MODERN MOUNTAIN RESCUE MEDICINE: TOO EXPENSIVE ?

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The costs of mountain medicine rescue in Western Europe have increased tremendously over the last decades. This increase is mainly due to a higher number of rescues with the consequent need for the availability of more emergency teams on one hand, and a more modern and sophisticated equipment and medical techniques, on the other.

Politicians, insurance companies and even health professionals have started to question the usefulness and the benefits of our actual rescue system. In response, we report a true rescue situation that may induce some reflections about the actual problem.

CASE REPORT

A group of friends, a fascinating fight of black cows on a summer camp at 2200 m of altitude, the exciting atmosphere under an apparently ever shining sun: this is the end of a beautiful summer day. At twilight the group of men decide to walk down to the valley. The mountain path winds down with sharp bends and steep slopes and finally ends in a forest. A 39-year-old man takes a shortcut without informing his friends. Suddenly, he falls and rolls down for more than 100 meters on an unstable scree-covered slope and rapidly looses conscience. After a while, he wakes up in total darkness without realizing what has happened. He is alone, lying on his back with head down. He realizes that he doesn't feel his legs anymore, and that he is unable to move them. He starts to shout desperately and after an endless time, which in reality must have been approximately an hour, his friends show up. They don't dare to touch him and immediately seek help. The family physician from the valley arrives first on the spot after wandering wearily in the steep slope of loose stones, in the black night, loaded with his emergency equipment. The helicopter brings another physician and a mountain guide with their equipment and puts them down on a safe, open spot close to the accident place. About two and a half hours after the accident occurred, the team is complete and the rescue begins.

At first, we find an agitated, disoriented man who answers clearly to our questions and breathes almost normally. His body is aching all over. He is able to move all four extremities, but the right arm has an open, bleeding fracture with a dislocated elbow. The left shin shows a large wound so that the naked bone is visible over more than 10 cm. Cardiopulmonary auscultation does not show anything alarming, but the vertebral column is diffusely painful on palpation. After stabilization of the neck, an antecubital intravenous line is inserted and bandages are put around the injured parts of the extremities. There are no signs of shock.

The patient's friends mention that there might be a forest road some hundred meters further down. Before we arrived, they apparently had thought about carrying their friend down to this road. Considering the major instability of the slope which was densely covered with stems, and visibility is poor. We ask the pilot to hoist us out despite the hazy night and the forest environment. After his agreement, we then

proceed to align and immobilize the elbow after injection of midazolam and ketamine. The horizontal net is placed under the patient without moving him. The hoist operation with an extension cable (40 m of total length) has initially to be performed by an immobile stationary flight because the pilot has only one visible geographical reference point in his projector: the top of a large fir tree. Once in air, the physician and patient begin to spin very rapidly and the latter begins to vomit. It takes some minutes until the system becomes stable and the two people can be flown out without further difficulties.

In the hospital, a dislocated C5-C6 fracture, a dislocated open fracture of the right elbow, a large wound of the left lower leg and a concussion are diagnosed. At first, the cervical and elbow fractures are reduced and operated by the according specialists. The patient remains at the hospital for 14 days, followed by a 24 days in a rehabilitation center. The long term outcome revealed a discrete limitation of the right elbow and the left ankle and a little stiffness of the cervical spine without significant functional limitations.

The complete treatment, including hospitalization, rehabilitation, physiotherapy, follow up medical costs and rescue expenses accounted for a total sum of $23,332 with the rescue part costing $2137. The patient benefited from a 10% invalidity pension based on his functional limitations of the elbow and ankle. Extending the calculations according to the patient's social situation and for an average life expectation of 78 years, the total pension at the end of his life would reach approximately $171,430 (Table 1).

Based on the good final result of this rescue under difficult circumstances, even without an established proof of the benefit of our intervention, one might think about other possible scenarios of outcome: this 39-year-old father of three young children could have died or become quadriplegic based on his C5-C6 cervical spine fracture. It is not uncommon that such patients develop immediate quadriplegia under or shortly after such a fall and consequently die by respiratory failure mainly due to an unfortunate body position. Likewise, his friends could have aggravated the dislocation of the cervical spine fracture by transporting the man down in the difficult conditions of rocky unstable ground, at night and without adequate immobilization. Taking death into consideration, there would be a similar amount of the acute treatment and rescue costs, but a nearly 10 times larger life insurance pension for his family (Table 1). In case of quadriplegia, the acute treatment and rescue costs are about 30 times higher, and the invalidity pension, in this case 100%, would be about 10 times higher compared to the real case (Table 1). In summary, we have real case expenses of about $200,000, compared to $1.2 million in case of death and $1.9 million in case of quadriplegia, respectively.

DISCUSSION

Helicopter rescue as well as the modern treatment modalities of patients by emergency physicians have acquired the reputation of being very expensive. This example, however, shows that the management may also save a lot of money, not to mention the avoidance of a significant invalidity of a single human being. Nevertheless, our observation does not release us from trying to optimize and improve our sophisticated means of intervention.

TABLE 1: Costs of the the real case emergency rescue and consequent costs compared to possible outcomes of death or quadriplegia

	Actual case	Death	Quadriplegia
Treatment/rescue expenses	23,332	21,430	715,000*
Invalidity/death pension**	171,430	1,143,000	1,860,000
Total	194,760	1,165,000	2,570,000

Values are presented in US dollars ($)
*Acute and long term treatment expenses such as day care, hospitalization, physiotherapy, physician fees have not fully been taken into account. The amounts are crude estimates for the whole life, including only the invalidity pension.
** Invalidity and death pensions are calculated based on Swiss insurance standards (SUVA, Schweizerische Unfall- und Versicherungsanstalt)

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