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Early Mobilization and Physiotherapy Vs. Late Mobilization and Home Exercises After ORIF of Distal Radial Fractures

A Randomized Controlled Trial

Ståle Ørstavik Clementsen, MD, Ola-Lars Hammer, MD, Jūratė Šaltytė Benth, PhD, Rune Bruhn Jakobsen, MD, PhD, and Per-Henrik Randsborg, MD, PhD

Investigation performed at Akershus University Hospital, Akershus, Norway

Background: Volar locking plates have permitted early mobilization, omitting the need for prolonged cast immobilization, after distal radial fractures (DRFs). However, the type of rehabilitation following plate fixation of DRFs remains an unresolved issue. The purpose of this study was to evaluate the effect of physiotherapy after volar plate fixation of DRFs. At a 2-year follow-up, we compared the results of immediate physiotherapy (early mobilization) with those of home exercises following 2 weeks in a dorsal plaster splint (late mobilization).

Methods: Patients with an extra-articular DRF scheduled for open reduction and internal fixation (ORIF) with a volar locking plate were evaluated for eligibility for enrollment in the study. The patients were randomized into 2 groups: (1) early mobilization and physiotherapy and (1) late mobilization and home exercise. In the early mobilization group, the plaster splint was removed after 2 to 3 days. During the first 3 months, the patients met with the institution's physiotherapist every other week. The late mobilization group wore the dorsal splint for 2 weeks and only met with our physiotherapist once, when the splint was removed. This group was provided with a home physiotherapy program and instructed to perform home exercises on their own.

Results: One hundred and nineteen patients were included in the study. The 2 groups had similar demographics with respect to age, sex, and baseline values. Seven patients were lost to follow-up. No clinically relevant difference in scores on the shortened version of the Disabilities of the Arm, Shoulder and Hand (QuickDASH) questionnaire was found between the 2 groups at any of the follow-up evaluations. The largest difference in the QuickDASH score was found at 6 weeks, when the early mobilization group had a mean score of 30 compared with a mean of 37 in the late mobilization group ($p = 0.05$).

Conclusions: Early mobilization and multiple physiotherapy visits did not improve wrist function compared with standard treatment of 2 weeks in a dorsal plaster splint, a single physiotherapy visit, and home exercises. Early mobilization following ORIF of an extra-articular DRF is safe.

Level of Evidence: Therapeutic Level I. See Instructions for Authors for a complete description of levels of evidence.

Volar locking plates have shifted the treatment of displaced distal radial fractures (DRFs) from previous methods such as percutaneous pinning and external fixation to plate fixation[1-4]. The volar locking plate permits early mobilization, omitting the need for prolonged cast immobilization. However, the duration of immobilization and type of rehabilitation following plate fixation of DRFs remain unresolved issues[5]. The purpose of this study was to evaluate the effect of physiotherapy after plate fixation of DRFs.

We carried out a randomized controlled trial (RCT) of patients with a displaced extra-articular DRF treated with a volar plate to compare (1) immediate repeated physiotherapy

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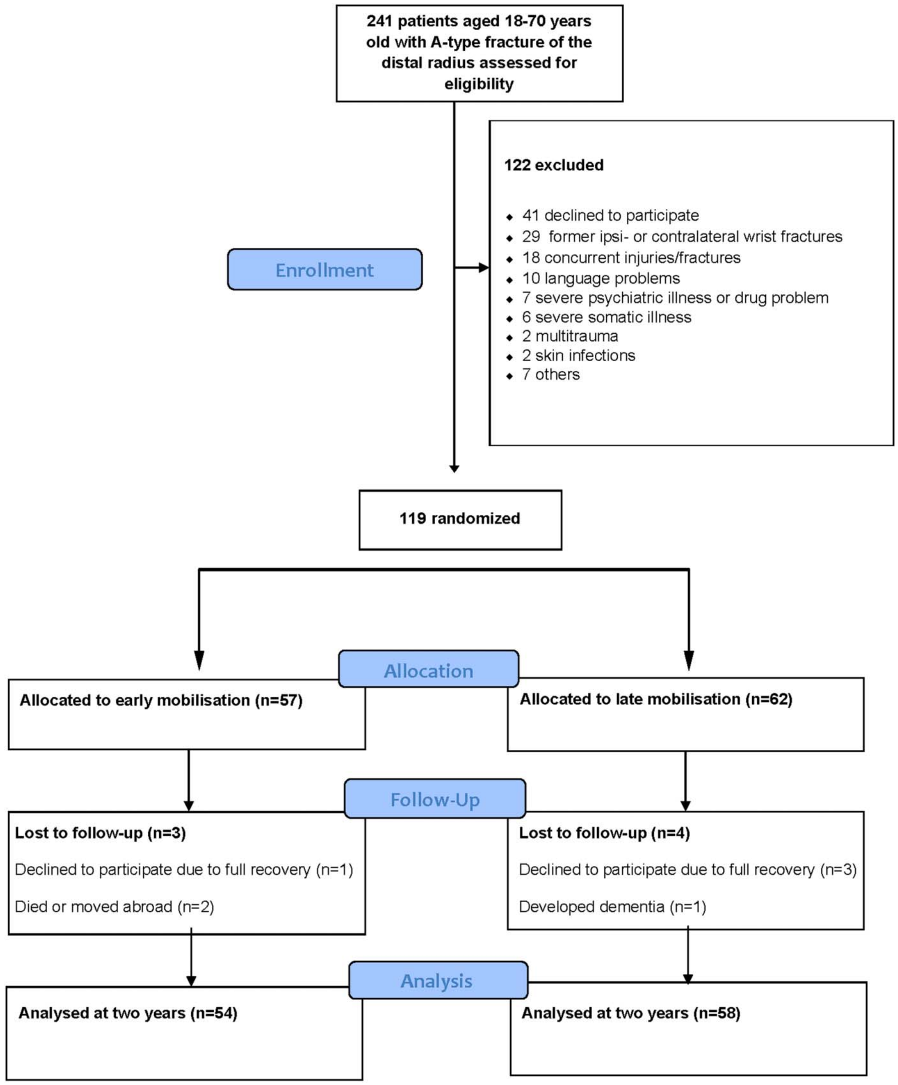

Fig. 1

CONSORT flowchart.

visits (early mobilization) with (2) home exercises (with a single physiotherapy visit) following 2 weeks in a dorsal plaster splint (late mobilization), which was our standard of care at the time. We hypothesized that there would be no difference in patient-reported outcomes or objectively measured function between the 2 groups at 2 years.

Materials and Methods

This RCT was conducted from January 2012 to May 2014 at Akershus University Hospital (Ahus) in Norway. Ahus is a large tertiary-care hospital serving a population of approximately 520,000 patients, where approximately 350 patients with a DRF receive surgical treatment each year. All OTA/AO type-A (extra-articular) DRFs were evaluated for eligibility. This RCT was reported according to the Consolidated Standards of Reporting Trials (CONSORT) statement.

Participants

Patients 18 to 70 years of age who had an extra-articular (type-A) DRF with >10° of dorsal tilt or dorsal comminution, any volar displacement (Smith-type fracture), and/or shortening of >3 mm were eligible for inclusion[6]. Exclusion criteria were an intra-articular fracture, concurrent fracture(s) (including of the distal part of the ulna) in need of fixation, a Gustilo-Anderson type-III open fracture, previous fracture(s) of either wrist, or language or other compliance issues. Enrollment was conducted by the on-call surgeon, and the type of fracture was verified by one of the authors.

Randomization

All patients gave both oral and written informed consent to participate in the study. They were subsequently allocated to receive either early mobilization and physiotherapy (early

TABLE I Demographic Characteristics of 119 Patients with an Extra-Articular DRF Randomized to Either Early or Late Postoperative Mobilization

	Early Mobilization (N = 57)	Late Mobilization (N = 62)
Age at injury* *(yr)*	55 (12.4)	55 (11.9)
Female sex†	53 (93%)	55 (89%)
Injury side: right†	29 (51%)	35 (56%)
Dominant hand injured†	28 (49%)	33 (53%)
Closed reduction prior to surgery†	54 (95%)	55 (89%)
Time from injury to surgery* *(days)*	9 (4.3)	9 (4.7)
Outpatient†	40 (70%)	45 (73%)
Inpatient†	17 (30%)	17 (27%)
Intoxicated at time of injury†	5 (9%)	5 (8%)
Duration of surgery* *(min)*	65 (19.8)	65 (19.9)
No. of different surgeons	29	25
Average experience as surgeon* *(mo)*	73 (45.9)	73 (45.7)
Smoker†	10 (18%)	15 (24%)
Osteoporosis verified preoperatively†	56 (98%)	59 (95%)

*The values are given as the mean and SD. †The values are given as the number with the percentage in parentheses.

mobilization group) or late mobilization and home exercises (late mobilization group) by drawing from sealed, opaque envelopes. Allocation was performed through computer-generated permuted block randomization with blocks of 10. Closed envelopes were prepared by a colleague not affiliated with the study. Surgery was performed by the surgeon on call.

TABLE II Patient-Reported Outcome Measures for 119 Patients with an Extra-Articular DRF Randomized to Either Early or Late Postoperative Mobilization

	Early Mobilization		Late Mobilization		Early Versus Late Mobilization*	
	No.	Mean (SD)	No.	Mean (SD)	Mean Difference (95% CI)	P Value
QuickDASH score						
Preinjury	57	2.2 (4.9)	62	2.3 (5.6)		
6 weeks	57	29.5 (19.4)	61	37.3 (19.1)	5.8 (0.0; 11.6)	0.05
3 months	54	17.1 (16.8)	61	17.3 (14.4)	5.6 (−0.2; 11.4)	0.06
1 year	51	10.1 (17.9)	59	10.7 (14.5)	4.4 (−2.3; 11.1)	0.20
2 years	54	7.4 (14.5)	57	8.5 (14.2)	2.9 (−6.1; 11.8)	0.53
VAS score						
Preinjury	57	0.1 (0.4)	62	0.1 (0.4)		
6 weeks	56	1.8 (1.8)	61	2.2 (1.7)	0.09 (−0.38; 0.56)	0.71
3 months	54	1.1 (1.6)	61	1.0 (1.2)	0.09 (−0.38; 0.55)	0.71
1 year	51	0.7 (1.8)	59	0.7 (1.2)	0.08 (−0.40; 0.56)	0.75
2 years	54	0.7 (1.9)	57	0.7 (1.5)	0.06 (−0.55; 0.68)	0.84
PRWE total score						
Preinjury	57	0.7 (4.1)	62	0.6 (2.4)		
6 weeks	57	29.6 (21.3)	61	35.7 (21.2)	4.51 (−1.45; 10.47)	0.14
3 months	54	17.0 (18.6)	61	15.9 (15.8)	4.31 (−1.40; 10.01)	0.14
1 year	51	10.2 (19.1)	59	10.7 (15.4)	2.98 (−2.00; 7.96)	0.24
2 years	54	8.2 (17.2)	57	8.0 (14.9)	1.25 (−5.57; 8.08)	0.72

*Results of linear mixed models, with adjustment for intra-patient and intra-surgeon correlations. All models were adjusted for duration of operation, surgeon experience, and patient sex and age at injury.

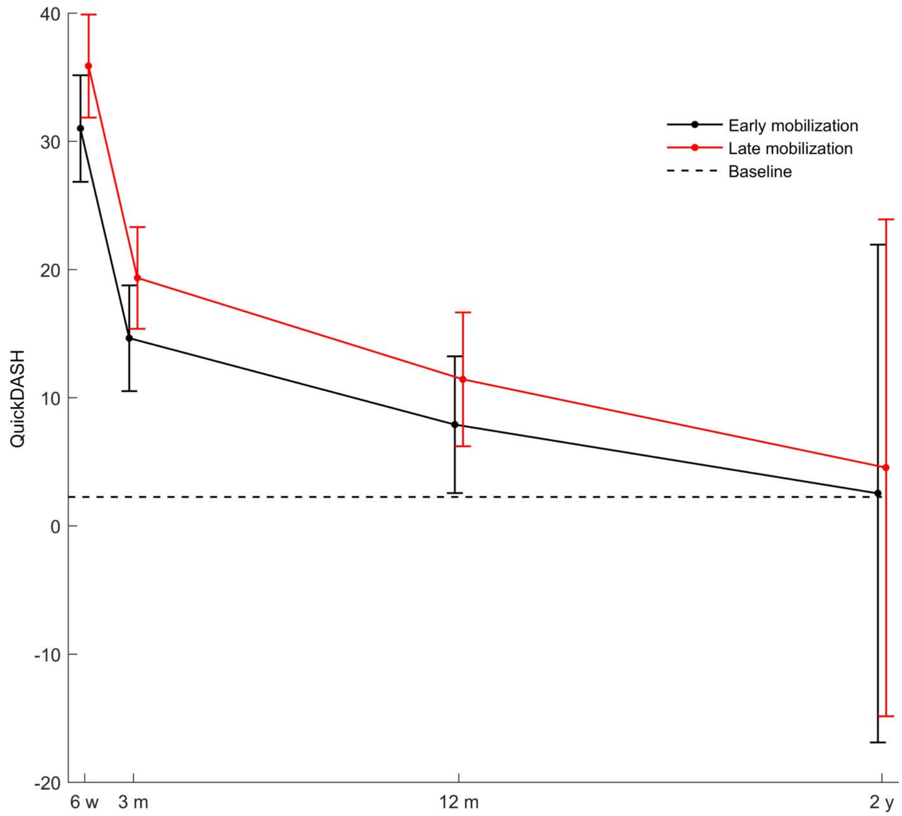

Fig. 2

Comparison of QuickDASH scores between groups in a linear mixed model, with adjustment for intra-patient and intra-surgeon correlations. The dots and I bars indicate the means and 95% CIs estimated by the linear mixed model.

All participants received the same surgical treatment (a volar locking plate) regardless of randomization.

Sample Size

The primary outcome measure was the QuickDASH, which is the shortened version of the DASH (Disabilities of the Arm, Shoulder and Hand) score. It has been validated and translated into Norwegian[7]. QuickDASH scores range from 0 to 100, with 100 being the worst possible outcome[8]. The aim was to find a difference of 10 points, as the minimal clinically important difference between the 2 groups, at the 2-year follow-up[9]. The standard deviation (SD) of the QuickDASH score was assumed to be 15[10]. A power calculation with an α of 0.05 and a power of 80% gave a total sample size of 72 patients, 36 in each group. The sample size was increased to a minimum of 110 to allow for longitudinal multilevel analyses and to protect against potential loss to follow-up.

Surgical Technique and Immediate Aftercare

All patients were treated with open reduction and internal fixation (ORIF) using the volar locking plate (DVR; DePuy). A standard technique with a volar modified Henry approach was employed, and a dorsal splint made of plaster of Paris was applied in the operating theater in both groups. The standard approach was performed through a volar incision over the flexor carpi radialis tendon. The approach included a short oblique incision over the flexor crease. The sheath of the flexor carpi radialis tendon was opened, and the flexor pollicis longus was retracted in an ulnar direction. The pronator quadratus was elevated to expose the fracture. Open reduction was accomplished, and a volar locking plate was applied. The reduction and plate position were confirmed with fluoroscopy.

Intervention and Outcomes

In the early mobilization group, the plaster splint was removed after 2 to 3 days, during a session with the physiotherapist. The importance of mobilization through early, non-weight-bearing movement and home exercises was explained. During the first 3 months, the patients in this group met with the institution's physiotherapist every other week. The physiotherapy consisted of information, passive and active mobilization, a guided training program, and emphasis on the importance of doing home exercises. The patients were instructed to exercise a minimum of 4 times a day with a regimen that included all active motions of the wrist and hand for the first 2 weeks. A written training program was provided. Passive stretching and load-bearing as pain permitted were introduced after 2 weeks. Unrestricted load-bearing was allowed after 6 weeks.

In the late mobilization group, the patients wore the dorsal splint for 2 weeks and then met with the physiotherapist once, at

TABLE III Range of Motion and Grip Strength for 119 Patients with an Extra-Articular DRF Randomized to Either Early or Late Postoperative Mobilization

	Early Mobilization		Late Mobilization		Early Versus Late Mobilization*	
	No.	Mean (SD)	No.	Mean (SD)	Mean Difference (95% CI)	P Value
6 weeks						
Flexion	56	38.2 (16.0)	60	37.7 (15.6)	−1.1 (−5.3; 3.2)	0.62
Extension	56	46.9 (18.3)	60	42.9 (17.4)	−1.3 (−6.2; 3.5)	0.59
Pronation	56	79.3 (13.4)	60	74.2 (15.2)	−3.7 (−6.9; −0.6)	**0.02**
Supination	56	60.4 (27.4)	60	59.8 (26.5)	0.4 (−5.2; 6.1)	0.88
Radial deviation	56	14.1 (7.9)	60	13.1 (7.1)	−0.6 (−3.1; 2.0)	0.66
Ulnar deviation	56	26.9 (13.0)	60	24.8 (12.9)	−1.0 (−5.0; 2.6)	0.61
Grip strength	56	13.6 (7.7)	60	12.2 (5.9)	−1.6 (−3.8; 0.6)	0.15
3 months						
Flexion	54	51.4 (14.8)	61	51.0 (11.1)	−1.1 (−5.2; 3.0)	0.61
Extension	54	62.2 (14.5)	61	60.1 (14.3)	−1.1 (−5.8; 3.6)	0.63
Pronation	54	83.6 (10.3)	61	81.9 (12.3)	−3.5 (−6.5; −0.5)	**0.02**
Supination	54	75.8 (18.5)	61	78.6 (15.5)	0.4 (−5.0; 5.8)	0.89
Radial deviation	54	18.3 (7.8)	61	18.4 (6.9)	−0.5 (−2.9; 1.9)	0.69
Ulnar deviation	54	33.4 (13.0)	61	33.9 (12.3)	−0.9 (−4.0; 3.2)	0.63
Grip strength	54	21.2 (8.5)	61	20.5 (7.7)	−1.6 (−3.7; 0.5)	0.14
1 year						
Flexion	51	59.7 (13.7)	59	61.0 (10.3)	−1.0 (−4.7; 2.6)	0.59
Extension	51	67.4 (12.9)	59	69.1 (8.6)	0.2 (−3.5; 4.0)	0.90
Pronation	51	87.0 (6.1)	59	86.0 (6.0)	−2.0 (−4.7; 0.7)	0.14
Supination	51	84.5 (10.8)	59	85.9 (6.3)	0.2 (−4.5; 4.8)	0.95
Radial deviation	51	21.2 (8.2)	59	21.6 (7.7)	−0.1 (−2.4; 2.1)	0.90
Ulnar deviation	51	37.8 (13.2)	59	38.1 (12.8)	−0.4 (−4.0; 3.2)	0.83
Grip strength	51	27.2 (8.1)	59	26.7 (7.5)	−1.4 (−3.3; 0.6)	0.17
2 years						
Flexion	54	64.1 (12.3)	57	63.4 (10.3)	−0.9 (−5.9; 4.0)	0.71
Extension	54	69.4 (10.6)	57	72.2 (7.6)	2.0 (−1.4; 5.4)	0.25
Pronation	54	87.4 (5.6)	57	87.4 (5.6)	−0.1 (−3.8; 3.6)	0.97
Supination	54	86.8 (7.1)	57	87.8 (4.6)	−0.2 (−6.6; 6.3)	0.96
Radial deviation	54	25.1 (8.4)	57	25.3 (8.4)	0.3 (−2.6; 3.2)	0.82
Ulnar deviation	54	40.7 (10.7)	57	41.3 (11.3)	0.3 (−4.2; 4.8)	0.90
Grip strength	54	29.2 (7.6)	57	28.3 (7.6)	−1.1 (−3.6; 1.4)	0.39

*Results of linear mixed models, with adjustment for intra-patient and intra-surgeon correlations. All models were adjusted for duration of operation, surgeon experience, and patient sex and age at injury.

which time the splint was removed. Wrist exercises were demonstrated, and the importance of mobilization and home exercises was explained. The same written training program as was used for the early group was provided. The late mobilization group then was left to perform home exercises on their own. The patients were allowed unrestricted load-bearing after 6 weeks.

Assessment of range of motion, pain, grip strength, and self-reported functional outcome was performed preoperatively and at 6 weeks, 3 months, 1 year, and 2 years postoperatively by an orthopaedic surgeon. In addition to the QuickDASH score, function was measured with the Patient-Rated Wrist Evaluation (PRWE) questionnaire[11].

We measured grip strength by using a hand dynamometer (Jamar Plus+ Digital Hand Dynamometer; Patterson Medical), which measures in kilograms. The range of motion was measured with a standard goniometer, and pain was evaluated using a visual analog scale (VAS). Patients quantified their pain on a scale of 0 to 10, with the 10 being worst.

Statistical Methods

The intention-to-treat principle was used in all analyses. The primary outcome (QuickDASH score) and secondary outcomes (VAS, PRWE total score, flexion, extension, pronation,

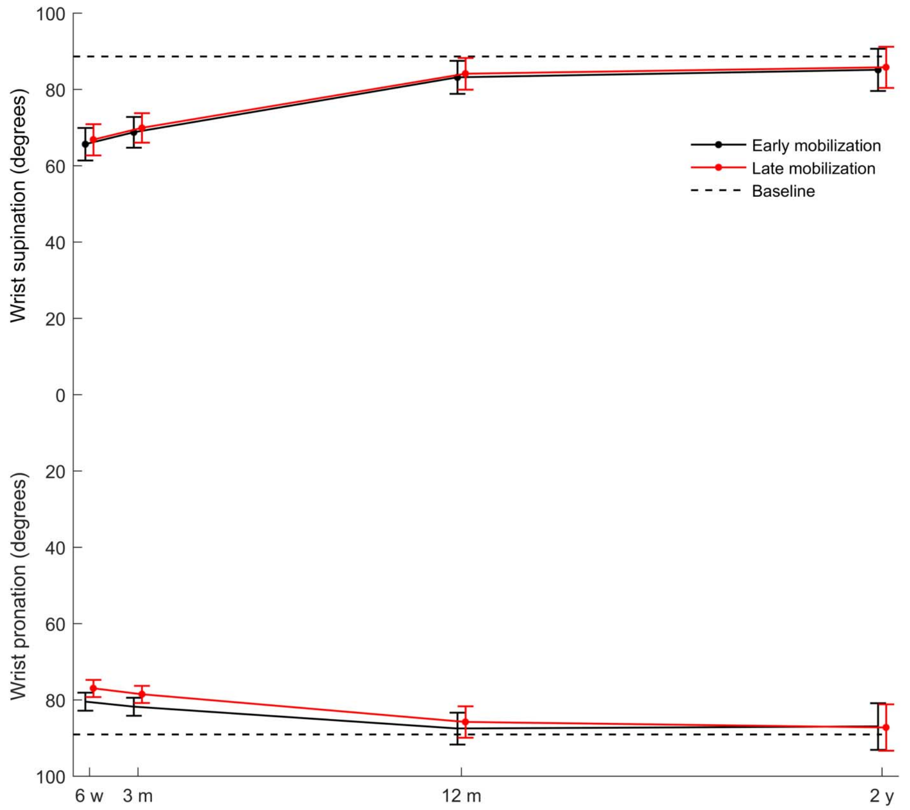

Fig. 3

Comparison of wrist supination and pronation between groups in a linear mixed model, with adjustment for intra-patient and intra-surgeon correlations. The dots and I bars indicate the means and 95% CIs estimated by the linear mixed model.

supination, radial deviation, ulnar deviation, and grip strength) were described by means and SDs.

Intra-patient correlations are likely to be present in the data as a result of repeated measurements for each patient. The data also might exhibit a hierarchical structure because many surgeons performed the operations. Differences between groups in primary and secondary outcomes were therefore assessed by a linear mixed model with fixed effects for nonlinear time, a group indicator, and the interaction between the time and group indicator. Random intercepts for patients nested within surgeon were included. Surgeon level was removed if it did not contribute to a better model fit according to the Akaike information criterion. A significant interaction term would imply overall between-group differences in time trend. As a post-hoc analysis, differences between groups at each time point were derived with the corresponding p values and 95% confidence intervals (CIs). The results of the linear mixed model were illustrated graphically. All models were adjusted for duration of the operation, surgeon experience, and patient sex and age at injury. The results after adjustment were tabulated.

Results with p values of <0.05 were considered statistically significant. No adjustment for multiple testing was implemented. All statistical analyses were performed with SPSS version 24.0 (IBM) and SAS version 9.4 (SAS Institute).

The study was approved by the Regional Ethics Committee of Eastern Norway (ref. 2011/1393). The trial was registered at ClinicalTrials.gov (NCT02015468) and approved by the local data protection officer.

Results

During the study period, 241 patients were assessed for inclusion, and 119 were enrolled and randomized into 2 groups (Fig. 1). The 2 groups had similar patient demographics with respect to age, sex, and injury side (Table I) and baseline scores on the QuickDASH, PRWE, and VAS. Surgery was performed as an outpatient procedure in 85 (71%) of the patients. The average duration between the injury and the surgery was 9 days, which was similar in the 2 groups. Seven patients (6%) were lost to follow-up.

All patients were interviewed by the physiotherapist or surgeon regarding their compliance with the training program. On average during the follow-up period, 89% of the patients reported that they had completed >80% of the recommended sessions.

Clinical Results

No overall statistically significant differences in the outcome measures were found between the 2 groups. Post-hoc analysis demonstrated no statistically significant or clinically relevant differences in the QuickDASH scores between the groups at any of the follow-up intervals (Table II, Fig. 2), neither before nor after adjustment for the duration of the operation,

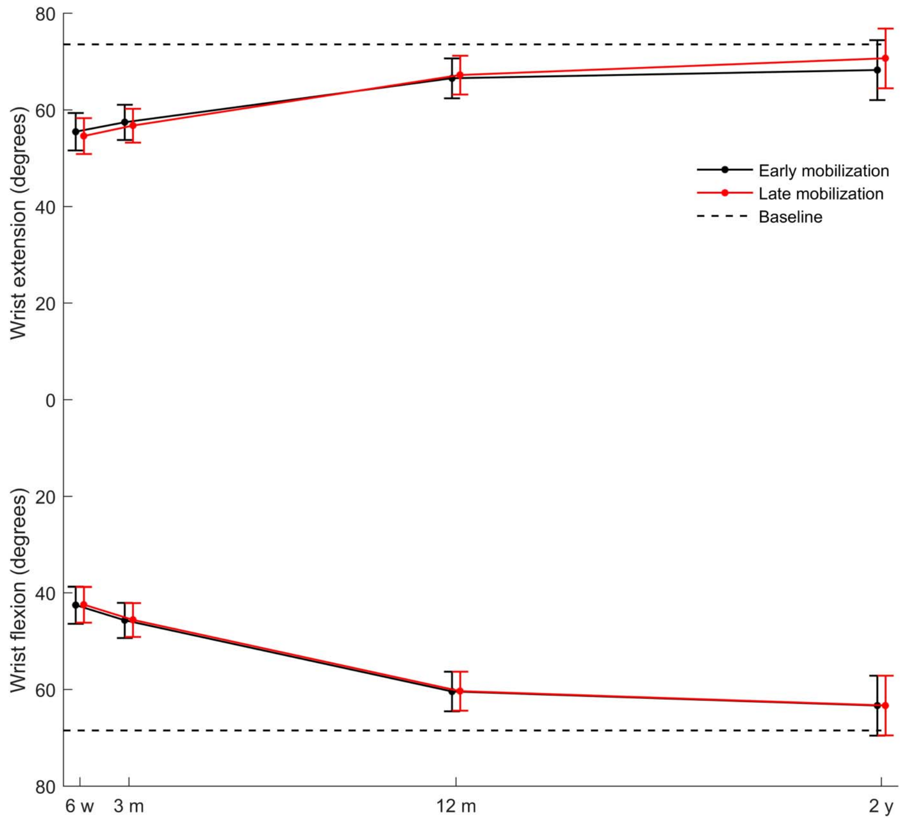

Fig. 4

Comparison of wrist extension and flexion between groups in a linear mixed model, with adjustment for intra-patient and intra-surgeon correlations. The dots and I bars indicate the means and 95% CIs estimated by the linear mixed model.

surgeon experience, and sex or age at the time of the injury. The largest difference in the QuickDASH scores between the 2 groups was found at 6 weeks, when the early mobilization group had a mean score of 30 (SD = 19.4) compared with a mean of 37 (SD = 19.1) in the late mobilization group. This difference bordered on significance, with a p value of 0.05 after adjustment.

The only functional outcome that showed a significant difference between the groups was pronation at 6 weeks (p = 0.02) and 3 months (p = 0.02) (Table III, Fig. 3), favoring the early mobilization group. There was no significant difference in any other functional outcome measure, including the VAS score (Table II), PRWE score (Table II), and grip strength (Table III), at any time of measurement in the study. All functional outcomes are shown in Figures 2 through 6.

Complications

There were no deep infections or secondary surgical procedures due to implant failure in either group. Ten patients, 6 in the early mobilization group and 4 in the late mobilization group, underwent plate removal, between 6 and 12 months after surgery. The plate was removed from 6 patients because of residual stiffness or pain, and 4 plates were removed because of patient request only. Secondary surgery was performed in 2 patients in the early mobilization group because suboptimal plate and screw placement was causing pain and irritation of the extensor tendons. Repeat osteosynthesis was performed by exchanging the volar locking plate. Both of these fractures healed without loss of position, and the plate and screws were removed 6 and 8 months postoperatively. Neither patient had any more symptoms or complications.

We found an approximately 10% rate of complex regional pain syndrome, which is in line with previous studies[4,12]. There was no significant difference between the 2 groups. Nor was there any significant difference between the groups with regard to the number of overall complications (Table IV).

Discussion

The main finding in the present study is that early mobilization and multiple formalized physiotherapy visits did not improve wrist function at any given time in the follow-up period (6 weeks, 3 months, 1 year, and 2 years postoperatively) compared with standard treatment of 2 weeks in a dorsal plaster splint, a single physiotherapy visit, and home exercises. At 6 weeks, the difference in QuickDASH scores bordered on statistical significance, favoring the early mobilization group. However, the adjusted mean difference in the QuickDASH score was 6 points, which is less than the minimal clinically important difference (8 to 17 points)[13,14].

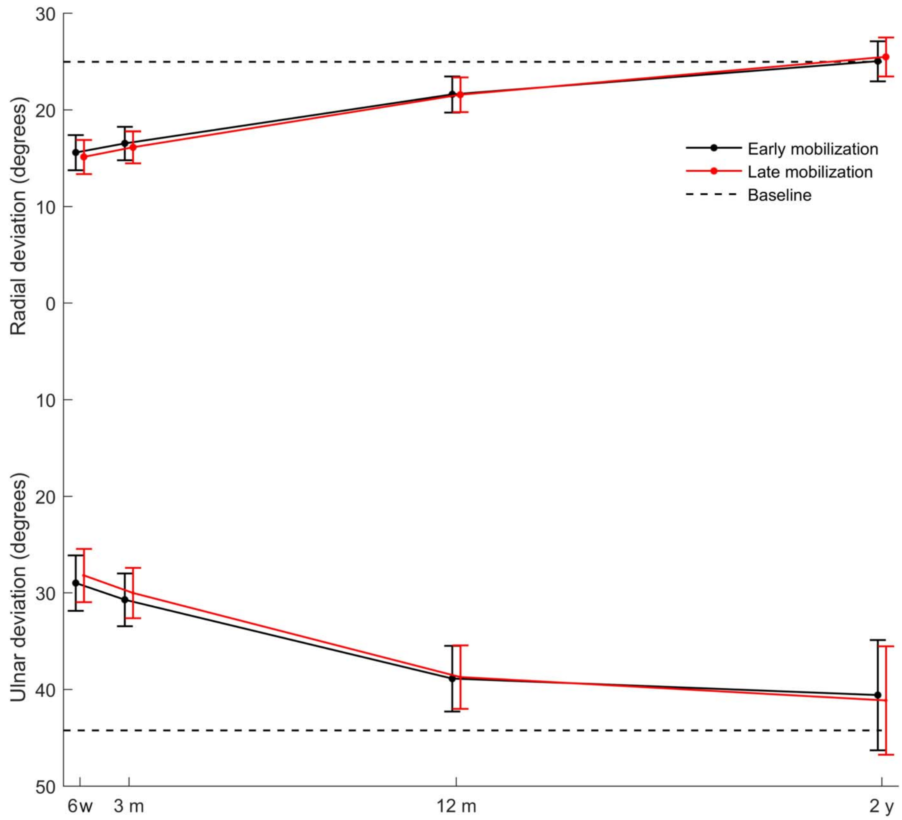

Fig. 5

Comparison of radial and ulnar deviation between groups in a linear mixed model, with adjustment for intra-patient and intra-surgeon correlations. The dots and I bars indicate the means and 95% CIs estimated by the linear mixed model.

Immobilization

The optimal duration of immobilization after fixation of a DRF with a volar locking plate has been the focus of several previous studies. Lozano-Calderón et al. randomized 60 patients to either 2 or 6 weeks of immobilization following plate fixation of a DRF[15]. They found no difference in functional outcome (range of motion, DASH, or VAS) at 3 or 6 months, but suggested that there could have been a difference earlier than 3 months that the study did not detect. Brehmer and Husband randomized 78 patients to either 6 weeks of immobilization or early training with a removable splint for 3 to 4 weeks[16]. They found a marginal difference, favoring early mobilization, in mobility, strength, and DASH scores at 6 weeks. The difference was clinically relevant until 6 weeks postoperatively and the difference in range of motion and the DASH score was statistically significant at 4 and 8 weeks. They concluded that early mobilization (within 3 to 5 days after surgery) is safe and facilitates an earlier return to normal function. Quadlbauer et al. reported a similar conclusion in a small RCT randomizing 30 patients to be treated with either 1 week or 5 weeks of immobilization after plate fixation of a DRF[17]. Not surprisingly, they found a significant difference in the range of motion, QuickDASH score, and PRWE score at 6 weeks (1 week after plaster splint removal in the late mobilization group). There was no difference at 3 months.

In an attempt to identify the optimal immobilization time after plate fixation for a DRF, Watson et al. randomized 133 patients to 1, 3, or 6 weeks of immobilization. They found that immobilization for 1 or 3 weeks was associated with better clinical and patient-reported results at 6 weeks compared with 6 weeks of immobilization[18]. There was no difference between the 1 and 3-week-immobilization groups, and all differences had disappeared after 3 months.

These studies have clearly demonstrated that 5 to 6 weeks of immobilization is unnecessary following fixation of DRFs with a volar locking plate. It is unclear whether immobilization is necessary at all beyond a few days for pain relief, which was the basis of the present study.

Concurrent soft-tissue injuries have been described in association with 35% to 85% of DRFs[19]. This has led some authors to recommend immobilization after stable internal fixation to allow hidden soft-tissue injuries to heal[19,20]. Neither wrist arthroscopy nor magnetic resonance imaging (MRI) scans were used to specifically look for ligament injuries in our cohort. However, the 2-year results were similar between the early and late mobilization groups. This strengthens the view that as long as there is no obvious pathological involvement in the carpal rows, concurrent arthroscopy or prolonged immobilization following plate fixation of extra-articular DRFs is unwarranted. Our results suggest that, if occult soft-tissue

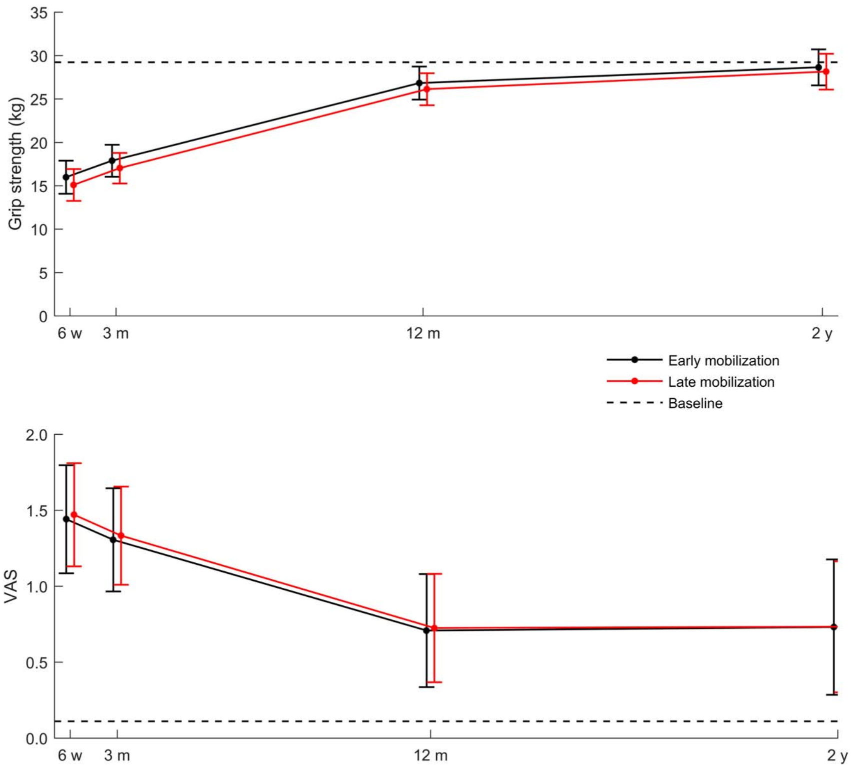

Fig. 6

Comparison of grip strength and VAS scores between groups in a linear mixed model, with adjustment for intra-patient and intra-surgeon correlations. The dots and I bars indicate the means and 95% CIs estimated by the linear mixed model.

TABLE IV Registered Complications in 119 Patients with an Extra-Articular DRF Randomized to Either Early or Late Postoperative Mobilization

	Early Mobilization (N = 57)		Late Mobilization (N = 62)		
	No.	%	No.	%	P Value
Major complications					
Suboptimal osteosynthesis leading to secondary surgery	2	3.5%	0	0	
Complex regional pain syndrome/prolonged pain	5	8.8%	7	11.3%	0.65
Carpal tunnel syndrome	0	0	1	1.6%	
Deep wound infection	0	0	0	0	
Tendon rupture	0	0	0	0	
Overall prevalence of major complications	7	12.3%	8	12.9%	0.92
Minor complications					
Transient nerve dysfunction	1	1.8%	3	4.8%	0.35
Superficial wound infection	0	0	1	1.6%	
Trigger finger	1	1.8%	0	0	
Dupuytren contracture	1	1.8%	0	0	
Scar problems	1	1.8%	0	0	
Overall prevalence of minor complications	4	7.0%	4	6.5%	0.90
Overall prevalence of complications	11	19.3%	12	19.4%	0.99
Secondary surgery					
Peripheral nerve decompression (median and ulnar)	0	0	1	1.6%	
Plate removal	6	10.5%	4	6.5%	0.42
Secondary osteosynthesis	0	0	0	0	
Overall prevalence of secondary surgery	6	10.5%	5	8.1%	0.64

injuries were present in our cohort, they had no clinical or therapeutic consequences.

Physiotherapy Versus Home Exercises

Despite a small number of RCTs, physiotherapy has not been proven to improve functional or patient-reported outcomes following plate fixation of a DRF compared with home exercises[15,21,22]. These studies support our finding that multiple physiotherapy visits are not necessary.

Interestingly, 2 studies have shown that home exercises led to a better result than physiotherapy. Krischak et al. compared home exercises with active physiotherapy in a study of 46 patients, 23 in each group, who used a splint for 6 weeks[23]. They found that home exercises led to better range of motion, grip strength, and PRWE scores at 6 weeks. Long-term results were not reported. Souer et al. compared exercises supervised by an occupational therapist with surgeon-instructed independent exercises[24]. Assessment at 3 and 6 months showed no difference in DASH scores between the 2 regimens; however, patients doing home exercises had a small but statistically significant improvement in wrist flexion, extension, supination, ulnar deviation, and grip strength at 6 months after surgery compared with those supervised by the occupational therapist.

Limitations and Strengths

Comparing 2 variables—the duration of immobilization (2 to 3 days versus 14 days) and multiple physiotherapy versus 1 physiotherapy visit—may have rendered our study less effective. Also, we only looked at extra-articular fractures. Intra-articular fractures might have a worse diagnosis, and the role of immobilization and physiotherapy might be different for those injuries. The study was conducted at a single institution, limiting the external validity of the results. Because of the nature of the investigation, neither the patients nor the physiotherapists could be blinded. However, the assessors at the various follow-up visits were blinded to group allocation. A strength of this study is the large number of patients and very low number lost to follow-up.

Conclusions

Early mobilization after ORIF of an extra-articular DRF is safe. Immobilization in a plaster cast or in a splint beyond 2 to 3 days is not necessary. There was a tendency for slightly better functional and patient-reported results at 6 weeks and 3 months in the early mobilization group, but these differences disappeared at 1 or 2 years. The data also suggest that home exercises are sufficient as long as the patients receive adequate information and that there is no need for multiple physiotherapy visits in the rehabilitation following these injuries. ■

Ståle Ørstavik Clementsen, MD[1,2]
Ola-Lars Hammer, MD[1,2]
Jūratė Šaltytė Benth, PhD[1,2]
Rune Bruhn Jakobsen, MD, PhD[1,2]
Per-Henrik Randsborg, MD, PhD[1]

[1]Akershus University Hospital, Akershus, Norway

[2]University of Oslo, Oslo, Norway

Email address for S.Ø. Clementsen: stcl@ahus.no

ORCID iD for S.Ø. Clementsen: 0000-0002-8330-7141
ORCID iD for O.-L. Hammer: 0000-0002-8504-3821
ORCID iD for J. Šaltytė Benth: 0000-0003-4199-2272
ORCID iD for R.B. Jakobsen: 0000-0003-3566-9516
ORCID iD for P.-H. Randsborg: 0000-0002-7674-1572

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