smoker, n (%)						
Yes	129 (29.4)	73 (33.3)	56 (25.5)	85 (24.7)	52 (29.2)	33 (19.9)
No	306 (69.7)	143 (65.3)	163 (74.1)	258 (75.0)	126 (70.8)	132 (79.5)
Missing	4 (0.9)	3 (1.4)	1 (0.5)	1 (0.3)	0 (0.0)	1 (0.6)
Past smoker, n (%)						
Yes	225 (51.3)	116 (53.0)	109 (49.6)	163 (47.4)	92 (51.7)	71 (42.8)
No	186 (42.4)	85 (38.8)	101 (45.9)	166 (48.3)	76 (42.7)	90 (54.2)
Missing	28 (6.4)	18 (8.2)	10 (4.6)	15 (4.4)	10 (5.6)	5 (3.0)
Diabetes, n (%)						
Yes	11 (2.5)	7 (3.2)	4 (1.8)	10 (2.9)	6 (3.4)	4 (2.4)
No	425 (96.8)	209 (95.4)	216 (98.2)	334 (97.1)	172 (96.6)	162 (97.6)
Missing	3 (0.7)	3 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Steroid use, n (%)						
Yes	10 (2.3)	6 (2.7)	4 (1.8)	8 (2.3)	4 (2.3)	4 (2.4)
No	426 (97.0)	210 (95.9)	216 (98.2)	336 (97.7)	174 (97.8)	162 (97.6)
Missing	3 (0.7)	3 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

PRWE, Patient-Rated Wrist Evaluation.

Table II. Rates and time to completion (days from due date) for the patient and hospital forms.

Variable	Overall	Surgical fixation	Cast immobilization
Patient CRF			
Due, n (%)	423	212	211
Returned, n (%)	345 (81.6)	178 (84.0)	167 (79.1)
Median time to completion, days (IQR)	2.0 (0.0 to 22.0)	1.0 (0.0 to 16.0)	2.0 (0.0 to 34.0)
Hospital CRF			
Due, n	419	211	208
Returned, n (%)	412 (98.3)	207 (98.1)	205 (98.6)
Time to completion: n	411	207	204
Median time to completion, days (IQR)	170.0 (36.0 to 435.0)	154.0 (23.0 to 376.0)	194.5 (46.0 to 506.0)

CRF, case report form.

Two subgroup analyses were undertaken to explore the effect of the displacement of the fracture and baseline patient treatment preference, separately, by including these factors plus an interaction with allocation in the primary analysis model. This was undertaken twice for the displacement: as defined at randomization, and as defined on the eligibility form, due to classification errors. Both subgroup analyses used a two-sided p-value of 0.05 and should be interpreted cautiously. As previously, we hypothesized that fixation would be less effective in patients with a displaced fracture than an undisplaced fracture, and would be more effective among those who received their preferred treatment.

The pain and function subscales of the PRWE, ROM, and grip strength were compared in secondary analyses. All were analyzed as for the primary outcome but used the most appropriate covariate structure. Due to the COVID-19 pandemic, a larger than expected amount of missing data was anticipated for the grip and ROM measurements, due to patients being unable to attend clinics. Sensitivity analyses were therefore undertaken using multiple imputation by chained equations to impute the missing values for grip strength and ROM, incorporating the subjective assessment of grip strength, as separate models. The correlation between the objective and subjective measurements of grip strength was also assessed.

Results

The five-year data were collected between 3 September 2018 and 10 January 2022. The completion rates of the CRFs are shown in Table II.

The raw PRWE scores at baseline and at five years for both the subscales and the overall scores are shown in Supplementary Table i. The mean unadjusted total PRWE score was 9.1 (SD 14.1) in the fixation group and 8.3 (SD 15.0) in the cast group at five years. A total of 415 patients, 208 in the fixation group and 207 in the cast group, were included in the primary analysis at five years. They had provided all necessary covariates and a valid score for at least one follow-up. An additional seven patients were included in the analysis at five years compared with at one-year, as they provided five-year data but had not provided earlier data (five in the fixation group and two in the cast group). The PRWE responses at each timepoint are shown in Supplementary Table ii.

There was no significant difference between the total PRWE scores in both groups at five years (mean difference 0.6 (95% CI -2.4 to 3.6) p = 0.709; Table III). The adjusted scores across the whole five-year period, by treatment group, are shown in Figure 2. An unstructured covariance pattern was used as it provided the lowest Akaike information criterion. As the assumptions of normality were robust, the data were not transformed for analysis.

The patients' CRFs were completed at a mean of 38.4 days (SD 121.9) after they were due (27.1 days (SD 102.2) in the fixation group, and 50.4 days (SD 139.3) in the cast group; Table II). Of the 344 patients who provided a valid PRWE score at five years, 304 (88.4%) were provided within a 12-week window of the due date (fixation, n = 162; cast, n = 142).

The analysis which restricted the data collection windows around the timepoints also found no evidence of a difference between the groups at five years (Table III).

A total of 31 patients who were randomized to fixation were treated with cast immobilization (14.2% of 219) and six who were randomized to cast immobilization underwent fixation within six weeks of randomization (2.7% of 220). Of these 37 non-compliant patients, 26 completed the PRWE at five years (fixation, n = 22; cast, n = 4). The CACE estimate of the five-year treatment effect on the total PRWE score was 0.91 ((95% CI -2.81 to 4.63); p = 0.632) in favour of the fixation group.

There was no significant interaction between the group to which the patients were randomized and the displacement of the fracture (as randomized, or as at eligibility) or the preferred treatment (Table III).

There was no significant overall difference in PRWE scores (over the five years) between the groups (mean difference -2.1 (95% CI -5.2 to 0.9); p = 0.162). There was also no significant difference in PRWE subscale scores (mean difference 0.7 (95% CI -1.2 to 2.6; p = 0.458), and -0.2 (95% CI-1.5 to 1.1; p = 0.783) for pain and function, respectively).

At five years, imaging was collected for 267 patients (61% of the original cohort); 28 had plain radiographs only, 12 had CT only, and 227 had both. A total of 182 patients (41.5% of those randomized and 68.2% of those assessed at five years) had a fully united fracture (defined as 100% union) (fixation, n = 92/146 (63.0%); cast, n = 90/121 (74.4%)). Seven patients (1.6% of those randomized; 2.6% of those assessed) had a nonunion, defined as 0% union (fixation, n = 3 (2.1%); cast, n = 4 (3.3%)). This is an increase in both rates from those seen at one year (37.6% of those randomized were fully united, and 1.1% had nonunion). The number needed to treat (NNT)

Table III. Results for the five-year primary, secondary, subgroup, and sensitivity analyses.

Variable	Mean (95% CI)		Mean difference (95% CI)	p-value*
	Surgical fixation	Cast immobilization		
Total PRWE score				
n	208	207	415	
Year 5	9.6 (7.5 to 11.7)	9.1 (6.9 to 11.2)	0.6 (-2.4 to 3.6)	0.709
Overall	19.1 (17.0 to 21.1)	21.3 (19.1 to 23.4)	-2.1 (-5.2 to 0.9)	0.162
Total PRWE score completed within 12 weeks of five-year timepoint				
n	199	198	397	
Year 5	8.9 (6.7 to 11.0)	8.6 (6.4 to 10.9)	0.2 (-2.9 to 3.3)	0.884
PRWE pain subscale score				
n	208	207	415	
Year 5	6.6 (5.3 to 7.9)	5.9 (4.6 to 7.3)	0.7 (-1.2 to 2.6)	0.458
PRWE function subscale score				
n	208	207	415	
Year 5	3.0 (2.1 to 3.9)	3.2 (2.2 to 4.1)	-0.2 (-1.5 to 1.1)	0.783
Grip strength (kg) for affected wrist				
n	205	208	413	
Year 5	38.4 (36.5 to 40.4)	40.9 (38.9 to 43.0)	-2.5 (-5.3 to 0.3)	0.082
ROM for affected wrist				
n	204	208	412	
Year 5	374.5 (367.1 to 381.8)	367.0 (359.1 to 374.9)	7.5 (-3.3 to 18.2)	0.176
Displacement, as randomized				
n	208	207	415	
Year 5	9.6 (7.5 to 11.7)	9.1 (6.9 to 11.2)	0.3 (-2.8 to 3.3)	0.860
Overall	19.1 (17.0 to 21.2)	21.2 (19.1 to 23.4)	-2.4 (-5.5 to 0.6)	0.118
Displacement, as eligible				
n	208	207	415	
Year 5	9.6 (7.5 to 11.7)	9.0 (6.9 to 11.2)	0.4 (-2.7 to 3.5)	0.810
Overall	19.1 (17.0 to 21.2)	21.2 (19.1 to 23.4)	-2.4 (-5.4 to 0.7)	0.130
Patient treatment reference				
n	207	206	413	
Year 5	9.6 (7.5 to 11.8)	9.0 (6.8 to 11.1)	-0.4 (-4.6 to 3.9)	0.867
Overall	19.0 (16.9 to 21.2)	21.2 (19.1 to 23.4)	-3.2 (-7.4 to 1.1)	0.145

*Covariance pattern mixed-effects linear regression model.
PRWE, Patient-Rated Wrist Evaluation; ROM, range of motion.

with surgery (3/219; 1.4%) compared with cast immobilization (4/220; 1.8%) to avoid one nonunion is 223 when considering all randomized patients and assuming that those with missing data did not have a nonunion. The NNT when comparing surgery (3/146, 2.1%) with cast immobilization (4/121, 3.3%) is 80 when considering only those for whom data were collected at five years.

A mean measurement of objective grip strength was provided for 246 patients at five years and was similar between the groups (n = 133; mean 38.7 kg (SD 12.1) for fixation and n = 113, mean 40.5 kg (SD 14.1) for cast). Grip strength in the affected wrist, compared in those who could provide an objective measurement, showed no significant difference between the groups at five years.

A subjective measure of grip strength was provided by 134 patients (fixation, n = 71; cast, n = 63); 116 of these also provided an objective measure (fixation, n = 63; cast, n = 53). The mean subjective grip strength was similar between groups (mean 92.0 kg (SD 15.0) for fixation, and 92.5 kg (SD 15.6) for cast). The raw subjective and objective grip strength scores are presented in Supplementary Table iii.

The mean score for those who only provided a subjective measure was slightly higher (mean 96.1 (SD 7.6)) than for those who provided both an objective and subjective measure (mean 91.6 (SD 16.0)). There was a low correlation between the objective and subjective measures of grip strength (0.28). Many patients who completed the subjective measure provided a score of 100 (equal/better than before) (n = 67; 57.8%), though the correlation remained similar when these patients were excluded (0.31).

When comparing grip strength following multiple imputation of missing data, there was also no significant difference between the groups at five years (adjusted mean difference -2.13 (95% CI -5.05 to 0.80); p = 0.153).

The overall ROM was similar for those in the fixation (mean 373.9° (SD 44.5°); n = 134) and cast groups (mean 365.6° (SD 43.6°); n = 115) at five years (Supplementary Table iv). When comparing ROM following multiple imputation, there was also no difference in ROM between the two groups at five years (adjusted mean difference 7.49 (95% CI -3.29 to 18.26); p = 0.173).

Tenderness was assessed for 111 of the 194 patients (fixation, n = 108; cast, n = 3) who received fixation as their initial

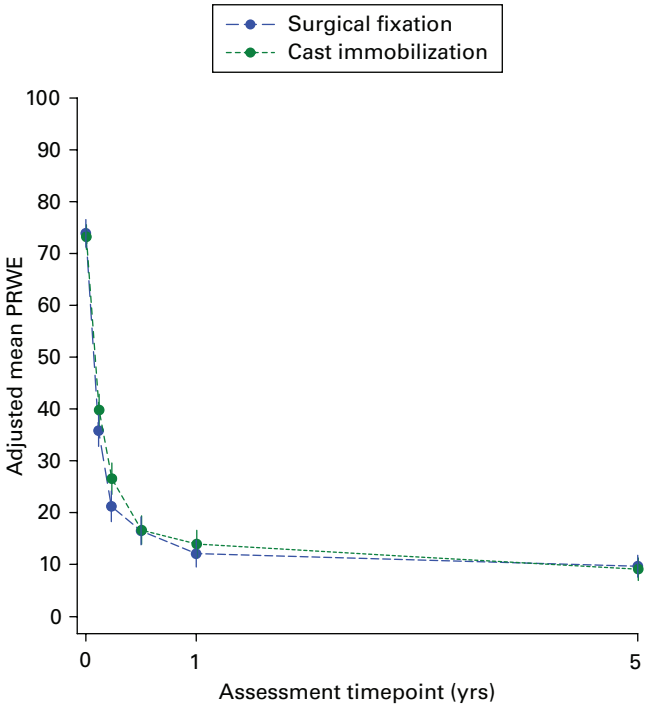

Fig. 2

Adjusted mean Patient-Rated Wrist Evaluation (PRWE) scores with 95% CIs, shown by group. Weeks six, 12, and 26 are plotted on the graph, but omitted from the axis label.

treatment. The scaphoid region was found to be 'not at all' tender in 97 (87.4%), only 'slightly' tender in nine (8.1%), 'fairly' tender in four (3.6%), and only one patient described it as 'very' tender.

A total of 132 patients were assessed for whether there was a scar from the initial surgery (fixation, n = 129; cast, n = 3), and there was for most (n = 125; 94.7%). All seven who did not have a scar were in the fixation group. For most of those with a scar, it was 'not at all' sensitive to the touch (n = 115; 92.0%). Only two described it as 'very' sensitive.

Seven patients underwent further surgery > one year after randomization (fixation, n = 1; cast, n = 6). None needed surgery for carpal tunnel syndrome or ganglion formation.

In the six months prior to the five-year follow-up, most of those who responded (85.8%; n = 296) were in paid employment and, on average, had taken no days off work because of their injury. A maximum of three days were taken off. A few (7.5%; n = 26) had changed or modified their occupation because of their injury, or changed their sport (9.6%; n = 33). These findings were similar in both groups (Supplementary Table v).

Discussion

There was no evidence in this five-year follow-up of adult patients with a clear fracture of the waist of the scaphoid in the SWIFFT trial of a difference in patient-reported wrist pain or disability between those who had their fracture surgically fixed and those who were treated by immobilization in a cast. These findings confirm those of Dias et al[9] who, in 2008, reported that there was no significant difference between the mean PRWE score just under eight years after injury between 35 patients who were randomized to undergo early fixation and 36 who were treated in a cast (7.0 (SD 1.6) vs 8.4 (SD 2.2); p = 0.90). Vinnars et al,[10] also in 2008, reported similar PRWE scores at ten years in fixation and cast groups, although 15/40 (37.5%) in the fixation group said that their wrist did not function as well as before surgery compared with 8/35 (22.8%) in the cast group.

We found no difference between the groups for grip strength and ROM. Although better grip was reported in the two studies described above in the cast groups, these differences were not statistically significant.[9,10] A 7% better grip strength at 12 years was reported in a small study from 2001 in those who had early surgery.[11] Non-significant improvements in the ROM of the wrist were reported in patients treated in a cast at eight, ten, and 12 years in these three studies.[9–11]

Only a few patients in the fixation group reported either that their scar was very tender or sensitive or that they had undergone further surgery to the wrist, and few in either group made lifestyle changes such as changing their job or sport. It has previously been noted that a fractured scaphoid led to a change in occupation from 0% at three years to 9.3% at ten years.[10,12] Change in sport has been reported in between 0% and 4.9% at 2.1 years after a fractured scaphoid.[9,10,13]

A very small percentage of patients for whom imaging was collected at five years had a complete nonunion, three (2.1%) in the fixation group and four (3.3%) in the cast group. The benefit of surgery in preventing nonunion was limited relative to cast immobilization. This means that the number needed to be treated surgically rather than with a cast to prevent one nonunion is high (80 operations, or 223 assuming that no patient with missing data had a nonunion). The impact on the use of operating time and resources and the delivery of an efficient service is clear.

Between the one- and five-year follow-ups, the mean PRWE score improved from 11.4 (SD 16.6) to 9.1 (SD 14.1) in the fixation group and 14.2 (SD 19.8) to 8.3 (SD 15.0) in the cast group. The six-point improvement of the PRWE in the cast group is of clinical importance.[14]

The strengths of this study include the fact that nearly 80% of the original cohort had a valid PRWE score at five years. This was much higher than the 66% that we anticipated in this young and predominantly male cohort. The baseline characteristics of the patients as randomized and for those who provided a valid PRWE score at five years were similar. An important finding was that there was no relationship between PRWE scores and non-compliance with the allocation of treatment, the displacement of the fracture, or the preferred form of treatment at baseline.

Limitations of the study include the fact that data collected during hospital visits were available for fewer patients than had PRWE scores. The five-year data were collected between September 2018 and January 2022, and thus coincided with a time during which the COVID-19 pandemic brought a temporary halt to most research, and hugely affected service delivery. Nevertheless, it was possible, for example, to collect imaging for 267 of the initial cohort (61%). Moreover, a similar number attended for clinical review and imaging in the two groups.

In conclusion, no difference was found between the two treatment pathways for patient-reported wrist pain, disability, and other measures such as grip strength and ROM in this five-year follow-up study of adult patients with a fracture of the waist of the scaphoid. While there was no evidence of any difference at five years between these forms of treatment, the cast immobilization group improved more in their patient-reported wrist pain and disability. The recommendation that adult patients with a fracture of the waist of the scaphoid which is displaced by ≤ 2 mm should be treated initially with immobilization in a cast, followed by early fixation of a nonunion, is further corroborated by this longer-term evidence.

Take home message

- There was no evidence of a difference in patient-reported wrist pain and disability on the Patient-Rated Wrist Evaluation between the two groups, nor on any of the secondary outcomes.
- This longer-term evidence further corroborates the recommendation that patients with a scaphoid waist fracture displaced by 2 mm or less should initially be treated with cast immobilization, followed by early identification and fixation of nonunions.

Social media

Follow S. D. Brealey on X @YorkTrialsUnit
Follow M. L. Costa on X @Oxford_Trauma

Supplementary material

†Tables displaying raw Patient-Rated Wrist Evaluation scores, provision of outcome measures, and raw grip strength and range of motion data.

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