

Thirty-year follow-up of ankle fractures

The natural course of ankle fractures was studied in 143 patients treated by closed methods. The average time elapsing from fracture to follow-up was 29 years. Eighty-two per cent had no radiographic signs of arthrosis; 83 per cent were free of symptoms. The most common fracture, supination eversion Stage II (49 cases), gave rise to minimal signs of arthrosis in only one patient, who had moderate symptoms. The suggestion that all ankle fractures must be perfectly reduced is not supported by the findings of the present study.

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It is unfortunate that the natural course of ankle fractures is not known: neither the occurrence of disability nor the significance of radiographic changes. We have examined a series of ankle fractures, on average almost 30 years after treatment by closed methods.

Patients and methods

Patients

The fractures had occurred in Malmö in the early 1950's in subjects who were still residents of the city, were under the age of 85 years and were available for follow-up – the cases were, otherwise, consecutive. Seventy-six patients declined to participate but no significant deviation with regard to fracture type, age or sex in relation to the examined patients was found in this group. The original sample thus collected consisted of 170 patients. Seven patients were excluded because of additional fractures in the same or the opposite side. Ten patients later had another ankle fracture and were excluded as well. Ten patients had originally been operated on and were also excluded, leaving 143 patients for examination: 81 men and 62 women, aged at the time of fracture 37 ± 9 and 40 ± 9 years, respectively. The time lapse between fracture and follow-up was 29 (25–34) years. The age at the time of follow-up was 67 ± 9 years.

Fifty-seven per cent of the fractures had been caused by a mild or moderate trauma such as tripping, stumbling, or falling at ground level. In 19 per cent there was a more severe trauma. Twenty-one per cent had occurred in a traffic accident, often involving bicycles, where the severity of the trauma was difficult to establish. Three per cent were caused by direct trauma.

Methods

Patients were interviewed in a standardized way regarding subjective symptoms, and the Cedell (1967) classification of symptoms and late objective results was used.

The clinical examination included measurements of ranges of motion compared with the contra-lateral side and of swelling (Sandegård 1974).

Radiographic examination. Three standard projections, antero-posterior, lateral and 20° inward rotation projection of the joint, were obtained of both ankles, and the following films were studied:

- (1) The *initial* films showing the fracture at the time of admission.
- (2) Films obtained *after casting* with or without reduction.
- (3) Films showing the position in which the fracture was allowed to heal – *the accepted position*.
- (4) Films taken at the *follow-up*.

The type of fracture (Table 1) was classified according to Lauge-Hansen (1942, 1954) and Weber (1972).

The degree of displacement was evaluated. The size of the posterior fragments was measured and expressed as the percentage of the joint surface carried by the fracture fragment in the lateral view. Attempts were made to quantify displacement in mm, whereas rotation malposition was estimated and classified in 4 grades from 0 (no rotation) to 3 (marked rotation).

In the radiographic examination at the follow-up, attention was paid to the presence or absence of secondary arthrosis. The *joint space* was measured at six sites of the joint (Jonsson et al. 1984). The presence or absence of juxta-articular cysts and sclerosis

Table 1. Ankle fractures. Type and degree of arthrosis at follow-up

Fracture type		Arthrosis degree ^a					Total
		0	(*)	*	**	***	
<i>Weber</i>							
A		19		1			20
B		85	6	7	3	2	103
C		13	3	1	3		20
Total		117	9	9	6	2	143
<i>Lauge-Hansen</i>							
Supination-adduction	I	10					10
	II	4		1			5
Supination-eversion	I	1					1
	II	48	1				49
	III	10		2			12
	IV	24	5	4	3	2	38
Pronation-abduction	I	4					4
	II	4	1	1	1		7
	III	3					3
Pronation-eversion	I	2					2
	II						0
	III	5		1			6
	IV	2	2		2		6
Total		117	9	9	6	2	143

^a Magnusson (1944), Cedell (1967)

was noted, as was the presence and location of osteophytes. In addition, the arthrosis classification of Magnusson (1944) and Cedell (1967) was used.

Results

Of the 143 patients only five had, over the years, sought medical advice for their ankle once the initial period of pain and discomfort was over.

At follow-up 118/143 (83 per cent) had no subjective complaints; 24 had occasional pain or aching.

There was no significant difference in volume between the injured and the uninjured lower limb. The range of motion in extension and flexion was equal in both ankles in 90/143 of the patients, and 121/143 also had equal range of motion in pro- and supination.

Tenderness on palpation was present on the medial side in four ankles and on the lateral

side in two ankles. A uni-lateral foot deformity on the fracture side was found in two patients.

Of the 143 patients, 117 were free of radiographic signs of arthrosis, and marked arthrosis was observed in only two ankles. Arthrosis was more common in the initially more severe fractures (Table 1).

In a multiple regression analysis of the 100 supination-eversion fractures of all stages, comparing the positions in which the fracture was left to heal with arthrosis and dysfunction, there were significant correlations between a poor outcome and the displacement of the medial malleolus and the size and displacement of a posterior fragment – all interacting with the severity of the injury.

Isolated lateral malleolar fractures

Arthrosis had developed in only one case of the most common type of ankle fracture, the lateral malleolus (Lauge-Hansen supination-eversion (SE Stage II)); the patient had moderate symptoms (Table 1). In most of these fractures some displacement had been accepted. Displacements of the lateral malleolus of up to 3 mm did not seem to cause arthrosis (Figure 1). Of the 49 patients only three had subjective complaints. One of these was the patient with arthrosis. They all participated in sports and the worst impaired still took daily walks of up to 3 hours. The rest were largely free of subjective symptoms, often having difficulty in telling which ankle had been fractured. Using the criteria of Cedell (1967) for late subjective and objective results, there were 47 good and 2 medium late subjective results, and 46 good, 2 medium and 1 poor objective results – the poor results consisting of a 2.5 cm increase of the malleolar circumference unassociated with any symptoms whatsoever.

Supination-eversion Stage IV injuries

There were 38 supination-eversion Stage IV injuries. Twenty-nine patients were free of symptoms. Twenty-four patients were free of radiographic signs of arthrosis (Table 1). There was no difference in age at the time of the injury, either between men and women, or between SE II and SE IV fractures.



Figure 1. Woman, age 43 – skiing accident. Supination-eversion Stage II fracture left ankle. A. Three mm lateral displacement of distal fibula fragment. No reduction, cast for 3 weeks. B. Follow-up 30 years later. No subjective complaints. Malleolar circumference +0.5 cm. No arthrosis.

All SE IV injuries were categorized as Weber type B and so were all SE II injuries except one (A-fracture). Weber type B thus comprised fractures with totally different prognoses.

Discussion

The best treatment of ankle fractures is much disputed and no consensus has been reached (Phillips & Spiegel 1979). If the discussion is limited to the lateral malleolar fracture, opinions range from “no importance at all” (Cox & Laxson 1952) to “it has the key role” (Yablon et al. 1977). Böhler (1957) stressed the importance of an anatomical reduction to avoid later disability and arthrosis. The consequences for the weight-bearing function of the ankle of even minor displacements of the lateral malleolus have been pointed out by Riede et al. (1969); even minor lateral or rotational displacement reduces the talar contact area to a considerable degree. The increased load on the joint surfaces after fractures left in a displaced position was then thought over the years to lead to an incongruence arthrosis (Riede et al. 1971).

Good results after conservative treatment of isolated lateral malleolar fractures (SE II) have been reported by Kristensen (1956), Paul et al. (1968) and Muschter & Götz (1974). Solonen & Lauttamus (1965, 1968) advocated open treatment and so did Cedell (1967), who in 38 cases treated openly, found only one with a slight arthrosis. Lange et al. (1984), using the criteria of Bargon (1978), never found ad-

vanced arthrosis in SE II fractures treated openly according to the AO-principles. Lindsjö (1981) also had good clinical results with AO-operations of SE II fractures. In a comparison between open and closed treatment of SE II fractures with a minimum follow-up of 3 years, Yde & Kristensen (1980b) found no difference in the outcome. Wilson (1975) considered SE II injuries stable and requiring no reduction.

An important factor in the treatment is the correct classification of SE fractures. The presence or absence of lesions on the medial side of the joint must be noted (Phillips et al. 1969). A rupture of the deltoid ligament renders the seemingly innocent Stage II injury an unstable SE IV injury with a possibility of talar dislocation. Series of conservatively treated SE II injuries may erroneously include a few SE IV injuries, downgrading the result (Cedell 1967, Yde-Kristensen 1980a,b).

The idea that all ankle fractures must be perfectly reduced is not supported by the findings of the present study. As for those few cases which had severe arthrosis, they had all had extensive fractures, as reflected in their Lauge-Hansen stages. Our data are not suitable for a more detailed analysis of the effects of treatment.

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