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Majed Haddad · Brian Jacoby · Lennart Snerum
Jytte Hede · Søren Overgaard

External fixation of distal radial fractures: 3 or 5 weeks of external fixation

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Abstract In a retrospective study we compare the functional and radiographical results of 2 groups of patients with unstable distal radial fractures treated with external fixation. In Group 1, 20 patients with 21 fractures were treated with external fixation for 3 weeks followed by a cast for 2 weeks. In Group 2, 16 patients were treated with external fixation for 5 weeks. The functional outcome was good in both treatment groups with no significant difference between the results in the two groups. Radiologically, Group I had less radial shortening than Group II, but there was no difference in the degree of dorsal angulation.

Résumé Dans une étude rétrospective nous avons comparé les résultats fonctionnels et radiographiques de deux groupes de traitements de fractures distales du radius. Dans le premier groupe, 20 patients avec 21 fractures ont été traités avec fixation externe pendant 3 semaines suivies d'immobilisation plâtrée pendant 2 semaines. Dans le deuxième groupe, 16 patients ont été traités avec fixation externe pendant 5 semaines seulement. Le résultat fonctionnel a été bon dans tous les cas, sans différence significative entre les deux groupes. Du point de vue radiologique on a constaté dans le premier groupe une longueur radiale plus grande que dans le groupe traité pendant 5 semaines, mais pas de différence dans l'angulation dorsale.

Majed Haddad (✉) Department of Ortopaedics, Aalborg Hospital, DK- 9000 Aalborg, Denmark
e-mail: U30372@AAS.NJA.DK
Tel.: +45 8641 1803, +45 4092 5281

Majed Haddad · Søren Overgaard
Department of Orthopaedics, Randers County Hospital, Denmark

Jytte Hede
Department of Radiology, Randers County Hospital, Denmark

Brian Jacoby · Lennart Snerum
Department of Orthopaedics, Holstebro County Hospital, Denmark

Introduction

Colles' fracture was first described by the Irish surgeon Abraham Colles in 1814 and since then the treatment has been controversial [9, 11]. After initial closed reduction and application of a plaster cast, a significant proportion of Colles' fractures re-displace. Re-manipulation and application of a new cast often results in an unsatisfactory radiological outcome and this may then require surgical treatment with external fixation [6]. In the literature the treatment period with external fixation varies from 4–8 weeks [6, 7, 12, 13]. The purpose of this study was to compare 2 treatment protocols of unstable distal radial fractures using either 3 or 5 weeks of external fixation.

Patients and methods

Patients over the age of 45 years with unstable Colles' fractures of Older types 3 and 4 [9] (Fig. 1), which were being treated unsuccessfully in a plaster of Paris cast, were studied (Table 1). Five patients in Group 1 and 6 patients in Group 2 had an external fixator applied after 14 days, while the remainder of the patients in both groups had their fracture fixed externally within the first week after the fracture.

Patients in Group 1 were treated by 3 weeks of external fixation followed by 2 weeks in a plaster cast whereas patients in Group 2 were treated by 5 weeks of external fixation. The patients in Group 2 were treated at a different hospital. Both groups received physiotherapy after removal of the external fixator.

Of the 30 patients in Group 1, 4 died during the follow-up period, 3 had moved and 3 patients refused to participate in the study; this left 20 patients with 21 fractures (1 patient having had bilateral fractures).

Table 1 Radiographical classification of the fractures according to Older et al [7, 9]

	Group 1	Group 2
Older type 3	10	6
Older type 4	7	7
Unclassified	1	0
Radiographs missing	3	3

Fig. 1 Classification of Colles' fractures according to Older et al. [9]

Table 2 Demography of patients

	Group 1	Group 2
No. of fractures	21 (1 bilateral fractures)	16
Sex: male	2	2
female	18	14
Age (years)	median 68 (51–88)	median 71 (58–78)
Follow-up (months)	median 60 (20–100)	median 33 (19–53)

Of the 20 patients in Group 2, 4 refused to participate in the study leaving 16 patients with 16 fractures.

All the patients had a follow-up of a minimum of 2 years (Table 2). One patient in Group 1 had the fixator removed after 2 weeks because of infection, and another because of pin loosening. Patients who were unable to attend for physiotherapy were excluded (4 patients from Group 1 and 3 from Group 2).

Surgical procedure

With patients under general anaesthesia, 2 pins of 3 mm thread were inserted into the distal radius 3–4 cm proximal to the fracture, and 2 further pins were introduced into the second metacarpal. The pins were introduced from the dorso-radial aspect of the arm and at an angle of approximately 45 degrees to the frontal plane. After reduction of the fracture a single bar was mounted with the wrist in palmar flexion and slight ulnar deviation.

Functional outcome

At follow-up the functional outcome was assessed by the method described by Solgaard (modified from Gartland and Werley) [3, 10, 13] (Table 3). The range of motion was measured by a goniometer, and grip strength was measured using a 'My-gripper dynamometer'.

Radiological assessment

The radiological outcome was assessed from lateral and antero-posterior radiographs [3, 4].

Table 3 Scoring of functional outcome (Solgaard scoring modified from Gartland and Werley) [3, 13]

	Max. points
Deformity	6
Subjective evaluation	6
Range of motion	6
Grip strength	6
Complications	15
Total score	
Excellent	0–2
Good	3–7
Fair	8–18
Poor	19–39

Table 4 Functional results in patients treated by 3 weeks' external fixation (Group 1) and 5 weeks' external fixation (Group 2)

	Group 1	Group 2
Excellent/good	18	13
Fair/poor	3	3
Median score	4 (0–18)	5 (0–14)*

* $P=0.8$

Table 5 Radiographic results

	Group 1	Group 2
Radial length	+5 (0, +11)*	+4 (–3, +10)
Dorsal angulation	+3.5 (–21, +10)	–3.5 (–21, +40)

* $P<0.05$

Statistics

Data are presented as 'the median' with 'the range' in brackets. Statistical tests were done using non-parametric methods, the Mann Whitney Rank sum test for unpaired data, and the Wilcoxon Rank test and Friedman Rank test for paired data.

$P<0.05$ was considered to be statistically significant.

Results

The functional outcome was excellent or good in 18 patients in Group 1 and in 13 patients in Group 2 with overall scores of 4 (0–18) and 5 (0–14) ($P=0.8$) (Table 4). Radiographically fractures in Group 1 had less radial shortening than Group 2 – 5 mm (0–11) as opposed to 4 mm (3–10) ($P<0.05$) whereas no difference in dorsal angulation was noted (Table 5).

In Group 1 (3 weeks of external fixation) no difference in radial length ($P=0.3$) and dorsal angulation ($P=0.3$) was shown either before and after removal of the external fixator or at follow-up.

Discussion

The functional result is the most important clinical parameter when assessing the results of the treatment of

Colles' fractures [9], and the duration of fixation is very debatable. In fact, many authors recommend shorter fixation periods especially in older patients in order to avoid stiffness of the wrist joint [2, 4, 5, 8]. Reducing the fixation period may decrease the risk of infection and of pin loosening, as well as shortening the rehabilitation period [1].

Our concern was that reducing the fixation period might increase the risk of re-displacement of the fracture and thus might spoil the functional result. However, in our retrospective study of distal radial fractures, no difference in the functional result was detected between those treated with external fixation in either Group 1 or Group 2. Surprisingly, less radial shortening was noted in Group 1 than in Group 2, but there was no significant difference in dorsal angulation.

It seems, therefore, that treatment with an external fixator for 3 weeks followed by 2 weeks in a plaster of Paris cast might be a better alternative than 5 weeks of external fixation in the treatment of unstable distal radial fractures for patients over the age of 45 years.

However, this needs to be confirmed in a prospective randomised study as our results might be biased because the 2 groups were treated in 2 different hospitals even though the criteria for inclusion in the study were identical.

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