0363-5465/102/3030-0754$02.00/0
THE AMERICAN JOURNAL OF SPORTS MEDICINE, Vol. 30, No. 5
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Acute Nonexertional Lateral Compartment Syndrome from Snowboarding

A Case Report

Joseph A. Assenmacher,* MD, and Robert E. Hunter, MD

From the Aspen Foundation for Sports Medicine, Education, and Research, Aspen, Colorado

The orthopaedic literature is replete with case reports describing exertional or traumatic compartment syndromes in the lower leg.[1–8,10,12–16] These have been classified by the compartment involved as well as by the duration of symptoms (acute or chronic). Compartment syndromes have also been attributed to positional causes, that is, "Well-leg Compartment Syndrome." [9] However, to our knowledge, there has been no description in the literature of isolated lateral compartment syndrome resulting from a nonexertional cause, as was the case with this patient.

CASE REPORT

A 31-year-old male snowboarder was seen at the Aspen Valley Hospital's emergency department for evaluation after 3 successive days of snowboarding. The patient denied any acute trauma, but he had developed difficulty ambulating on his left lower extremity early that morning because of severe pain. He denied any numbness in his leg or foot, but when he tried to invert his foot, the pain worsened. He reported that the lateral side of his lower leg felt swollen and he experienced pain when the area was massaged.

On physical examination, the patient demonstrated a visibly swollen lateral compartment compared with the contralateral lower extremity. He was able to actively dorsiflex his left foot, but eversion strength was noted to be 4/5. Light touch, pinprick, and temperature sensation were intact, as were his pedal pulses. Palpation of the lateral compartment and passive inversion were noted to be excruciatingly painful. Radiographs were unremarkable. Intracompartmental pressures, measured with a Stryker Compartment Pressure Monitor (Kalamazoo, Michigan), were normal in the anterior, superficial posterior, and deep posterior compartments. The pressures in the lateral compartment were as follows: 60 mm Hg in the proximal third, 80 mm Hg in the middle third, and 120 mm Hg in the distal third of the muscle belly (Fig. 1).

The patient was immediately taken to the operating room for lateral compartment release. Intraoperatively, the peroneal muscle bellies demonstrated a zone of transition marked by a visible line (Fig. 2). The muscle proximal to the line had good contractility to stimulation and a normal red appearance. Distal to the line, the muscle had minimal contractile response to stimulation and the color was noted to be a light salmon. The wound was closed primarily, and intracompartmental pressures were rechecked and noted to be less than 10 mm Hg (Fig. 3).

Postoperatively, the patient regained full motor strength by 4 weeks after the release and he had no residual neurovascular sequelae. He has since returned to his preoperative level of athletics and notes no subjective or objective differences between his lower extremities.

DISCUSSION

Compartment syndrome of the lower extremity can result in devastating long-term results if not addressed in a timely fashion.[17] Most of the previously reported cases of acute lateral compartment syndrome have been secondary to acute trauma or repetitive overuse. This was not the case in our patient.

There is no disagreement that snowboarding is a demanding and rigorous sport requiring strength, stamina, and dexterity. This patient was an accomplished snowboarder. We believe that this compartment syndrome was nonexertional because of the following facts. This patient rented stiff snowboard boots that were one size too large because none in his size were available. The lead foot (his left) is thought to absorb the majority of the loads and stresses associated with snowboarding, and the lead foot has been shown to sustain the majority of lower extremity injuries.[11] Snowboard boots are fairly rigid, allowing for

* Address correspondence and reprint requests to Joseph A. Assenmacher, MD, Aspen Foundation for Sports Medicine, Education, and Research, 100 East Main Street, Aspen, CO 81611.

No author or related institution has received any financial benefit from research in this study.

Figure 1. Marks on the patient's leg correspond to the areas of pressure measurements in the proximal third (to right on photograph), middle third, and distal third (to left on photograph) of the lateral compartment.

Figure 2. There was a clear demarcation line (arrows) between the proximal third (to right on photograph) and the distal two-thirds (to left on photograph) of the lateral compartment muscles.

only minimal ankle range of motion and thereby limiting muscle excursion and shortening. Intraoperative findings demonstrated a visible demarcation line at the level of the boot top. The facts that the patient's boots were too big and allowed the lateral compartment to contact the stiff upper boot (secondary to increased medial-lateral translation) led to this compartment syndrome.

Snowboarding injuries are quite common, and the majority of injuries sustained are to the upper extremities and are caused by falls. However, foot, ankle, and lower extremity injury rates approach 20%, with more than half of the injuries occurring in the lead foot.[11] In addition, the majority of lower extremity injuries are sustained in snowboarders wearing soft boots.[11] A thorough differential diagnosis includes the following: lateral talar process fracture, medial malleolus fracture, peroneal tendon dislocation, fifth metatarsal fracture, and anterior compartment syndrome. This patient's symptoms were easily differentiated from the diagnoses mentioned. The pain was severe and unrelieved by narcotics, the pain was located in the middle of the lower extremity, and there was visible isolated lateral compartment swelling. The results of the radiographic and neurovascular examinations were normal, other than showing weakness in eversion.

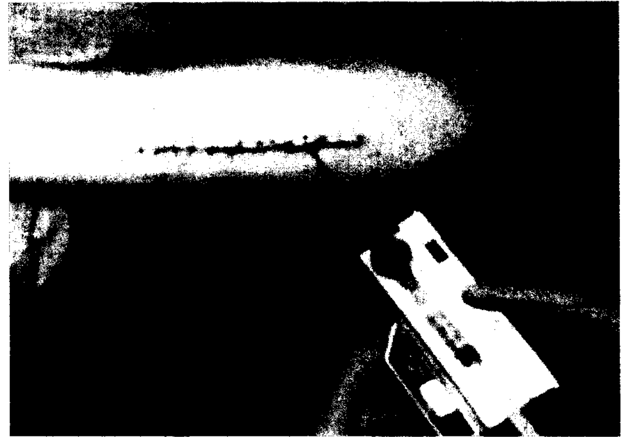

Figure 3. Primary closure and the method of postoperative intracompartment pressure measurement.

Lower extremity injuries represent a significant subset of injuries seen in the snowboarder. Injury patterns, as well as a comprehensive differential diagnosis must be thoroughly investigated to properly diagnose and treat these injuries. Awareness of these variables and how they affect injury patterns is essential in the care of the injured snowboarder. Proper equipment sizing with rigid boots used in both snowboarding and downhill skiing is essential to avoid further episodes of this type of compartment syndrome. Changes in boot construction may also be helpful.

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