DEATHS DUE TO RAPID HIGH ALTITUDE CLIMBING (ASCEND)

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ABSTRACT

High altitude pulmonary edema develops in people who make a rapid ascend to a high altitude and the body is not able to acclimatize itself. We came across two such cases in the department of Forensic Medicine at I.G.M.C, Shimla.

Key Word: HAPE

INTRODUCTION

Anyone who has climbed even a moderate mountain has probably felt some altitude effects. People ascend to mountains during holidays for trekking and big multinational companies hold meetings away from cities so that their officers can relax and enjoy themselves besides working. If the ascent is fast and the body fails to adjust to the changed scenario a holiday can turn into a nightmare. Although air everywhere contains 21% oxygen, the atmospheric pressure decreases as altitude increases so less and less oxygen becomes available to human body due to fall of oxygen tension in inspired air as well as the alveolar air. Water vapours exert a tension of 47 mm Hg at all altitudes and carbon dioxide is continuously excreted from the body into respiratory alveoli. Because of this combination, the oxygen of the alveolar air falls at high altitude [1]. This usually happens when there is rapid ascent to altitude above 2500 meters or around 8000 feet [2]. The body uses many strategies to cope up with the lack of oxygen, without these strategies high altitude can prove to be fatal.

Since the reporting of HAPE by Dr. Charles Housten, the compensatory mechanisms adapted by the body were categorized into immediate and other little delayed. The first and most effective change is hyperventilation, which bring more fresh air deep into lungs and washes out carbon dioxide thus increasing the available oxygen. With each breath a climber losses fluid and becomes more easily dehydrated breathing dry air causes painful dry cough-high altitude hack which may be bad enough to crack a rib. Hypoxia also causes the heart to beat faster driving more blood throughout the body to hungry cells. The brain, which makes only 3% of total weight, uses 20% of oxygen; the brain is likely to suffer when the supply is short. Body tries to balance acid-base alterations by 2, 3 DPG. Further adjustments can be made by increased number of red cells produced by the marrow thus increasing the amount of oxygen blood can carry. Hypoxia increases blood pressure in arteries supplying the lung, if this increases too much fluid leaks from blood into lungs causing high altitude pulmonary edema, which can be rapidly fatal, drowning the victim in his own juices. The delayed effect is hypertrophy of right side of heart so that blood can be effectively pumped through the expanded capillary bed of lungs. Kidneys excrete alkaline urine, urea content is more and ammonium salts less.

If the mechanism fails there will be hypoxia induced endothelial dysfunction leading to vasoconstriction along with clinical signs of headache, light-headedness, weakness, trouble in sleeping, upset stomach, loss of appetite. The person becomes exhausted sits to rest and may not wake from fatal sleep of hypothermia.

The present cases, which have been presented, are in reference to high altitude pulmonary edema with history of rapid ascent to Shimla, which is to a height of 2159 meters, or 7400 feet. The highest point is Jakhu hill at a height of 2455 mts.
CASE - I

A 22 years old male came to Shimla from Tamil Nadu by train on 22-09-04 at 6.00 am. He along with his friends went to Potato Research Institute, Bemloi. On coming back, he decided to take rest before going for a walk to The Mall at 2 pm. At 2 pm, his friends went to call him and he was found unconscious. He was declared brought dead at I.G.M.C Shimla. 

Post mortem finding: On examination froth in nose and mouth was present. On internal examination, cerebral edema was seen. On cut section of lungs, gross frothy discharge was present. Trachea and lungs contained froth besides congestion of liver, spleen and kidney.

CASE II

A 40-year-old man came to Shimla from Delhi on 28-10-04 night for making sweets at a local shop. On 31-10-04, he complained of chest pain and restlessness. He was found unconscious, brought to I.G.M.C Shimla, and was declared brought dead.

Post mortem findings: On external examination, no injuries were found on the body. Froth was present in Larynx and Trachea. Gross congestion and froth was present in both the lungs. Viscera analysis was negative for chemical examination.

DISCUSSION

Whenever there is a history of sudden death the foremost cause thought is the involvement of cardiovascular system. The incidence of the mentioned cases may be low but cannot be ignored. The try should be that the people should be aware of the symptoms.

To prevent high altitude illness one should take time travelling to high altitude. When one travels to high altitude body starts adjusting right away to the lower amount of oxygen in air, but it takes several days for the body to adjust completely. If one is healthy, one can probably go safely from sea level to high altitude. The closer one lives to sea level the more time body takes to get use to high altitude. One should not ascent faster than 1000 feet per day. If one skis at an elevation of 10000 feet during the day, he should sleep the night before and night after at an elevation of 8500 feet. There are studies to suggest that the allelic variants of adaptation and HAPE are on the same locus of genes. If the signs of headache, weakness, trouble sleeping appear stop ascending to high altitude or go back to low altitude until the symptoms go away. The more severe symptoms are difficulty even while resting, coughing, and inability to walk in straight line. The person should immediately go to a lower altitude and contact a doctor.

The active role of Nifedipine, Decadron, Acetazolamide helps in saving valuable lives (5). They are useful in preventing as well as in treating high altitude pulmonary edema. People can die of high altitude pulmonary edema if the symptoms are not recognized or are ignored.

The physical exertion during first 24 hrs is important factor, which add up to the problem (6). People with sickle cell anemia should not go to high altitudes and the parents should take care of small children who are being taken to high altitude as their bodies have hard time adjusting to low oxygen level. A high altitude is also dangerous for people with severe lung disease, such as chronic obstructive pulmonary disease or severe emphysema and for people with severe heart disease. Some experts recommend that pregnant women should not travel to an altitude above 8000 feet.

References

4) American Academy of Family Physician. High altitude illness: How to avoid it and how to treat it.