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Effectiveness Therapy Oxygen Hyperbaric (HBOT) Against Central Retinal Artery Occlusion (CRAO): Literature Review

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ABSTRACT
Central Retinal Artery Occlusion (CRAO) is a rare eye disease causing sudden vision loss due to artery blockage. It's considered an eye emergency due to potential ischemia, infarction, and acute vision loss. Hyperbaric oxygen therapy (HBOT), delivering 100% oxygen at pressures exceeding 1 atmosphere, enhances oxygen transport, vascular perfusion, and neuroprotection, benefiting retinal tissue. Under hyperbaric conditions, oxygen supply to the retina increases to 100%, reducing edema and preserving adjacent tissue. This research method uses a literature review design. Three articles were included in the international database PubMed. The results of the review revealed that the three articles analyzed in the literature reported a consistent finding: hyperbaric oxygen therapy (HBOT) has the potential to reduce macular edema. This suggests that HBOT may offer a promising treatment modality for addressing macular edema associated with Central Retinal Artery Occlusion (CRAO). In the discussion, it can be inferred that the mechanism behind HBOT's efficacy in reducing macular edema lies in its ability to enhance oxygen delivery to the ischemic retina, thereby reducing edema and preserving surrounding tissue. This finding underscores the importance of exploring HBOT as a therapeutic option for managing complications of CRAO, potentially improving visual outcomes for affected individuals. However, further clinical studies are warranted to validate these findings and elucidate the optimal HBOT protocols for treating macular edema in CRAO patients. The thickness of the retinal layer in patients progressively decreased, compared to the accompanying eye in reducing edema.

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INTRODUCTION

Central retinal artery occlusion (CRAO) is a rare case that happens in a case of emergency field emergency eyes that cause vision to be lost in a way sudden (Chronopoulos & Schutz, 2019). Occlusion of the central retinal artery can occur at all ages; however, more often at ages more than 60 years (Park et al., 2015). Incidence Occlusion of central retinal artery was reported <2 per 100,000 population in a study in America and 1.72 per 100,000 population in a study in South Korea. Occlusion central retinal artery was reported for the first time in 1859. The healing prognosis is terrible if there is no governance of sore eyes.

Arteries originate from the carotid arteries, and the central retinal artery is an essential thing from ophthalmic arteries. The supply blood layer part in the retina originates from the central retinal artery And its branches (Tomkins-Netzer et al., 2024). In normal conditions, the blood supply to 2/3 of the parts of the retina is supplied from a central retinal artery, and 1/3 of the part is supplied outside of the circulation choroidal through diffusion. Retina requires the consumption of high oxygen

compared to other organs, namely 13 mL/100 mg per minute. Retinal tissue does not have tolerance to hypoxia (Heng et al., 2019).

Occlusion of the central retinal artery can be marked with symptoms of loss of sudden vision and no pain, and it happens in one sharp vision on Occlusion (Mac Grory et al., 2021). The central retinal artery is around 20/400 or worse in 80% of conditions. No can be treated. Factor risks include Occlusion arteries of the central retina, including giant cell arteritis, atherosclerosis carotid artery, disease thromboembolism, hypertension, smoking, diabetes, and Vasospasm (Limaye et al., 2018).

Therapy Occlusion central retinal artery, like ocular massage, anterior chamber paracentesis, medication lowering intraocular pressure, vasodilators, and oral diuretics, where the goal is to move the embolus downstream with lower intraocular pressure and cause vasodilation (Grimes et al., 2023). On In 2006, Hyperbaric oxygen therapy (HBOT) was introduced as therapy For Occlusion central retinal artery. Therapy oxygen hyperbaric can deliver 100% oxygen with pressure more considerable than 1 atmosphere (atm) and can increase transportation And diffusion of plasma oxygen, with effect positive on vascular perfusion and neuroprotection, with an adequate vascular supply (Shi et al., 2018). Typically, a deep-condition normobaric circulation choroid supplies 60% of the required oxygen by the retina, which increases to 100% in a deep-condition hyperbaric. During therapy oxygen, the volume of dissolved oxygen in plasma increases 20 to 30 times. Therapy oxygen hyperbaric can reduce edema and maintain adjacent networks with ischemic areas (Harrison et al., 2018).

RAO is a rare but serious condition that causes sudden vision loss due to artery blockage in the eye. Traditional treatment options for CRAO are limited, and additional or alternative therapies may be necessary to improve outcomes. Therefore, this research is conducted (Celebi, 2021).

Lost vision is a symptom of Occlusion of the central retinal artery. Clinical delay treatment can cause increasing blindness. In 2008, the Undersea and Hyperbaric Medical Society started using therapy oxygen on the Occlusion central retinal artery, which oxygen to the retina via circulation choroidal in the way of diffusion (Linsenmeier & Zhang, 2017).

The research aims to investigate the effectiveness of hyperbaric oxygen therapy (HBOT) in the treatment of Central Retinal Artery Occlusion (CRAO), a rare but severe condition leading to sudden vision loss due to arterial blockage in the eye. Traditional treatment options for CRAO are limited, necessitating exploration of additional or alternative therapies to enhance treatment outcomes. This research seeks to address the gap in current treatment modalities by evaluating the potential benefits of HBOT in improving visual outcomes and preserving retinal tissue integrity in patients with CRAO (Jayasinghe et al., 2022).

The novelty of this research lies in its focus on HBOT as a therapeutic intervention for CRAO, which has gained attention in recent years but requires further investigation to establish its efficacy and safety. By examining the existing literature and synthesizing evidence from previous studies, this research aims to contribute to the growing body of knowledge on the management of CRAO and provide valuable insights into the potential role of HBOT in improving patient outcomes (John Blegen IV et al., 2021).

The benefits of this research include the potential advancement in treatment options for CRAO patients, particularly in cases where traditional therapies have proven ineffective or insufficient. By elucidating the mechanisms of action and efficacy of HBOT in CRAO treatment, this research may inform clinical practice and guide healthcare professionals in making informed decisions regarding patient care. Ultimately, the findings of this research may lead to improved visual outcomes, enhanced

quality of life, and reduced risk of permanent vision loss for individuals affected by CRAO (Sharma et al., 2018).

METHOD

The study employed a literature review design, utilizing a structured approach to drafting research questions based on the PICO framework (Population, Intervention, Comparison, Outcomes). Specifically, the PICO elements for this study were as follows: Population - patients with an indication of occlusion of the central retinal artery; Intervention - hyperbaric oxygen therapy; Outcome - effectiveness of hyperbaric oxygen therapy. Inclusion criteria for article selection included: (1) articles involving the administration of hyperbaric oxygen therapy, (2) studies conducted on patients with occlusion of the central retinal artery, (3) assessment of the effectiveness of hyperbaric oxygen therapy as the primary outcome, (4) publication date between 2014 and 2024. A comprehensive search for relevant articles was conducted using the international database PubMed, covering a period of 10 years from 2014 to 2024. The search strategy involved combining keywords related to central retinal artery occlusion and hyperbaric oxygen therapy. A total of 34 articles were identified from the PubMed database search. After screening for eligibility, 22 articles met the inclusion criteria, while 9 articles were excluded as they did not align with the research questions. Ultimately, 3 articles were included in the analysis, meeting all specified criteria for intervention adequacy and relevance to the study objectives. The analysis focused on evaluating the effectiveness of hyperbaric oxygen therapy in the management of central retinal artery occlusion, as reported in the selected articles. By synthesizing the findings from these articles, the study aimed to provide insights into the potential benefits of hyperbaric oxygen therapy for patients with occlusion of the central retinal artery.

RESULTS AND DISCUSSION

Based on the results search Literature There are 3 articles included. From research that, in part, the article has explained objective research, randomization samples, and homogeneity samples, and can applied locally (Skrivankova et al., 2021). Case Report "The efficacy of hyperbaric oxygen therapy in the treatment of central retinal artery occlusion." Case First, a patient with occlusion of the central retinal artery underwent therapy with oxygen for three days with results of sharpness vision improved up to 1.0. Then, after Sunday to seven, repeat it and show normal. In the case of two patients with occlusion of the central retinal artery after 13 days of therapy, the sharpness of the eye improved to 0.8. Ten days after the first visit, control with expected results (Dewi et al., 2023).

Article research "Oxygen therapy in patients with retinal artery occlusion: A meta-analysis." Therapy oxygen for therapy repair sharpness vision in a patient's occlusion central retinal artery, giving oxygen hyperbaric 100% with a duration of more than nine hours is an effective clinical program. "Successful treatment of central retinal artery occlusion using hyperbaric oxygen therapy." (Kim et al., 2018). Therapy oxygen is carried out on the patient's occlusion central retinal artery with a pressure of 2.8 ATA for 140 minutes per session. First, sharpness vision patients who do not correct increase to 0.2 on OD and 0.5 on OS.

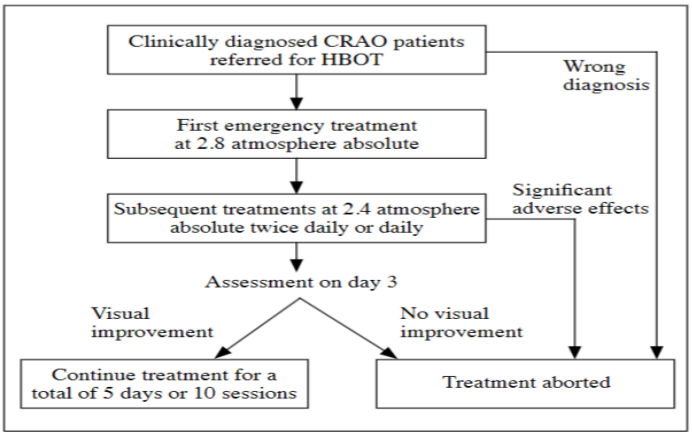

Figure 1 Protocol therapy oxygen hyperbaric for occlusion central retinal artery

Therapy oxygen hyperbaric is wrong. One possible therapy used on diseased eyes is occlusion of the central retinal artery. With oxygenation hyperbaric, oxygen can reach layers of the retina in And outside through choroid (Dikmen et al., 2022). The early administration of HBOT can prevent irreversible damage to the retina (McMonnies, 2018). Giving therapy oxygen hyperbaric for therapy occlusion, the central retinal artery must keep going continuously until the Genre through the retinal artery can maintain inner retina capabilities in a normal condition.

The literature states that therapy oxygen hyperbaric can reduce macular edema. The thickness of the inner retinal layer of the patient, in a way progressive, decreased, compared with accompanying eyes with reduced edema (Ciulla et al., 2021). Based on the American Heart Association (AHA) classification based on events, therapy on occlusion of the central retinal artery with therapy for oxygen hyperbaric at level IIb. Therapy oxygen hyperbaric is a safe therapy and can accepted; however, the data is still rare.

According to the Undersea and Hyperbaric Medical Society, Therapy oxygen hyperbaric must done at the beginning of the first 24 hours after symptom onset, and the result is Good If done in the first 12 hours. It is getting better condition on occlusion of the central retinal artery related to speed time. Get treatment (6 hours), and no problems with abnormal eye or aggravating factors are complained of. The literature states there are 4 key determining factors to the success of therapy oxygen hyperbaric on occlusion central retinal artery, among others in a way early / fast done therapy oxygen hyperbaric, deg occlusion vessels blood, type vessels occluded blood and adequacy pressure oxygen (PaO2).

CONCLUSION

Based on this literature review, we conclude that hyperbaric oxygen therapy can be effectively used in treating patients with central retinal artery occlusion. The research indicates that patients receiving hyperbaric oxygen therapy within 8 hours of symptom onset have an 83% chance of improving by 3 lines or more on the Snellen chart. These findings provide strong support for the use of hyperbaric oxygen therapy as part of the management of central retinal artery occlusion. However, it is important to note that this therapy should be administered quickly and timely to achieve optimal results. Thus, a better understanding of when and how to administer hyperbaric oxygen therapy to patients meeting these criteria is crucial for improving their clinical prognosis. This conclusion highlights the importance of appropriate interventions in enhancing the quality of life and clinical outcomes of patients with central retinal artery occlusion.

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