

HBOT Enhanced Physical Therapy: A Novel Approach to Improve Rehabilitation for Neurological Brain Injury



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Introduction

Hyperbaric oxygen therapy (HBOT) refers to the medical use of oxygen at a level higher than atmospheric pressure. Initially utilized in the treatment for decompression illness, HBOT has been proven to treat conditions such as diabetic non-healing wounds and late effect radiation from cancer survivors (Bhutani & Vishwanath, 2012). Elevation of partial oxygen pressure in the body has been shown to facilitate the peripheral and neurological regeneration processes.

Our team is currently assessing the neurotherapeutic effects of physical therapy in conjunction with hyperbaric oxygen therapy to enhance rehabilitation goals for patients with neurological brain injury.

Our study has demonstrated the possibility of treating stroke-induced hemiplegic paralysis in patients enabling them to walk, by the use of HBOT and physical therapy. HBOT, in addition to physical therapy, was initiated 14 months from the neurological insult. The patient started HBOT after reaching a plateau in an established physical therapy program. After 40 treatments over a 100-day period, there were marked improvements in neurological balance tests that were conducted.



Methods

- Patient gave informed consent to participate in treatment for hyperbaric oxygen therapy.
- Measurements including blood pressure, pulse oximetry, and neurological testing were recorded before treatment.
- Improvements in the patients' condition was using Electronic Medical Records.
- Hyperbaric oxygen therapy was provided 3 times a week over a 100-day period.
- Hyperbaric oxygen therapy was conducted at 17 feet of sea water pressure which is the equivalent of 1140 mmHg for one hour.
- Physical therapy was provided during treatment inside the hyperbaric chamber.

Materials



30 foot in length x 10 foot in diameter hyperbaric chamber



Equipment that the patient utilized



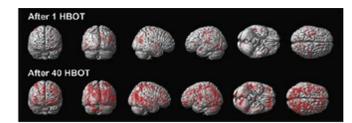
Delivery System for 100% oxygen during treatment

Results and Discussion

It is commonly believed that HBOT is only utilized in the treatment of decompression illness for divers. Divers get decompression illness from surfacing too fast where large bubbles of nitrogen enter the bloodstream. Treatment in a hyperbaric chamber decreases the size of these nitrogen bubbles. However, hyperbaric chambers are used almost exclusively to treat non-healing wounds.



HBOT works by increasing the amount of oxygen available for the body. Similar to healing external wounds, recent studies have shown that HBOT has the ability to treat neurological brain injuries such as stroke, multiple sclerosis (MS), and traumatic brain injury (TBI) (Hu et al., 2016).

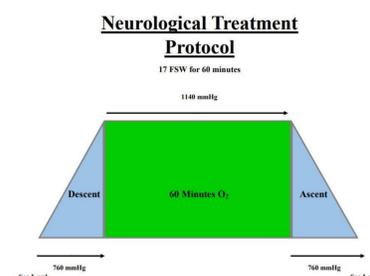


(Miskin & Fox, 2016)

HBOT has been shown to be effective in the treatment of TBI and PTSD patients at an increased atmospheric pressure in the chamber. Through increased blood flow to the brain and increases in post-treatment assessments, HBOT has been statistically proven to increase cognitive functioning and quality of life (Peterson et al., 2018).

The primary purpose of HBOT is to accelerate the healing of wounds with vascular damage. A stroke is a version of cerebral vascular damage, and a similar healing mechanism appeared to have been shown in the stroke patients' case.

In this study it was shown that the patient reported a better quality of sleep, marked improvement in gait, and marked improvements in the movement of her left arm.



Conclusion

We have demonstrated a hypothetical mechanism of neurogenesis through the improvement of this individual patient. Although an n-of-1 trial is not statistically significant, physical therapy in addition to hyperbaric oxygen therapy is indicated for further exploration for the enhanced rehabilitation goals for neurological brain injuries. We have theoretically demonstrated how the number of treatment segments, the duration of treatment, and treatment frequency affect the incidence of positive outcomes in this subset of patients.

References

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