Two fractures of the lower extremity not to miss in the emergency department

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Case 1 description
Buddy is an active 33-year-old man who presents to the emergency department (ED) complaining of pain in his left ankle and foot after falling while back-country skiing 3 days ago. The fall involved a moderate-speed slide down a steep chute and rotational release of the left leg from the ski binding. Buddy experienced immediate pain to the lateral malleolar region. Immediately after the injury, he painfully skied the return trip to the cabin. He has been bearing weight since the injury and complains of persistent pain to the lateral malleolar area. Physical examination reveals tenderness over the anterior talofibular ligament and the distal aspect of lateral malleolus. The medial malleolus, fifth metatarsal, and proximal fibula are nontender. An anterior draw test reveals negative results. There is marked swelling and effusion of the ankle joint. There is no bruising. The knee and hip are normal. Conventional radiography of the ankle reveals normal results (Figure 1). The diagnosis of an anterior talofibular ligament sprain is made, and the patient is given ankle-support products and physiotherapy instructions.

Buddy returns to the ED 2 months later complaining of persistent pain, ongoing swelling, and the new sensation that his foot is “flatter and less stable.” A physical examination reveals an obvious ankle joint effusion, tenderness over the area below the lateral malleolus, and a hindfoot that is splayed laterally. The distal lateral malleolus is nontender. During the 2 months between the ED visits, Buddy has been running and cross-country skiing regularly despite experiencing persistent pain with these activities.

An x-ray scan shows a large ankle joint effusion, and a computed tomography (CT) scan of the ankle (Figure 2) shows an intra-articular displaced fracture through the lateral process of the talus (LPT).

How do you treat Buddy now? What are the complications of missing this injury? How could it have been picked up during Buddy’s first ED presentation?

Discussion
The LPT is a wedge-shaped osseous projection of the lateral aspect of talus. It articulates inferomedially with the calcaneus and superolaterally with the distal fibula. Together, they form the lateral portion of the subtalar joint and help provide lateral ankle stabilization and hindfoot articulation.1,2

With the increasing popularity of snowboarding, the incidence of LPT fractures has increased over the past 15 years. These injuries are now commonly referred to as snowboarder’s fracture.3–6 The mechanism of injury is an axial load applied to a dorsiflexed foot undergoing rotational force.6 These fractures are commonly found on the leading foot of a snowboarder. They were also evident during Buddy’s fall. Fractures of the LPT are commonly diagnosed as “severe ankle sprains” on initial presentation.1,4,6 Table 1 provides suggestions on how to identify LPT fractures in the ED.

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Table 1

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<tr>
<th>Suggestion</th>
<th>How to Identify LPT Fractures</th>
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<td>1. Observe for pain, swelling, and instability</td>
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<td>2. Perform a complete physical examination</td>
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<td>3. Consider imaging studies</td>
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Figure 1. Plain film radiograph of the anteroposterior view of the left ankle: Arrow indicates the fracture of the lateral process of the talus that was missed in the emergency department. The radiologist identified the fracture; however, it was not seen by the emergency department staff.
During the patient history, consideration of the mechanism of injury is a key element in making the diagnosis of LPT fracture. You can gather more information on the likelihood of LPT fractures on physical examination by palpating the LPT directly for tenderness, as well as performing the LPT stress test (Figure 3).6 Close scrutiny of the anteroposterior view of the CT scan at the LPT region can aid plain-film yield (Figure 1 arrow). A modified oblique view through the ankle (Broden view) will increase radiographic diagnosis.6 A CT scan of the ankle and foot provides the diagnosis.3,5

Patients with LPT fractures should be immobilized in a non-weight-bearing, short leg cast and should see an orthopedic surgeon within several days of injury. Treatment delays are associated with malunion, joint instability, and osteoarthritis.5,6 There are several classification systems for LPT.1,6 Open reduction, internal fixation surgery appears to provide better outcomes for larger fragments, comminuted fractures, and displaced pieces that are greater than 2 mm.5,6 Conservative management appears to be suitable for some LPT fractures, but close follow-up is important owing to the high risk of malunion and osteoarthritis.

What about Buddy?

Buddy wears a partial-weight-bearing, boot-style brace for the lower leg for 6 weeks, resulting in moderate callus formation evident on repeat CT scanning. Following the removal of the brace, Buddy undergoes 3 months of extensive proprioception and rehabilitation exercises; however, he only has a modest return to preinjury function.

Case 2 description

Betty is a 61-year-old woman who presents to the ED via ambulance after being struck on her left side at the knee by a vehicle moving at less than 15 km/h. She was knocked to the ground but did not lose consciousness. She has small abrasions on her right arm. Betty complains of pain in the left knee and has

Table 1. Suggestions on how to identify fractures of the lateral process of the talus and lateral tibial plateau in the ED

<table>
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<tr>
<th>TYPE OF FRACTURE</th>
<th>HOW NOT TO MISS THESE FRACTURES IN THE ED</th>
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<tbody>
<tr>
<td>Lateral process of the talus</td>
<td>Consider this fracture in situations in which the mechanism of injury involves axial loading, dorsiflexion, and foot rotation. Examine the talus. Consider additional rotational views of x-ray or computed tomographic scans if suspicious.</td>
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<tr>
<td>Lateral tibial plateau</td>
<td>Accept that this fracture can occur with seemingly benign trauma in the elderly or patients with osteoporosis. Look for lipohemarthrosis on x-ray scans. Get oblique views of x-ray or computed tomographic scans if suspicious.</td>
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ED—emergency department.
difficulty bearing weight. There is swelling and tenderness throughout the left knee, but there is no obvious ligamentous instability. A neurovascular examination of the lower extremities reveals normal results. The plain film does not show any obvious fractures (Figure 4). A joint effusion is evident on the lateral view of the x-ray scan. She is placed in a knee immobilization device and sent home with crutches. She is instructed to follow up with her family physician in 1 week.

The next morning, Betty is called back to the ED after the radiologist checks her x-ray scans and detects a minimally displaced fracture of her lateral tibial plateau.

How could Betty’s injury have been found when she first presented in the ED?

Lateral tibial plateau fractures
Fractures of the tibial plateau are estimated to be the second most common type of bony injury to the knee. They are also among the most commonly missed fractures of the extremities in the ED. Table 1 provides suggestions on identifying lateral tibial plateau fractures in the ED. The mechanism of injury is usually an axial load to a knee in a valgus (ie, medially directed) position.

Fractures to the medial tibial plateau are most common in younger patients with higher-energy trauma and are usually obvious on radiographic images. Fractures of the lateral tibial plateau are more common in elderly patients and in those with osteoporosis. Fractures of the lateral tibial plateau can occur with seemingly benign or low-energy trauma and are often radiographically occult. A common mechanism of injury is being struck by the bumper of a slow-moving vehicle. Patients will generally present with pain and have difficulty bearing weight. Standard anteroposterior and lateral plain films have been shown to be 79% sensitive for fractures of the lateral tibial plateau. Adding oblique knee views to the radiographic examination increases sensitivity to 85%.

Evidence of a joint effusion with lipohemarthrosis (ie, a layer of fluid and fat) on a lateral x-ray scan is highly suggestive of a tibial plateau injury. A retrospective analysis of magnetic resonance imaging (MRI) of known tibial plateau fractures found joint effusions in 100% of patients, 41% of whom had lipohemarthrosis.

There is a high association of meniscal tears and injury to knee ligaments with fractures of the lateral tibial plateau. Studies using arthroscopy found soft tissue injuries to be prevalent in 56% to 71% of patients with lateral tibial plateau fractures, while another study that used MRI found soft tissue injuries to be prevalent in 90% to 97% of patients.

Definitive diagnosis of lateral tibial plateau fracture is made with CT or MRI. The Schatzker classification system, which divides tibial plateau fractures into 6 types, can be used to describe these injuries.

Managing patients with fractures of the lateral tibial plateau in the ED includes immobilizing the knee, providing analgesia, and ensuring that patients remain non-weight bearing. Patients with lateral tibial plateau fractures should be referred to orthopedic surgeons.

What about Betty?
Betty’s CT scan reveals a Schatzker type-3 fracture with 2 to 4 mm of depression. She is seen by an
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Competing interests
None declared

References

BOTTOM LINE
• Lower extremity injuries are common complaints in emergency departments (EDs). Fractures of the lateral process of the talus (LPT) and the lateral tibial plateau are often missed during initial ED visits.

• A key element to diagnosing these 2 fractures is to consider the mechanism of injury: for LPT it involves an axial load applied to a dorsiflexed foot undergoing rotational force; for lateral tibial plateau fractures it usually involves an axial load to a knee in a valgus (ie, medially directed) position.

• Managing patients with LPT or lateral tibial plateau fractures in the ED includes immobilizing the fracture, instructing patients to avoid weight-bearing situations, and ensuring early follow-up with an orthopedic surgeon.

POINTS SAILLANTS
• On reçoit souvent des cas de blessures aux extrémités inférieures à l’urgence. Les fractures du processus latéral de l’astragale ou talus (PLT) et du plateau tibial latéral passent souvent inaperçues lors de la visite initiale à l’urgence.

• Le diagnostic de ces 2 fractures repose sur un élément clé, soit le mécanisme de la blessure: dans les cas des fractures du PLT, il s’agit d’une compression axiale appliquée sur un pied en flexion dorsale subissant une force rotative; pour les fractures du plateau tibial latéral, c’est habituellement une compression axiale sur un genou en position de valgus (c.-à-d. dirigée vers le milieu).

• La prise en charge à l’urgence des patients victimes d’une fracture du PLT ou du plateau tibial latéral demande d’immobiliser la fracture, de recommander aux patients d’éviter d’appliquer un poids et d’assurer un suivi sans délai par un chirurgien orthopédique.

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