

**THE USE OF HYPERBARIC OXYGEN
THERAPY (HBOT) IN OPHTHALMOLOGY**

Essay

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by

Haitham Ibrahim Elkharadly

M.B.,B.Ch

Supervised By

Prof.Dr. Negm al-Din Hilal Abd-Allah

Professor of Ophthalmology

Ain Shams University

Dr.Momen Mahmoud Hamdi

Lecturer of Ophthalmology

Ain Shams University

Faculty of Medicine

Ain Shams University-Cairo.

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا

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Professor of ophthalmology

Dr. Momen Mahmoud Hamdi

Lecturer of ophthalmology

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List of abbreviation

AGE	Arterial Gas Embolism
AION	Arteritic Ischemic Optic Neuropathy
ASI	Anterior Segment Ischemia
ATA	Atmospheres Absolute
ATM	Atmosphere
BRAO	Branch Retinal Artery Occlusion
CAI	Carbonic Anhydrase Inhibitors
CME	Cystoid Macular Edema
CNS	Central Nervous System
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CRAO	Central Retinal Artery Occlusion
CROM	Cerebro-Rhino-Orbital Mucormycosis
CRVO	Central Retinal Vein Occlusion
DCS	Decompression Sickness
DME	Diabetic Macular Edema
DR	Diabetic Retinopathy
ERG	Electroretinogram.
FDA	Food and drug Administration
FSW	Feet of Seawater
HBOT	Hyperbaric Oxygen Therapy
IOP	Intra-Ocular Pressure
IVFA	Intravenous Fluorescein Angiography

MSW	Meters of Sea Water
NAION	Non-Arteritic Ischemic Optic
NSAIDs	Neuropathy
Nd:YAG	Non-Steroidal Anti-Inflammatory Drugs
OD	Neodymium :Yttrium Aluminium Garnet
OS	Oculus Dexter
PO2	Oculus Senister
PPV	Oxygen Partial Pressure
PRP	Pars Plana Vitrectomy
PSI	Panretinal Photocoagulation
RON	Pounds Per Square Inch
RP	Radiation Optic Neuropathy
TVFD	Retinitis Pigmentosa
UHMS	Temporal Visual Field Defects
VEGF	Undersea Hyaperbaric Medicine
VER	Society
	Vascular Endothelial Growth Factor
	Visual Evoked Response

Protocol of the essay

In 1930s hyperbaric oxygen (HBO)therapy was first applied in the navies of united states of America and Great Britain to treat decompression sickness. (Halit, et al , 2008).

After 1950, a more complete examination of blood gases and understanding the detailed physiology of gas exchange led the physicians to employ HBO therapy as a treatement of choice. (Jain. 2004).

HBO Therapy includes application of 100% oxygen with an atmospheric pressure that is two- to three- fold of that found in the air at sea level . During HBO therapy arterial oxygen pressure and tissue oxygen pressure can increase up to 2000 mm Hg and 400 mm Hg, respectively . Application of oxygen at this pressure, which increases the gradient (or the transfer of oxygen into tissues) twenty-fold, has many biochemical, cellular, and physiological useful effects. (Tibbles et al., 1996).

HBO therapy can be managed either by direct respiration in the cabins, including one or more patients, or by endotracheal tube, mask, or a firm cap. Instead of using a monoplace chamber for a particular disease in each treatment session, the usage of multiplace chamber, serving two or more patients who need that particular treatment session, reduces the cost of treatment and preferable in the most clinical settings. (Leach et al., 1998).

Hyperbaric oxygen therapy is a primary or adjuvant therapeutic method used in treatment of various acute or chronic disorders. Currently, eye diseases are among the off-label use of hyperbaric oxygen. However, there is an increasing body of evidence showing its safety and efficacy in central retinal artery occlusion (Weinberger, et al.2002), cystoid macular edema secondary to retinal vein occlusion (Krott, et al, 2000), scleral thinning and necrosis faced after pterygium surgery (Bayer, et al, 2002), orbital rhino-cerebral mucormycosis (Yohar, et al. 1994), nonhealing corneal edema, anterior segment ischemia (Recupero, et al, 1992), and diabetic retinopathy (Dumitru,1993). Its potential to treat some blinding disease has also been pointed out in recent studies. (Halit, et al , 2008).

Multiple sessions of HBO therapy have been associated with an improvement in visual function and retinal appearance in patients with Purtscher retinopathy. (Lin, et al. 2006).

Early HBO therapy is recommended for bilateral blindness during hemodialysis. (Keynan, et al. 2006).

HBO therapy is largely safe when properly administered, although the potential systemic and ocular complications are carefully described. The principal systemic complications are pulmonary, central nervous system and hypertensive effects. The ocular complications include progressive (but reversible) myopia with repeated treatment sessions, and cataracts. The only absolute ocular contraindication to HBO therapy

is the presence of an intraocular gas bubble due to prior surgery or trauma. (UHM 2008 Vol.35, No.5.)

This essay constitutes an up-to-date summary of knowledge and therapeutic use of hyperbaric oxygen, and aims to contribute understanding of current and potential use of hyperbaric oxygen therapy in ophthalmology.

Aim of the Essay

Understanding current and potential use of HBO therapy in ophthalmology is of great importance . This is particularly important in the context of limited efficacy or inefficacy of conventional interventions for potentially blinding diseases.

Contents

- Introduction .
- Physiological Basis of HBO therapy .
- Techniques of application of HBO therapy.
- Current and Potential Use of HBO therapy in Ophthalmology.
- General and Ophthalmologic Side Effects of HBO therapy .
- The Costs of HBO therapy.
- Conclusion .

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CHAPTER 1

Introduction