

# "Snowboarder's Fracture": Fracture Of The Lateral Process Of The Talus

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**Background:** As physicians caring for patients who sustain snowboarding ankle injuries, we have noted that fracture of the lateral process of the talus occurs frequently. The incidence of this fracture, however, is very low in other accounts of ankle injuries. We report a case of fracture of the lateral process of the talus and review the pertinent literature of this injury.

**Methods:** A literature review was performed using MEDLINE files from 1966 to the present. We found additional references from the bibliographies of available reports.

**Results and Conclusions:** Physicians caring for snowboarders should look specifically for fracture of the lateral process of the talus in a snowboarder with a lateral ankle or foot injury. This fracture can mimic a lateral ankle sprain, yet the fracture is easily missed on plain radiographs of the ankle. Because displaced or comminuted fractures can cause long-term disability, primary care physicians and specialists alike need to be aware of the association of this fracture with snowboarding. (J Am Board Fam Pract 1994; 7:130-3.)

A previously uncommon fracture, the fracture of the lateral process of the talus, is occurring more frequently. This fracture is easily missed and if not treated correctly can result in persistent ankle pain and disability. Increasingly seen as a result of snowboarding, this fracture should always be considered in individuals sustaining a snowboarding ankle injury. The number of snowboard enthusiasts has steadily grown during the past 20 years,<sup>1</sup> and some estimate that between 7 and 25 percent of ski area customers are snowboarders. The rate of injury to snowboarders has been estimated to be 2 injuries per 1000 snowboarder days (comparable with the rate of injury among skiers), with 18 percent of these injuries involving the ankle.<sup>2</sup> It is important that primary care physicians be aware of this fracture, because it often mimics an ankle sprain. Air travel makes it possible for a physician practicing in a location remote from the mountains to see this injury. We report a fracture of the lateral process of the talus secondary to snowboarding and recommend that physicians

consider "snowboarder's fracture" in snowboarders with ankle injuries.

## Case Report

A healthy 22-year-old man fell while snowboarding. Within 1 hour of his injury he visited his family physician, reporting that he had heard a snap, felt immediate pain, and had marked swelling of his left ankle. Physical examination showed tenderness and considerable swelling in the region of the lateral malleolus, but there was no neurologic or circulatory deficit. The ankle was stable. A radiograph revealed a fracture of the lateral process of the talus that did not appear to be severe (Figure 1). The patient's foot was placed in a non-weight-bearing posterior splint. Because of the unusual nature of the fracture, however, a computed tomographic (CT) scan of the ankle was obtained, which showed a large comminuted, minimally displaced fracture of the posterior inferolateral aspect of the talus extending into the posterior talocalcaneal facet joint (Figure 2). The patient was treated with open reduction and internal fixation of the fracture and subsequently had good function of the ankle and only minimal discomfort.

## Literature Review

Fractures of the lateral process of the talus have been reported in the medical literature, with Maróttoli's report<sup>3</sup> of 10 cases in 1942 being the

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**Figure 1a.**

**Plain radiography of ankle. Fracture is best seen on lateral view.**



**Figure 1b.**

first published. In 1950 Bonnin mentioned the fracture and believed that an 8-week plaster immobilization would be appropriate treatment.<sup>4</sup> The fracture was further described by Milch and Milch<sup>5</sup> in 1959, who proposed that the mechanism of injury was ankle inversion. In 1965 Hawkins<sup>6</sup> reported 13 cases of fracture of the lateral process of the talus from a series of 50 consecutive talar fractures. Nearly one-half (6 of 13) of these fractures were missed on initial review of the radiographs. Seven of 13 of these patients were pain free after 8 weeks of plaster immobilization. Disability persisted 6 months after the fracture in 6 of the 13 patients. Five of the 13 required subsequent surgery. Hawkins<sup>6</sup> thought that the fracture was caused by severe dorsiflexion and inversion.

Fjeldborg,<sup>7</sup> in 1968, discussed the mechanism of injury and described both dorsiflexion and supination as important forces contributing to the injury. Kleiger<sup>8</sup> noted that because no strong ligament is attached to the lateral process of the talus, the fracture must occur as a result of the posterior calcaneal facet striking the posterior margin of the lateral talar articular surface during extension. The incidence of this fracture has been estimated to be 0.86 percent of ankle sprains and fractures.<sup>9</sup> Our experience with snowboarders, however, suggests that the incidence of this fracture in this group might be much higher.

In an excellent review in 1987, Mills and Horne<sup>10</sup> found that fewer than 60 cases of this fracture had been reported in the literature. They contacted 9 patients with this injury and found that 3 of 9 had no pain, 3 had mild pain, 1 had moderate pain, and 2 had severe pain at a minimum of 7 months after the injury. They reported that 40 percent of these fractures are missed on initial radiographs because it is difficult to see the fracture on standard views and that 25 percent of patients have pain following treatment.

## Discussion

### Anatomy

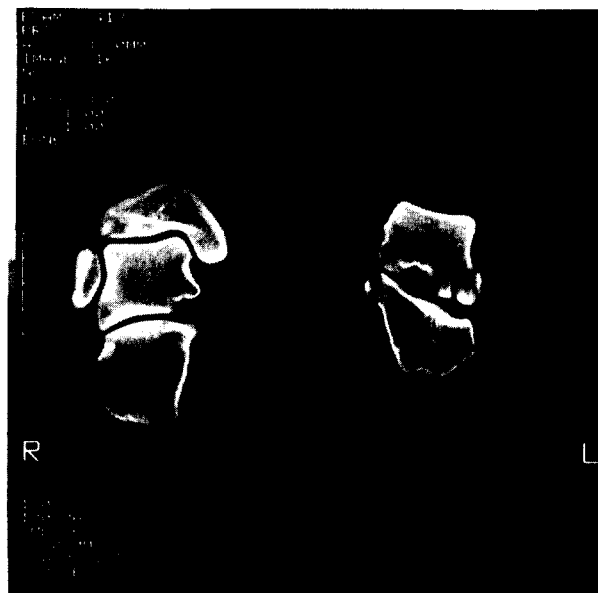
The lateral process of the talus is a broad-based, wedge-shaped prominence of the talar body with articular and nonarticular surfaces. The two articular surfaces are positioned dorsolaterally to the fibula and inferomedially to the anterior portion of the posterior calcaneal facet. The lateral talocalcaneal ligament usually originates from the tip of the process. A fracture of the process therefore usually involves the posterior subtalar joint (Figure 3).

The mechanism of the injury is generally thought to be sudden, severe dorsiflexion and inversion. This force produces a shearing stress transmitted from the calcaneus to the lateral process, resulting in a fracture fragment of variable



**Figure 2a.**

**Computed tomograph demonstrating comminuted fracture of the lateral process of the talus.**



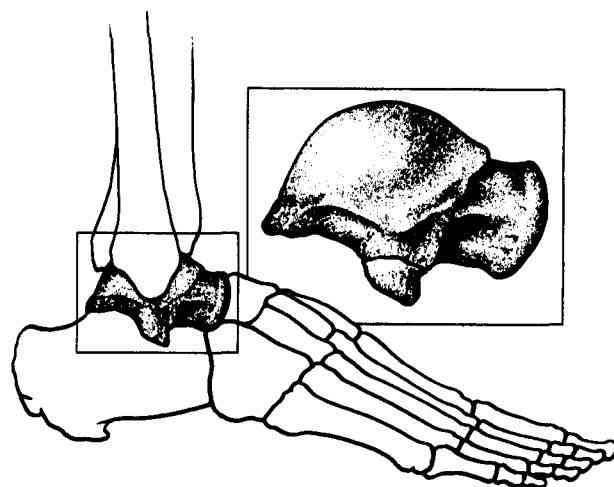
**Figure 2b.**

size. Hawkins<sup>6</sup> described three types of fractures: (1) a simple fracture of the process that extended from the talofibular articular surface down to the posterior talocalcaneal articular surface of the subtalar joint, (2) a comminuted fracture that involved both the fibular and posterior calcaneal articular surfaces of the talus and the entire lateral process, and (3) a chip fracture of the inferior portion of the posterior articular process of the talus.

### **Diagnosis**

This fracture, while uncommon, is occurring more frequently as the popularity of snowboarding increases. Edwin Noordewier, MD, a family physician at Keystone, Colorado, has reported this fracture often occurs in snowboarders (personal communication). Janes and Paul reported cases of this fracture associated with snowboarding at symposium in Austria in May 1993.<sup>11</sup> The fracture is also seen in patients who fall from a height and suffer a dorsiflexion-inversion injury. Because fracture of the lateral talar process is easily missed unless the examining physician suspects it, an ankle injury in a snowboarder should prompt the clinician to search specifically for this injury. The patient's description of the injury and the location of symptoms can be similar to those of a simple inversion ankle sprain. Typical physical findings include swelling and ecchymosis over

the lateral aspect of the ankle. Tenderness in the region of the lateral talar process can easily be mistaken for pain caused by ligamentous injury. Persistent pain and swelling in this area should further alert the clinician to search for this fracture. Routine ankle radiographs might be helpful but the fracture is not always seen. The fracture can be observed on the mortise view just distal to the lateral malleolus. Conversely, the fracture might only be seen on the lateral view through the overlapping malleoli. If a fracture is diagnosed, or



**Figure 3. Common location of snowboarder's fracture. Drawing by Victor Skersis**

if clinical suspicion is high, the clinician should obtain a CT scan. The CT scan will indicate the size of the fracture, presence of comminution, and degree of intraarticular involvement.

### **Treatment**

Appropriate treatment of this injury depends on the finding of displacement and the severity of comminution. Missed fractures could lead to persistent pain and disability.<sup>6</sup> Small avulsion fractures that do not involve the articular surface can be treated conservatively with non-weight-bearing immobilization for a period of 4 to 6 weeks. Larger, comminuted, or displaced fractures or those involving the articular surface are best treated by open reduction and internal fixation or excision.

Rockwood, et al.<sup>12</sup> have recommended 4 to 6 weeks in non-weight-bearing plaster for nondisplaced fractures and open reduction and internal fixation for large displaced fractures, as well as primary excision of displaced, comminuted fractures or delayed excision for established painful nonunions. Patients with persistent pain might require subtalar arthrodesis.

### **Future Studies**

As snowboarding grows in popularity, fracture of the lateral process of the talus could be more commonly seen in primary care physicians' offices. Very little is known about this fracture. Prospective studies are needed to clarify the following questions:

1. What is the incidence of the fracture among snowboarders?
2. What are specific risk factors for this debilitating fracture?
3. What are common presenting complaints, physical examination findings, or historical factors that could help the primary care physician recognize this fracture?
4. What are successful preventive strategies for this and other snowboarding injuries?
5. Are available releasable bindings protective?
6. Do rigid boots provide more ankle protection than soft boots?
7. Do wrist guards decrease the incidence of wrist injuries?

8. Is one foot position on the board safer than another?
9. Which fractures require surgery and which can be treated conservatively?

### **Summary**

The realization that fracture of the lateral process of the talus occurs frequently among snowboarders has important implications for patients and clinicians. Clinicians should maintain a high level of suspicion for this fracture and should consider necessary tests to rule out the injury in any snowboarder with lateral ankle pain. A CT scan of the talus early in the care of a snowboarder with a lateral ankle injury can help clarify the injury, which will possibly help prevent persistent disability and pain. Clinicians treating patients for snowboard injuries should remember to consider "snowboarder's fracture."

### **References**

1. Aitkens M. Have snowboard, will soar. *Phys Sportsmed* 1990; 18(1):114-20.
2. Ganong RB, Heneveld EH, Beranek SR, Fry P. Snowboarding injuries: a report on 415 patients. *Phys Sportsmed* 1992; 20(12):114-22.
3. Marótolli OR. Sobre las fracturas de la apófisis externa del astrágalo. *Rev Ortop y Traumatol*, 1943; 13:107-17.
4. Bonnin JG. Injuries to the ankle. New York: Grune & Stratton, 1950.
5. Milch H, Milch RA. Fracture surgery: a textbook of common fractures. New York: Paul B. Hoeber, 1959.
6. Hawkins LG. Fracture of the lateral process of the talus: a review of thirteen cases. *J Bone Joint Surg (A pt 2)* 1965; 47:1170-5.
7. Fjeldborg O. Fracture of the lateral process of the talus: supination-dorsal flexion fracture. *Acta Orthop Scand* 1968; 39:407-12.
8. Kleiger B. Injuries of the talus and its joints. *Clin Orthop* 1976; 121:243-62.
9. Mukherjee SK, Pringle RM, Baxter AD. Fracture of the lateral process of the talus: a report of thirteen cases. *J Bone Joint Surg [Br]* 1974; 56:263-73.
10. Mills HJ, Horne G. Fractures of the lateral process of the talus. *Aust NZ J Surg* 1987; 57:643-6.
11. Janes PC, Paul C. The snowboarder's talus fracture. The Tenth International Symposium on Skiing Trauma and Safety, Zell am See, Austria, May 1993.
12. Rockwood CA, Green DP, Bucholz RW. Fractures in adults. Philadelphia: Lippincott, 1991:2089-91.