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Early mobilisation versus immobilisation of surgically treated ankle fractures. Prospective randomised control trial

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Abstract

In a randomised prospective controlled trial of 52 patients aged 16 to 65 we compared early non-weightbearing ankle mobilisation with ankle immobilisation following surgical treatment of bimalleolar ankle fractures. At 3 months there was no significant difference between the two groups in the range of ankle movements or pain. There was however a significant difference in the gait pattern with a higher proportion of cases in the early ankle mobilisation group having a symmetrical gait ($P = 0.0001$). © 1999 Elsevier Science Ltd. All rights reserved.

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1. Introduction

The emphasis on early return of function following fracture treatment, requires that treatment methods be evaluated carefully.

It remains debatable as to whether early ankle mobilisation following internal fixation of ankle fractures improves the outcome. Previous studies have assessed the long term outcome of ankle fractures following early post operative ankle mobilisation [1–4]. Early mobilisation conferred no significant advantage in these studies. Short term outcome studies such as that from Ahl et al. [5] compared immediate and late weightbearing following open reduction and internal fixation of ankle fractures, at 3 months and 6 months after injury. These fractures, however, were all treated with early post-operative mobilisation. Early weightbearing was reported to improve rehabilitation.

To our knowledge, there is no report of any prospective trial to assess the short term outcome of ankle fractures treated by early post operative ankle mobilisation.

2. Materials and methods

52 consecutive patients aged 16 to 65 years with surgically treated bimalleolar ankle fractures were studied. All patients gave informed consent. Patients with previous ankle disease or other concomitant skeletal injury were excluded from the study. All patients had stable internal fixation of the ankle fractures according to the AO group principles [6]. The lateral malleolus was fixed with a lag screw and a neutralisation plate. The medial malleolus was fixed with two screws or tension band wiring according to the size of the fracture fragment.

Post-operatively these patients were randomised into two groups by sealed opaque randomisation envelopes.

Patients in group 1 (study group) were advised to perform non-weightbearing active ankle movements starting 24 h after surgery. Repeated ankle dorsi and plantar flexion was performed by the patient during four sessions a day, each lasting 10 min, with the ankle resting in a plaster slab at all other times. This was continued for 2 weeks, when sutures were removed and a below-knee walking plaster cast was applied. Instructions were then given to the patient about graduated weightbearing.

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Table 1
Rom: DorsiFlexion ($p = 0.81$, two sample t-test)

Compared with the normal uninjured ankle	Study group (°)	Control group (°)
Mean loss	8.65	9.04
Median	7.5	10
Standard deviation	6.57	4.69
S.E. mean	1.3	0.92

Patients in group 2 (control group) were instructed to remain non-weightbearing in the plaster slab post operatively for 2 weeks, without attempting any ankle movement. At 2 weeks sutures were removed and a below-knee walking plaster was applied. The same instructions on graduated weightbearing were given to this group as to group 1.

The plaster cast was removed in both groups 6 weeks after operation and advice was given on ankle remobilisation. All patients in both groups were assessed 12 weeks after surgery by a single observer who was 'blind' to the post operative regime which each patient had used. The assessment included recording the pain level on a visual analogue scale [7], the range of ankle motion as described by Lindsjo et al. [8] and a subjective assessment of gait. The functional level was assessed using Olerud's ankle scoring system [9]. The 'two sample t-test' was used to analyse the individual parameters recorded in the two groups.

3. Results

There were 26 patients in each group, with a mean age of 42.7 years (18 to 65 years), 25 were male and 27 female. The right ankle was injured in 23 cases and the left in 29 cases. All patients attended for follow-up until completion of the study.

The mean values of dorsiflexion and plantar flexion are shown in Table 1 and Table 2, respectively. Olerud's functional scores [9] and the average pain level were not significantly different as shown in Table 3. Gait assessment was recorded as being symmetrical in 20 cases out of 26 in group 1 and in 6 out of 26 cases in group 2.

There was one case of superficial wound infection noted at 2 weeks. This resolved rapidly with a course of oral antibiotics. There were no cases of implant failure or loss of fracture reduction.

4. Discussion

An early return to function should be the principal aim of fracture treatment. In the light of this, assessment of short term results which reflect on the efficacy of fracture management are assumed important.

Rowley et al. [10] conducted a prospective trial to assess short term outcome of ankle fractures treated surgically compared with those treated by manipulative reduction and plaster. The age group of their patients was similar to ours and no difference in the outcome was noted in the two groups at 20 weeks.

Ahl et al. [5] have also reported on the short term outcome of ankle fractures. They have compared early weightbearing with delayed weightbearing following internal fixation of bi and trimalleolar fractures. However, both groups of patients were, allowed to remobilise their ankles actively following surgery. Cimino et al. [4] compared early active mobilisation and full weightbearing in a plaster cast versus AFO in surgically treated ankle fractures with a median follow-up of 8 months.

This study is unique in that we have compared early active mobilisation of the ankle in the first 2 weeks following internal fixation with plaster immobilisation of the ankle immediately following surgery. Both groups were treated similarly in all other respects and any difference between the groups could be attributed to the ankle mobilisation/immobilisation during the first

Table 2
Rom: Plantar Flexion ($p = 0.83$, two sample t-test)

Compared with the normal uninjured ankle	Study group (°)	Control group (°)
Mean loss	12.31	12.69
Median	10	10
Standard deviation	5.33	7.1
S.E. mean	1	1.4

Table 3
Results

	Study group	Control group
Olerud score	46.2 (35–60)	43.4 (30–65)
Pain (visual analogue scale)	2.8 (1–5)	3.0 (1–6)

2 weeks following surgery. There was no statistically significant difference noted in the range of ankle motion at 3 months between the two groups in our series. This finding is in keeping with the conclusion reached by Cimino et al. [5]. The subjective pain level was recorded separately in our series, in addition to computing this parameter with individual Olerud scores in order to increase the emphasis on pain as an outcome measure. However, these did not show any significant difference between the groups.We recognise that application of plaster in group 1 at 2 weeks could be a factor accounting for the lack of difference in the two groups when assessed at 12 weeks. Our aim in this study was merely to determine if ankle mobilisation in the first 2 weeks after injury would prevent future loss of movement. For this reason we had to treat the two groups identically after the first 2 weeks. We have demonstrated in our study that ankle remobilisation in the first 2 weeks after surgery does not make a difference to the early outcome at 12 weeks. We now propose to perform another study leaving a group of patients free of plaster for the entire post-operative period in order to determine the outcome.

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