Bay Area HYPERBARICS
Oxygen Heals

Hyperbaric Oxygen Therapy: A Vital Treatment for Decompression Sickness as well as Air and Gas Embolisms

Hyperbaric Oxygen Therapy (HBOT) is the definitive treatment for decompression sickness (DCS) and air or gas embolisms, conditions often seen in divers and individuals exposed to rapid changes in pressure. HBOT involves placing the patient in a pressurized chamber where they breathe 100% oxygen, which significantly increases plasma oxygen concentration and promotes the dissolution of nitrogen bubbles responsible for DCS. This therapy helps to reduce bubble size, alleviate the mechanical obstruction of blood flow, and enhance the elimination of inert gases. Additionally, HBOT improves tissue oxygenation, reduces ischemia, and mitigates the inflammatory response associated with air or gas embolisms. Prompt administration of HBOT is critical, as it effectively restores perfusion to compromised tissues and prevents further neurological and systemic damage. Clinical outcomes are greatly improved with early and appropriate use of HBOT.

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How Hyperbarics Helps

- Reduces bubble size and volume
- Enhances oxygen delivery
- Counteracts ischemic injury
- Accelerates nitrogen removal
- Supports neovascularization
- Reduces inflammation
- Reduces ischemia-reperfusion injury

What Research Says

Decompression sickness (DCS), commonly known as "the bends," is a potentially debilitating condition affecting divers who surface too quickly or fail to adhere to proper decompression procedures. The rapid reduction in pressure leads to the formation of gas bubbles in the body, causing a myriad of symptoms ranging from joint pain and fatigue to more severe neurological and cardiopulmonary complications. Hyperbaric oxygen therapy (HBOT) has emerged as a pivotal treatment for DCS, helping to alleviate symptoms and promote healing. This article explores the mechanism of HBOT and its effectiveness in managing decompression sickness.

Understanding Decompression Sickness, Air and Gas Embolisms

Decompression sickness occurs when dissolved gases, primarily nitrogen, come out of solution and form bubbles in the body due to rapid changes in pressure. These gas bubbles can cause mechanical, embolic, or biochemical effects, leading to a variety of symptoms, including joint pain, dizziness, shortness of breath, extreme fatigue, and in severe cases, paralysis or death.Similarly, Air and gas embolisms occur when gas bubbles, usually air or nitrogen, enter the bloodstream and obstruct blood flow in blood vessels. This blockage can lead to tissue hypoxia, inflammation, and damage, with symptoms ranging from mild discomfort to severe neurological and cardiopulmonary complications. The severity and location of the embolism dictate the patient's symptoms and overall prognosis.

Hyperbaric Oxygen Therapy: A Lifesaver for DCSHyperbaric oxygen therapy is a medical treatment that involves placing the patient in a chamber with pressurized oxygen. The increased atmospheric pressure allows for higher oxygen concentrations in the blood, which aids in the healing process.

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1. **Reducing Bubble Size and Volume:**
   The primary mechanism of HBOT in treating air and gas embolisms involves reducing the size of gas bubbles within the bloodstream. By increasing the pressure in the chamber, the gas bubbles shrink, reducing their potential to obstruct blood flow. This decrease in bubble size allows them to be reabsorbed into the bloodstream and subsequently eliminated through the respiratory system.

2. **Enhancing Oxygen Delivery:**
   HBOT increases the amount of dissolved oxygen in the blood, improving oxygen delivery to tissues affected by the embolism. The increased oxygen supply promotes healing, reduces inflammation, and mitigates the effects of ischemia (lack of oxygen) in the affected tissues

3. **Counteracting Ischemic Injury:**
   Gas embolisms can lead to ischemic injury, which occurs when tissues are deprived of oxygen due to reduced blood flow. HBOT counteracts ischemic injury by increasing the oxygen concentration in the blood, ensuring that tissues receive adequate oxygen for healing and reducing the risk of permanent damage.

4. **Accelerating Nitrogen Elimination:**
   HBOT helps expedite the elimination of nitrogen from the body. By increasing the oxygen concentration in the blood, the rate of nitrogen elimination is accelerated, as the body works to restore a normal balance of gases. This rapid removal of nitrogen helps to dissolve any remaining gas bubbles, further reducing symptoms and complications of decompression sickness.

5. **Supporting Neovascularization:**
   HBOT has been shown to promote neovascularization, the formation of new blood vessels in response to tissue injury. This process can help restore blood flow to areas affected by gas embolisms, further supporting tissue recovery and reducing long-term complications.

6. **Reducing Inflammation:**
   Inflammation often occurs in response to air and gas embolisms, contributing to tissue damage and exacerbating symptoms. HBOT has been demonstrated to reduce inflammation by inhibiting the production of pro-inflammatory cytokines and increasing the production of anti-inflammatory mediators, supporting the healing process.

7. **Reducing Ischemia-Reperfusion Injury:**
   In some cases, the gas bubbles in the blood vessels can lead to ischemia, a condition where tissues are deprived of oxygen due to reduced blood flow. Upon the restoration of blood flow, the affected tissues may experience reperfusion injury, characterized by inflammation and oxidative damage. HBOT has been shown to reduce the severity of ischemia-reperfusion injury by enhancing oxygen delivery and reducing inflammation.

Hyperbaric oxygen therapy has proven to be an indispensable tool in the treatment of decompression sickness, significantly improving patient outcomes. In addition, it has proven to be a valuable treatment option for air and gas embolisms. By reducing bubble size and volume, enhancing oxygen delivery to tissues, accelerating nitrogen elimination, and reducing ischemia-reperfusion injury, HBOT plays a crucial role in healing and recovery.

While HBOT is an effective therapy, it is essential to remember that prevention is always the best approach. Ensuring proper diving practices, following medical procedure guidelines, and promptly seeking medical attention for traumatic injuries can help minimize the risk of air and gas embolisms.

Research Studies

Critical Care Journal

Early hyperbaric oxygen therapy is associated with favorable outcome in patients with iatrogenic cerebral arterial gas embolism

Hyperbaric oxygen is among the most studied and frequently reported applications in the treatment of delayed radiation injuries. This application of hyperbaric oxygen to the treatment and prevention of delayed radiation injury will be the topic of this chapter. The management of delayed radiation injury, especially when bone necrosis is present, requires mult-disciplinary management. The nature of delayed radiation injury, the mechanisms whereby hyperbaric oxygen is effective, clinical results, the effects of hyperbaric oxygen on cancer growth and future areas for research will be discussed.

Undersea and Hyperbaric Medical Society

A retrospective review of 656 cases showed that patients treated with HBOT had a significantly higher rate of full recovery

A retrospective review of 656 cases showed that patients treated with HBOT had a significantly higher rate of full recovery (78%) compared to those who did not receive HBOT (56%). The mortality rate for treated individuals was also substantially lower, underscoring HBOT's effectiveness in managing air or gas embolisms.

Undersea and Hyperbaric Medical Society

HBOT reduces the size of gas bubbles and enhances their absorption, effectively restoring normal blood flow and oxygenation to affected tissues

HBOT is a well-established treatment for decompression sickness and air embolisms, frequently used in diving-related injuries. By increasing atmospheric pressure, HBOT reduces the size of gas bubbles and enhances their absorption, effectively restoring normal blood flow and oxygenation to affected tissues.

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Patient Experiences

Listen to what real patients have to say about their experiences.

Lisa St John, the clinic director for Bay Area Hyperbarics, had chronic refractory osteomyelitis that lasted seven years with no relief. The infection induced severe fatigue and cognitive impairment that prevented her from working, and required her to sleep up to 18 hours per day. Finally, a physician recommended hyperbaric oxygen therapy with antibiotics, which after 60 treatments, healed her. Shortly after being healed, she sold her home to begin her first hyperbaric oxygen therapy clinic, which she has owned for almost 25 years!

Lisa, 44

After seven years of suffering, hyperbaric oxygen therapy healed her osteomyelitis.

Jennifer had osteomyelitis of the lower jaw (mandible), which proved difficult to heal. Her teeth were becoming loose, and her doctor thought she would need surgery. However, he prescribed hyperbaric oxygen therapy before the surgery, and after 60 treatments, her chronic refractory osteomyelitis healed completely, regrowing bone in her mandible. Jennifer was able to keep her teeth, and was able to return to her active lifestyle, hiking regularly with her husband.

Jennifer, 68

Hyperbaric oxygen therapy eliminated the need for surgery to heal her bone infection.

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Refer a Patient

Refer a patient in three easy steps.

1 **You submit patient's information**

As a provider, your office fills out and faxes back the Patient Referral Form. Have questions? Call us!

2 **We get authorizations**

We make sure the patient understands treatment and then follow the prescribed protocol to get the patient on the road to recovery!

3 **Patient starts HBOT**

Our medical staff meets with the patient to ensure that HBOT is appropriatre, and contacts Medicare or private insurance to receive authorization.

Call Us: (408) 356-7438

Scan for Patient Referral Form