Surgery for old ankle fracture

13 cases followed for 9 (5–15) years

Fang Yao Chiu, Chi Yin Wong and Wai Hee Lo

Between 1978 and 1988, we treated 13 cases of neglected ankle fractures by open reduction and internal fixation or osteotomy 11 (2–36) months after the accident. Having been followed for 9 (5–15) years, the results were evaluated. All the patients were improved, even though restoration of the anatomy of the joint often was difficult. Those operated on after less than 6 months had better function than those with longer delays.

Department of Orthopedics and Traumatology, Veterans General Hospital-Taipei and National Yang-Ming Medical College, Taipei, Taiwan. Correspondence: Dr. Fang-Yao Chiu, Department of Orthopedics and Traumatology, Veterans General Hospital-Taipei 201, Sec. 2, Shih-pai Rd., Taipei, Taiwan, 11217. Tel +886 2-875 7557. Fax -874 1420
Submitted 93-09-26. Accepted 94-03-16

Fogel and Morrey (1987) have proposed 1 month as the upper limit for delayed reduction and fixation of displaced ankle fractures. We report the results of open reduction with internal fixation or osteotomy when treatment of ankle fractures had been delayed more than 2 months.

Patients and methods

During the 10-year period, 1978–1988, 13 consecutive patients with old ankle fractures were treated by delayed open reduction and internal fixation, or osteotomy. There were 9 men and 4 women with mean age 41 (16–69) years, and all had persistent pain, impaired ambulation, limited motion, and malposition or malunion of the fractures. The mean delay from injury to operation was 11 (2–36) months. The reasons for the delay included unsuccessful or inadequately closed reduction in 8 patients, neglected fractures in 4, and refusal of initial treatment in 1 patient. All the fractures were closed and there were no associated injuries. The preoperative radiographs of all the patients were available for review and classification by both Lauge-Hansen (Lauge-Hansen 1952, Yde 1980) and Weber (Muller et al. 1991) systems (Table 1). During the follow-up period of 9 (5–15) years, all patients returned for clinical and radiographic assessments made by the authors.

Operations

10 patients were treated with open reduction and internal fixation. All the fracture lines were found and were separated with an osteotome. Reduction was complicated by callus formation and remodeling of the fracture fragments. Open reduction and fixation of the fibula were accomplished with a one-third tubular plate in 5 patients, with small dynamic compression plates in 2, with Rush pins in 2, and with a cortical screw in 1 patient. A syndesmosis screw was used in 3 of the plated cases. Fracture of the posterior malleolus, constituting at least a quarter of the articular surface, occurred in 2 ankles; both were reduced and fixed with screws. The medial malleolus was fixed in 8 patients, 6 with screws and 2 with tension band wiring. 1 deltoid ligament disruption was repaired. The fractures united in 14 (10–18) weeks, without bone grafting. No complications developed in this group.

3 patients had corrective osteotomy with internal fixation 9, 14, and 36 months after the injury. At the operation, all the fractures were healed, and the osteotomy was done through the old fracture areas. No significant arthrosis or noticeable articular damage was found during the operations. The fixation devices used were tubular plates for the lateral malleolus, cortical screws in 2 and tension band wiring in 1 for the medial malleolus. The posterior malleolus and soft tissue were all well, but 1 case developed separation of the syndesmosis, which was fixed with a cortical screw. All cases achieved good restoration of the talocrural relationship. They healed within 4 months. Superficial wound infection developed in 1 case, but was cured after debridement. No other complication occurred.

Evaluation of results

The results were evaluated according to the perfor-

Table 1. Observations in 13 patients with operations for neglected ankle fractures

A	B	C	D	E	F	G	H	I	J			K		
									a	b	c	a	b	c
1	29	F	SE	B	8	180	0	2	37	5	42	57	13	70
2	36	M	PA	C1	5	167	0	0	31	8	39	59	13	72
3	50	M	PE	C1	24	133	1	1	35	6	41	58	11	69
4	66	M	SE	B	4	122	1	2	26	8	34	71	13	84
5	69	M	PA	C2	21	100	1	1	28	6	34	56	11	67
6	43	M	SE	B	5	92	0	0	33	5	38	71	15	86
7	16	F	PE	C1	2	84	0	0	24	8	32	74	15	89
8	31	M	PE	C2	7	76	0	1	30	6	36	58	11	69
9	41	M	SE	B	6	66	0	1	30	5	35	63	13	76
10	49	F	PD	C1	3	60	1	1	36	3	39	67	13	80
11	23	M	SE	B	14	114	0	0	37	8	45	78	13	91
12	57	F	PE	B	36	73	1	2	34	5	39	74	11	85
13	25	M	SA	A	9	72	0	0	43	5	48	73	15	88

A Case
  1–10 Open reduction
  11–13 Osteotomy
B Age at operation
C Sex
D Lauge-Hansen classification
  SA Supination-adduction
  SE Supination-external rotation
  PA Pronation-abduction
  PE Pronation-external rotation
  PD Pronation-dorsiflexion
E Weber classification
F Months operative delay
G Months follow-up
H Preoperative degree of arthrosis
I Postoperative degree of arthrosis
J Preoperative performance score
  a Functional
  b Radiographic
  c Overall
K Postoperative performance score
  a Functional
  b Radiographic
  c Overall

mance index of Fogel and Morrey (1987), including several objective and subjective variables. Pain was graded by the patients as none, mild, moderate, or severe, and the clinical examination consisted of the assessment of ambulation and measurement of motion with a hand goniometer placed along the tibia and the medial aspect of the foot. Subtalar motion was estimated as normal, limited, or absent. Standing, weight bearing, anteroposterior and lateral radiographs were obtained in all the patients. The follow-up films were graded for evidence of arthrosis, into none, mild (degrees 1 and 2) or severe (degrees 3 and 4) according to the criteria described by Bauer et al. (1985). The quality of reduction was also evaluated on the basis of (1) tibiotalar displacement, according to the distance between the medial malleolus and the talus, compared to the opposite ankle, or millimeters of displacement of the fibula for bimalleolar fractures, (2) millimeters of displacement of the anterior aspect of the trochlea of the talus with respect to the anterior border of the tibia, or (3) angular displacement of the talus in the anterior posterior projection. The final grading was made by the performance index, according to the following criteria: greater than or equal to 75 points, good; 50–74 points, fair; and less than 50 points, poor. The functional score meant the overall score in pain, ambulation and motion, and the radiographic score indicated the score in radiographic findings as itemized in the performance index (Fogel and Morrey 1987).

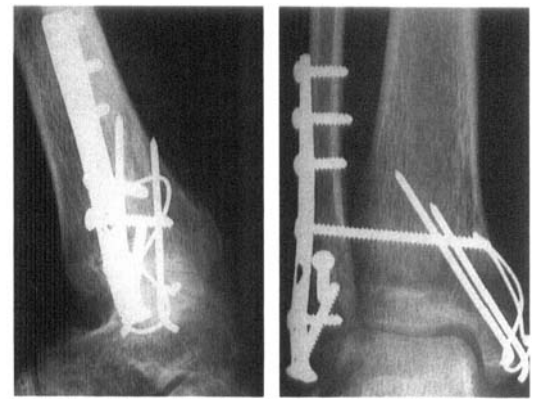
Results

The 10 patients who had reduction and internal fixation all improved, 5 to good and 5 to fair, with increase in the mean performance score from 37 to 76 (Table 1). The 5 good cases were all treated within 6 months after the injury with anatomic reduction (Figure 1). In the 5 fair cases, 4 were treated more than 6 months after the injury, and anatomic reduction was obtained in only 1 of these. 1 patient was treated 4 months after the initial injury, but reduction of the fracture was not anatomic. Noticeable articular damage was recorded in 2 cases with good results and 2 with fair results, and there was no correlation between the presence of articular damage and the final outcome. Nor did age, sex, fracture type and the amount of initial displacement seem to influence the final outcome.

The 3 patients who had osteotomy all improved to good from the poor preoperative status (Table 1, Figure 2); the mean performance score rose from 44 to 88.

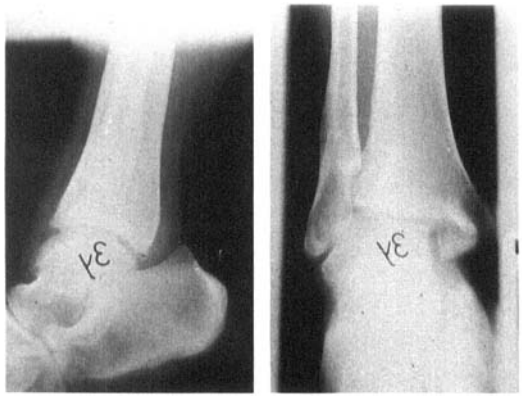
Figure 1. Case 6. A 43-year-old man with ankle fracture untreated for 5 months.

Preoperatively.



8 years postoperatively, with good ankle function.

Figure 2. Case 12. A 57-year-old woman with ankle fracture untreated for 3 years.



Preoperative malunion.

6 years postoperatively (implant removed), with good ankle function.

Discussion

The best treatment for displaced ankle fractures is, no doubt, immediate open reduction and internal fixation. However, it is not always possible because certain aspects of the injury may lie beyond the control of the surgeon. In our country, the traditional bone setters still play an important role in management of musculoskeletal injury. This is the most important cause of delay in fracture treatment. Treatment then mainly depends on the probability of achieving anatomic reduction and rigid internal fixation, and the initial and later articular cartilage damage.

In cases with symptomatic loose fragment(s), removal with repair of the soft tissues seems the treatment of choice (Burwell and Charnley 1965). For cases with malposition, we achieved successful reduction in 5 of the 6 cases managed within 6 months, but in only 1 of the 4 cases managed later than 6 months. All the cases improved after the treatment, but good results were achieved only in the cases with successful reduction. That is, anatomic reduction and the length of delay are critical to the final outcome. The rate of union in cases treated after the delay was not different from those managed promptly. However, the delayed treatment is technically quite demanding. The prognosis of delayed open reduction and internal fixation is poorer if an anatomic reduction is not achieved. It is still worthwhile to perform open reduction in patients with malposition, regardless of the time delay, provided that no ankle joint arthrosis has appeared. If malposition is allowed to progress to malunion, it is difficult to achieve a good

restoration of the joint anatomy, even by osteotomies. Nevertheless, it is worth trying if no significant arthrosis exists; all our 3 cases had good results. For cases with malunion and arthrosis, arthrodesis seems to be the only surgical option.

References

Bauer M, Bergström B, Hemborg A, Sandegard J. Malleolar fractures: nonoperative versus operative treatment. A controlled study. Clin Orthop 1985; 199: 17–27.

Burwell H N, Charnley A D. The treatment of displaced fractures at the ankle by rigid internal fixation and early joint movement. J Bone Joint Surg (Br) 1965; 47: 634–60.

Fogel G R, Morrey B F. Delayed open reduction and fixation of ankle fractures. Clin Orthop 1987; 215: 187–95.

Lauge-Hansen N. Fractures of the ankle. IV. Clinical use of genetic roentgen diagnosis and genetic reduction. Arch Surg 1952; 64: 488–96.

Muller M E, Allgower M, Schneider R, Willenegger H. Manual of internal fixation: Techniques recommended by the AO-ASIF Group. 3rd Ed, Springer Verlag, New York 1991: 598–600.

Yde J. The Lauge-Hansen classification of malleolar fractures. Acta Orthop Scand 1980; 51 (1): 181–92.