INSTRUCTIONS FOR EQUALIZING EARS AND SINUSES

By Allen Dekelboum, MD

Middle ear and sinus barotrauma are the most common injuries associated with exposure to increasing and decreasing pressure. Descent in the water adds approximately one-half pound of pressure for each foot of descent and diminishes a similar amount on ascent. According to Boyle's Law, as the pressure increases on descent, the volume of a gas in an enclosed space decreases proportionately. As the pressure decreases on ascent, the volume of the gas increases proportionately. On descent it is imperative that all enclosed air-filled spaces be equalized actively or passively. On ascent, the increasing gas volume usually vents itself naturally. The greatest pressure and volume changes occur closest to the surface.

In order for equalization to be effective, the diver should be free of nasal or sinus infections or allergic reactions. The lining of the nose, throat and eustachian tubes should be as normal as possible. If this is true, the following techniques are effective in reducing middle ear and sinus squeeze.

1. Prior to descent, neutrally buoyant, with no air in the buoyancy compensator, gently inflate the ears with one of the methods listed below. This gives you a little extra air in the middle ear and sinuses as you descend.

2. Descend feet first, if possible. This allows air to travel upward into the eustachian tube and middle ear, a more natural direction. Use a descent line or the anchor line.

3. Inflate gently every two feet for the first ten to fifteen feet, and less frequently as you descend deeper.

4. Pain is not acceptable. If there is pain, you have descended without adequately equalizing.

5. If you do not feel the ears opening, stop, try again, perhaps ascending a few feet to diminish the surrounding pressure. Do not bounce up and down. Try to tilt the difficult ear upwards.

6. If you are unable to equalize, abort the dive. The consequences of descending without equalizing could ruin an entire dive trip or produce permanent damage and hearing loss.

7. If your doctor agrees, the use of decongestants and nasal sprays may be used prior to diving to reduce swelling in the nasal and sinus passages, as well as the eustachian tube. Decongestants should be taken one to two hours before descent and last from eight to twelve hours. Nasal sprays should be taken thirty minutes before descent and usually last about twelve hours. Caution should be taken when using over-the-counter nasal sprays, since repeated use can cause a rebound reaction with worsening of congestion and possible reverse block on ascent.

8. If at any time during the dive you feel pain, have vertigo (whirlies) or note sudden hearing loss, abort the dive. If these symptoms persist, do not dive again until consulting your physician.

9. Equalizing Techniques

a. Passive - requires no effort.

b. Valsalva - increase nasopharynx pressure by holding nose and breathing against a closed glottis (throat).

c. Toynbee - swallowing with mouth and nose closed - **good for ascent!**

d. Frenzel - Valsalva while contracting throat muscles with a closed glottis.

e. Lowry - Valsalva plus Toynbee - holding nose closed, gently trying to blow air out of nose while swallowing. - **easiest and best method after practice!**

f. Edmonds - jutting jaw forward plus Valsalva and/or Frenzel - **good method!**

g. Miscellaneous - swallowing, wiggling jaws - **good for ascent!**