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Occupational therapy and Colles' fractures

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Abstract In this randomized trial, we enrolled 30 patients treated for a distal radius Colles' type fracture. The fractures were reduced if necessary and fixed in a below-elbow plaster cast for 5 weeks. One group consisting of 14 patients received instructions for shoulder; elbow and finger exercise and the other group consisting of 16 patients had occupational therapy. At 5 weeks, 3 and 9 months we measured the functional scores. There were no statistically significant differences between the groups at any time. It seems that for non-surgically treated patients with a distal radius fracture only instructions are necessary.

Résumé Etude randomisée de 30 patients traités d'une fracture distale du radius de type Pouteaux-Colles. Les fractures furent réduites si nécessaire et fixées dans une manchette plâtrée durant 5 semaines. L'un des groupes était constitué de 14 patients qui avaient reçu des instructions d'exercices pour l'épaule, le coude et les doigts. L'autre groupe était constitué de 16 patients qui ont bénéficié d'une ergothérapie. Une évaluation a été faite après 5 semaines, 3 et 9 mois. Il n'avait aucune différence significative entre les 2 groupes en aucune période. Il semble ainsi suffisant, dans les fractures distales du radius traitées orthopédiquement, d'instruire les patients en vue d'une autorééducation.

Introduction

Fracture of the distal radius of the Colles' type is common. The short- and long-term functional results are reported to be satisfactory despite the anatomic end result

[8, 12, 17, 22]. Some studies have claimed that early mobilization of the wrist during the bandage period offers a better functional result [3, 4, 11]. There have only been few reports about active exercise therapy during and after removal of the plaster cast [7, 14, 21].

We present a randomized prospective controlled trial on the effect of occupational therapy after removal of the plaster cast.

Patients and methods

The study comprised 30 patients with a distal radius Colles' type fracture. The fracture was reduced, if necessary, and the arm fixed in a below-elbow plaster cast. The allocation principle was by the closed envelope method to one of two groups. One group received an exercise instruction for the shoulder, elbow, wrist and fingers and the other group received both the exercise instruction and occupational therapy (Table 1) at and after plaster cast removal. The patients were examined with the Solgaard modified Gartland and

Table 1 Instruction is given to both groups. The instruction is performed three times a day

Instruction

Warm-up for 10 min in warm soap-water
Raising and lowering the shoulders
Rotating the shoulders
Hands to neck and lumbar back
Bending and stretching the fingers
Spreading and joining the fingers
Reaching the fingertips with the thumb
Reaching the finger base with the thumb
Turning the back and palm of the hand
with the elbow fixed at the side
Bending the wrist with the hand over the side of a table

Occupational therapy.

Active joint exercises for wrist, elbow and shoulder
Edema prevention
Coordination exercise
Coarse and fine motor-function exercise
Strengthening exercise
Sensation exercise
ADL training

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Table 2 Results (DA Dorsal angulation, RA radial angulation, ARL axial radial length, *median value, ** mean value)

	Non-occupational therapy	Occupational therapy	P value
DA initial**	25.580	24.880	>0.05
RA initial**	15.830	17.60	>0.05
ARL initial**	6.33 mm	7.07 mm	>0.05
DA reduction**	5.330	5.470	>0.05
RA reduction**	20.920	21.130	>0.05
ARL reduction**	8.5 mm	8.07 mm	>0.05
Score 5 weeks*	12	13	>0.05
Score 3 month*	6	8	>0.05
Score 9 month*	2	3	>0.05

Werley functional score [5, 18] at cast removal by 5 weeks, and after 3 and 9 months (Table 2). The grip strength was measured using a "My gripper", which is shown to be very reliable [18] and the scoring was corrected for dominant compared with nondominant hand [2, 9]. X-rays were taken at the accident and emergency ward on arrival, after reduction and at day 11, because earlier reports have shown that most fractures dislocate within the first 2 weeks [1, 16].

There were 14 patients in the group receiving instruction and 16 patients in the group receiving instruction and occupational therapy. The fracture classification was made according to the system of Older [13]; 1 patient in the instruction group and 2 patients in the treatment group were not classifiable.

There were 3 men and 27 women with a mean age of 66 years (46–82), 16 patients sustained the fracture to the dominant hand. The local ethical committee approved the protocol (KA89300).

Results

Details of the 2 groups, which have similar characteristics, are shown in Table 3. Table 2 gives the statistical analysis. The radiographic measurements shown are from the initial and 11-day control X-rays. The parameters examined are the dorsal angulation (DA), the radial angulation (RA) and the axial radial length (ARL) measured from the basis of the ulna head to tip of the radial styloid process. There was no statistical significance between the groups.

Table 2 shows the modified Gartland and Werley score at 5 weeks, 3 and 9 months. The median score at 5 weeks is fair in both groups and at 3 months it is good in the instruction group and still fair in the occupational group. At 9 months it is excellent in the instruction group and good in the occupational group, but none of the differences reach statistical significance.

The mean total amount of time used in the treatment group was 11.38 h (6–22), distributed 2 times a week with a median of 37.5 times (22–90).

We used the Mann-Whitney U-test for unpaired data and calculated the type 2 error in order to test the power of the analysis. The two groups were unequal so we had to find the harmonic mean, which was 15. With a risk of committing a type 1 error of 5% and a minimal clinically relevant difference between the groups in order of the dispersion, the type 2 error was 20% giving a power of 80%.

Table 3 Description of the population, Years are given in mean with the range in brackets

Number	14	16
Age in years	65.9 [57–79]	66.1 [46–82]
Female:male	13:1	14:2
Older type 1	1	1
Older type 2	4	7
Older type 3	4	5
Older type 4	3	1
not classifiable	2	1

Discussion

Several studies have shown that early mobilization during the cast period has beneficial or at least no detrimental effect on the early functional results after fracture of the distal radial end [3, 4, 10, 11]. There are few randomized reports concerning the effects of formal physio- or occupational therapy.

Grönlund et al. [7] evaluated the effects of instruction compared with occupational therapy during an immobilization period of 5 weeks. They found a significant difference in favor of occupational therapy by 5 weeks but no difference at 9 and 12 weeks. Svensson et al. [21] compared the combination of intermittent pressure bandage and 3 weeks of occupational therapy with no pressure bandage and 3 weeks of occupational therapy. At the 3-month control examination they found a significant increase in extension in favor of the group who had received intermittent pneumatic compression and occupational therapy. There was no difference regarding the other movements and grip strength. They also concluded that there was an overall significant progress in wrist/finger movement and grip strength during the first 3 weeks with occupational therapy and intermittent pneumatic compression. There was a less but still significant progress at the 3-month control in both groups, but there was no control group without occupational therapy. This is in accordance with several reports that show increasingly better functional results after 3 and 6 months without specific formal physio- occupational therapy despite anatomical results and treatment methods [8, 19].

In our study occupational therapy was started after removal of the plaster slab. Like Oskarsson et al. [14] we were unable to show any significant effect of occupational therapy for 16 weeks compared with instruction alone at 3 and 9 months. Therefore, it seems that there is no further beneficial effect of formal occupational therapy compared to instruction alone after distal radial Colles' type fractures treated with or without reduction and plaster cast treatment. The material is small and there is a risk of committing a type 2 error, but the statistical power of the investigation is 80%.

From other studies it is shown that reduced and plaster cast treated patients with a distal radial fracture gain excellent to good results between 75 and 84% after a year despite the end anatomical results [8, 12, 17, 22]. In general, the risks of a poor result correlate with the ini-

tial comminution and joint involvement [8, 19]. This indicates that the end functional result could relate to the damage of soft tissue structures in the radiocarpal and radioulnar joints, i.e., damage to ligaments and the triangular cartilage [6] or the carpal alignment and this may not be curable by occupational therapy [6, 15, 20].

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