

## Jones' fracture

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**SUMMARY.** Fractures of the proximal portion of the fifth metatarsal 1.5 cm distal to the proximal end are called Jones' fractures. They are said to tend to be followed by delayed union or non-union when treated conservatively and surgical treatment is often recommended. There have also been reports of good results from conservative therapy, and, therefore, we decided to review 36 cases of Jones' fracture.

Jones' fractures are classified as Type I, II or III according to Lehman's criteria. Type I fractures are acute and Type II and III are chronic or fatigue fractures. Our series consisted of 29 Type I, five Type II and two Type III fractures. In general, Type I fractures are treated conservatively and Type II and III are treated surgically. Four of the 29 Type I cases developed bone resorption during their course and were treated surgically. Bone union was ultimately achieved in every case treated conservatively and surgically.

We concluded from the results of our study that Type I fractures should be treated conservatively with careful observation of the progress, and that Type II and III fractures should be treated surgically with an intramedullary compression screw to achieve good results.

### INTRODUCTION

Fractures of the proximal portion of the fifth metatarsal include fractures of the styloid and at the base. In Japan, the former are called 'geta' (Japanese traditional wooden clogs) fractures, because of forcible inversion of the foot while wearing 'geta' is one of the causes. The latter are called Jones' fractures. They occur at least 1.5 cm distal to the joint area and tend to develop into pseudoarthrosis. Surgical treatment is recommended for Jones fractures, and yet there have been reports of good results with conservative therapy. We, therefore, reviewed our own series of 36 cases of Jones' fracture and report on the treatment methods and results.

### MATERIALS AND METHODS

There were 36 subjects, 14 men and 22 women, treated between 1974 and 1994, aged from 14-82 years (mean: 45 years). The right foot was involved in 20 cases and the left foot in 16. The cause of the fracture was a sports injury in 15 cases, sprains and falls while walking in 11 cases, domestic accident (for example, falls down stairs) in seven cases and traffic accidents in three cases.

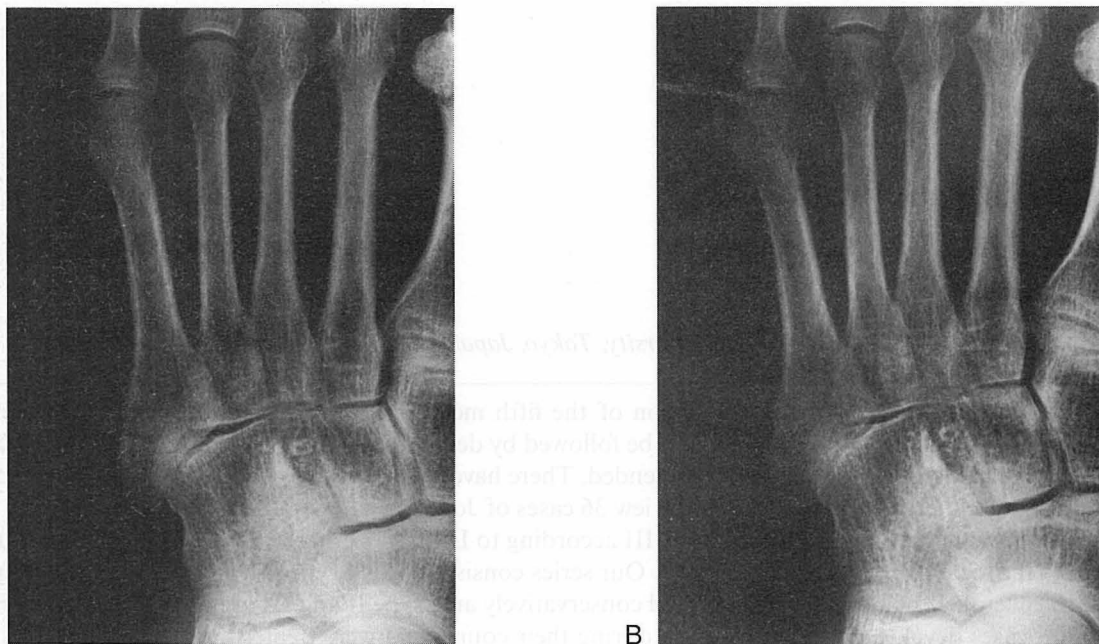
We classified these cases by the Lehman<sup>1</sup> fracture classification system. In Type I, there is no clear history of previous pain or injury, the fracture line is narrow and there is no evidence of osteosclerosis around it. In Type II, there is a history of previous trauma, the fracture line shows new bone formation or radiolucence due to bone resorption and it resembles the delayed union associated with osteosclerosis. In Type III, there is repeated trauma and recurrent pain, and a broad fracture line associated with new bone formation and bone lucency, with complete occlusion within the bone marrow, resembling pseudoarthrosis. Our series consisted of 29 Type I fractures, five Type II fractures and two Type III fractures.

Conservative therapy consisted of immobilization in a plaster cast for 5-6 weeks. In the early stage the tension band wiring method was employed, and later intramedullary fixation with a screw was performed. Weight bearing was allowed after 3 weeks of non-weight bearing. Jogging was gradually permitted, according to the patient's pain from 4 weeks onward.

### RESULTS

Type I fractures were, as a rule, treated conservatively. Primary bone union was achieved in 25 of the 29 patients, but it was associated with partial osteosclerosis in eight of them. The interval until bone union averaged 11.4 weeks. Four of the Type 1 patients in

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**Fig. 1**—35-year-old man. (A) Radiograph at the time of initial presentation reveals no evidence of osteosclerosis or bone resorption. The fracture is classified as type I. (B) Radiograph at 8 weeks shows bone union.

which bone resorption occurred during the course of conservative treatment developed pseudarthrosis, and surgery was then performed secondarily, with bone union achieved in every case.

Surgical treatment was performed in a total of 11 cases, four of the 29 Type 1 cases and all of the five Type II and two Type III cases. The surgical procedure was tension band wiring method in four cases and intramedullary screw fixation in seven cases, with bone grafting performed in combination in both Type III patients. Bone union was achieved in every case, the pain resolved and the patients returned to their routine activities and sports without any restrictions. The interval until bone union was 7 weeks in the patients who underwent open reduction and internal fixation without bone grafting, and 10.3 weeks in the patients with Type III lesions, who also received bone grafts.

## CASE REPORTS

### Case 1

A 35-year-old man injured his foot as a result of forcible inversion while playing tennis without a clear past history of trauma or pain. A diagnosis of Type I Jones' fracture was made (Fig. 1A). The fracture was immobilized in a plaster cast for 4 weeks and partial weight bearing was started thereafter. Bone union was achieved at about 8 weeks (Fig. 1B).

### Case 2

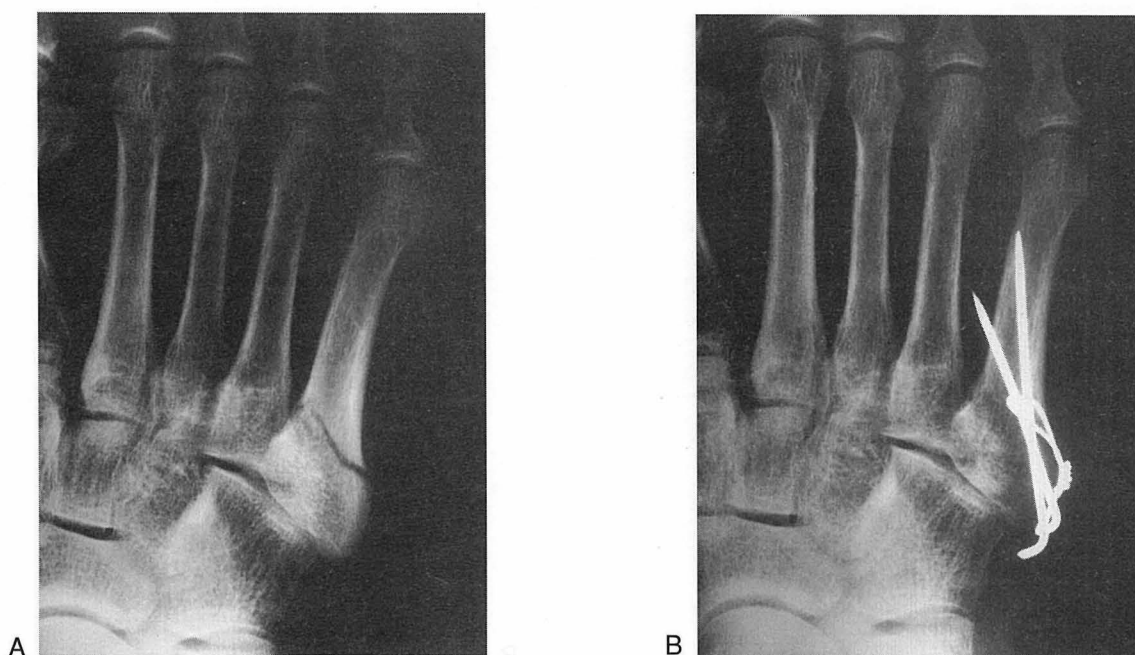
The patient was a 61-year-old woman who fell while walking and injured her foot as a result of forcible inversion. There was no evidence of osteosclerosis in the fracture area on the radiographs on presentation (Fig. 2A). Immobilization was achieved with a plaster cast and the patient's course was observed. However, when bone resorption was detected on radiographs surgery was performed with tension band wiring, and bone union was achieved about 4 weeks postoperatively (Fig. 2B).

### Case 3

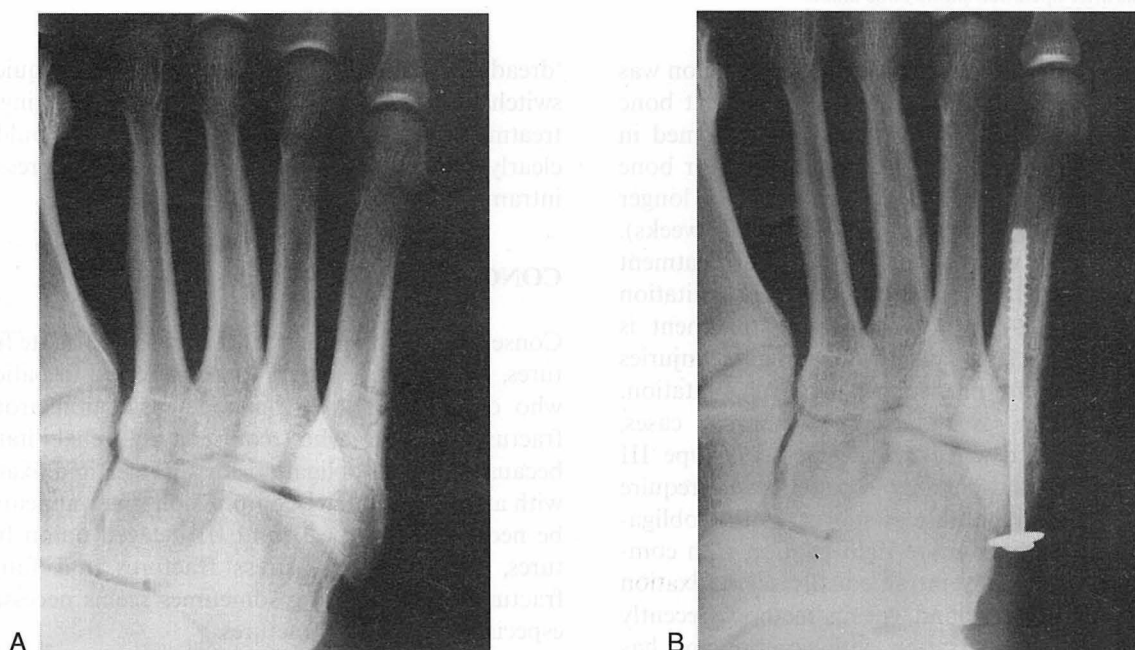
A 21-year-old male basketball player injured his foot as a result of forcible inversion of his foot when he landed after a jump. The fracture was Type II (Fig. 3A). Internal fixation with an intramedullary cannulated compression screw was performed. Jogging was permitted at 3 weeks and the patient returned to basketball after 6 weeks. Bone union was achieved at about 6 weeks (Fig. 3B).

### Case 4

The patient was a 19-year-old male basketball player who was injured when he suffered forcible inversion of his foot as he landed after a jump. The fracture was Type III according to the radiographic findings (Fig. 4A). Internal fixation with an intramedullary



**Fig. 2**—61-year-old woman. (A) Radiograph at the time of initial presentation reveals no evidence of osteosclerosis or bone resorption. (B) Bone union was achieved 4 weeks after operation.



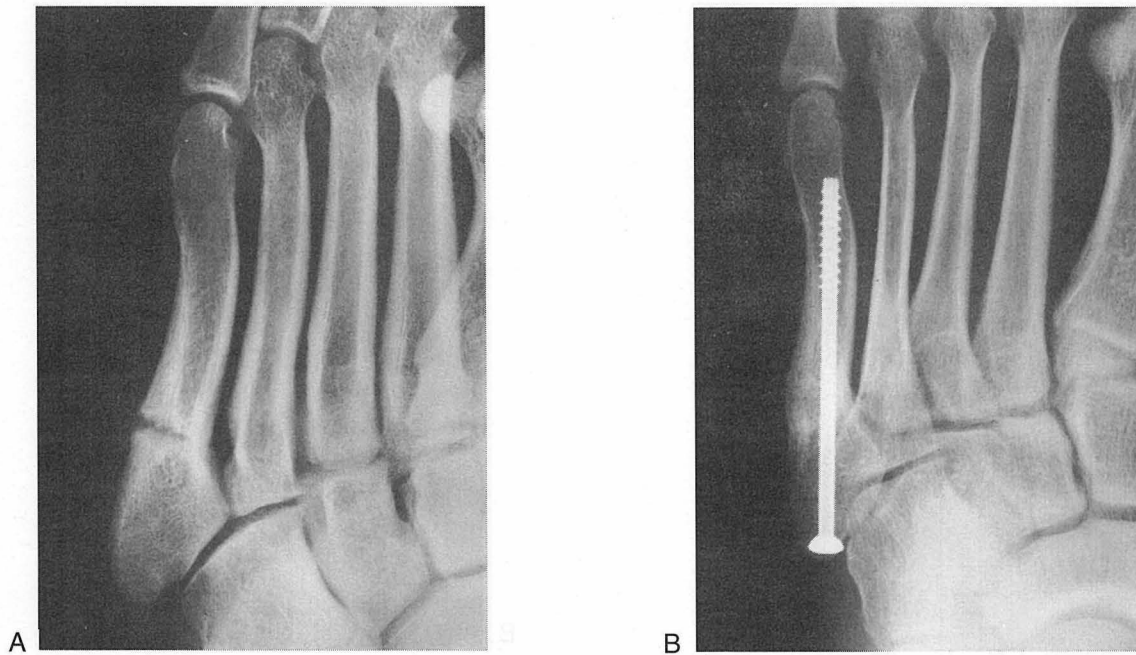
**Fig. 3**—21-year-old male basketball player. (A) Radiograph at the time of initial presentation reveals thickening of the bone cortex of the fifth metatarsus as well as the second metatarsus, suggesting a fatigue fracture, but there is no occlusion of the bone marrow. The fracture was classified as type II. (B) Radiograph at 6 weeks after surgery shows bone union.

cannulated compression screw and bone grafting were performed. Partial weight bearing was begun at 3 weeks and the patient returned to basketball after 8 weeks. Bone union was achieved at about 10 weeks according to the postoperative X-ray evidence (Fig. 4B).

## DISCUSSION

The fracture of the proximal diaphysis of the fifth metatarsal described by Robert Jones in 1902 is considered the first case of Jones' fracture ever

reported, and numerous reports have been made regarding its treatment.<sup>2-7</sup> Many reports have recommended surgery, claiming that delayed union and pseudoarthrosis tend to occur, and even if bone union can be achieved conservatively, the period of immobilization in the plaster cast and the interval until patients return to their daily routine and sports is too long. On the other hand, there are also reports maintaining that since good results of conservative treatment have also been reported,<sup>7</sup> conservative treatment is worth trying. There were 29 Lehman Type I cases in our own series of 36 patients, and while osteosclerosis



**Fig. 4**—19-year-old male basketball player. (A) Radiograph at the time of initial presentation reveals osteosclerosis in the cortex, radiolucency around the fracture line and occlusion of the bone marrow cavity. The diagnosis was type III Jones fracture. (B) Radiograph at 10 weeks after operation shows bone union.

was observed in eight (26%) of them, bone union was achieved in 25 cases (82%). This suggests that bone union in acute injury is not as poor as claimed in some papers. However, the period required for bone union by conservative methods did tend to be longer than in the surgical cases (11.4 weeks vs 7 weeks). Bone union time was shorter with surgical treatment than conservative methods, and early rehabilitation was also possible. Thus, conservative treatment is indicated in Type I patients, those with acute injuries who do not require particularly early rehabilitation. Surgery, however, is indicated in chronic cases, such as Type II delayed union fractures, Type III pseudoarthrosis and possibly in patients who require early rehabilitation because of sports or other obligations in society. Since more rigid fixation with compression is possible by intramedullary screw fixation than by the tension band wiring method, recently intramedullary screw fixation with compression has been used. Both Type II and Type III fractures showed bone resorption and new bone formation, and while both fatigue fractures and stress fractures are possible, there is no difference in treatment policy. Thus, good results can be obtained by conservative methods in acute fractures and by surgical methods in fatigue fractures.

Even if Type I Jones' fractures exhibit a tendency towards delayed union or non-union, conservative treatment is worthwhile because it resulted in bone union in 25 of the 29 Type I cases (86%) in our series. However, careful radiographic monitoring is necessary to achieve good results, and if there is radiographic evidence of bone resorption, such as the

'dreaded black line', treatment should be quickly switched to surgery. Additionally, when deciding on treatment, Type II and III Jones fractures should be clearly distinguished and treated with a compression intramedullary screw.

## CONCLUSION

Conservative therapy is indicated in Type I acute fractures, but surgery appears to be indicated in patients who develop signs of the bone resorption around fracture lines or who require early rehabilitation because of social obligations or sports. Rigid fixation with an intramedullary compression screw appears to be necessary in Type II and III delayed union fractures, pseudoarthrosis, stress fractures and fatigue fractures. Bone grafting sometimes seems necessary, especially in Type III fractures.

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