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CASE REPORT

Avalanche Survival After Rescue With the RECCO Rescue System: A Case Report

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We report a case of survival of a completely buried avalanche victim after being located with the radar-based RECCO Rescue System. In the winter of 2015, 2 off-piste skiers were completely buried in an avalanche near the secured ski area in Baqueira Beret, Spain. The first victim was located with the RECCO Rescue System in less than 35 minutes and was alive and conscious at extrication. This system emits radio waves and requires a specific reflector. It is a portable device that is used by more than 600 rescue organizations worldwide, especially in secured ski areas. The device should be brought to the avalanche site together with electronic avalanche transceivers, a probing team, and avalanche dogs. In the hands of experienced professionals, the device may allow rapid location of victims not carrying an electronic avalanche transceiver. Although it is not the first successful extrication of a victim with the RECCO Rescue System, it is the first case published in the medical literature and is intended to encourage data collection and to increase our understanding of the effectiveness of this device in avalanche rescue.

Key words: avalanche, RECCO Rescue System, safety equipment, backcountry skiing, organized avalanche rescue

Introduction

Approximately 150 persons die annually in North America and Europe in avalanches.[1] If a winter recreationist is caught in an avalanche, the overall survival rate is approximately 46%.[2] Rapid extrication is the most important factor to increase a victim's chance of survival as survival probability continues to decrease every minute.[2,3]

Previous studies have shown that avalanche transceivers and standard rescue equipment (transceiver, probe, and shovel) increase the chance of survival by reducing the time of extrication.[4,5] In a sample of completely buried avalanche victims, those located via avalanche transceiver had a relative reduction in mortality of 74% (95% confidence interval, 52% to 86%) compared with those located without a transceiver.[4] In an in-field survey of backcountry users, only 75% of persons carried an avalanche transceiver and 66% carried standard rescue equipment.[6] Another study reported that 44% of completely buried avalanche victims did not have a transceiver.[5] Off-piste skiers, who commonly use mechanized support for ascent and who descend outside the secured ski area, are less frequently equipped with rescue devices.[5,7] Therefore, a device that could detect buried victims who are not carrying a transceiver is an attractive rescue option.

The RECCO Rescue System is used by more than 600 rescue organizations worldwide (especially in ski areas) and is described in textbooks on rescue and wilderness medicine.[8] It is considered standard rescue equipment in some areas together with transceivers, a probing team, and avalanche dogs. However, medical literature about this device is lacking in indexed databases. In contrast, there are several articles about the use and effectiveness of avalanche transceivers and avalanche airbags. This limits our understanding of its use, effectiveness, and impact on survival. We present a case of survival of an avalanche victim after being located by the RECCO Rescue System and discuss the advantages and limitations of this device in avalanche rescue.

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Case Report

On February 2, 2015, 4 skiers left the secured ski area in Baqueira Beret, Spain (2300 m). During the descent, the group triggered an avalanche (60 m wide, 80 m long, 1 m [range, 0.6–1.2 m] average depth), which completely buried 2 of them. Neither skier was equipped with a transceiver, shovel, or probe. A third companion (who was not buried) was able to immediately call the rescue service, and after 3 minutes, the first ski patrollers arrived at the avalanche site. They started to search for the 2 buried victims with transceivers and the RECCO detector in a 10-m-wide search strip. After 6 minutes, the ski patroller using the RECCO detector received a weak signal. It was later determined that this signal was from a mobile phone carried by the victim in his chest pocket. The location of the victim (male, 45 years old, in supine position) was confirmed by probing and he was extricated alive, uninjured, and conscious after less than 35 minutes of burial from a depth of 1.3 to 1.5 m.

The RECCO was also used to search for the second victim, but no signal was detected. After 15 to 20 minutes, a probing team found the second victim (female, 40 years old), and she was extricated alive and conscious after 45 to 50 minutes from a depth of 1.3 m, not far from the first victim. The second victim had mild hypothermia (grade 1) and several contusions. Both victims were brought to a local hospital by helicopter. They survived without any neurological deficits.

In total, 17 ski patrollers, 5 firefighters, and 1 helicopter were involved in this rescue.

Discussion

Survival of the first victim can probably be attributed to fast extrication. Even without the RECCO Rescue System, it is possible that the victim would have been located rapidly via the probing line and extricated alive. This is an example, though, in which searching with the RECCO Rescue System was faster than probing. The ski patrollers were able to arrive on site quickly because of the vicinity of the accident site to the patrolled ski area. In general, victims rescued by organized rescue teams have a lower probability of survival than victims rescued by companions because of the time required to arrive on site (mean arrival time is >40 minutes).[9] The second victim probably had a patent airway to survive complete burial longer than 35 minutes.[3]

The RECCO Rescue System consists of 2 parts: 1) a lightweight (<1 kg) portable detector, and 2) a small, flat capsule reflector (Figure). The detector is carried to the avalanche site by the rescue team or used by rescuers on a helicopter. The reflector is worn by the recreationist and has been integrated into outerwear, helmets, protection gear, and boots of several outdoor clothing brands. The reflector works continuously without a battery.[8] The detector transmits a highly directional radar signal on the 800-MHz frequency band that is received by the reflector, which doubles the frequency of the received signal and reflects it toward the detector.

The detector can also identify a signal reflected from other electronic devices such as cell phones, cameras, radios, and avalanche transceivers. In this case, neither of the buried skiers was wearing a RECCO reflector. The mobile phone of the first victim was oriented toward the surface of the avalanche and could be detected. Had the phone been oriented toward the ground, the signal might have been too weak to be detected. These electronic devices (cell phones, cameras, radios, etc) are not specific for the frequency of the RECCO detector, and the reflected signal is much weaker. The producer estimates a maximum range of the detector signal of 200 m in air and 20 m in snow (using the RECCO reflector), but this is dependent on the snow conditions and may decrease in wet snow.

The RECCO Rescue System can be an adjunct to standard rescue equipment for organized rescue teams.

Figure. The RECCO Rescue System consists of a reflector (left) and a detector (right).