



Medical risks of hyperbaric oxygen therapy

As with all medical treatments, hyperbaric oxygen therapy includes medical risks and possible side-effects. Most are related to the unique aspects of HBO such as significant and relatively rapid changes in pressure inside the chamber and the high levels of oxygen used. Most are relatively mild and self-limited, but some can be severe and even life-threatening.

Side effects of hyperbaric oxygen therapy

Hyperbaric oxygen is usually well tolerated with few side-effects. However, there are some side effects that patients may experience.

Visual refractive changes

Hyperbaric oxygen therapy treatments can temporarily change the shape of the lens in the eye. This usually results in worsening myopia (nearsightedness), but improvement in presbyopia (the inability to focus on objects near the eye due to age-related changes in the lens). This change usually reverts back to its pre-treatment status six-eight weeks after treatments stop. Rarely, the change will not completely return to its baseline level.

Cataract maturation

While HBO therapy has not been shown to cause cataracts, there is some thought it may cause pre-existing cataracts to mature faster than normal.

Claustrophobia

Due to the confined and enclosed nature of the hyperbaric chamber, some patients can develop a feeling of claustrophobia, and those who are already claustrophobic can experience a worsening of their symptoms. A multi-place chamber (such as we operate) can help alleviate some of these feelings due to the size of the chamber. If claustrophobic symptoms become severe enough, pre-treatment sedation can be considered on a case-by-case basis.

Hypoglycemia

Some patients with diabetes experience a drop in blood sugar during hyperbaric treatments. In order to prevent this, patients are encouraged to eat before coming for treatments and blood glucose is monitored during the dive at appropriate intervals.

Complications of hyperbaric oxygen therapy

While it's generally very safe, as with all medical treatments, Hyperbaric Oxygen Therapy carries with it the risk of complications that in rare instances can be life threatening and/or result in permanent or long-term disability.

Barotrauma of the ear

Barotrauma is a term that refers to injury due to increased pressure. Barotrauma of the ear is the most frequent complication of HBO. The middle-ear is an air-filled cavity behind the ear drum that connects to the throat through a slit-like passage called the eustachian tube. During compression, if the air pressure in the middle-ear cannot be equalized with the external pressure, the eardrum will bow inward, leading to pain and possibly rupture, leading to hearing loss.

Round or oval window rupture

Round and/or oval window rupture is a phenomenon related to ear barotrauma. The round and oval windows are membranes separating the air-filled middle ear from the fluid-filled inner ear. Rarely, over-vigorous attempts to equalize the pressure in the middle ear can lead to increased pressure in the inner-ear and can rupture these membranes. Deafness is the result. So, while rupture of these windows is not related to pressure change per-se, it is related to maneuvers used to prevent another complication.

Sinus squeeze

Similar to the middle-ear, the sinuses are air-filled spaces in the skull. Failure to equalize the pressure in the sinuses and the external environment leads to severe pain and possibly bleeding into the sinuses.

Tooth squeeze

Recent dental work can leave air-filled voids in teeth. The inability to equalize the pressure in these

pockets can lead to pain and even cracking of the teeth.

Pneumothorax or pulmonary barotrauma

Pulmonary barotrauma refers to damage to the lung tissue as a result of pressure change, resulting in air leaking from the lungs into the chest cavity causing a collapsed lung, or pneumothorax. This generally occurs in patients with air trapping lesions in the lungs, such as can occur in emphysema or asthma. During decompression, these air-filled pockets will begin to expand, and, if the pressure is not relieved by the airways in the lungs, these pockets can rupture. This released air can cause excess pressure in the chest cavity leading to difficulty breathing and decreased blood pressure that can result in death if untreated. Treatment consists of emergency evacuation of air from the chest cavity by inserting a needle through the chest wall, and, subsequently, placing a chest tube to re-expand the lung.

Oxygen toxicity seizures

The high level of oxygen in the blood that occurs during HBO treatments can be toxic to the central nervous system and can result in seizure activity. While this is rare during clinical hyperbaric treatments, it does occur and may be more likely in those with pre-existing seizure disorders or hypoglycemia (low blood sugar). Treatment consists of simply removing the supplemental oxygen from the patient, which will terminate the seizure.

Pulmonary oxygen toxicity

Elevated oxygen concentrations can be detrimental to the lungs. Prolonged exposure to high levels of oxygen can eventually lead to chest pain, difficulty breathing, and eventually, respiratory failure. In the early stages of the condition, the lungs rapidly return to baseline once the oxygen concentration is decreased. Thus, due to the intermittent nature of HBO treatments, pulmonary oxygen toxicity is rarely seen in clinical practice. On the other hand, this can become a concern in critically ill patients who must be maintained on supplemental oxygen between treatments or those patients who require unusually frequent or prolonged treatment courses.

Decompression sickness

Decompression sickness, or the bends, is a result of the uptake of nitrogen into the blood when air (which is about 80 percent nitrogen) is breathed at increased ambient pressure. This is generally more of a concern for the inside attendants, who breathe air during a treatment, rather than patients, who are breathing 100% oxygen. This can become a concern if a patient must be removed from oxygen for prolonged periods of time during the dive. Decompression sickness can result in pain,

neurological injury, cardiopulmonary collapse, and possibly death.

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University of Iowa Hospitals & Clinics

200 Hawkins Drive
Iowa City, IA 52242

Hyperbaric Medicine Facility (/hyperbaric-medicine-facility)

- **Dr. Peter J.R. Jebson Hyperbaric Medicine Facility**
Elevator I, Level 5
1-319-356-8220, 1-319-356-7706

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