

High Altitude Medicine for Search and Rescue

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High Altitude Syndromes: THE BIG THREE

- ┌ Acute Mountain Sickness (AMS)
- ┌ High Altitude Pulmonary Edema (HAPE)
- ┌ High Altitude Cerebral Edema (HACE)

Rescuers at High Altitude

- ┌ Need to recognize and treat altitude illness
- ┌ Need to reduce risk to unacclimatized rescuers

Case #1

- ┌ 33 year old man
- ┌ Day 2 at Everest Base Camp
- ┌ Complained of headache and nausea
- ┌ Diagnosis?

Acute Mountain Sickness (AMS)

Diagnosis of AMS = Recent ascent to high altitude + Symptoms

Symptoms of AMS

- ┌ Headache
- ┌ Fatigue
- ┌ Loss of appetite
- ┌ Nausea/vomiting
- ┌ Dizziness
- ┌ Problems sleeping
- ┌ Low urine output

**ABNORMAL PHYSICAL FINDINGS
ARE NOT FOUND IN AMS**

Differential Diagnosis of AMS

- ┌ Viral illness
- ┌ Hangover
- ┌ Exhaustion
- ┌ Dehydration
- ┌ Hypothermia
- ┌ Sedative/hypnotics meds

] Carbon monoxide

Case #1

Now how are you going to help him?

- Tell him to "Take 2 aspirin and call me in the morning."
- Get the oxygen?
- Hike him down?
- Call the helicopter?

Natural History of AMS

-] Usually self-limited
-] Responds well to treatment
-] If untreated, may persist for weeks
-] May precede *HAPE* and *HACE*

Management of AMS

-] Stop ascent!
-] Acclimatize or treat before continuing
-] Descend if not improving despite treatment
-] Descend immediately for difficulty walking, decreased consciousness or pulmonary edema

**WHEN IN DOUBT,
GO DOWN!**

Treatment Options for AMS

-] Acclimatization
 - 12 hours to 4 days
-] Rest and fluids
-] Symptomatic treatment
 - Tylenol, ibuprofen or aspirin for headache
-] Acetazolamide
 - 250 mg twice a day until symptoms resolve
 - Does not mask the symptoms of AMS
-] Descent until symptoms improve
 - Usually 1,500 - 3,000 feet below current level
-] Hyperbaric chamber
 - Is equivalent to descent or treatment with oxygen

Additional Treatment of AMS

-] Oxygen
 - 2-4 liters per minute by nasal cannula
-] Dexamethasone
 - 2 doses of 4 mg, 6 hours apart

- Do not ascend until at least 12 hours after the second dose, and then only if there are no symptoms of AMS
- Masks symptoms of AMS

Other Aids to Acclimatization

- ∫ “Climb high, sleep low.”
- ∫ High carbohydrate diet
- ∫ Drink enough fluids
- ∫ Mild exercise – avoid overexertion
- ∫ Avoid alcohol and sleeping medications

The Golden Rules of Altitude Illness

Golden Rule #1

If you feel bad at altitude,
it’s because of the altitude until proven otherwise.

Golden Rule #2

If you feel bad at altitude,
don’t go higher until your symptoms resolve.

Golden Rule #3

If you are very sick, getting worse,
or can’t walk in a straight line, descend.

Golden Rule #4

Never send anyone down alone.

Golden Rule #5

Even doctors (rescuers) can get
altitude illness.

Case #2

- ∫ 26 year old Nepali man
- ∫ Healthy
- ∫ Travels from Kathmandu (4,000 feet) to Everest Base Camp (17,700 feet) in 3 days
- ∫ No complaints on arrival
- ∫ Stays overnight
- ∫ Eats breakfast
- ∫ To cook, he says he has a “Slight headache”
- ∫ To MD, he has no complaints and seemed fine
- ∫ Descends late morning
- ∫ Descends alone
- ∫ Is ataxic (walks like he is drunk) at Gorak Shep (16,000 feet, 3 miles from Base Camp)

- ┌ Diagnosis?
- *Though initially this sounded like a case of High Altitude Pulmonary Edema, the climber died from a pulmonary embolism (a reminder to think of other diagnoses)*

High Altitude Pulmonary Edema (HAPE)

- ┌ The most common cause of death from high altitude illness
- ┌ Most often occurs after 2nd night at new altitude
- ┌ Abrupt onset
- ┌ May occur without AMS

Symptoms of HAPE

Early:

- *Fatigue*
- *Weakness*
- *Shortness of breathe on exertion*
- *Dry cough*

Late:

- *Fast heart rate*
- *Rapid breathing*
- *Shortness of breath at rest*
- *Can't breathe lying down*
- *Blood-tinged sputum*

Treatment of HAPE

- ┌ DESCENT
- ┌ Minimize exertion
- ┌ Oxygen
- ┌ Hyperbaric chamber
- ┌ Nifedipine (and/or Viagra?)
 - *Decreases high blood pressure in the pulmonary arteries*
 - *Nifedipine 10mg initially, then 20 mg every 6-12 hours*
- ┌ No dexamethasone

High Altitude Syndromes: THE BIG THREE FOUR

- ┌ Acute Mountain Sickness (*AMS*)
- ┌ High Altitude Pulmonary Edema (*HAPE*)
- ┌ High Altitude Cerebral Edema (*HACE*)
- ┌ High Altitude Flatus Expulsion (*HAFE*)

HAFE

“Unwelcome spontaneous passage of colonic gas.”

- ┌ Possible mechanisms
 - *Expansion of bowel gas with ascent*
 - *Intestinal hypermotility*

- High fiber diet

Rescuers at High Altitude

- ∫ Need to recognize and treat altitude illness
- ∫ Need to reduce risk to unacclimatized rescuers

Prevention of Altitude Illness for Rescuers

- ∫ Have protocols pre-planned by medical director
- ∫ If mission profile is unsafe - don't go!

Prevention of Altitude Illness for Rescuers

- ∫ Acclimatize before rescue
 - *Example: Ranger Camp on Denali is at 14,000 feet*
- ∫ Limit altitude exposure
 - *You can be at altitude for several hours before getting ill*
- ∫ Supplemental oxygen
 - *The cause of AMS, HACE and HACE is lack of oxygen, therefore if you have more oxygen you can prevent or slow down the onset of mountain sickness*
- ∫ Have an escape plan
- ∫ Medications
 - *Diamox 125-250 mg twice a day starting 24 hours before ascent, and discontinue after the second or third night at the maximum altitude (or with descent if that comes earlier)*
 - *Tylenol, Ibuprofen, or Aspirin*
 - *Dexamethasone for worsening symptoms and unable to descend immediately*

Online Reference:

A good website for high altitude information is www.basecampmd.com