High Altitude Flying in the Andes Mountains

By Robert Sarlay, Jr. MD, MPH

Airmen may find themselves at risk of acute mountain sickness and require use of prophylactic medication to prevent this condition. This article reports the case of a second-class pilot applicant seeking to use acetazolamide for prevention.

History

While performing a second-class medical examination for a 50-year-old male with 5,000 flying hours total and 250 in the last six months in a Beechcraft Baron, you notice that the airman has listed Diamox as a medication on his Form 8500-8; however, the airman did not indicate the condition for which he is taking the medication. Upon further questioning, the airman reports that he plans to go to South America in the next several days to work for several months. The airman has been contracted to carry supplies and people to a research team in the mountains of Peru from their base camp to the research station at high altitude. His job will require that he make routine flights to high altitude to deliver the supplies and possibly wait overnight at altitude. His normal base of operations will be at sea level. His primary physician has advised him to take Diamox (acetazolamide) to prevent altitude illness. The airman is concerned about how this medication might affect his medical certification. He reports no prior use of the medication. Additionally, he reports no prior episodes of altitude illness.

Etiology of Acute Mountain Sickness

Acute mountain sickness is a preventable illness that occurs with too rapid ascent to altitude without time to acclimate [4]. The signs and symptoms of AMS include headache and at least one of the following: gastrointestinal disturbance (nausea, emesis, and anorexia), dizziness, light headedness, fatigue, or sleep disturbance [4]. AMS is one of several high altitude illnesses that can occur. Everyone who travels to altitude is susceptible to developing AMS, with 25 to 85% of travelers actually developing symptoms based on epidemiological studies [1]. Of travelers that develop symptoms, 0.1 to 4% progress to the more hazardous illnesses of high altitude pulmonary edema or high altitude cerebral edema [1]. AMS commonly occurs above 8,000 feet (2,400 meters) [1]. Individuals at most risk of development include those who ascend rapidly (both rate and magnitude), those who engage in strenuous physical activity, those of a young age, those who live at low altitude, or those that have history of prior AMS [1]. To prevent AMS, one should ascend at a rate of 300 to 500 meters per day; in addition, acetazolamide (125 to 250 mg by mouth twice a day) can help prevent the illness [2]. Multiple trials have established it as a good preventive medication and helped establish the 125 to 250 mg dose, with higher dosages showing no greater efficacy but increased side effects [3].

Aeromedical Concerns

Besides the many dangers of mountainous terrain such as the rugged landscape, the altitude extremes, and the temperature extremes, the airman is at high risk for cognitive defects from hypoxia, sleep loss, and high-altitude illness—specifically, acute mountain sickness (AMS) [5]. The airman is at particular risk for AMS, as his job will require him to rapidly ascend to high altitude with little time to acclimate [1]. AMS is not specifically addressed by the FAA guidelines. AMS is a time-limited condition that would prevent the aviator from flying while the condition was present. However, once treated by descent, oxygen, or pharmacotherapy, the condition would be expected to resolve without permanent defects, allowing the aviator to fly. Once the condition resolved, the airman could resume his aviation duties. He would also need to report the development of this condition during his next FAA examination.

The second concern would be the use of Diamox as a prophylactic medication to prevent AMS. Ideally, slow ascent and proper acclimation make AMS a preventable illness, but when rapidly arriving at high altitude direct from sea level by flying, these preventive measures are not possible [4]. The recommendation to use acetazolamide for prevention is sound advice to this airman, but there are some aeromedical concerns which need to be addressed. Acetazolamide is a carbonic anhydrase inhibitor that forces the kidneys to excrete bicarbonate, making the blood more acidic. This metabolic acidosis stimulates minute ventilation, increasing oxygen in the blood [1]. Acetazolamide is a centrally acting medication. The adverse effects of this medication include paresthesias, mild diuresis, and aversion to carbonated beverages. It is contraindicated in those persons who have an allergy to sulfa drugs [1].

Both the AMS and the acetazolamide are concerns in regards to flying safety. Generally, self-limiting, short-term conditions require an airman to avoid aviation duties if either the condition or the medication could affect flight safety. However, in this case, the danger of the airman developing AMS, which could incapacitate him, can be avoided by the airman taking a prophylactic dose of acetazolamide.

Role of the AME

An AME needs to assess the underlying disease or condition and the treatment to make a good determination favoring aviation safety. The AME should obtain a detailed history from the airman, including dosage, side effects, tolerance to the medication, and length of use of the medication. Additionally, the AME should provide the reason why the medication is required and include a recommendation to the FAA. The AME must defer issuance of a medical certificate for any medication or medical condition that is unacceptable.

An AME should note the importance of deferring issuance of a medical certificate for any medication that is unacceptable. Inappropriate issuance of a certificate to an airman who is on an unacceptable medication is one of the main causes of reversal by the FAA. Too high a rate of this error can result in the AME receiving a letter of reprimand, as the AME is placing the national airspace at risk.

The AME should submit the information with regards to the medication to the AMCD or their Regional Flight Surgeon for consideration of authorization for use under the special issuance section of 14 CFR 67.401. Furthermore, each case submitted to the AMCD or Regional Flight Surgeon for special issuance is determined on its own merits, taking into consideration how the airman's performance would be affected by the condition and the medication(s).

Outcome

The information about the case was discussed with the AMCD to advise the airman if the use of acetazolamide would be acceptable. A verbal authorization was granted and subsequently a special issuance was sent stating "Acetazolamide (Diamox) is allowable for altitude sickness prevention. [AMCD] will need to be advised of any actual episodes of altitude sickness." Accordingly, the airman was granted a second-class medical certificate.

References

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