

The dangers of snowboarding

A 9-year prospective comparison of snowboarding and skiing injuries

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ABSTRACT – We studied 2,552 snowboarding injuries and 5048 skiing injuries sustained during 1988–97. The number of snowboarding injuries had been increasing year by year and was 6 times as many as skiing injuries (2.0 versus 0.35 per 1,000 visits). The types of snowboarding injuries included fractures (39%), lacerations (21%), dislocations (17%), and contusions (15%). Upper extremity injuries were more frequent than those in the lower extremity in snowboarders. The commonest fractures involved the radius (48%), clavicle (11%), humerus (11%), and ulna (7–8%). The shoulder joint was most commonly dislocated (55%) followed by the elbow (27%), acromioclavicular (10%), finger (4%), and hip joints. In snowboarding accidents, the rates of fractures and dislocations were higher than those in skiing in almost every part of the body. Severe injuries were commoner in snowboarding accidents. We recommend the use of appropriate equipment and instructions for beginners to prevent such injuries.

Snowboarding has become increasingly popular over the past several years and was made an Olympic event in the 1998 Nagano Olympics. Snowboarding injuries are increasing. We have evaluated 7,600 cases of skiing and snowboarding injuries in the Okumino skiing area, Gifu prefecture, Japan.

We analyzed differences between skiing and snowboarding injuries with regard to type of injury, anatomical distribution, and various characteristics of these accidents.

Patients and methods

About 1.6 million skiers and snowboarders visit the Okumino region every year. Almost all those who sustained serious injuries in the Okumino skiing area attended Sumi Hospital. The injured persons chose this hospital because it is the closest to the skiing slopes and it is the only emergency hospital in this area.

7,600 patients (2,552 snowboarding injuries and 5,048 skiing injuries) were treated at Sumi Hospital from November 1988 to April 1997. We used questionnaires to collect the data from the patients and required the following information: name, age,

Number of patients

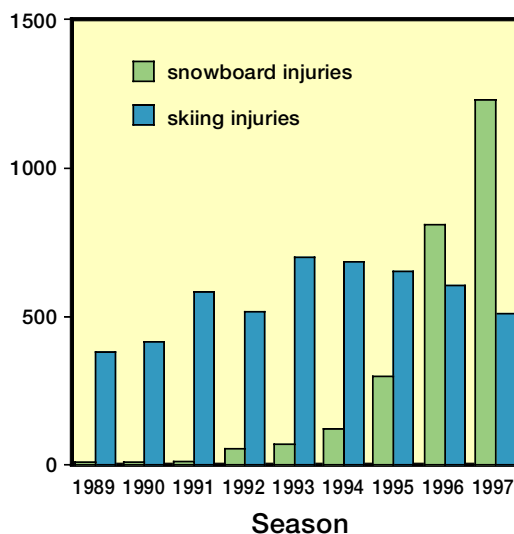


Table 1. The patient's skill, percentages

Proficiency level	Snowboarding n 1776	Skiing n 4895
Novice	13	12
Beginner (1–5 times)	37	35
Intermediate (6–10 times)	43	43
Skillful (10 times or more)	8.1	10

Table 2. Type of injuries

Types of injuries	Snowboarding n (%)	Skiing n (%)
Fracture	993 (39)	1116 (22)
Laceration	527 (21)	1575 (32)
Dislocation	429 (17)	541 (11)
Contusion	388 (15)	689 (14)
Sprain	237 (9)	814 (16)
Head injury	203 (8)	513 (10)
Upper/lower limbs (%)	55/17	26/40

sex, location and the slope grade, snow condition, experience and the mode of injury.

The total number of snowboarders and skiers who visited the Okumino region was reckoned by the number of tickets issued at Okumino skiing slopes separately (snowboarders need a special ticket in this area). The injury rate was calculated by dividing the number of patients by the total. All statistical analyses were made using the chi-square test.

Results

During 10 seasons (1988–97), 7,600 patients with skiing and snowboarding injuries were admitted to our hospital. The injury rates of snowboarding and skiing were 2.03 and 0.35 injuries per 1000 visits, respectively. The average age of patients with snowboarding injuries was 23 (11–48) years, but that of skiers was 23 (3–73) years. 70% of the patients were male. Snowboarders were apt to sustain injuries on gentle slopes, while skiers were more likely to sustain them on steep slopes and at higher speeds. Snowboarding injuries were common on frozen slopes, while skiing injuries were likely to occur on fresh or damp snow. We

Table 3. Location of fractures

Part of body	Snowboarding			Skiing		
	n	(%)	Rate ratio	n	(%)	Rate ratio
<i>Upper limb</i>						
Radius	473	(48) ^a	38	56	(5.0)	0.4
Ulna	78	(7.8) ^a	6.1	8	(0.7)	0.05
Humerus	107	(11)	8.5	86	(7.7)	0.6
Clavicle	113	(11)	8.9	168	(15)	1.2
<i>Lower limb</i>						
Tibia	43	(4.3)	3.4	363	(33) ^a	2.5
Fibula	48	(4.8)	3.8	194	(17) ^a	1.3
Femur	13	(1.3)	1.0	56	(5.0) ^a	0.4
<i>Trunk</i>						
Vertebra	63	(6.3)	5.0	52	(4.6)	0.4
Pelvis	12	(1.2)	0.9	17	(1.5)	0.1
Rib	43	(4.3)	3.4	55	(4.9)	0.4
Rate ratio per 100,000 visits						
^a P < 0.0001 (difference between snowboarding and skiing injuries)						

found no discrepancy in proficiency between snowboarders and skiers. Almost all snowboarding and skiing injuries occurred among novices (5 times or less: 47%, 10 times or less: 90%) (Table 1). 82% of injured snowboarders had received no professional instruction, and 94% of them did not use protective equipment.

The commonest snowboarding injuries were fractures (39%), followed by lacerations (21%), dislocations (17%), and contusions (15%). The most frequent skiing injuries were lacerations (32%), followed by fractures (22%), and sprain (16%). In snowboarding, injuries were mainly affected in upper limbs (55%), while skiing injuries mainly affected the lower limbs (40%) (Table 2).

The upper limb was the commonest site of snowboarding fractures with a rate of 77%. The radius was most likely to be fractured (47% of snowboarding fractures), followed by the clavicle, humerus, and ulna. In skiing, lower limb fractures were commoner, with a rate of 56%. The rate of fractures in snowboarding was higher than in skiing in almost all parts of the body (Table 3).

Both snowboarders and skiers were most likely to damage their shoulder joints. Elbow joint dislocations were the next commonest among snowboarders (27%), while skiers were unlikely to dis-

Table 4. Location of dislocations

Part of body	Snowboarding			Skiing		
	n	(%)	Rate ratio	n	(%)	Rate ratio
Shoulder	234	(55)	18.6	427	(79) ^a	3.0
Elbow	116	(27) ^a	9.2	14	(2.6)	0.1
Acromioclavicle	43	(10) ^a	3.4	42	(7.7)	0.3
Finger	15	(3.5)	1.2	44	(8.1) ^a	0.3
Hip	7	(1.6)	0.5	6	(1.1)	0.04
Rate ratio per 100,000 visits						
^a P < 0.0001 (difference between snowboarding and skiing injuries)						

locate their elbow. Generally, the rate of dislocations in snowboarding was higher than in skiing in all parts of the body (Table 4).

Most injuries resulted from a fall, followed by collisions. However, jumping was the most important cause of injury in snowboarding, especially among men (19%). Men tended to be injured on steeper slopes and at higher speeds. On the contrary, women sustained injuries on gentler slopes and at lower speeds, especially in snowboarding.

Discussion

The number of snowboarding injuries has steadily increased in Japan, particularly since 1996. Biasca et al. (1995) reported that the injury rate of snowboarders is higher than that of skiers, while Fischler and Röhliberger (1996) reported a lower rate.

Shealy (1993) stated that when the risk of injury is related to the ability to ski/snowboard, the risks are the same in both sports. Most injuries occurred among skiers and snowboarders in those with the least experiences, but the true risk including uninjured snowboarders and skiers can not be judged by Shealy's study.

Fractures were the most frequent snowboarding injuries in our study, followed by lacerations, dislocations, contusions and sprains. This differs from the results of Bladin et al. (1993) and Bladin and McCrony (1995), who found sprains to be the commonest followed by fractures and contusions. An explanation may be that skiers and snowboarders

who suffered only slight injuries, such as sprains, went home without being examined in our hospital. As Abu-Laban (1991) reported that lacerations were not common in snowboarding, but were the second commonest injury in our study, especially of the head (69%). When snowboarders fall or collide, they are apt to hit their head on the edge of the snowboard or on hard-packed snow.

In the series reported by Sasaki et al. (1999), the upper extremity was more commonly affected in snowboarding injuries, but in that reported by Oberthaler et al. (1995), the lower extremity was more commonly affected. In this study, the injury rate of upper limbs was 3 times higher than that of lower limbs. Distal radial bone fracture was the commonest type of fracture in snowboarding injuries. This agrees with studies by Calle and Evans (1995) and Zollinger et al. (1994). The reason may be that when snowboarders fall, they tend to put their hand on the ground in the anteroposterior position because both boots are fixed with non-releasable bindings. The lack of ski poles may result in frequent falls onto a hyperextended wrist. When the snowboarders fell on a hand behind their body, the rate of double fractures, two-part fractures and comminuted fractures tended to be higher in our patients.

In skiing injuries, the commonest dislocation was of the shoulder joint, followed by the finger joint, and acromioclavicular joints. Elbow joint dislocations occurred mainly in snowboarding injuries. We assume that it is uncommon for skiers to hit their elbows violently, because they use their ski poles to help soften the fall.

According to Laporte et al. (1999), snowboarding injuries showed no laterality in the upper extremities., but in our study, injuries of the upper extremities, such as humeral fractures, shoulder and elbow dislocations, primarily affected the left side. We found no real laterality in skiing injuries. That which we observed is probably because snowboarders tend to ride down the slope in a regular style (with the left side in front), so they tend to fall on their left shoulder.

Severe injuries were commoner in snowboarding, especially injuries of the head, as reported by Prall et al. (1995). Our study included 5 cases of subdural hemorrhage, one of which was fatal in a 26-year-old woman. She hit the back of her head

several times on hard-packed snow while snowboarding for the first time on a gentle slope which made the snowboard fall in an unexpected direction. When the back edge catches on a bump, the snowboarder falls in an unexpected direction. We call it "the back edge phenomenon".

Snowboarding has become a popular sport with young people. Many snowboarders attempt acrobatic maneuvers. Almost all patients with snowboarding injuries were novices who had not received any expert instruction and did not use any protective equipment. Now, the dangers of snowboarding are becoming known, and protectors and releasable bindings are becoming more widely available. We urge snowboarders to recognize the risks of snowboarding. We recommend more instruction from professional instructors, using protections for the head, wrists, knees, and buttocks, snowboarding in good snow conditions and an insurance policy card.

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