



Immediate unprotected weight-bearing of operatively treated ankle fractures

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The objective of this study was to determine whether immediate mobilisation and unprotected weight-bearing of rigidly internally fixed fractured ankles had a significant effect on ankle function or whether it predisposed the ankle to loss of reduction or hardware failure. Twenty five patients with operated Weber A/B/C fractures were allowed immediate full weight-bearing without a plaster and were compared with matched historical controls treated in a non-weight-bearing plaster cast. Matched-pair analysis revealed no differences for hospital stay and functional outcome on Olerud and Molander scoring system but significant difference in time until return to work (mean : 91.3 ± 20.2 vs. 54.6 ± 15.5 days). In the cast group four patients had postoperative complications ; one patient had loss of internal fixation and one had non-union while four patients in the non cast group had mainly wound-healing related problems. Patients in the non cast group tolerated earlier full weight-bearing compared with patients in the cast group, and there were no disadvantages concerning hospital stay, pain intensities, and functional scores. Treating patients without plaster may result in faster rehabilitation.

Keywords : ankle fracture ; weight-bearing ; follow-up ; Olerud / Molander score.

INTRODUCTION

The indications for operative treatment of an ankle fracture are relatively clear, but controversy exists with regards to many aspects of the post

operative care of these fractures (1, 3, 18). To date, two concepts are advocated : 1) early functional treatment with partial weight-bearing (EWB), or 2) immobilisation with a cast or orthosis for 6 weeks without weight-bearing (6WC). The majority of patients sustaining ankle fractures are young and thus, the major goal of any postoperative regimen is to shorten the time of convalescence and to attain full weight-bearing as soon as possible (2, 3, 6-9, 11, 15-19).

Very few studies recommend immediate weight-bearing after operative treatment of ankle fractures. The purpose of the present study was to determine whether immediate mobilisation and unprotected weight-bearing of rigidly internally fixed fractured

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Table I. — The baseline characteristics of the patients

Gender	(%)
Male	31 (62)
Female	19 (38)
Foot	
Right	31 (62)
Left	19 (38)
Injury	
Weber A	2 (4)
Weber B	20 (40)
Weber C	28 (56)
Treatment	
Non-weight-bearing with cast	25 (50)
Full weight-bearing without cast	25 (50)
Mean (SD) age in years (median ; range)	44.05 (15.49) 42.5 ; 16 to 77

ankles had a significant effect on ankle function or whether it predisposed the ankle to loss of reduction or hardware failure. Therefore, we evaluated two regimes of postoperative management following internal fixation of ankle fractures comparing the results of early functional rehabilitation and full weight-bearing (EWB) without plaster cast with historical controls, treated with cast immobilisation and non-weight-bearing for 6 weeks (6WC).

PATIENTS AND METHODS

We retrospectively reviewed 89 patients with ankle fractures who attended our emergency department between Jan 2000 till Aug 2004 and were subsequently admitted for open reduction and internal fixation. We included all unstable and/or displaced Weber type-A, B or C ankle fractures (20). All the patients under 18 years of age and compound fractures were excluded from the study. Out of 89 patients only 50 were available for follow-up and hence 39 patients were excluded from the study. The mean age of the patients in this particular cohort was approximately 44 years (table II).

All these fractures were treated with open reduction and internal fixation within 48 hours of injury achieving stable fixation using standard AO/ASIF principles of fracture repair: a 1/3-tubular-plate for the fibula, and malleolar screws for the medial malleolus fracture (in cases with a bimalleolar ankle fracture). In the presence

of a syndesmotic injury, a syndesmotic 4.5 mm cortical screw was placed through the fibula and both cortices of the tibia. Post operatively the patients were either treated in a non-weight-bearing plaster cast (Group A) or were allowed immediate full weight-bearing as tolerated without a plaster (Group B). The latter group represents the practice of the senior author (NG) for postoperative management of ankle fractures. The treatment or weight-bearing status was not modified for patients with syndesmosis injuries or deltoid ligament repair. There were 25 patients in Group A and 25 patients in Group B. For comparison, the 25 patients of each group were matched with respect to age, gender, body mass index, and fracture type.

The recovery of the patients was assessed clinically with use of subjective, objective, and radiographic evaluation criteria with reviews at 10 to 14 days, six weeks and three months and one year after the operation. Syndesmosis screws were routinely removed at 6-8 weeks. All patients were contacted at final follow-up to assess clinical and functional outcomes. The follow-up ranged from 24 to 58 months with an average follow-up of 37.5 months. The functional outcome was assessed by a modification of the ankle specific function instrument: the Olerud and Molander index (14).

RESULTS

The baseline characteristics of the patients in the study are provided in table I with each group consisting of 25 patients each. The most common cause of the fractures in both groups was an injury that occurred while walking. Table II shows a comparison of different characteristics between the two groups. Nine patients, 6 in the early weight-bearing and 3 in the cast group had a screw inserted across the syndesmosis, which was removed at six to eight weeks.

The data were analysed with use of a personal computer and SPSS statistical software. Comparison of the differences between the groups was made with the Student t test for continuous variables and with the chi-square test for categorical variables. In all tests, $p < 0.05$ was considered significant.

Postoperative Pain and Hospital Stay

Postoperative pain intensity on the day of discharge under stress (physiotherapy / movement)

Table II. — Comparison of baseline characteristics of the two groups

	Cast (25)	Without Cast (25)	p value
Gender			
Male	17	16	.765
Female	8	9	
Foot			
Right	16	15	.771
Left	9	10	
Injury			
Weber A	2 (8)	0	.248
Weber B	12 (48)	8 (32)	
Weber C	11 (44)	17 (68)	
Age	45.24 (\pm 15.8)	43.44 (\pm 15.23)	.684
Body-mass index (kg/m ²)	27.1 [\pm 64.8]	26.4 [\pm 65.6]	.36
Hospital stay (days)	4.6 (\pm 0.5)	4.3 (\pm 0.4)	0.12

was 1.8 points on the numerical rating scale (range : 0 to 4) and was comparable in both groups (EWB vs. 6WC : NRS = 1.9 vs. 1.7). The average hospital stay was comparable in both groups : 4.6 ± 0.5 days in group A and 4.3 ± 0.4 days in group B (table II).

Functional Assessment

Functional recovery, according to the scoring systems of Olerud and Molander (14) is depicted in fig 1. With the numbers available, no significant differences between the two groups could be detected with respect to functional outcome at any of the follow-up evaluations.

Return to Work

For patients who were employed, the mean duration (and standard deviation) between the surgery and return to work or to their usual daily activities was 91.3 (20.2) days (median : 90 days ; range : 56 to 130) for group A and 54.6 (15.5) days (median : 52 days ; range : 28 to 86) for group B ; the difference is statistically significant ($p < 0.001$) (fig 2).

Radiological results

All fractures in both groups healed primarily and radiographically by 12 weeks (except one non-

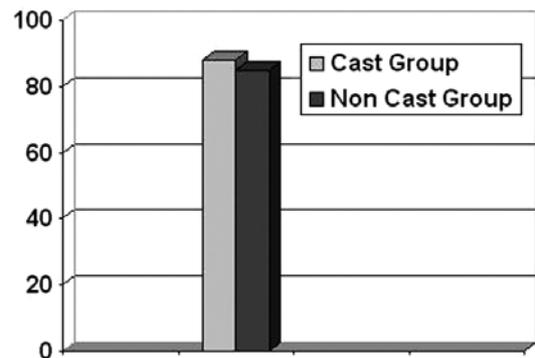


Fig. 1. — The functional ankle scores in both groups at an average 37.5 months follow-up ; p value 0.858.

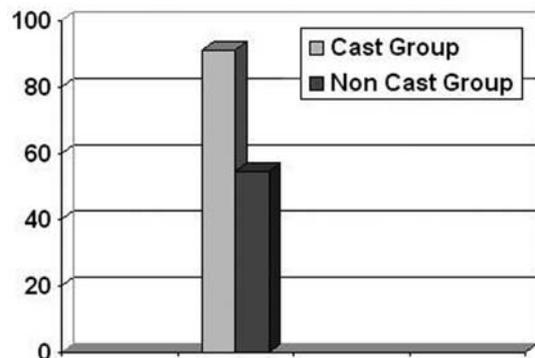


Fig. 2. — The mean time (in days) for return to work in both groups ; p value < 0.001 .

union of medial malleolus). The final review showed a good or anatomical radiological appearance (Cedell (5) group I or II) in all cases, with medial clear space widening of 1 mm or less in all patients.

Complications

There were no perioperative complications. In group A, four patients had a postoperative complication. One of them had a superficial wound infection that was treated with oral antibiotic therapy, one developed pulmonary embolism on the third postoperative day and was treated with intravenous heparin followed by warfarin for three months. One patient had loss of internal fixation at one week which was re-operated. One non-union refused further operative intervention. In group B, four patients had a postoperative complication. Three of them had a superficial wound infection and one had posttraumatic arthritis. These three cases in group B with jeopardised skin were put in an ankle brace to limit dorsi and plantar flexion for 1-2 weeks but were allowed to continue with full weight-bearing. The brace was removed once the skin wound healed. The difference in the overall complication rates between the group treated with a cast and the group treated without a cast was not significant. In the early weight-bearing group we had syndesmotic screw breakage in 2 patients while there was no screw breakage in the group treated with a cast, however this difference was not significant with a p value of 0.316 ; management protocol and mobilisation of the patients with screw breakage remained unchanged.

There was no radiographically documented post-operative loss of reduction of the ankle fracture in either group, although one patient in the group treated with a cast had loss of internal fixation, which was re-operated at one week. The patient continued to recover uneventfully without any additional complications.

DISCUSSION

This retrospective study demonstrates that early functional treatment with weight-bearing after

stable osteosynthesis for ankle fractures is associated with an earlier return to full weight-bearing in certain populations. This was possible without a significant difference in the functional outcome between the two postoperative treatment regimes. At a minimum of two-year follow-up evaluation, all ankles had healed well clinically ; the radiographic (anatomic) results were comparable in the two groups. However there was a statistically significant increase in the time to return to work in the cast group.

The aim of open reduction and internal fixation of these fractures is to obtain stable fixation and allow early movement (4, 21). Experimental studies have shown the beneficial effects of a passive range of movement on defects of articular cartilage. This has led several authors to recommend early movement and even weight-bearing after operative treatment for fractures of the ankle (1, 3, 10, 19). Ahl *et al* (1, 2) in two studies comparing patients with an ankle fracture who were managed with early and late weight-bearing in a walking cast showed that early weight-bearing in a below-the-knee walking cast is a safe postoperative treatment modality. Previously, van Laarhoven *et al* (19) found only a temporary benefit in the subjective evaluation, but not in the loaded dorsal range of movement or in the overall clinical result, in patients who were managed with mobilisation in a below-the-knee walking cast compared with those who were managed with non-weight-bearing with crutches after internal fixation of an ankle fracture. Cimino *et al* (6) in their study concluded that full weight-bearing as tolerated in the immediate post operative period did not increase the incidence of wound complications or loss of fracture reduction. Harager *et al* (10) in their study proposed that full immediate weight-bearing after open reduction and internal fixation is recommendable, even in an elderly population. However all these studies have either used postoperative plaster cast or functional bracing to allow immediate weight-bearing.

Our study is the first to compare immediate full weight-bearing without plaster cast and conventional non-weight-bearing plaster cast immobilisation in the post operative management of ankle fractures. Although there were three superficial

wound infections in the non-cast group as compared to one case in the group treated with cast application, the difference was not significant. The functional scores in the two study groups were very similar at any of the follow-up examination, with a good or excellent score, according to the system of Olerud and Molander. However there was a statistically significant difference in duration for average return to work in the non cast treated group (54.6 days) compared to in the cast treated group (91.3 days).

Postoperative plaster casting is a well-established and safe treatment for ankle fractures. However this treatment suffers from obvious disadvantages, such as complete immobilisation of the ankle and difficulty in starting rehabilitation. The theoretical basis for the use of functional treatment in orthopaedic practice is the fact that early weight-bearing and the avoidance of complete immobilisation have been shown to facilitate the restoration of the range of motion of the injured joint, to decrease the development of soft-tissue atrophy, and to prevent the development of osteoporosis (12, 13). Prolonged immobilisation and non weight-bearing may place the patient at risk for fracture disease and ankle stiffness (6).

This study was a retrospective study and was performed at a district general hospital with a relatively small number of patients and several lost for follow-up (out of 89 patients only 50 were available for follow-up); hence it is difficult to recommend a protocol for post-operative treatment of ankle fractures. The need for postoperative immobilisation must be further examined through a randomised prospective study of casting and non-weight-bearing versus no immobilisation and full weight-bearing.

CONCLUSION

We conclude that immediate mobilisation and unprotected weight-bearing of rigidly internally fixed fractured ankles did not predispose the ankle to loss of reduction or hardware failure and the functional results compared with the conventional cast immobilisation were comparable. In our opinion early mobilisation without plaster is

recommended in certain populations and may result in faster rehabilitation, if the ankle fracture has been surgically stabilised and the patient has no further serious co-morbidities that would prohibit early functional movement and weight-bearing.

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