HYPERBARIC OXYGEN THERAPY INDICATIONS, CONTRAINDICTIONS AND COMPLICATIONS

Policy: This policy lists accepted conditions or indications for insurance reimbursement for Hyperbaric oxygen therapy (HBOT), contraindications and relative contraindications, and complications that may occur with and/or during HBOT. Additional information is provided regarding drug therapy with HBOT.

1.0 HYPERBARIC OXYGEN THERAPY (HBOT) ACCEPTED CONDITIONS FOR INSURANCE REIMBURSEMENT:

1.1 The following list includes the currently accepted conditions:

A. Air or gas embolism
B. Carbon monoxide/cyanide poisoning and smoke inhalation
C. Crush injury/traumatic ischemia
D. Decompression sickness
E. Enhancement in healing in selected problem wounds
F. Exceptional anemia resulting for blood loss
G. Gas Gangrene(clostridial)
H. Necrotizing soft tissue infections
I. Refractory osteomyelitis
J. Comprised skin grafts/flaps
K. Radiation tissue damage
L. Thermal burns

2.0 ABSOLUTE CONTRAINDICATIONS

2.1 Untreated pneumothorax

A. Surgical relief of the pneumothorax before the HBOT treatment, if possible, removes the obstacle to treatment.

3.0 RELATIVE CONTRAINDICATIONS-- "Conditions in which caution must sometimes be observed but which are not necessarily a contraindication to HBOT." (Kindwall, 1995)

3.1 History of spontaneous pneumothorax
3.2 Severe sinus infection
3.3 Upper respiratory infection
3.4 Asymptomatic pulmonary lesions on chest x-ray
3.5 Uncontrollable high fever (greater than 39C)
3.6 History of chest or ear surgery
3.7 Congenital spherocytosis

3.8 Any anemia or blood disorder (Although HBOT treats different types of anemia.)
3.9 Any convulsive disorder (Although many patients have seizure disorder and are treated successfully with HBOT.)
3.10 History of optic neuritis or sudden blindness
3.11 Middle ear infection
3.12 Diabetes mellitus (insulin therapy) (Many diabetic wound patients are diabetic and are treated successfully with HBOT.)
3.13 Pregnancy
3.14 Nicotine use/addiction
3.15 Acute Hypoglycemia (Many patients are treated successfully with HBOT.)
3.16 Emphysema with CO_2 retention

4.0 POSSIBLE COMPLICATIONS

While important to consider, most patients do not experience the following:
4.1 Barotrauma (We've never had one of our patients experience barotraumas because we operate each dive manually, and at the first sign of pressure we can reverse the process and relieve any discomfort.)

4.2 Confinement Anxiety (Oxygen is a natural anti-anxiety for patients, and we have successfully treated many patients with confinement anxiety in our extra large hyperbaric chambers.)

4.3 Oxygen toxicity (pulmonary and CNS) (1 in 10,000 people may experience this but no permanent effects result from this occurrence. There are 14 signs that patients display before experiencing oxygen toxicity that the CHT is trained to recognize. Once again, because we operate our chambers manually, if a patient should start to display symptoms, the pressure is reversed and symptoms are resolved.)

4.4 Myopia—Minor eyesight changes due to temporary curvature in the lens while undergoing slight pressurization.
A. Gradually reverses after cessation of HBOT when the lens flattens out again. Patients report usually between 3 to 4 weeks.
B. Resolved within three months in most cases (Jain, 1996)

5.0 THE USE OF DRUGS IN THE HYPERBARIC CHAMBER

5.1 "As A General Rule most drugs do not have any particular combined or synergistic effect with the compressed air or the increased oxygen partial pressure. Important exceptions exist. It is probably safe to assume that unless there are specific contraindications or precautions regarding use of a particular substance or compound under pressure it is safe to go ahead and administer it." (Kindwall, 1995)

5.2 No intramuscular injections are to be given immediately before or after each HBOT treatment as the intense constriction under pressure results in almost no drug absorption. Decreasing pressure (surfacing) would cause sudden drug absorption due to vasodilation. Injections are best administered 1 or 2 hours prior to or after each HBOT treatment.

5.3 Intravascular injection is not the route of choice for administering drugs. The vasoconstrictive effective effect of HBOT causes a slow uptake. At the completion of the treatment, patients could be susceptible top the effects of sudden release of the drug into circulation. Prior administration by mouth is preferable when possible.

6.0 DRUGS AFFECTING THE CENTRAL NERVOUS SYSTEM

6.1 Steroids and adrenaline may both cause an increased sensitivity to oxygen toxicity.

6.2 Narcotics may sensitize the patient to oxygen toxicity.
A. Narcotics depress respiration by decreasing medullary reactivity to CO2 and O2.
B. Hyperbaric Oxygen can cause a depression of respiration, especially in the presence of narcotic drugs.
C. The exaggerated depression of ventilation leads to an increased PCO, which in turn leads to vasodilatation in the brain blood vessels. The accompanying increased blood flow results in an increased amount of dissolved oxygen in the brain and may lead to oxygen convulsions. (Jain, 1996)

6.3 CNS Stimulants, such as amphetamines interact unfavorably with HBOT.
A. Diet Pills
B. Excessive coffee drinking in those susceptible to caffeine.

6.4 Scopolamine may be used concomitantly with HBOT; however, the visual and cardiovascular side effects of the drugs should be taken in consideration.

6.5 Carbonic anhydrase inhibitors tend to promote CO2 retention and vasodilatation.
A. Mafenide acetate (Sulfamylon), an antibacterial agent used in burn patients must be removed before treatment in the Hyperbaric chamber.
B. Acetazolamide is a carbonic anhydrase inhibitor which prevents oxygen induced vasoconstriction. If a patient is taking acetazolaimide as a diuretic when referred for treatment, there will be a risk of oxygen seizure. It should not be used at pressure greater than 2 ATA.

7.0 INTERACTIONS WITH ISCELLANEOUS DRUGS

7.1 Digitalis - some evidence suggests that HBOT may reduce the toxic effects of digitalis.

7.2 Insulin dosage required for IDDM will be decreased during HBOT. Blood glucose levels should be monitored closely and dosage should be adjusted accordingly.

7.3 Reserpine (Serpalane) and guanethidine (Iselin), antihypertensive which decreased arterial, vasoconstriction, may have been shown to interact unfavorably with HBOT.

7.4 aminophylline causes an increase in gas bubbles due to shunting of gases across the lungs.

7.5 The use of Thyroxin or the excess production of the thyroid horine (as in Graves Disease) predisposes to oxygen toxicity. Thyroidectomy has the opposite effect.

7.6 Bleomycin, an antineoplastic, is known for pulmonary toxicity.
7.7 Doxorubicin (Adriamycin) and Cis-Platinum, angioplasties, are contraindicated.
7.8 Disulfiram (Antabuse) may potentiate oxygen toxicity.

8.0 DRUGS THAT PROTECT AGAINST OXYGEN TOXICITY

8.1 The drug should reach the right location at the right time, and remain effective there in the face of continuous hypoxia, without itself inducing any toxic effects. There is no such ideal drug available at present. However, the following provide some benefits (Jain, 1996)

A. Antioxidants, free radical scavengers and trace minerals.
1) Allopurinol
2) Ascorbic acid
3) Magnesium
4) Selenium
5) Vitamin E- a daily dose of 400mg should be given starting two
Days before the therapy.
B. Chlorpromazine (Thorazine)
C. Lithium
D. Levodopa

8.2 Anticonvulsants- if anticonvulsants are used prophylactically to suppress convulsions, it is critically important that the usual oxygen pressure/time limits be strictly observed. Suppression of convulsions is exposed is carried beyond the latent period for oxygen toxicity can occasion permanent oxygen damage to the CNS. In clinical exposures of no more than 90 minutes limited to 3 ATA, permanent damage has not been reported in the human. Drugs to protect against seizures include:

A. Diazepam
1) Seizures due to convulsive disorders (not due to Hyperbaric therapy).
2) Seizures due to oxygen toxicity, prophylaxis in patients with a highrisk of oxygen toxicity.
Usually an increased dose of Diazepam is required in the hyperbaric environment (up to 30mg IV PRN has been used).
B. Lorazepam is similar to Diazepam, but requires one-fifth the dose.
C. Carbamazepine has been found to be useful for the prevention of CNS toxicity during HBOT of epilepsy-prone patients.

References:

Jain, K. (1996). Textbook of Hyperbaric medicine. Seattle: Hogrefe & Huber.
Kindwall, E. (1995). Hyperbaric Medicine procedures. Flagstaff, AZ: Best Publishing.