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Intra-articular displaced fractures of the calcaneus

Operative vs non-operative treatment

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Abstract Twenty-eight patients with displaced intra-articular fractures of the calcaneus treated by open reduction and fixation were compared with 30 patients with similar fractures treated conservatively. Judged by the clinical and radiographic criteria results were more satisfactory in the surgical group than in the nonoperative group, although high rates of poor results were encountered in both groups.

Résumé Vingt-huit patients avec une fracture intra-articulaire déplacée du calcanéum et traitée par réduction et fixation interne ont été comparés avec trente patients présentant une fracture similaire mais traitée de façon conservatrice. Selon les critères cliniques et radiographiques de Järvholm et coll., les auteurs, bien que trouvant une fréquence élevée de mauvais résultats dans les deux groupes, ont de meilleurs résultats dans le groupe chirurgical.

Introduction

Treatment of calcaneal fractures often leads to unsatisfactory results, whether the treatment is conservative or operative. The purpose of this study was to compare the results of treatment in patients with displaced intra-articular fractures of the os calcis treated in two centres between 1980 and 1990. In one centre the treatment was surgical, while the other centre used closed methods.

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Materials and methods

64 patients with displaced intraarticular calcaneal fractures were included in the study. The fractures were classified according to the classification of Essex-Lopresti [6] and Soeur and Remy [17]. Only fractures of the ''tongue-type'' or ''joint depression type'' were included in the study. The fractures of the ''joint depression type'' were divided in groups A, B & C according to increasing comminution and displacement of the fragments. In group A there was only depression of the posterior facet of the os calcis. Group B fractures had further comminution of the os calcis into four major fragments but no significant displacement of the vertical component. Fractures in group C were characterized by greater comminution and more pronounced displacement.

All fractures were classified by one author (E.C.R.M.) using radiographs and computed tomography. 32 patients were treated conservatively and 32 patients operatively.

Operative treatment

Surgical approach depended on the severity of the fracture. A lateral approach was used in the simple joint depression type fractures. A combined lateral and medial approach was used in the more severe cases. The lateral approach was similar to the one described by Gould [8]. Internal fixation was obtained using one-third tubular plate and small bone screws. Bone defects were filled with iliac crest cancellous graft. Reduction was checked radiological using Image intensifier. Postoperatively a posterior splint and a compression bandage was used for 2 weeks. Mobility exercises were then started and weight bearing was permitted after 10–12 weeks. All operations were done by the same one surgeon (E.G.).

Non-operative treatment

The foot was elevated until oedema had subsided, usually 7–10 days, followed by non-weight bearing exercises. Full weight bearing was allowed after 10–12 weeks. Patients in this group were treated by the same one author (E.C.R.M.).

At the follow-up all patients were examined clinically and radiographically. CT scan were done in all patients. The Böhler angle was recorded as well as displacement between fracture-fragments as seen in the lateral view. Subtalar osteoarthritis was defined as narrowing of the joint space combined with sclerosis of the subchondral bone. Clinical assessment was done using the criteria of Järvholm et al. [9]. Statistical analysis included the chi-square test and the student's *t*-test.

Table 1 Clinical characteristics of the two treatment groups

	Operative treatment	Non-operative treatment
n	28	30
Fracture type		
Group B	21	19
Group C	7	11
Sex		
M	23	24
F	5	6
Mean follow-up	3.9 (2–8) years	4 (3–6) years

Results

Four patients treated operatively and 2 patients treated non-operatively were lost to follow up. Information on number of followed patients, fracture type, sex and mean follow-up is given in Table 1. In both groups the pre-injury occupations were similar and none were sportsmen.

The clinical findings relating to pain and function are summarized in Table 2. Seven operatively treated and 2 non-operatively treated patients considered the results excellent and had almost no disability. There were 5 operatively treated and 15 non-operatively treated patients who considered the results fair to good.

Radiographic findings (Table 3) showed marked differences in the post-injury Böhler angle between the two groups. The mean duration of incapacity was 4.5 months. 6 patients in the operatively treated and 11 patients in the non-operatively treated group were not able to return to their previous occupation.

There were two superficial infections in the operatively treated group and no deep infections. Reflex sympathetic dystrophy was seen in 3 patients treated operatively and in 5 patients treated non-operatively. The overall results were rated as excellent in 9 patients, good in 13, fair in 7 and poor in 29.

Discussion

A better understanding of both the degree (severity) and the 3-D pattern of this injury is required to allow selection of the optimal treatment for each individual patient. Computed tomography and double oblique views are of paramount importance when such a decision has to be made [3, 16].

The results of this study seem to demonstrate that operative treatment gives better results than nonoperative treatment for displaced intra-articular fractures of the calcaneus; this is in keeping with the findings of most authors [1, 2, 7, 10, 11, 12, 14, 16, 18, 20]. However, it must be borne in mind that some authors recommend manual reduction [13] or functional treatment for this injury [4].

Such injuries continues to be followed by a high percentage of unsatisfactory results despite operative treatment [5, 15, 19]. A better 3-D understanding of the injury and a more agressive surgical approach to reconstruction of the joint anatomy allow more satisfactory results with operative treatment than with nonoperative treatment. However, a large number of patients have had open reduction and internal fixation and done poorly, and a large number of patients have had nonoperative treatment and done well.

There have been many attempts at more accurate identification of the groups most likely to benefit from surgery. The present study addresses this question, because it has demonstrated that comminuted fractures of the joint-depression type do better with operative treatment.

Table 2 Clinical findings at follow-up following treatment for intra-articular fractures of the calcaneus

	Conservative treatment (*n*=30)	Operation (*n*=28)
Pain and function		
Negligible pain or restriction of activity	8	3
Slight pain on activity, no restriction of work or recreational activity	12	15
Moderate pain; partial restriction of work or recreational activity; occasional pain at rest	7	8
Pronounced disability or pain	3	2
Walking ability on even/uneven surface (patient's own estimation)		
>100 m	6	2
100–500 m	12	9
500–1000 m	10	8
1000–3000 m	2	7
>3000 m	0	2
Normal gait	14	7
Jumping ten times on injured foot	13	8
Can run	3	13

Table 3 Radiographic findings[a] in intra-articular fractures of the calcaneus

	Non surgical (*n*=30)		Surgical (*n*=28)	
	I	FU	I	FU
Step in fracture (mm) Mean	4	3.5	3.5	1.5
Böhler angle (degrees) Mean	+2	+6	+3	+8
Postraumatic osteoarthritis		4		1

[a] I initially, FU at follow-up

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