LESSONS FROM HISTORY

Reported Resuscitation of a Hypothermic Avalanche Victim With Assisted Ventilation in 1939

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We present a historical case of a 12-year-old boy who survived a reported avalanche burial in 1939 in the Upper Peninsula of Michigan. The boy was completely buried for at least 3 h, head down, at a depth of about 1 m. He was extricated without signs of life and likely hypothermic by his father, who took him to his home. There, the father performed assisted ventilation for 3 hours using the Schäfer method, a historical method of artificial ventilation, without any specific rewarming efforts. The boy recovered neurologically intact. This case illustrates the importance of attempting resuscitation, possibly prolonged, of victims of hypothermia, even those who are apparently dead.

Keywords: hypothermia, artificial ventilation

Introduction

On April 12, 1940, the *The Ironwood Daily Globe* newspaper in Ironwood, MI, in the Upper Peninsula of Michigan, reported that, “For rescuing his son Henry and resuscitating [sic] him by artificial respiration on March 15, 1939,” after Henry was buried in an avalanche,¹ Gust Takala was to receive a National Safety Council medal on May 18, 1940. The newspaper quoted the district engineer of the Safety Division of the Bureau of Mines as saying that “the medal is quite rare... It is awarded only in cases of electrical shock, gas asphyxiation, drowning or other accidental cases of suspended respiration and where the victim has been successfully resuscitated [sic] by the Schaefer prone pressure method...” Takala “learned his first aid work as a miner at the Eureka mine, where he is employed.”¹

Description of the case

Henry Takala was a 12-year-old boy who had been skiing with another 12-year-old boy, John Lahti. Henry skied first “over an over-hanging snow drift on a hill.”¹ As John “was going over, the drift broke off.” John “and

the drift and other quantities of snow slid down the hill covering Henry completely and John partly. John managed to brush the snow from in front of his face which permitted him to breathe.”

“The accident happened after 3 o’clock. The father discovered what had happened at 4:45 o’clock. He got John out first and then brought him to his home... at 5:50 o’clock. With the assistance of neighbors his own son was then dug out.

Henry was found with his face protected by one arm, which had also prevented immediate suffocation. Both arms were stiff from the shoulders and bent at the elbows. Their position and stiffness hindered the father in his performance of artificial respiration which he performed for three hours at his home before the boy recovered. During the three hours whenever the father stopped his first aid work, his son would stop breathing and the work would have to be resumed. It looked hopeless at the time and so the father was told by the neighbors, but he continued until the boy recovered.”¹

Further details of the rescue appeared in the original article in the *Ironwood Daily Globe* 2 days after the accident. The newspaper reported that Gust Takala “got John out first in a partly conscious condition. He was near the surface of the fallen pile of snow... Henry, who was down head first in the snow and covered by three feet [about 1 m] of it, was not taken out until 6:40

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o'clock. He was unconscious."² The paper mentioned that "today the boys are no worse for their experience. Henry feels soreness in one of his legs." The rescue was complicated because the "steep incline of the hill and sliding snow made it difficult to get the boys to the surface. The storm-blocked roads made it impossible to get a doctor quickly for Henry."²

THE SCHÄFER PRONE PRESSURE METHOD

The Schäfer prone pressure method was the standard means of artificial respiration in the United States from 1908 until about 1951, when it was replaced by the Nielsen arm lift/back pressure technique.³ The fascinating story of how the Schäfer method was adopted as the preferred method of resuscitation by the Royal Society of Medicine, the American Red Cross, and other national organizations is beyond the scope of this article. The Schäfer method involved pushing on the victim's back to force expiration (*Figure 1*).⁴ Inspiration was passive. The Nielsen method provided active inspiration and expiration. The Nielsen method was, in turn, replaced by mouth-to-mouth resuscitation, which the American Red Cross adopted in 1959.³

AVALANCHES IN MICHIGAN

Michigan's Upper Peninsula is located in one of the largest and most distinct "snowbelts" in the United States.⁵ Lake Superior, the second largest lake in the world (about the size of state of South Carolina or of Austria), sits immediately north of the peninsula and rarely freezes completely. The lake provides abundant moisture to fuel lake-effect snows, which form when cold air sweeps across warm lake water and then fall on the leeward (downwind) shores. Enhancing the snowfall are 2 mountain ranges (the Porcupines and the Huron Mountains), whose highest summits rise more than 400 m (1300 ft) above Lake Superior. Deep winter snows are

Figure 1. Schäfer prone pressure method.⁴

common. Annual total snowfalls in some areas of the Upper Peninsula can exceed 635 cm (250 in).⁵ The region has the greatest seasonal snowfall east of the Rocky Mountains.⁶ The western half of the Upper Peninsula is hilly and rugged. There are, at present, 2 sizeable ski areas within 3 km (2 mi) of where the avalanche nearly claimed young Takala.

Although many people tend to think of avalanches as a problem confined to tall mountains (eg, Rocky Mountains, Sierra Nevada, Cascades), avalanches can happen anywhere steep slopes are covered in snow. Avalanches and avalanche accidents in Michigan are rare but not unknown.⁷ One of the authors (Atkins) has uncovered reports of 6 avalanche accidents in Michigan involving the complete burials of 7 victims in both the Upper and Lower Peninsulas. Of the 7, 1 was a hunter who was killed in 1924.⁸

Discussion

Gust Takala, through his actions and persistence, saved his son's life. He performed a difficult extrication and successful resuscitation in an era before there was extensive knowledge about the resuscitation of hypothermic avalanche victims. In 1939 there were no American guidelines for the treatment of avalanche victims, hypothermic or otherwise. The original case report contains a wealth of details that leave little doubt as to its accuracy. Henry was buried deeply, likely for at least 3 hours. He recovered completely.

The duration of complete burial and the fact that Henry was unconscious suggest that he likely had a core temperature between 24 and 30°C, consistent with moderate hypothermia (core temperature 28–32°C) or severe hypothermia (core temperature <28°C).⁹ He must have been able to breathe during burial with an open airway. He must also have had a connection between his airway and the surface of the snow through which he could exchange air, or he would have died of asphyxia after such a long burial.

Although Henry appeared dead to his father at the time of extrication, he was most likely breathing spontaneously. In hypothermic subjects, breathing may be shallow and difficult to detect.⁹ There have been occasional reports of "auto-resuscitation" from cardiac arrest in hypothermia, with return of spontaneous circulation after resuscitative efforts have ceased.¹⁰ We are not aware of any cases of survival from severe hypothermia with cardiac arrest after spontaneous rewarming at room temperature. Henry's core temperature was likely at the warmer end of the 24 to 30°C range, close to 30°C, because he rewarmed passively at room temperature during 3 h of

resuscitative efforts. It is probable that his circulation was stable during resuscitation and that the Schäfer method functioned as assisted ventilation of a person who was breathing spontaneously rather than as artificial ventilation of an apneic person. It is possible that Henry would have survived without assisted ventilation. It is also conceivable that the Schäfer method provided artificial ventilation or even cardiopulmonary resuscitation.

Conclusion

Hypothermia victims may appear to be dead. They may have generalized lividity and body stiffness, with vital signs that are difficult to detect. Rescuers should attempt to resuscitate a hypothermia victim unless there is an obvious condition that is not compatible with life, such as decapitation or a completely obstructed airway. This case illustrates the importance of attempting resuscitation, possibly prolonged, of victims of accidental hypothermia, even those who are apparently dead. Don't give up until the victim is warm and dead or warm and alive!

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