

CASE REPORT

Fractures of the lateral process of the talus

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SUMMARY. Thirteen patients with isolated fractures of the lateral process of the talus were reviewed. Two fracture types were seen: an intra-articular type in seven cases and an avulsion type in six cases. The former occurs at the base of the process as a result of blows to the calcaneus. The latter occurs at the tip as a result of traction by ligaments. Open reduction and internal fixation were performed in four cases of displaced intra-articular-type fracture and in one case of unstable avulsion type fracture. Bone union was complete, and the results were good in every case. However, pain on walking persisted in two cases treated conservatively. It was suspected that many isolated fractures of the lateral process of the talus are misdiagnosed as severe sprain and cause persistent ankle pain. Thus, accurate diagnosis and appropriate treatment in the early stages are essential to prevent persistent symptoms.

INTRODUCTION

Fractures of the lateral process of the talus usually occur in association with major fractures of the talus and isolated fractures of the lateral process of the talus are rare. For that reason fewer than 80 cases (only five cases in Japan) have been reported and the mechanism of injury and treatment policy have yet to be established. We encountered 13 cases of isolated fracture of the lateral process of the talus and assess their etiologic mechanism, fracture type, and methods of treatment in this report.

SUBJECTS

As shown in Table 1, the subjects were eight men and five women ranging in age from 19 to 61 years (mean 37.3 years), and there was no sex-bias in their age distribution. The cause of the injury was a traffic accident in four cases, a fall from a height in six cases, being pinned under heavy objects in one case, strain in one case and snowboarding in one case. The fracture was an intra-articular type in seven cases and an avulsion type in six cases. There were no associated injuries of the long bones or tarsal bones.

TREATMENT

Conservative therapy, chiefly immobilization in a plaster cast, was performed in eight cases and open reduction and internal fixation with screws or Kirschner wire were performed in the five other cases. Conservative therapy consisted of immobilization in a plaster cast for about one month followed by joint range-of-motion training. Partial weight-bearing was permitted from the 6th week onward and full weight-bearing at around 8-10 weeks. Range-of-motion training was begun in the 3rd week in the surgical patients and full weight-bearing at 6-8 weeks. The patellar tendon bearing brace was prepared as needed. Sports and strenuous activity were permitted from 3 months onward.

RESULTS

Bone union was achieved in every case. None of the patients developed aseptic necrosis. Nor was any clear evidence of arthropathic change detected in any of the patients during the follow-up examinations. Resumption of schoolwork and the patient's previous work was possible, but pain on walking and pain on movement persisted in two patients treated conservatively by plaster cast immobilization.

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Table 1—Fractures of the lateral process of the talus (ORIF: open reduction and internal fixation)

Case no.	Initials	Age	Sex	Fracture type	Cause	Treatment
1	NM	37	Male	Avulsion	Motorcycle	ORIF (screw)
2	KO	19	Female	Avulsion	Fall from a height	Conservative
3	TI	23	Male	Intra-articular	Motorcycle	ORIF (screw)
4	KS	39	Female	Intra-articular	Fall from bicycle	Conservative
5	RT	22	Male	Intra-articular	Motorcycle	ORIF (screw)
6	KS	59	Female	Intra-articular	Object fall	ORIF (screw)
7	TM	36	Male	Intra-articular	Motorcycle	ORIF (screw+K-wire)
8	OT	53	Male	Intra-articular	Fall from stairs	Conservative
9	TI	45	Male	Avulsion	Fall from a height	Conservative
10	MF	46	Male	Avulsion	Fall from stairs	Conservative
11	NA	21	Female	Avulsion	Fall from stairs	Conservative
12	SN	61	Female	Avulsion	Strain	Conservative
13	NA	23	Male	Intra-articular	Snowboarding	Conservative

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Case 2

The patient was a 19-year-old woman who was injured in a fall while walking along a mountain trail. A plain X-ray film revealed a fracture of the lateral process of the talus and the fracture line was observed at the tip of the lateral process (Fig. 1A, B). The fracture was immobilized in a plaster cast for 4 weeks, and partial weight-bearing was begun at 6 weeks. At present, 14 months later, bone union has been achieved but pain in the lateral portion of the ankle persists when the patient moves it.

Case 4

The patient was a 39-year-old woman who was injured when she fell while riding a bicycle. Subcutaneous bleeding and tenderness were observed anterior to the lateral malleolus of the ankle. A diagnosis of fracture of the lateral process of the talus was made based on the plain X-ray findings (Fig. 2A, B). Tomographs showed that the fracture line extended to the talocalcaneal joint (Fig. 2C, D). The fracture was immobilized in a plaster cast for 4 weeks and partial weight-bearing was started at 6 weeks. At present, 2 years after the injury, bone union is complete and the patient has been able to return to her original job without pain or restriction of her range of motion.

Case 6

The patient was a 59-year-old woman who was injured when objects she had piled high fell on her and her foot became pinned under them. The bone fragment was large (Fig. 3A, B) and the fracture line reached the talocalcaneal joint surface on the tomographs (Fig. 3C) and computed tomography (CT) scans (Fig. 3D). Surgery was performed to allow early rehabilitation.

The bone fragment was fixed with screws (Fig. 3E, F). Active motion was begun 3 weeks postoperatively and partial weight-bearing was possible from 6 weeks onward. At the present time, 18 months after the injury, bone union is complete and the patient's daily activities are unrestricted.

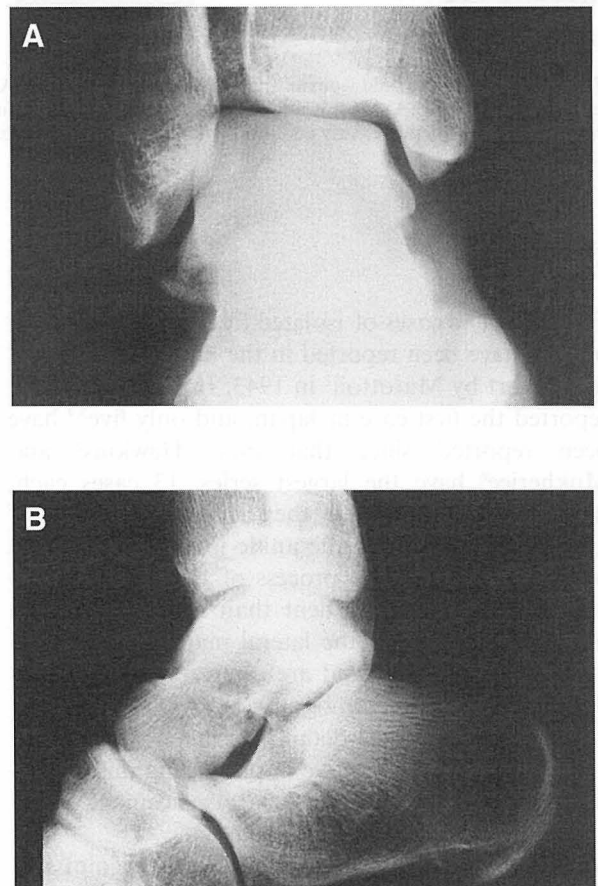


Fig. 1—Case 2. 19-year-old woman. Avulsion-type fracture. Anteroposterior view (A) and lateral view (B) reveal bone flakes on the tip of the lateral process.

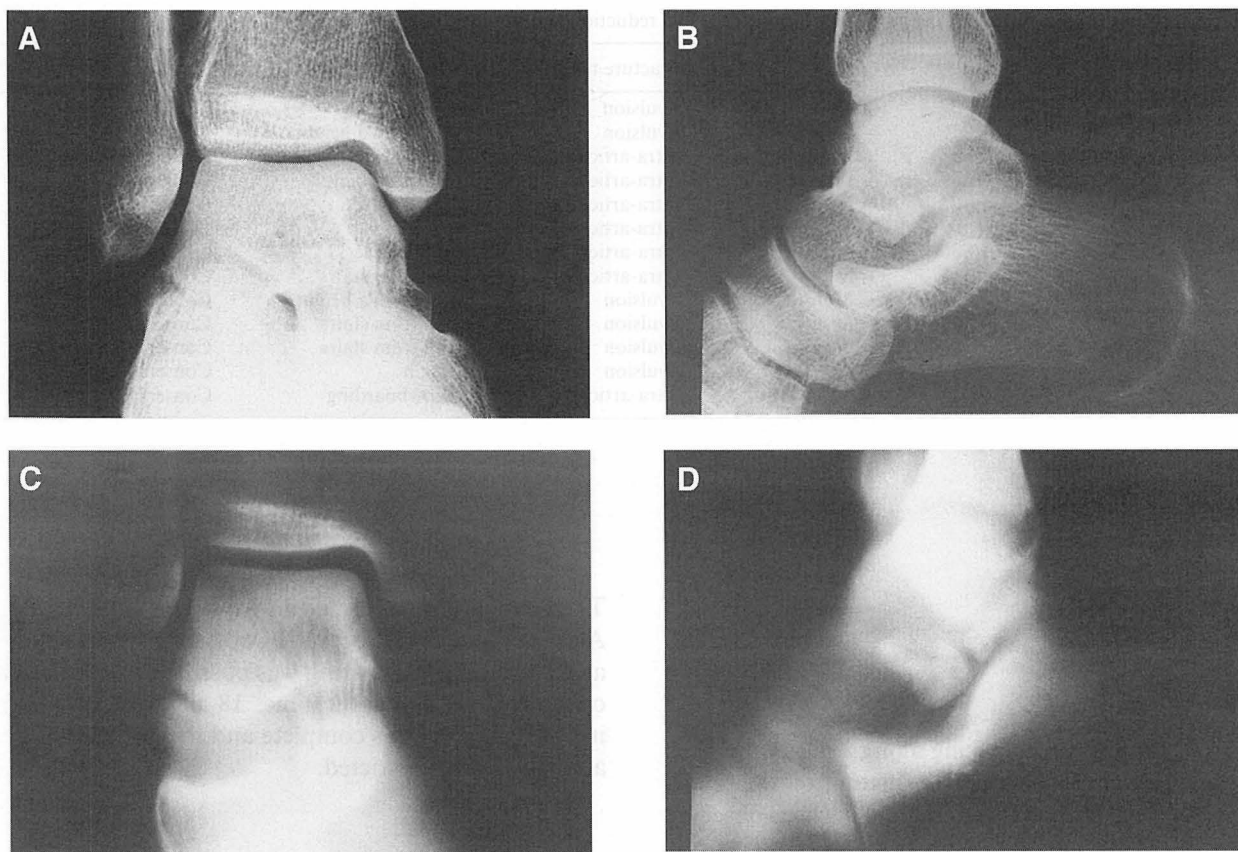


Fig. 2—Case 4. 39-year-old woman. Intra-articular-type fracture. A fracture line is visible at the lateral process of the talus in the anteroposterior view (A) but it is unclear in the lateral view (B). Anteroposterior view (C) and lateral view (D) tomographs, however, demonstrate the fracture clearly and reveal that the fracture involves the talofibular joint and the posterior subtalar joint.

DISCUSSION

Fewer than 80 cases of isolated fracture of the lateral process have been reported in the literature since the first report by Marottoli¹ in 1943. In 1989 Munefuji² reported the first case in Japan, and only five^{3,4} have been reported since that time. Hawkins⁵ and Mukherjee⁶ have the largest series, 13 cases each. According to Mukherjee⁶ they account for 0.86% of all external injuries of the ankle joint area. Isolated fractures of the lateral process of the talus are suspected to be more frequent than reported because fracture lines overlap the lateral malleolus or calcaneus on radiographs and are often missed. Whisby⁷ claimed that lateral tomographs provide good diagnostic and anatomical detail. Ebraheim⁸ maintained that coronal CT is effective in preventing misdiagnosis and in assessing the size and displacement of the fragment.

The lateral process of the talus forms a joint surface with the fibula and plays a weight-bearing role in the ankle joint area, while the lateral inferior surface forms a portion of the posterior joint surface of the subtalar joint. The anterior talofibular ligament and the lateral talocalcaneal ligament attach to it and are

involved in movement and support of the ankle joint and subtalar joint. Movement of the lateral process during forcible inversion and eversion is still not clearly understood, and the precise mechanism of the injury is unknown. Cimmino⁹ advocated involvement of three forces: direct force from beneath the calcaneus; avulsion fractures of the tip portion of the lateral process as a result of forced supination of the ankle; and direct external force. However, Hawkins⁵ claimed that the lateral talocalcaneal ligament is slender and not strong enough to cause an avulsion fracture. Hawkins took the movements of the foot into consideration and concluded that external force from the calcaneus to the lateral process causes the fracture when the ankle is inverted and dorsiflexion force is applied to it. Fjeldborg¹⁰ stated that when the foot is inverted the lateral process becomes the only junctional area between the posterior joint surface and the talus, and that when dorsiflexion force is applied in that position, a fracture occurs because the external force is concentrated on the lateral process.

Two fracture types were seen in our patients: an intra-articular type, in which a fracture line caused by direct force from the calcaneus reached the talocalcaneal joint surface, and an avulsion type, caused by

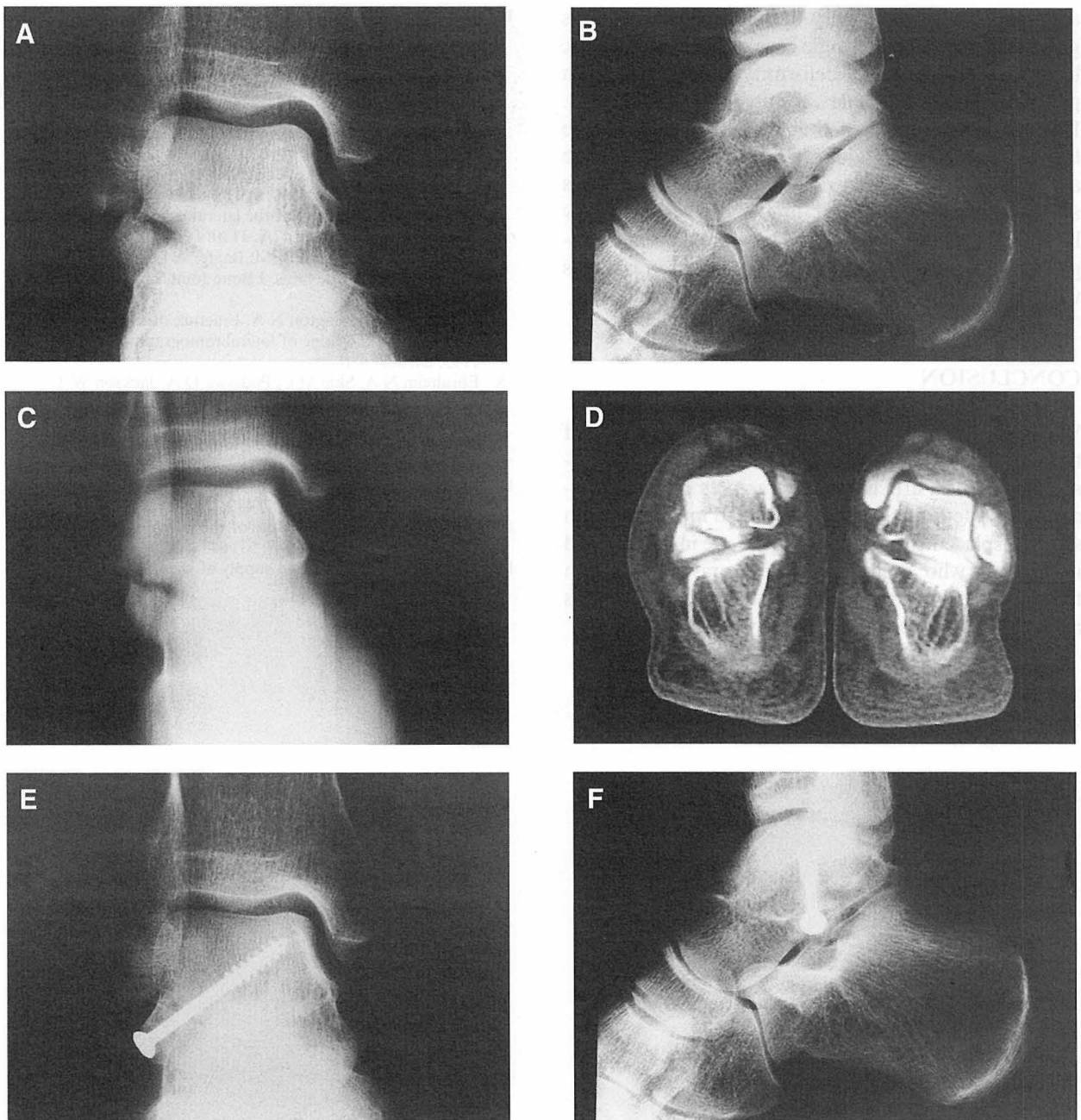


Fig. 3—Case 6. 59-year-old woman. Intra-articular-type fracture. The anteroposterior view (A) shows a large fragment of the lateral process of the talus. However, it is difficult to identify it in the lateral view (B). Tomographs (C) and CT scans (D) clearly show the size and displacement of the fragment. A postoperative anteroposterior view (E) and lateral view (F) confirmed that repositioning of the fragment was anatomical and that internal fixation by malleolar screw was rigid.

the traction force of ligaments, in which only the tip of the lateral process was fractured. Mills¹¹ claimed that intra-articular-type fractures occur because the talus and the calcaneus are in contact with each other, and that the avulsion-type-fracture occurs as a result of traction force by part of the lateral talocalcaneal ligament and anterior talofibular ligament, which insert on the lateral process.

As a rule surgery is used to treat patients with severe displacement of intra-articular-type fractures and it is indicated in cases in which early joint movement is

required, for example in athletes. We treat intra-articular-type fractures with little displacement and avulsion fractures conservatively and consider it necessary to immobilize the fracture in a plaster cast for approximately 6 weeks. However, even in avulsion-type fractures, pain and swelling sometimes persist in patients with severe instability, and bone fragment removal and lateral ligament reconstruction become indicated. According to Mulfinger¹² the lateral process of the talus, in contrast to the body, receives an abundant blood supply from the branches of the fibular artery

and the tarsal sinus artery and thus bone union is good. There was not a single case of pseudoarthrosis, bone necrosis or joint deformity among our own patients and favorable results were obtained. However, it is suspected that many fractures of the lateral process of the talus are misdiagnosed as severe ankle sprain. Moreover, delay in accurate diagnosis and appropriate treatment in the early stages may lead to persistent ankle pain. Therefore, lateral tomographs and coronal CT scans are essential in patients with abnormalities on routine radiographs.

CONCLUSION

We assessed 13 cases (13 feet) of isolated fractures of the lateral process of the talus. The fractures were classified into intra-articular-type fractures and an avulsion-type fractures. Surgery is indicated in patients with severe displacement, patients with severe instability and in patients who require early joint range-of-motion training. Tomographs, CT scans and stress radiographs are essential to determine the policy of treatment.

REFERENCES

1. Maróttoli O R. Sobre las fracturas de la apófisis externa del astrágalo. *Rev Orthop y Traumatol* 1943; 13: 107-117.
2. Munefuji M, Tanaka T. A case report of the lateral process of the talus. *Orthop Surg Traumatol* 1989; 32: 213-215.
3. Fujita M. Three cases of fracture of the lateral process of the talus. *J Jpn Soci Surg Foot* 1993; 14: 204-209.
4. Ogiwara T, Yamano K. A case report of the lateral process of the talus. *J Joint Surg* 1990; 9: 113-115.
5. Hawkins G L. Fracture of the lateral process of the talus. *J Bone Joint Surg* 1965; 47A: 1170-1175.
6. Mukherjee K S, Pringle R M, Baxter A D. Fracture of the lateral process of the talus. *J Bone Joint Surg* 1974; 56B: 263-273.
7. Whitby E H, Barrington N A. Fracture of the lateral process of the talus - the value of lateral tomography. *Br J Radiol* 1995; 68: 583-586.
8. Ebraheim N A, Skie M C, Podeswa D A, Jackson W T. Evaluation of process fractures of the talus using computed tomography. *J Orthop Trauma* 1994; 8: 332-337.
9. Cimmino V C. Fracture of the lateral process of the talus. *Am J Roentgenol* 1963; 90: 1277-1280.
10. Fjeldborg O. Fracture of the lateral process of the talus. *Acta Orthop Scand* 1968; 39: 407-412.
11. Mills J H, Horne G. Fracture of the lateral process of the talus. *Aust N Z J Surg* 1987; 57: 643-646.
12. Mulfinger L G. The blood supply of the talus. *J Bone Joint Surg* 1970; 52B: 160-167.