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Hyperbaric Oxygen Therapy for Posttraumatic Stress Disorder

Hani Raoul Khouzam

[1]Staff Psychiatrist, PTSD Treatment Program, VA Northern California Health Care System (VANCHCS), Mather, California.

[2]Clinical Professor of Psychiatry and Medicine, UC Davis Health, Sacramento, California.

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***Corresponding author:** Hani Raoul Khouzam, Staff Psychiatrist, PTSD Treatment Program, VA Northern California Health Care System (VANCHCS), Mather, California.

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Abstract

The conventional treatment of posttraumatic stress disorder usually combines psychotherapy and medications. Many patients do not respond to the conventional treatments and thus requiring the exploration of novel alternative treatment such as hyperbaric oxygen therapy. This article summarizes the complexity of posttraumatic stress disorder and its currently available conventional treatments, the description of hyperbaric oxygen therapy, its mechanism of action, its medical indications, and its proposed use in the treatment of posttraumatic stress disorder

Keywords: posttraumatic stress disorder; medications; psychotherapy; hyperbaric oxygen therapy; treatment.

Prelude

The goal of treating posttraumatic stress disorder (PTSD) is to reduce symptom severity and frequency, to improve functional impairment, to treat concurrent disorders, to prevent relapse and to improve quality of life [4]. Despite the range of effective treatments for PTSD, not all patients have an adequate response, even after receiving adequate and appropriate treatment duration [5]. The current mainstay conventional treatments for PTSD is a combination of psychotherapy and medications. Clinicians have been treating patients who do not respond to conventional treatments with various other therapeutic interventions and among these are the proposed use of hyperbaric oxygen therapy as novel intervention for PTSD.

The Complexity of Posttraumatic Stress Disorder

As a psychiatric condition PTSD develops following a traumatic event that involves physical harm that has been experienced, threated with, or witnessed toward self, loved ones or others. It is characterized by recurrent and intrusive distressing recollections of the traumatic events and is associated with a sense of reliving the experience with intense psychological or physiological distress at exposure to cues that resemble the traumatic event, avoidance of stimuli associated with the trauma, or inability to recall important aspects of the trauma[1]. Individuals with PTSD often experience a cluster of additional symptoms including loss of interest, estrangement from others, sleep disturbances, nightmares, irritability, difficulty concentrating, hypervigilance, exaggerated startle responses, aggressive behaviors , shame and guilt , and some patients develop dissociative flashback episodes [1,2]. The conventional treatment of PTSD is complex and requires individualized and an interdisciplinary approach that combine pharmacological, psychological, social, and spiritual Interventions [3].

Conventional Treatments for PTSD

The mainstay treatments for PTSD are psychotherapy and medications. The goal of treatment is to provide patients with various therapeutic interventions

to cultivate and practice interpersonal and social interaction skills to cope with the trauma, and to manage and control some of the secondary manifestations of PTSD. These may include depression, anxiety, sleep difficulties, interpersonal, occupational, and educational difficulties, and substance use disorder.

Detailed description of the various medications and psychotherapies used for PTSD treatment are beyond the scope of this article. Medications typically include antidepressants, anxiolytics, noradrenergic, sleep enhancers, mood stabilizers, atypical antipsychotics, and other medications to address persistent symptoms. Different psychotherapies have also been utilized including cognitive behavioral therapy, cognitive processing therapy, exposure therapy ,stress Inoculation training, present centered therapy , eye movement desensitization and reprocessing therapy and a multitude of other psychosocial and spiritual interventions to address the unique and individual characteristics of each patient .However, a substantial proportion of patients have treatment resistant PTSD and do not respond to the available PTSD conventional treatment interventions ,thus creating an urgency to explore other novel treatment intervention such as hyperbaric oxygen therapy.

HBOT Description

HBOT involves breathing oxygen in a chamber with higher than normal atmospheric pressure, resulting in increased amounts of oxygen gathered by the lungs and dissolved in the blood [6]. The U.S. Food and Drug Administration(FDA)approved HBOT for the treatment of 13 medical conditions including Air or gas embolism, Gas gangrene, Crush injury, Compartment syndrome, Acute peripheral ischemia's, Decompression sickness, Enhanced healing in selected problem wounds, Exceptional blood loss anemia, Necrotizing soft tissue infections, Osteomyelitis, Delayed radiation injury (soft tissue and bony necrosis),Compromised skin grafts and flaps, Carbon monoxide poisoning treatment for air or gas embolisms, Carbon monoxide poisoning, Decompression sickness, and Thermal burns[7].

According to the Hyperbaric Oxygen Committee of the Undersea and Hyperbaric Medical Society, HBOT involves breathing 100% oxygen while inside a chamber where the air pressure is at least 1.4 times greater than normal [8]. The therapeutic effects of HBOT are multidimensional and assume that exposure to higher than normal atmospheric pressure lead to an increased oxygen levels of in the blood which then increase perfusion of oxygen delivery to tissues and body organs. It is designed to increase the supply of oxygen to the blood and tissues and is thought to have osmotic and angiogenesis effects. The oxygen level that is inhaled during normal inhalation is around 21% and the atmospheric absolute (ATA) pressure at sea level is 760 mmHg [8].

Complications and Contraindications

HBOT is a relatively safe procedure , but its administration is associated with certain risks, due to the effect of oxygen toxicity which is usually manifested by a progressive, reversible myopia, thought to be due to physical lens deformation[9].No other optical side-effects such as cataracts have been reported [9].In some individuals HBOT , central nervous system toxicity may occur resulting oxygen-induced convulsions and seizures [10,11] .Middle ear and sinus barotraumas could occur and are preventable by equalization techniques or tympanostomy tubes[12].The administration pseudoephedrine would prevent otitis media [13].Although inner ear barotrauma is extremely rare, a tympanic rupture could result in permanent hearing loss, tinnitus and vertigo. Pulmonary barotrauma and pneumothorax are extremely rare, particularly without pre-existing lung disease. Dental barotrauma may rarely cause pain under a dental filling. Stimulation of malignant growth by increasing tumor oxygenation has not been reported and a history of malignancy is not considered a contraindication for HBOT[14].Providing HBOT can be used during pregnancy without causing and complications to the mother or the growing fetus[15].

The only absolute contraindication to HBOT is an untreated tension pneumothorax [16]. Relative contraindications include impaired pressure equalization, and cardiac disease [17].

HBTO Mechanism of Action in PTSD

The use of HBOT for mental health conditions is not FDA approved. Evidence is insufficient to support its use psychiatric disorders such as depression, autism spectrum disorders and PTSD. Several research studies have investigated HBTO as an alternative treatment for patients who have not responded to the currently available PTSD conventional treatments. The proposed benefits of HBOT in PTSD is based on the incidental findings that some patients with PTSD who had brain imaging showed alterations in regional brain perfusion, with stunned and hypo perfused regions thus suggesting that the inadequate brain prefusion may play a role in preventing adequate treatment response to the currently available PTSD conventional treatments[18]. In other instances , patients with traumatic brain injury (TBI) and co-occurring PTSD showed clinical improvement in their PTSD symptomatology when they received HBTO for the management their TBI[19].Other reports also showed improved PTSD symptoms when HBTO was used for the management of TBI and brain concussions[20].

Several case studies and uncontrolled trials, evaluating the efficacy of HBOT as a treatment for cognitive dysfunction or persistent post-concussive symptoms in patients with co-occurring TBI and PTSD showed improvement in PTSD [19,20]. These studies examined PTSD symptoms as a secondary outcome, but there are no trials examining the effects of HBOT in patients with a primary PTSD diagnosis [21].

Conclusion

Although HBOT offer the promise of being an effective and novel treatment intervention for patients who have not responded to conventional PTSD treatments that combine psychotherapy with medications .The benefits of HBOT in patients with PTSD has not been fully proven in randomized double-blind placebo controlled clinical trials ,Until such trials are conducted ,clinicians should not be rushed in recommending HBOT as an alternative or adjunctive PTSD treatment .

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Conflicts of Interests

No conflicts of interests. The materials described in this article are those of the authors and do not reflect the views of the Department of Veterans Affairs or the VA Northern California Health Care System or UC Davis Health, Sacramento, California.

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