Mountain and Alpine Medicine

Berg- und Alpinmedizin

EDITORIAL

ACCEPTED: October 2020

PUBLISHED ONLINE: November 2020

Tannheimer M. Mountain and Alpine Medicine. Dtsch Z Sportmed. 2020; 71: 265-266. doi:10.5960/dzsm.2020.469

Priv.-Doz.
Markus Tannheimer, MD
Senior Physician,
Visceral Surgery,
Alb-Donau Clinic
Blaubeuren

Mountain sports of all kinds are very popular and the popularity continues to increase (3). Classical mountain climbing as an extensive endurance stress has a high health-promoting effect due to economization of cardiovascular work, improved fat burning and improved peripheral perfusion. I want to intentionally state this at the start, since this editorial addresses especially possible risks and dangers of mountaineering activities. There are even diseases which are altitude-dependent and which are caused by hypobaric hypoxia with subacute action. The cover image on this special edition of the German Journal of Sports Medicine, showing a mountain climber at about 6700 m altitude trailblazing on Manslu (8163 m), illustrate the unforgettable impressions of mountaineering.

Mountain Sicknesses

Above a threshold altitude of about 2500 m, the immediate reaction with deepening respiration and increased heart rate is no longer adequate for the human organism to compensate altitude hypoxia and a time-consuming acclimatization is necessary. Insufficient acclimatization leads to mountain sicknesses, of which the probability of occurrence is usually underestimated. This is due especially to the fact that the onset of mountain sicknesses has a latency between a few hours and several days (7, 11). This latency enables an asymptomatic stay at higher altitudes despite insufficient acclimatization, when the stay is only brief and descent is made soon enough, that is before the mountain sickness becomes manifest. Glacier skiing and the customary ascent of Mont Blanc (4810 m) in 1.5 days are everyday examples that this tactic functions by making use of the latency time. The situation is basically different if one remains at a high altitude (whether planned or unplanned) and misunderstandings are pre-programmed if only the target altitude is taken into account but the exposition time ignored (11). If risk factors like shallow breathing also occur, a life-threatening high altitude pulmonary edema can occur at unspectacular altitudes, even well below 2500 m (4). Sports doctors must be aware of this problem, be familiar with the different forms of mountain sickness, and be able to suggest prophylactic measures if they want to advise people planning stays at high altitudes. In their article, Berger et al. give an excellent overview of the three forms of mountain sickness: acute mountain sickness (AMS) and the life-threatening forms of high altitude pulmonary edema (HAPE) and the rare high altitude cerebral edema (HACE) (2). In addition to the pathophysiology, well-founded, practical recommendations for drug and non-drug prophylaxis and therapy are offered. This is especially important, since expedition mountaineering is becoming more and more popular and even Mount Everest is offered as a commercially-bookable guided tour (5), sometimes even as a quick ascent using normobaric hypoxia at home for pre-acclimatization (10). Normobaric hypoxia, which can be used for acclimatization, enables exposition up to about 7000 m at low altitudes with relatively little expenditure. Normobaric hypoxia has been very successfully used for several years in fire protection, since an open fire is practically impossible below 15% oxygen content and below 13% even explosive substances like benzene no long burn (6). Thus the topic of altitude hypoxia is not only important for sports medicine, it has also found entry into the areas of general and occupational medicine.

Accidents and Mountain Rescue

The geographic characteristics of mountains, with steep ravines and flanks, along with the unevenness of paths and terrain mean that falls and accidents can be considerably more serious than on level ground. Thus, an accident which is actually negligible itself can lead to loss of balance and possibly fatal falls. In dynamic types of sports, such as skiing, the high energy of movement can lead to high-speed traumata. Faulhaber et al. analyze the accidents among mountaineers and alpine skiers. The data analysis show the noteworthy result that 75% of all falls occur during descent and 70% of all fall victims were visually impaired to some degree. This offers a lot of potential for avoiding falls.

The mountains add considerably to the difficulties of rescuing and retrieving accident victims. This was the subject in the Case Report by Tannheimer, in which the initial treatment and removal of a victim with cranio-cerebral trauma at 5700 m during expedition mountaineering is described. In an urban setting, a period of 28 hours before reaching a hospital is nearly inconceivable. This report makes clear that a group in the mountains must often rely on themselves and perform treatment of injured persons on their own. This means a great responsibility of mountaineers for one another ›

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CORRESPONDING ADDRESS:
Priv.-Doz. Dr. med. Markus Tannheimer
Leitender Oberarzt, Viszeralchirurgie,
Alb-Donau Klinikum, Blaubeuren
Ulmer Str. 26, 89143 Blaubeuren, Germany
✉: m.tannheimer@adk-gmbh.de

and emphasizes the importance of founded basic knowledge of first aid and mountain rescue for all those who are in the mountains.

The topic of first aid knowledge is one addressed by Küpper et al., who see clear potential for improvement (7). Since care and rescue of injured or ill persons in the mountains is almost always more difficult and complicated than in urban areas, the requirements for the rescuers are also higher. The rule of thumb indicates that the endurance performance capacity as expressed by $\dot{V}O_2max$ decreases starting at 1500 m altitude decreases by 10% per meter altitude (1), that means it can be reduced up to a third even in the Alps. This must be taken into account in undertaking rescue actions at high altitudes and implies that mountain rescuers must have a high basic endurance level.

Cardiac Emergencies in Mountaineering

This reduced endurance performance capacity, caused by oxygen partial pressure at high altitudes, necessarily raises the question of the tolerance of mountain sports in cases of prior cardiopulmonary diseases. Anecdotal reports of sudden cardiac death among mountain climbers make heart patients and their physicians wary. Burtscher et al. address the topic of sudden cardiac death for the individual mountain sports disciplines and relativize the risk on the basis of founded numbers from nearly four decades in Austria. Their risk assessment and recommendations for prophylaxis are a valuable treatment guide for all doctors who deal in their everyday practice with cardiac-impaired patients who want to engage in mountain sports or who are exposed to high altitudes in their profession.

The Suspension Syndrome

Lechner et al. address the suspension syndrome, a disease which at first sight appears to be associated exclusively with steep rock and ice walls (8). It is a generally rare disease pattern, which can occur during free suspension in a safety harness. The generalized hypoperfusion with reduced brain perfusion and consecutive loss of consciousness is, however, independent of altitude and can thus occur in industrial-medical settings, such as among construction workers, window cleaners, etc., which makes knowledge of pathophysiology, prevention and emergency treatment, including elucidation of misinformation concerning the so-called rescue death, relevant for urban doctors.

With that, I wish all readers of this special alpine and mountain/medical issue of the German Journal of Sports Medicine a broad increment in knowledge and pleasure in this highly-interesting border area of medicine, which is finding increasing entry into our sports medical practice.

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