The effect of passive mobilisation following fractures involving the distal radius: a randomised study

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This study investigated whether passive mobilisation added to the effectiveness of an advice and exercise regimen for patients following distal radial fractures. Thirty-nine patients were randomly allocated to one of two groups. Patients in the first group received advice and exercises; patients in the second group also received a six-week course of passive mobilisation. Range of movement, function and pain were measured pre-treatment, and three and six weeks later. Significant improvements were found over time for all outcome measures. No significant differences were detected between groups for any outcomes except flexion, where the difference was not clinically important. Routine passive mobilisation does not appear to incur additional benefit over an advice and exercise regimen for this patient group. **[Kay S, Haensel N and Stiller K (2000): The effect of passive mobilisation following fractures involving the distal radius: A randomised study. *Australian Journal of Physiotherapy* 46: 93-101]**

Key words: Colles' Fracture; Radius Fractures; Randomized Controlled Trials; Wrist Injuries

Introduction

Fractures of the distal radius are one of the most common skeletal injuries (Ark and Jupiter 1993). Management of these fractures ranges from the application of a plaster cast with or without pins through to external or internal fixation. Physiotherapy aimed at regaining range of movement (ROM), reducing pain and improving functional outcomes often follows the removal of plaster or fixation. Physiotherapy treatment involves detailed advice and education to ensure protection of the fracture, control of swelling, restoration of skin condition and a gradual increase in activity. Active, passive and increasingly resisted exercises to improve ROM, strength and stability, and passive joint mobilisation techniques (physiological and accessory), to restore functional range of pain free active motion, may also be utilised. Whilst exercises and advice may require only occasional patient attendance to ensure compliance, correction and progression, passive mobilisation techniques usually are applied over a course of treatment comprising more frequent visits. Although a combined treatment regimen using all components is believed to be effective, it is not known which individual components are required. If passive mobilisation was found to be an unnecessary part of this combined approach, a self management program of advice and exercises given by a physiotherapist has the potential to reduce outpatient physiotherapy attendance and thus the cost of service provision.

Two studies have investigated the use of passive mobilisation techniques following immobilisation for fractures of the distal radius (McPhate and Robertson 1998, Taylor and Bennell 1994). Taylor and Bennell (1994) randomised 30 patients to either a control group receiving heat, exercises and home advice, or an experimental group which, in addition, received passive mobilisation techniques. All patients received physiotherapy treatment twice a week until the treating physiotherapist was satisfied with their progress. No significant difference was found between the groups in the range of wrist extension achieved at the time of discharge from physiotherapy. However, methodological concerns with this study, including the lack of an independent examiner, and the use of wrist extension range as the only outcome variable, means that the validity of these results is uncertain. In a study by McPhate and Robertson (1998), reported in abstract form, 32 women with Colles' fractures were randomly allocated to either a control group where patients received a home exercise program or an experimental group that, in addition, received passive mobilisation. Outcome variables assessed were pain using a visual analogue scale (VAS), wrist extension range and grip strength. No significant difference was seen between groups in range or grip strength, although the mean pain score was significantly lower in patients treated with

passive mobilisation in addition to an exercise regimen. Further details regarding pain scores were not provided in the abstract. Methodological concerns with this study included limited outcome variables, particularly the lack of a functional measurement, the short duration of the study period and unknown intra- and inter-examiner reliability.

Therefore, the aim of this study was to investigate the effect of passive mobilisation techniques following fractures involving the distal radius, using a more comprehensive range of outcome variables, in particular wrist ROM, pain and function.

Method

All patients attending the Royal Adelaide Hospital outpatient service for management of fractures involving the distal radius, once pins and/or plaster casts were removed, and who gave informed written consent, were eligible for inclusion in this prospective study. Exclusion criteria were: unwillingness to participate, inability to understand written or spoken English, previous wrist fracture on the affected side within the last 20 years, previous wrist fracture on the affected side at any time if the patient reported a residual loss of range or function, concurrent ipsilateral upper limb fracture, concurrent bilateral upper limb fractures, pre-existing inflammatory joint condition, external fixation, or open reduction and internal fixation. Patients were withdrawn from the study if they failed to attend three consecutive appointments. Approval from the Royal Adelaide Hospital Research Ethics Committee was obtained.

From March 1997 to March 1998, 40 patients were included in the study and randomly allocated to one of two groups by means of a computer generated random numbers table. Patients in the Non-Mobilisation Group attended physiotherapy for an initial treatment where they received standardised advice on fracture protection, swelling control, skin care and functional activities. Patients were also instructed in, and asked to practise, a home exercise program which included active exercises, soft tissue stretches, isometric stabilising exercises and gentle grip strengthening. Patients were provided with a booklet outlining this advice and illustrating the exercises. An appointment was made for the following week to review the exercises. Subsequent appointments could be made, at the physiotherapist's discretion, to ensure the exercises were performed correctly and the advice was being followed. Follow-up appointments were made at three weeks for the purposes of progressing the exercises and measuring the outcome variables, and again at six weeks for the purpose of measurement.

Table 1. Thumb motion scale

Score	Opposition of thumb tip to:
1	tip of index finger
2	tip of middle finger
3	tip of ring finger
4	tip of little finger
5	volar surface of the distal inter-phalangeal joint of the little finger
6	volar surface of the proximal inter-phalangeal joint of the little finger
7	volar surface of the metacarpo-phalangeal joint of the little finger
8	distal palmar crease
9	mid palmar crease

Based on the scale described by Kapandji (1992) and modified by Michael Sandow, orthopaedic surgeon, Royal Adelaide Hospital.

Patients in the Mobilisation Group received passive mobilisation techniques in addition to the management as described for the Non-Mobilisation Group. These passive mobilisation techniques incorporated two sets each of physiological and accessory movements, with the grade of mobilisation left to the discretion of the treating physiotherapist but based on examination findings, the results of the previous treatments and the stage of fracture healing. Initially, passive mobilisation involved accessory mobilisations (Grades 1–2) in both antero-posterior and postero-anterior directions of the wrist joint complex (ie distal radio-ulnar joint, radio/ulnar-carpal joint, proximal and distal carpal rows, specific inter-carpal joints), in a neutral position with the distal radius stabilised, and progressed to incorporate end of range physiological movements (Grades 3–4). Mobilisation Group patients attended twice a week for the first three weeks and then once a week for the subsequent three weeks.

All patients were treated by one of three experienced hand physiotherapists. The two physiotherapists who treated the majority of patients (37 of 40 patients) are members of the Australian Hand Therapy Association and have each worked in hand and upper limb

Table 2. Profiles of the 39 patients completing the study according to group.

	Non-Mobilisation Group (*n* = 20)	Mobilisation Group (*n* = 19)	Statistical analysis	
Sex: M/F *(n)*	8/12	4/15	$\chi^2 = 2.67$	$p = 0.26$
Age (years) *	51.6 (18.8)	54.7 (13.1)	$t_{(37)} = -0.61$	$p = 0.55$
Dominance: R/L/A *(n)*	18/1/1	18/1/0	$\chi^2 = 2.00$	$p = 0.57$
Musculoskeletal history				
Taking anti-inflammatory medication *(n)*	1	2	-	
Generalised joint problems *(n)*	1	1	-	
Fracture history				
Side of fracture: dominant/non-dominant	10/10	8/11	$\chi^2 = 1.05$	$p = 0.59$
Type of fracture: ea/pa/ca *(n)*	10/6/4	10/2/7	$\chi^2 = 3.82$	$p = 0.28$
Type of fixation: pins & POP/POP *(n)*	8/12	5/14	$\chi^2 = 1.85$	$p = 0.40$
Period of immobilisation (weeks) *	6.4 (1.2)	5.9 (1.0)	$t_{(37)} = 1.41$	$p = 0.17$
Time from injury to initial assessment (weeks) *	7.2 (1.6)	7.0 (1.9)	$t_{(37)} = 0.35$	$p = 0.73$

Statistical comparison of the number of patients taking anti-inflammatory medication and generalised joint problems was not performed due to the small number of patients involved.

*Mean (SD)

M: male; F: female; R: right; L: left; A: ambidextrous; ea: extra-articular; pa: partial articular; ca: complete articular; POP: plaster of Paris.

physiotherapy management for more than 10 years.

Patients were assessed prior to commencing physiotherapy, and three and six weeks later, by an independent experienced hand physiotherapist who was unaware of the patient's allocated group. At each assessment, the patient was asked to grade his/her perception of pain severity and functional disability over the previous day using a VAS (0 = no pain or no difficulty using the wrist for daily activities and 10 = the worst pain imaginable or where daily activities were extremely difficult). Ranges of movement of the wrist joint complex (wrist - flexion, extension, radial deviation, ulnar deviation; distal radio-ulnar joint - supination, pronation) and thumb (web space angle) were measured by the independent examiner using a goniometer in positions recommended by the American Society of Hand Therapists (Adams et al 1992). In addition, finger flexor and extensor deficits were recorded in millimetres, and thumb opposition was measured using a thumb motion scale (see Table 1). Grip strength was measured using a calibrated Jamar dynamometer (JA Preston, Corporation Jackson, MI, USA) on Setting 2 to ensure maximal grip strength (Firrell et al 1996). A functional assessment tool was devised specifically for this study, based on aspects of the Rancho Los Amigos Hospital test (Carroll 1965). There were six functional tests: cylindrical grip - picking up a jug filled with 500mL of water by its handle; grip with pronation - pouring 250mL of water from the jug into a glass; pronation - pouring 250mL of water from one glass to another; supination - pouring 250mL of water from one glass to another "backwards" through supination; weight bearing through wrist extension - pushing up to standing through extended wrists on the arms of a chair; wrist flexion when attending to perineal care after toileting. Each test was rated on a 0–3 ordinal scale by the independent examiner, with the exception of perineal care which was self-rated, where 0 represented an inability to perform the task, 1 = task partially complete, 2 = able to complete task with difficulty, and 3 = able to complete task without difficulty. To ensure the maximal consistency of application of the functional assessment tool, a specific written procedure was devised for each of the five tests rated by the independent examiner.

X-rays taken at the time of injury were classified by a specialist orthopaedic surgeon using the AO system of classification (Manual of Internal Fixation Techniques 1991).

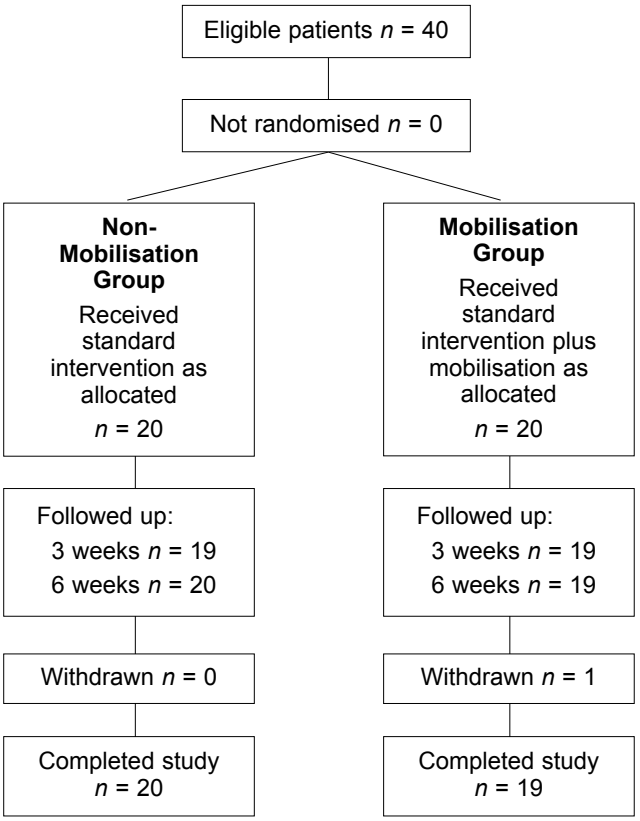

Figure 1. Progress of patients throughout the study period.

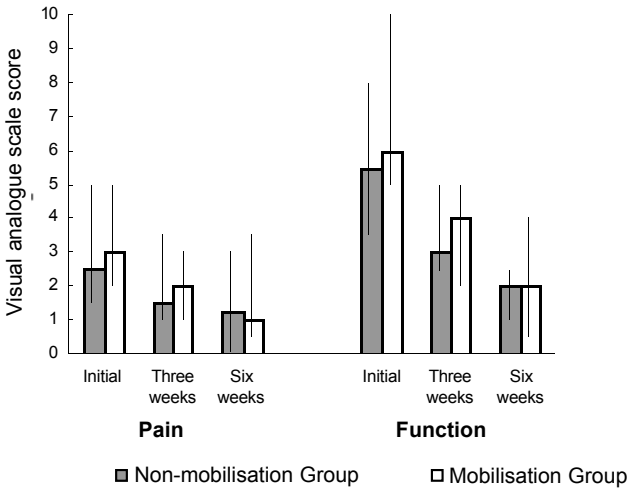

Figure 2. Median visual analogue scale scores (inter-quartile ranges) for pain and function according to group.

Statistical analyses Analyses were performed using the SPSS and SAS statistical software packages. Repeated measures analysis of variance was used to analyse outcomes with continuous data (ie grip strength and all ROM data except thumb opposition) and for ordinal ranked outcomes (ie scores for VAS, thumb opposition and functional tasks). In addition, for the ordinal ranked outcomes, the Mann-Whitney U test was used to compare groups at each measurement time (ie initially, three weeks, six weeks). Nominal data from the patient profiles were analysed using the chi-square test (Yates' correction for continuity was used to adjust χ^2 when a low cell frequency was encountered). Interval data from the patient profiles, and the number of treatments patients received during the study period, were analysed using the *t*-test. Probability values of less than 0.05 were considered significant.

A sample size of 17 subjects per group was calculated (STPLAN Version 4, B Brown, University of Texas) as being required, based on a Type 1 error of 0.05, a Type 2 error of 0.20 (statistical power of 80 per cent), a standard deviation of 10 degrees (wrist extension, Taylor and Bennell 1994) and considering a difference of 10 degrees (wrist extension, 55 degrees versus 45 degrees, Taylor and Bennell 1994) to be clinically significant.

Intra-rater reliability study Prior to the commencement of the study, the physiotherapist involved in the measurement procedures completed a full assessment (with the exception of the measurements made by the patient, ie VAS pain and function and perineal care) of 10 patients recovering from wrist fractures. This assessment was repeated later on the same day in a different order with the examiner unaware of the original results. For the assessments of all the ROM measurements and grip strength, the intra-class correlation coefficient (1,1) ranged from 0.82 to 0.98. These indicate good intra-rater reliability. For the range of thumb opposition, using the thumb motion scale, the same grade was achieved for nine patients and was within one grade for the tenth patient. For the functional tasks, grip and grip with pronation were scored the same for all patients on both occasions; pronation, supination and weight bearing tasks were scored the same for eight patients and were within one grade for the remaining two patients. It was not considered appropriate to statistically analyse the results of the reliability

Table 3. Range of motion and grip strength according to group.

	Non-Mobilisation Group (n = 20)		Mobilisation Group (n = 19)		Differences (95% CI)		Statistical analysis *
Extension – Mean (SD)							
Initial	34.5	(17.9)	33.9	(23.2)	0.6	(-13.0; 14.1)	$F_{(2,35)}$ = 0.55
Three weeks	52.6	(14.3)	52.1	(19.8)	0.5	(-10.9; 11.9)	p = 0.58
Six weeks	58.3	(12.6)	61.6	(13.2)	-3.3	(-11.7; 5.1)	
Flexion – Mean (SD)							
Initial	32.3	(11.6)	32.9	(14.0)	-0.6	(-9.0; 7.7)	$F_{(2,35)}$ = 4.22
Three weeks	43.2	(15.0)	48.2	(10.6)	-5.0	(-13.6; 3.6)	p = 0.02
Six weeks	50.5	(13.4)	51.8	(10.7)	-1.3	(-9.2; 6.5)	
Radial deviation – Mean (SD)							
Initial	11.8	(6.3)	12.9	(5.4)	-1.1	(-4.9; 2.7)	$F_{(2,35)}$ = 0.19
Three weeks	15.0	(6.0)	17.1	(5.8)	-2.1	(-6.0; 1.8)	p = 0.83
Six weeks	18.5	(5.4)	20.0	(5.3)	-1.5	(-5.0; 2.0)	
Ulnar deviation – Mean (SD)							
Initial	9.8	(7.3)	12.9	(7.7)	-3.1	(-8.0; 1.7)	$F_{(2,35)}$ = 0.64
Three weeks	15.5	(5.5)	19.2	(8.2)	-3.7	(-8.3; 0.9)	p = 0.53
Six weeks	19.5	(6.7)	22.4	(6.1)	-2.9	(-7.0; 1.3)	
Pronation – Mean (SD)							
Initial	62.8	(16.4)	65.5	(14.7)	-2.8	(-12.9; 7.4)	$F_{(2,35)}$ = 0.07
Three weeks	71.1	(11.3)	73.4	(11.4)	-2.4	(-9.8; 5.1)	p = 0.93
Six weeks	75.3	(7.9)	77.6	(8.4)	-2.4	(-7.7; 2.9)	
Supination – Mean (SD)							
Initial	43.8	(26.8)	46.3	(23.6)	-2.6	(-18.9; 13.8)	$F_{(2,35)}$ = 0.19
Three weeks	60.3	(19.3)	63.4	(15.2)	-3.2	(-14.6; 8.3)	p = 0.83
Six weeks	66.3	(15.8)	70.3	(10.2)	-4.0	(-12.6; 4.6)	
Web space – Mean (SD)							
Initial	41.5	(8.0)	38.7	(7.6)	2.8	(-2.2; 7.9)	$F_{(2,35)}$ = 0.76
Three weeks	44.5	(6.0)	43.2	(6.5)	1.3	(-2.8; 5.4)	p = 0.48
Six weeks	48.0	(8.2)	46.8	(6.3)	1.2	(-3.6; 5.9)	
Thumb motion scale – Median (interquartile range)							
Initial	6.0	(5.0 – 7.0)	6.0	(4.0 – 7.0)	0.4	(-1.0; 1.8)	$F_{(2,35)}$ = 2.63
Three weeks	7.0	(6.0 – 7.0)	7.0	(6.0 – 7.0)	-0.4	(-1.2; 0.4)	p = 0.09
Six weeks	7.0	(6.0 – 8.0)	7.0	(7.0 – 7.0)	0.1	(-0.5; 0.6)	
Grip strength – Mean (SD)							
Initial	8.7	(8.3)	7.2	(5.5)	1.4	(-3.1; 6.0)	$F_{(2,35)}$ = 0.50
Three weeks	16.9	(13.3)	13.5	(6.6)	3.4	(-3.6; 10.4)	p = 0.61
Six weeks	20.8	(13.3)	17.3	(7.4)	3.5	(-3.5; 10.5)	

Range of motion was measured in degrees except for thumb opposition which was measured using a scale (see Table 1). Grip strength was measured in kg.

* Statistical analyses represent results of the group by time interaction using repeated measures analysis of variance.

Table 4. Median scores (inter-quartile ranges) for functional tasks according to group

	Non-Mobilisation Group (n = 20)	Mobilisation Group (n = 19)	Statistical analysis *
Grip			
Initial	2.0 (2.0 – 3.0)	3.0 (2.0 – 3.0)	$F_{(2,35)}$ = 0.07
Three weeks	3.0 (3.0 – 3.0)	3.0 (3.0 – 3.0)	p= 0.93
Six weeks	3.0 (**)	3.0 (3.0 – 3.0)	
Grip / pronation			
Initial	2.0 (2.0 – 3.0)	3.0 (2.0 – 3.0)	$F_{(2,35)}$ = 1.27
Three weeks	3.0 (3.0 – 3.0)	3.0 (3.0 – 3.0)	p = 0.29
Six weeks	3.0 (**)	3.0 (3.0 – 3.0)	
Pronation			
Initial	2.0 (1.0 – 2.0)	2.0 (1.0 – 3.0)	$F_{(2,35)}$ = 0.44
Three weeks	2.0 (2.0 – 3.0)	3.0 (2.0 – 3.0)	p = 0.65
Six weeks	3.0 (2.0 – 3.0)	3.0 (3.0 – 3.0)	
Supination			
Initial	1.5 (0 – 3.0)	1.0 (0 – 3.0)	$F_{(2,35)}$ = 0.06
Three weeks	3.0 (2.0 – 3.0)	3.0 (2.0 – 3.0)	p = 0.95
Six weeks	3.0 (3.0 – 3.0)	3.0 (3.0 – 3.0)	
Weight bearing			
Initial	1.0 (0 – 2.0)	1.0 (0 – 2.0)	$F_{(2,35)}$ = 0.57
Three weeks	2.0 (1.0 – 2.0)	2.0 (2.0 – 3.0)	p = 0.57
Six weeks	3.0 (2.0 – 3.0)	3.0 (2.0 – 3.0)	
Perineal care			
Initial	3.0 (0 – 3.0)	3.0 (1.0 – 3.0)	$F_{(2,35)}$ = 0.05
Three weeks	3.0 (2.0 – 3.0)	3.0 (2.0 – 3.0)	p = 0.95
Six weeks	3.0 (2.0 – 3.0)	3.0 (3.0 – 3.0)	

** score remained constant for all patients.

* Statistical analyses represent results of the group by time interaction using repeated measures analysis of variance.

studies for the non-continuous data (ie the thumb motion scale and the functional tests) due to the high percentage agreement and the limited variation in the scores (Haas 1991).

Results

One patient initially recruited to the study withdrew his consent after commencing treatment in the Mobilisation Group, as he found the passive mobilisation techniques too uncomfortable (see Figure 1). As he withdrew from the study prior to the collection of data at three weeks, no outcome measurements were available for this patient. Thus 39 patients completed the study, 20 in the Non-Mobilisation Group and 19 in the Mobilisation Group (Figure 1). One patient (Non-Mobilisation Group) failed to attend for the review at three weeks, but her initial and six-week data have been included in the analysis.

The profiles of the 39 patients completing the study are shown in Table 2 and indicate that the process of randomisation was successful in achieving homogeneity between the treatment groups. All but one patient sustained his/her fractured distal radius after a fall, with the remaining patient sustaining her fracture in a motor vehicle accident. Seven patients (two Non-Mobilisation Group patients, five Mobilisation Group patients; χ^2 = 0.83, p = 0.24) were noted to have experienced complications related to their wrist fracture at the initial assessment. These complications included pin site infection (two patients), re-manipulation of the fracture (two

patients), osteoporosis requiring a protective splint to be worn following removal of plaster (one patient), stiff and swollen fingers (one patient) and early complex regional pain syndrome (one patient). Complications continuing or occurring later during the study period were also noted for five patients (one Non-Mobilisation Group patient, four Mobilisation Group patients; $\chi^2 = 1.04$, $p = 0.18$) as follows: carpal tunnel syndrome (two patients), fracture mal-union (one patient), marked stiffness and dysfunction of the wrist and fingers in the patient with complex regional pain syndrome and also in the osteoporotic patient mentioned earlier. These patients were not withdrawn from the study, continued to receive treatment as per their group allocation and are included in the data analysis.

The median (and inter-quartile ranges) VAS scores for pain and function for the two groups at each measurement period are presented in Figure 2. Analysis of these data demonstrated a significant improvement in these scores over the study period ($p < 0.001$). No significant group by time interactions were found for the VAS scores (pain – $F_{(2,35)} = 0.47$, $p = 0.63$; function – $F_{(2,35)} = 0.87$, $p = 0.43$). No significant differences were detected between groups for VAS scores at any of the measurement times using the Mann-Whitney U test ($p > 0.53$).

Each of the outcomes of ROM of the wrist joint complex and grip strength (Table 3) showed significant improvement over time ($p < 0.001$). No significant group by time interactions were found, with the exception of flexion (Table 3). Although a statistically significant group by time interaction was found for flexion, the differences between groups were not of a magnitude that would be considered clinically significant (Table 3). The 95 per cent confidence intervals for the differences between groups at six weeks contained values that were generally less than 10 degrees, except for extension and supination which went slightly outside this range (Table 3).

Scores for the functional tasks (Table 4) also showed significant improvement over time ($p < 0.005$). No significant group by time interactions were found (Table 4) and there were no significant differences detected between groups at any measurement time for the functional tasks using the Mann-Whitney U test ($p > 0.18$).

For the sake of brevity, flexor and extensor deficit data have not been presented. In summary however, flexor deficit for all fingers showed significant improvement over time ($p < 0.001$), but there were no significant group by time interactions ($p > 0.25$). Finger extensor deficit showed significant improvement over time only for the ring and little fingers ($p = 0.03$), with no significant group by time interaction seen for any of the extensor deficit outcomes ($p > 0.39$).

To ensure that the inclusion of patients who developed early and/or late complications in data analyses did not skew the results, further analyses were undertaken comparing the treatment groups but excluding those patients who developed early and/or late complications. No significant group by time interaction was found for any of the outcome variables.

During the study period, patients in the Non-Mobilisation Group attended for a mean (SD) of 3.2 (0.9) treatments compared with 9.1 (0.7) for patients in the Mobilisation Group ($t_{(37)} = -23.12$, $p < 0.001$).

Discussion

This study confirms and extends the findings of Taylor and Bennell (1994) and McPhate and Robertson (1998). Pain and all measurements of ROM and function significantly improved over the study period for patients who had sustained fractures involving the distal radius and were treated with advice and exercises, with or without a course of passive mobilisation. However, with the exception of wrist flexion, there were no statistically or clinically significant differences detected between patients who did or did not receive passive mobilisation in addition to advice and exercises. Although a statistically significant group by time interaction was found for wrist flexion, the 95 per cent confidence intervals for the mean differences between groups at six weeks contained values which were less than 10 degrees and therefore not considered clinically important. Similarly, although the 95 per cent confidence intervals for the differences between groups contained values which were more than 10 degrees for extension and supination (Table 3), these values were so close to 10 degrees that any potential differences between groups are unlikely to be clinically important. Thus, for this patient sample, the addition of passive mobilisation to a treatment

regimen of advice and exercises did not appear to improve outcome. Unlike McPhate and Robertson (1998), no significant difference was found between groups in the level of pain. It is not possible to compare the results of this study with those of McPhate and Robertson (1998), given the lack of detail provided in their abstract.

The sample of patients appeared representative of those who usually present with this type of injury and no attempt was made to select patients who were likely to have good outcomes. The physiotherapists involved in treatment were confident that the management of patients in both treatment groups was optimal within the parameters outlined for each group. Although no attempt was made to assess the compliance of patients with the home exercise program for patients in either group, exercises were reviewed by the physiotherapist at follow-up appointments, to ensure they were being performed correctly. Therefore, it would seem unlikely that inadequate treatment was responsible for the lack of significant differences between the treatment groups.

When selecting the outcome measurements to be used in this study, we believed it was important to include a combination of patient reported symptoms (ie pain and function), ROM data and also functional ability. As noted earlier, a functional scale was designed purely for use in this study as we believed existing scales were not sufficiently specific to wrist joint function. The tasks selected were based on a scale already in use and also on personal clinical experience of the tasks with which previous patients had frequently reported difficulty, eg lifting objects, weight bearing through the extended wrist and tasks which involve supination/pronation. While the functional scale devised and used in this study appeared sensitive to change, was easy to administer and demonstrated acceptable intra-rater reliability, our relative inexperience with this type of functional scale means that it is not necessarily recommended as a definitive test of wrist function.

Further research should be undertaken with similar patient groups to confirm the findings of this study. It could be argued that if future studies do confirm these results, a randomised controlled study, where the control group receives no physiotherapy intervention at all, should be undertaken to investigate whether advice and exercises hasten return to function compared with natural recovery alone. It is also possible that there may be sub-groups of patients following fractures of the distal radius for whom passive mobilisation is beneficial, but this study was unable to establish the characteristics which may help identify them.

Due to the design of the study, the number of treatments given during the study period was, as expected, significantly higher in the Mobilisation Group. Using the hospital reimbursement rate per occasion of service that was current at the time of the study, the mean total reimbursement was $161 per patient in the Non-Mobilisation Group and $457 per patient in the Mobilisation Group. Thus patients in the Non-Mobilisation Group achieved results similar to those of patients in the Mobilisation Group, but with considerably less expenditure on the part of the public health funder.

Conclusion

This study found that passive mobilisation did not add to the effectiveness of a regimen of advice and exercises for patients following fractures involving the distal radius managed with pins and/or plaster casts. Based on these results, physiotherapists should continue to provide comprehensive advice and exercise regimens for these patients, but the routine inclusion of passive mobilisation is not supported. It is important that the results of this study are verified by further studies and that they are not extrapolated to other conditions in which passive mobilisation is used.

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