Winter Wipeout

Skiing and Snowboarding Injuries

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OBJECTIVES

On completion of this lesson, you should be able to:

1. Identify the most common injuries sustained by skiers and snowboarders.
2. Understand how to assess, image, and treat patients with skiing-related knee injuries.
3. Properly assess skiing-related thumb injuries and understand their associated morbidity.
4. Identify and manage common skiing- and snowboarding-related shoulder injuries.
5. Describe how to identify and treat unique snowboarding-related ankle injuries.

FROM THE EM MODEL

18.0 Traumatic Disorders
   18.1.8 Extremity Bony Trauma

CRITICAL DECISIONS

- What injuries and mechanisms should be suspected when managing skiers and snowboarders?
- How should skiing-related knee injuries be managed in the emergency department?
- How should skiing-related thumb injuries be managed in the emergency department?
- What unique factors should be considered when evaluating a snow sport-related shoulder injury?
- What differential diagnoses should be considered when evaluating a snowboarder with an ankle injury?

As the winter sports season reaches its peak, the number of skiing- and snowboarding-related injuries mounts. More than 100,000 injured skiers and snowboarders seek care in US emergency departments annually. Although nearly 50% of these presentations involve sprains and strains, these patients are at risk for a number of unique complications that can result in long-term sequelae. As such, emergency physicians must be prepared to recognize the mechanisms and nuanced signs of skiing- and snowboarding-related injuries, conduct appropriate diagnostic tests, employ splinting and bracing, and initiate rehabilitation and orthopedic follow-up.
**CASE PRESENTATIONS**

■ **CASE ONE**

A 54-year-old man presents with knee pain resulting from a fall sustained while skiing. He explains that he turned quickly to avoid colliding with another skier, while shifting his weight toward the tails of his skis. He immediately heard a “pop” and felt a sudden, sharp pain in his right knee. Although the pain quickly abated after he fell, his knee felt “wobbly” when he tried to stand. Unable to bear weight and walk, the patient had to be carried down the mountain by the ski patrol.

On examination, his right knee is visibly swollen, with a palpable effusion. There is no tenderness to palpation along the patella or the medial or lateral knee joint lines. He has a limited range of motion (+5 degrees of extension and 100 degrees of flexion) with end-range flexion and extension.

He complains of diffuse knee pain, which is most pronounced posteriorly. His quadriceps strength is 4/5, and his hamstring strength is 4+/5. The clinician performs the Lachman test, which is positive without an end point and with increased laxity in comparison to the left knee. Increased excursion is noted when varus and valgus stress is applied while the right limb is in full extension, but no frank knee pain or gapping is noted. A posterior drawer test is negative. The emergency physician orders x-rays.

■ **CASE TWO**

A 22-year-old woman presents with pain and swelling at the base of her right thumb after falling during a skiing lesson. She explains that she lost her balance on a beginner slope and landed on outstretched hands; she was wearing her pole straps at the time. She has no history of prior thumb injuries and is right-hand dominant.

The patient has some mild swelling and discoloration around her first metacarpophalangeal (MCP) joint, and tenderness is noted on the ulnar side of the thumb. Although she has full active range of motion, opposition movements cause her pain. The emergency physician orders x-rays of the patient’s thumb.

■ **CASE THREE**

A 25-year-old man arrives via ambulance after a snowboarding accident at a local terrain park. He explains that he lost his balance and fell after landing a large jump. He complains of ankle pain and is having difficulty bearing weight.

Mild swelling of the lateral ankle is noted, but there is no bruising. Palpation reveals tenderness of the lateral ankle and lateral malleolus without crepitus. There is no pain at the proximal fibula or base of the fifth metatarsal. The patient is able to plantar flex and dorsiflex his ankle with some discomfort. His ankle strength and sensation are intact. Suspecting a fracture, the clinician orders x-rays.

**CRITICAL DECISION**

What injuries and mechanisms should be suspected when managing skiers and snowboarders?

Most snow-sport injuries are traumatic, the result of moving at a high rate of speed on firm, slippery terrain while surrounded by other people and obstacles. Falls account for 75% to 85% of injuries, collisions cause 11% to 20%, and lift-related incidents prompt 2% to 9% of winter sport-related emergency department visits.²

Many variables affect injury rates, including ability, age, gender, physical fitness, and snow conditions. Patients younger than 20 years and those older than 40 years are at greatest risk.³ While beginners experience injuries three times more often than expert skiers and snowboarders, their injuries tend to be less severe. Experts, who typically move at higher speeds, are far more likely to sustain head injuries, fractures, and high-grade ligament sprains. Hard-packed snow generally yields a greater number of high-speed and impact injuries than powder and heavy snow.

Other factors that predispose patients to accidents include:
- Time skiing/snowboarding without rest
- Skiing/snowboarding above one’s ability level
- Improper or faulty equipment
- An inadequate adjustment to altitude
- Dehydration or fatigue
- Skiing/snowboarding off trail or in closed areas
- Failure to observe posted warning signs

Skiers are prone to injuries that involve the lower extremities, while snowboarders are more apt to sustain upper-extremity trauma. Knee injuries are the most common ski-related complaints, followed by trauma to the head, face, shoulder, and thumb.¹ Snowboarders are most inclined to injure their wrists, shoulders, knees, heads, faces, and ankles.⁴ Although serious splenic injuries are rare, they occur more frequently in snowboarders than they do in skiers.⁵

Traumatic brain injuries, ranging from concussions to intracranial hemorrhages, are common in both skiers and snowboarders (7.2%-17.9%) and are the most common cause of death and serious injury among both.¹⁶ Chest trauma (eg, rib fractures, pneumothoraces, hemothoraces) and spinal injuries also occur.⁷ Ninety-five percent of snow sport-related thoracic and lumbar spinal injuries involve compression fractures, spinous process fractures, or transverse process fractures. In such cases, neurological sequelae are rare.⁸
rupture will disappear when the knee is placed in 30 degrees of flexion.

The mechanism responsible for most MCL injuries is valgus stress placed on the knee during a fall. These injuries are especially common in beginners, who often spend considerable time skiing in a wedge position, with their knees in a valgus position and their hips and knees internally rotated. On examination, these patients complain of medial knee pain; there is tenderness to palpation over the far medial knee joint and increased pain when valgus stress is applied. Grade II and III sprains are accompanied by a laxity of the ligament when valgus stress is applied. Importantly, the laxity of the affected limb should be compared to the contralateral, uninjured side, as some patients inherently have greater ligamentous laxity.

Between 23% and 55% of skiing-related meniscal tears are associated with ACL ruptures.9,13 Lateral meniscal injuries accompany between 43% and 81% of ACL and MCL tears and are five times more common than coincident medial meniscal tears in skiers with acute ACL insufficiency.9,11,13 These “shearing” injuries are sustained when the tibia rotates on the femur. The diagnosis of an ACL injury occurs when a skier loses balance and transfers weight over the back of the ski. The hips drop below the knees and the uphill arm falls backward. The uphill ski becomes unweighted, placing pressure on the inside edge of the downhill ski, and the upper body rotates to face the downhill ski, exerting an internal rotation force on the tibia.

Clinical Clues
A skier with an ACL injury may report feeling or hearing a “pop” followed by a sensation of pain. Although the pain diminishes rapidly, the affected knee will feel unstable when the patient attempts to stand or walk. Effusion develops shortly thereafter, and with it, the pain returns. The Lachman test, in which the examiner stabilizes the patient’s femur with one hand and pulls and pushes the tibia anteriorly with the other, is the most sensitive (80%-99%) and specific (95%) method for detecting ACL ruptures.

Because the ACL is a primary medial stabilizer, increased excursion may be noted when varus and valgus stress is applied to the knee in full extension. This finding should not be misinterpreted as a sign of trauma to the MCL or LCL, which can be identified by tenderness with palpation over the ligaments and painful laxity with the application of varus or valgus stress in full extension and 30% of flexion. The increased excursion caused by an ACL rupture will disappear when the knee is placed in 30 degrees of flexion.

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FIGURE 1. Phantom Foot Mechanism
This ACL injury occurs when a skier loses balance and transfers weight over the back of the ski. The hips drop below the knees and the uphill arm falls backward. The uphill ski becomes unweighted, placing pressure on the inside edge of the downhill ski, and the upper body rotates to face the downhill ski, exerting an internal rotation force on the tibia.

FIGURE 2. Valgus-External Rotation Mechanism
These injuries are caused when the skier falls forward, catching the inner edge of the ski tip on snow.

FIGURE 3. Boot-Induced Anterior Drawer Mechanism
With this mechanism, a skier lands from a jump, and the tails of the skis strike the snow first, which forces the elevated ski tips downward. The boot applies a passive anterior drawer load to the tibia.
can be difficult to observe during the physical examination, unless the patient presents with a knee that is locked (a complication of a bucket-handle tear, in which a portion of the meniscus has flipped into the joint).

Patients typically develop an effusion within hours of injury. The McMurray maneuver, in which a varus force is applied to an internally rotated leg (lateral meniscus) as the knee is moved from flexion to extension and valgus force is applied to an externally rotated leg (medial meniscus) as the knee is moved from flexion to extension, may be attempted. However, the test can be difficult to perform in a painful, swollen limb. The test is considered positive when a palpable or audible “clunk” can be appreciated when the knee is moved from flexion to extension. Suspicion can be confirmed by an outpatient MRI.

Any skier who presents with knee pain should undergo x-rays in the emergency department (anteroposterior [AP], lateral, and tunnel views). A sunrise view may be helpful if a patellar pathology is suspected. The films should be studied for evidence of a tibial plateau or Segond fracture (Figure 4). Segond fractures, which represent an avulsion of the anterolateral ligament of the knee, appear as small, cortical avulsion fractures lateral to the proximal tibia.

Although uncommon, Segond fractures are pathognomonic for an ACL injury in adults and likely represent a significant varus stress with internal rotation of the tibia with respect to the femur. In addition, Segond fractures are associated with a high coincidence of medial meniscal tears. A reverse Segond fracture, or an avulsion fragment medial to the proximal tibia (where the deep capsular component of the MCL is attached), frequently indicates trauma to the PCL, MCL, or medial meniscus and is typically the result of a high-energy valgus or external rotation mechanism.

It is also important to closely study the tibial spines of any patient with a suspected ACL or PCL rupture. Tibial spine avulsions, rare injuries in which the ligament remains intact but the bone is fractured at its tibial attachment, require knee immobilization and a prompt surgical consultation. All but the most minimally displaced of these fractures are managed surgically.

Tibial plateau injuries are sustained via the same mechanisms that precipitate ligamentous injuries of the knee. Clinicians should maintain a high suspicion for these diagnoses when assessing x-rays; a CT scan should be seriously considered if a displaced, intra-articular tibial plateau fracture is suspected but not appreciated or fully assessed on plain film. Significant knee injuries should be promptly evaluated with outpatient MRI imaging to assess for ligamentous, meniscal, and bony trauma.

**Management and Disposition**

Ambulation should be tested prior to discharge, and patients who can walk unassisted should generally be allowed to do so. The placement of a knee immobilizer should be avoided whenever possible; these devices can significantly delay surgical management and hinder rehabilitation by promoting muscle atrophy and reducing range of motion in the affected limb. Exceptions to this rule include quadriceps and patellar tendon ruptures, displaced tibial plateau fractures, tibial spine avulsion fractures, patellar fractures or dislocations, and knee dislocations. In these instances, the knee should be immobilized in extension and the patient should refrain from bearing weight. An immobilizer may also be considered for traumatic knee injuries in children, who sometimes require more aggressive bracing for a comfortable and safe discharge. Pediatric patients are more likely to regain strength and range of motion post-injury than their adult counterparts.

Any patient with one of the above indications for a knee immobilizer warrants urgent or emergent orthopedic management, and orthopedics should be consulted prior to emergency department discharge to determine the appropriate disposition and follow-up plan. If a knee immobilizer is not indicated, but the pain is unbearable or the knee is too unstable for the patient to walk unassisted, a hinged knee brace and/or crutches can be supplied and the patient can be instructed to bear weight as tolerated.

Rehabilitation should be initiated upon discharge from the emergency department.
There is a theoretical concern that placing significant valgus stress on the MCP joint during ligamentous stability testing could create a Stener lesion where one did not previously exist. In practice, however, a relatively gentle examination is unlikely to cause significant additional damage or increase the complexity of the probable impending surgical repair.

The differential diagnosis of a skiing-related injury to the base of the thumb includes a Bennett fracture, Rolando fracture, and scaphoid fracture. Four-view x-rays of the hand (AP, lateral, and oblique views) should be obtained. Dedicated wrist films, including a scaphoid view, can be obtained if a scaphoid fracture is suspected. In addition, the x-rays should be studied closely for evidence of an avulsion fracture of the distal attachment of the UCL. Stress views can help clarify the degree of instability at the first MCP joint. Unstable grade III injuries require an outpatient MRI for further evaluation and possible surgical planning. In the hands of an experienced clinician, an ultrasound evaluation can also be effectively used to assess for a UCL rupture.

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**Evaluation and Management**

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Patient should receive close orthopedic follow-up. The interphalangeal joint should be left free to preserve optimal function and avoid stiffness. Patients should be advised against removing the splint until definitive care is sought. Grade I and II injuries can generally be treated nonoperatively, while grade III injuries (with or without a Stener lesion) typically require surgical repair. 17

**CRITICAL DECISION**

What unique factors should be considered when evaluating a snow sport–related shoulder injury?

Falls are the most common cause of shoulder trauma. The most common mechanisms are direct blows, eccentric muscle contractions with shoulder abduction and external rotation, and an axial load on an outstretched arm.18

Rotator cuff tears, anterior glenohumeral dislocations, acromioclavicular (AC) joint sprains, and clavicle fractures are the most common shoulder injuries sustained by skiers.18 Less common shoulder injuries include greater tuberosity fractures, trapezius strains, proximal humerus fractures, biceps strains, glenoid fractures, scapula fractures, humeral head fractures, sternoclavicular separations, and acromial fractures.

AC separations are the most common snowboarding-related shoulder injuries, followed by glenohumeral joint dislocations, clavicle fractures, anterior and posterior sternoclavicular dislocations, rotator cuff strains, and proximal humerus fractures.18

### Shoulder Dislocations

Anterior shoulder dislocations, which far outnumber posterior dislocations, most commonly occur during falls in which the shoulder is abducted and externally rotated. These injuries can also occur when a skier or snowboarder catches an arm or ski pole on a stationary object while the remainder of the body continues its forward momentum. In snowboarders, anterior shoulder dislocations frequently result from jumps, aerial maneuvers, and falls backward.19 Luxatio erecta humeri is a rare form of dislocation in which the humeral head is displaced inferiorly and the arm becomes locked in a flexed, overhead position.

Rotator cuff tears are closely associated with glenohumeral dislocations and greater tuberosity fractures. A skier older than 40 years who presents with a shoulder dislocation has a 35% risk of a concomitant rotator cuff tear. This risk increases to 40% in patients with greater tuberosity fractures and to 100% in those with neurological findings involving the axillary nerve.9,18 Weakness with resisted shoulder abduction in the scapular plane suggests a rotator cuff tear. These presentations are often delayed, however; as such, it is important to elicit a good history regarding the onset of symptoms.

Patients with an anterior shoulder dislocation present with pain and decreased passive and active range of motion in the affected limb. The shoulder will have a squared-off appearance ([Figure 8](#)), and there may be a palpable mass indicating the displaced humeral head. The neurovascular examination may reveal numbness in the axillary nerve distribution over the lateral arm.

### Table 1. Rockwood Classification of AC Injuries

<table>
<thead>
<tr>
<th>Type</th>
<th>AC Ligaments</th>
<th>CC Ligaments</th>
<th>Deltopectoral Fascia</th>
<th>CC Interspace Difference*</th>
<th>Radiographic Appearance of an AC Joint</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Sprained</td>
<td>Intact</td>
<td>Intact</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>II</td>
<td>Disrupted</td>
<td>Sprained</td>
<td>Intact</td>
<td>&lt;25%</td>
<td>Widened</td>
</tr>
<tr>
<td></td>
<td>Disrupted</td>
<td>Disrupted</td>
<td></td>
<td>25% to 100%</td>
<td>Widened</td>
</tr>
<tr>
<td>IV</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Increased</td>
<td>Clavicle posteriorly displaced (axillary)</td>
</tr>
<tr>
<td></td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>100% to 300%</td>
<td>N/A†</td>
</tr>
<tr>
<td>VI</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Disrupted</td>
<td>Decreased</td>
<td>Clavicle displaced inferior to coracoid</td>
</tr>
</tbody>
</table>

*Distance between the superior aspect of the coracoid process and the inferior aspect of the clavicle, as measured radiographically.
†N/A = information unavailable
Prereduction x-rays (including AP, true AP, scapular Y, and axillary views) should be obtained to confirm the dislocation and identify alternative or concomitant pathologies. X-rays can help confirm the position of the humeral head in relation to the glenoid fossa and enable the identification of fractures. A humeral neck fracture that accompanies a shoulder dislocation can make closed reduction difficult or impossible. Greater tuberosity fractures are often seen in patients with traumatic shoulder dislocations and can be identified by prereduction plain films. In rare cases, this fragment interferes with reduction attempts.

Plain x-rays can also identify alternative diagnoses such as AC joint sprains, distal clavicle fractures, and isolated humeral neck fractures. If a dislocation is suspected clinically but is not identified on x-rays, the clinician should look for subtle signs of a posterior dislocation (eg, a light bulb sign) (Figure 9). The axillary view can also help reveal these injuries.

Once a shoulder dislocation has been confirmed, reduction should be attempted promptly. The patient’s pain level and the difficulty of the procedure increase commensurate with the amount of time since the injury. An isolated, uncomplicated shoulder dislocation can be successfully reduced using one of many described reduction techniques. Most anterior glenohumeral dislocations can be reduced without sedation. The value of post-reduction films is controversial, and clinicians may be able to accurately assess these injuries clinically. In addition, a fracture that is identified after reduction was almost certainly present before the reduction attempt and is unlikely to alter decisions regarding the pursuit of surgical repair.

Following reduction, patients should be discharged in a sling and instructed to avoid performing overhead activities and abducting, externally rotating, or extending the shoulder. However, they should also be encouraged to begin gentle, passive range-of-motion exercises (eg, pendulum swings) as soon as can be tolerated.

Shoulder Separations

Snowboarding-related AC separations most often result from falls in which the patient lands directly on the lateral acromion. When managing a patient who has been injured in a snowboarding accident, the shoulders should be carefully inspected by palpating the joints and bony landmarks, noting any deformities and identifying the point of maximal tenderness. Range-of-motion testing should be attempted; however, due to the underlying pathology or secondary to pain, most shoulder injuries will be accompanied by a decreased range of motion. A thorough neurovascular examination should be performed.

The AC ligaments are primarily responsible for the horizontal stability of the clavicle in relation to the acromion, while the coracoclavicular (CC) ligaments control vertical stability. Any trauma to these structures constitutes an AC sprain, the severity of which can be assessed using a variety of diagnostic tools. The Rockwood classification system (Table 1), the most widely used scale, can help facilitate communication between the emergency physician and the orthopedist.
Type I injuries involve partial tearing of the AC ligament. Type II sprains are defined by a complete tearing of the AC ligament and partial disruption of the CC ligament, with a slight elevation of the distal clavicle in relation to the acromion. Type III sprains are accompanied by a 25% to 100% elevation of the distal end of the clavicle in relation to the coracoid, as the CC ligaments and the AC ligament are completely disrupted.

In types IV through VI, the CC and AC ligaments are completely disrupted and the trapezius and deltoid are detached from the distal half of the clavicle. In type IV injuries, the trapezius is impaled by the distal clavicle. Type V sprains are characterized by 100% to 300% superior displacement of the distal clavicle in relation to the coracoid. In type VI injuries, the distal clavicle is depressed into the subcoracoid space.

X-rays should be performed on any patient with a skiing- or snowboarding-related shoulder injury. Weighted views, in which the patient holds a 10- to 15-pound dumbbell in the affected hand, can help verify any instabilities related to a suspected AC sprain. A cross-body adduction film, in which the hand on the affected side is reached across to grasp the contralateral shoulder, can accentuate the elevation of the clavicle in cases of CC ligament disruption. AC separations warrant orthopedic or sports medicine follow-up to ensure appropriate healing without functional impairment. Patients with Rockwood type I to III fractures, who generally can be managed nonoperatively, should be placed in a sling for comfort and encouraged to mobilize the injured shoulder as tolerated to prevent stiffness. Shoulder pendulum exercises, which can often be initiated within a week, should be demonstrated to the patient prior to discharge.

Type IV to VI injuries warrant an orthopedic consultation prior to discharge; these presentations are associated with significant soft-tissue damage, and urgent surgical repair may be required. In some cases, surgical repair is warranted for unstable type III injuries, particularly in patients with pain or disability that persists remote from the initial trauma.

**CASE RESOLUTIONS**

**CASE ONE**

X-rays of the skier’s injured knee revealed a small avulsion fragment lateral and superior to the fibular head, which was identified as a Segond fracture. The emergency physician suspected an ACL rupture based on the mechanism of injury, rapid development of an effusion, instability, positive Lachman test, increased varus-valgus excursion of the knee in extension, and presence of a Segond fracture.

The patient was able to walk unassisted in the emergency department and did not require a brace or crutches. He was advised to take it slow, while contracting his quadriceps and hamstrings with each step to stabilize the knee, and was urged to follow up with an orthopedist in the next week to discuss management options. The clinician also showed him how to perform quadriceps sets and heel-slide exercises to maintain his muscle mass and stave off atrophy. In addition, he encouraged the patient to work hard on regaining full flexion and extension of the knee by performing aggressive range-of-motion exercises multiple times per day.

**CASE TWO**

X-rays of the patient’s thumb revealed no signs of a fracture, an avulsion fragment, or subluxation. Suspecting a rupture of the UCL, the clinician consulted with the hand surgeon on call, who suggested performing a valgus stress maneuver on the MCP joint. The test revealed considerable valgus angulation without a ligamentous end point.

The clinician diagnosed an unstable grade III UCL injury and placed the thumb in a spica splint. The patient was warned about the risks of long-term pain and disability and was advised to follow up with a hand surgeon in 5 to 7 days.

**CASE THREE**

The snowboarder’s plain films revealed soft-tissue swelling without any evidence of a fracture. The alignment of the osseous structures was normal. Given the mechanism of injury and ongoing exquisite tenderness over the lateral aspect of the ankle, the emergency physician obtained a CT scan, which revealed a nondisplaced LTFP. The patient was placed in a splint, discouraged from bearing weight, and advised to seek orthopedic follow-up care.

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**Pearls**

- Avoid the use of a knee immobilizer, unless it is truly indicated.
- Initiate physical therapy exercises in the emergency department for knee injuries that do not require immobilization. Advise patients to begin aggressive range-of-motion and strength-preserving exercises immediately upon discharge.
- Ensure prompt hand surgery follow-up care for any patient with an injury of any grade to the UCL of the thumb. Surgery may be the only way to avoid long-term pain and functional compromise.
- Maintain a high index of suspicion for an LTFP in any snowboarder with an appropriate mechanism of injury. Additional imaging may be warranted, even if the initial x-rays are negative.
CRITICAL DECISION

What differential diagnoses should be considered when evaluating a snowboarder with an ankle injury?

Lateral talar process fractures (LTPFs), which account for 32% of snowboarding-related ankle fractures, are nearly exclusive to snowboarding.9 Prior to the advent of the sport, these injuries accounted for only 0.86% of reported ankle fractures and were typically associated with high-energy mechanisms such as motor vehicle accidents and falls from height.

In snowboarders, LTPFs (Figure 10) typically involve a high-velocity impact and significant axial loading (eg, landing a jump). It is believed that dorsiflexion, inversion, and possibly external rotation forces also play a role.22 A high level of suspicion should be maintained for these injuries in any patient with a convincing mechanism.23

The physical examination will reveal tenderness over the anterolateral ankle, including the lateral process, lateral malleolus, anterior talofibular ligament, and sinus tarsi.22 Trauma to the lateral talar process is notoriously difficult to diagnose, and clinical clues can be subtle. Many of these cases are initially misdiagnosed as ankle sprains, and as many as 50% are missed on initial radiography.9

A high index of suspicion should be maintained when managing patients with normal x-rays but a concerning history or examination findings, and there should be a low threshold for initiating CT scans to definitively diagnose or rule out these fractures. MRI should not be the first-line imaging modality for evaluating such cases, as it can fail to distinguish between small avulsion fractures of the talus and adjacent ligamentous injuries.9

Summary

Despite the popularity of these winter pastimes for people of all ages, snow sports carry an element of risk. Snowboarders frequently suffer from injuries to the upper extremities, feet, ankles, head, and shoulders; however, snowboarding appears to be gentler on the knees than skiing. Knee trauma is the most common injury in skiers, followed by trauma to the head, face, shoulder, and thumb.

Although many knee injuries require surgical management, there are very few indications for the placement of a knee immobilizer and enforcement of non-weight-bearing status. When possible, it is important to limit bracing, maximize weight-bearing, and initiate rehabilitation directly from the emergency department.

Without proper treatment, UCL injuries of the thumb can cause long-term morbidity. It is imperative to manage these cases with a thorough physical examination, appropriate diagnostic imaging, proper bracing, and a prompt hand surgery referral.

Skiing- and snowboarding-related shoulder injuries should be managed with early mobilization and prompt follow-up care to minimize the recovery time and maximize long-term function. LTPFs are well-described, albeit uncommon, injuries that are almost exclusively associated with snowboarding. Misdiagnosing these injuries as ankle sprains can result in chronic pain and loss of function. A CT scan is the imaging study of choice in any patient with normal x-rays but a suspicious mechanism and physical examination findings.

REFERENCES