Death at Extreme Altitude

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In October 1988 four Czechoslovak climbers made the first alpine-style ascent of the formidable SW face of Mount Everest, first climbed in 1975 by Chris Bonington's large British expedition. They were equipped with the inner lining of one tent, two sleeping bags, two 40m climbing ropes, four ice axes, two ice hammers, three small cameras, one light video camera, a cooking stove and gas, food for three days and little else. After three and a half days they reached the south summit (8750m) and one climber continued to the summit (8872m). The others began to descend towards the South Col. In the early evening the summiteer rejoined the others at approximately 8300m and radioed that they felt bad and that three persons were nearly blind. They were never heard from again. Americans arriving at the South Col half an hour later could see the entire route to the south summit, but no signs of human activity. Since this area is easy scrambling ground for an experienced climber, the mass disappearance is most likely a consequence of high-altitude cerebral edema which caused the climbers to fall through a cornice or be blown off the ridge.

This is just one recent example illustrating the horrifying statistics on the highest peaks of this globe. To date, 246 climbers have made a total of 275 ascents of Mount Everest; 102 climbers have died on the slopes of this mountain (Elizabeth Hawley, personal communication). This ratio shows no decline in recent years. In the post-monsoon season of 1988, 31 individuals reached the summit of Mount Everest; nine climbers died, seven while attempting the summit without bottled oxygen. 66 persons have climbed K2 (8611m), while 24 have died during the climb. The death toll on 83 British expeditions to peaks over 7000m from 1968 until 1987 was 4.3%. There are repetitive personal tragedies for élite high-altitude climbers like Doug Scott and Krzysztof Wielicki, who survive 10 or more years after two or three high-altitude climbing expeditions per year, while losing most of their close climbing friends who share their passion.

Of the 102 climbers who died on Mount Everest, 49 were killed by falling ice, particularly in the notorious Khumbu ice-fall, and by avalanches. 28 persons suffered a fatal fall and 16 a condition described as 'illness' (exhaustion, exposure), while nine died from unknown causes. In the case of these previously very healthy individuals, 'illness' in most circumstances means high-altitude pulmonary edema (HAPE) and/or cerebral edema (HACE). Falls of experienced climbers on the relatively easy routes of Mount Everest are certainly in part due to hypoxia and/or HACE-induced brain dysfunction. Likewise, 'death from

unknown causes' hides hypoxia consequences. Comparable numbers for death caused by HAPE, HACE and unknown causes were found in an analysis of British expeditions, where the chances of death increased with altitude. The recent rash of fatalities in climbers without supplementary oxygen who explore above 8000m further illustrates the crucial role of cerebral hypoxia. On the first ascent of Mount Everest without bottled oxygen, Messner felt 'unusually clumsy' and noted, 'if I had no axe I should simply fall down' and 'we cannot any longer keep on our feet while we rest'.

This ataxia is not surprising if one considers the degree of hypoxia at altitudes above 8500m. The calculated arterial PO_2 in one climber on the summit of Mount Everest was 28 torr; the corresponding value in eight volunteers decompressed over weeks to that altitude in a hypobaric chamber was 30 torr. The arterial oxygen saturation in these subjects was 58% and it dropped to 51% during work.

Can anything be done to reduce the number of victims at extreme altitude? Considering the competitive personalities of these climbers, the fascination associated with long, arduous and dangerous climbs, and the public interest and financial support focused on the most spectacular climbs, it is unlikely that mountaineers will turn great attention to pastoral peaks. Therefore, avalanches and ice and rock falls will continue to kill climbers. The risk can only be reduced by spending less time in the area of danger, as did the two Swiss, Erhart Loretan and Jean Troillet. These men climbed the N face of Everest in 40 hours and returned from the summit to their Base Camp in three hours, making 98% of the descent in a glide upon their backs. However, this style can be practised only by the most extraordinary individuals. Many deaths due to HAPE and/or HACE could have been prevented if climbers had listened to their sick bodies and descended, instead of ascending further. Progressive symptoms of severe acute mountain sickness were ignored, particularly by those who went 'too fast too high'. Sometimes even the most experienced climbers cannot resist the challenge of the summit. Andrew Czok, the first man on Mount Everest in winter, died on Kangchenjunga from HAPE, as did Fritz Luchsinger, the first man on Lhotse, years later on Xixabangma. Both men had suffered from worsening symptoms of HAPE but continued their ascent. Thus, despite the admonitions of climbing physicians, impaired judgement and competitive behaviour will continue to take their toll. Worse yet, catastrophic illness will strike even the wise and prepared without prior warning, as in the recent case of Chris Chandler on Kangchenjunga.

In earlier times, amphetamines were recommended by a few expedition doctors who wanted to give a climber the best chance to reach the summit. Sadly, some of these climbers died while taking an avoidable risk. There is no question that supplemental oxygen reduces the deleterious effects of severe hypoxia and can prevent some deaths due to HAPE and HACE. Falls undoubtedly occur less often in climbers supplemented by 'English Air', as Sherpas on the early Everest expeditions used to call the oxygen bottles. Climbers who run out of oxygen or encounter equipment failure high on the mountain experience great misery due to the sudden drop of tissue oxygen saturation. Previously strong people will have died under these circumstances.

The main problem is that climbing with bottled oxygen is no longer fashionable. Modern light-weight expeditions and alpine-style ascents cannot be performed if one has to carry bulky oxygen cylinders. These factors, and concerns for the environment, have encouraged climbers on the 8000m peaks to forgo bottled oxygen. Diminution of oxygen use for climbing is unfortunately also paralleled by a trend of many expeditions not to carry oxygen for medical purposes.

A pressurized bag has been successfully used in individual cases of severe acute mountain sickness. The time may soon arrive when most large trekking parties travelling with a doctor or well-instructed layperson will carry such a piece of equipment. Still, experience suggests that the bag will be inaccessible in extreme conditions when it is most needed.

Two controlled field studies have demonstrated the efficacy of dexamethasone treatment in ameliorating the symptoms and signs of acute mountain sickness. Dexamethasone is more effective for the cerebral symptoms of AMS than for pulmonary problems. Nifedipine treatment of HAPE patients results in clinical improvement, better oxygenation, reduction of the widened alveolar oxygen gradient and pulmonary artery pressure, and progressive clearing of alveolar edema. When given sublingually, patients usually report some relief within 15 to 30 minutes, paralleled in certain cases by a marked increase in arterial oxygen saturation. Proper positioning of the patient may allow drainage of alveolar fluid through the bronchial tree. The great advantage of all these modalities is that they can be employed by the climber using lightweight tactics.

This is small progress. The casualty rate will not decline markedly unless over-enthusiastic climbers change their attitudes toward the high mountains and their dangers. Every climber wants to decide how close to the edge he or she may push. Maurice Herzog, who completed the first ascent of an 8000m peak, lost all his fingers and toes, but thought that it was worth it. Climbing to extreme altitude is risky; it is the price of such adventure.

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