



High Altitude Pulmonary Edema

A more severe, potentially life threatening form of altitude illness is High Altitude Pulmonary Edema (HAPE). HAPE is a non-cardiogenic form of pulmonary edema occurring with an incidence of less than one percent. For reasons not well understood, some individuals develop severe pulmonary hypertension upon short term exposure to altitude which has been hypothesized to cause a pressure induced fluid leak into the alveolar space of the lung. The flooded capillaries prevent adequate oxygenation and a spiral of worsening hypoxia and increasing pulmonary hypertension ensues. The x-ray picture of HAPE is unilateral or bilateral fluffy infiltrates without enlargement of the heart.

HAPE, unlike AMS, is much more likely to affect young healthy males, with one study reporting a 13 fold increase in risk for that group. Children can and do get HAPE and are susceptible to a peculiar form that strikes the resident of altitude on return from a brief sojourn to lower altitude.

The typical HAPE victim is a healthy male in his twenties who arrives above 8,000 feet and immediately begins heavy physical exertion such as skiing. He may or may not have symptoms of AMS, but within 24-48 hours of arrival begins to develop increasing shortness of breath and a nonproductive cough. Believing he has an upper respiratory infection he may try an over-the-counter cold remedy without improvement. Usually by the third day at altitude the symptoms are severe enough to warrant seeking medical care: significant dyspnea, cough (usually dry but occasionally productive of white or pink frothy sputum), headache, and ataxia. Increasing hypoxia may cloud judgment and unless the victim descends or seeks medical care death may rapidly follow.

Treatment for HAPE is dependent on available facilities and experience. Descent to a lower altitude nearly always brings on dramatic improvement. If descent fails to rapidly improve the patient's condition the diagnosis should be reconsidered. However, descent is not always necessary, provided adequate facilities are available for observation and oxygenation. Many HAPE patients in Summit County, Colorado remain at altitude for treatment, with moderate cases treated with oxygen therapy in the clinic or even the hotel room. A few days of oxygen therapy and rest may allow resumption of recreational activities.

Drug therapy of HAPE has not been very successful. Therapy that works well for other forms of pulmonary edema is less effective in HAPE. Diuretics have not proven to be beneficial except in life threatening cases. The use of

acetazolamide is not well studied for treatment of HAPE, but theoretical concerns about intravascular fluid depletion because of its diuretic effect suggest it may not be helpful. The recognition that nifedipine effectively decreases pulmonary hypertension thereby decreasing the hypothesized pressure induced fluid leak may allow for improved medical therapy of the disorder. A lightweight portable fabric compression chamber (Gamov bag) allows for simulated altitude descent and can be life saving in instances where actual descent is not possible or oxygen is not available.