

Case Study Hyperbaric Oxygen Therapy for Idiopathic Sudden Sensorineural Hearing Loss

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Abstract : Background: The National Institute for Deafness and Communication Disorders defines idiopathic sudden sensorineural hearing loss as the idiopathic loss of hearing of at least 30 dB across 3 contiguous frequencies occurring within 3 days. The most common clinical presentation involves an individual experiencing a sudden unilateral hearing loss, tinnitus, a sensation of aural fullness and vertigo. The etiologies and pathologies of ISSNHL remain unclear. Several pathophysiological mechanisms have been described including: vascular occlusion, viral infections, labyrinthine membrane breaks, immune associated disease, abnormal cochlear stress response, trauma, abnormal tissue growth, toxins, ototoxic drugs and cochlear membrane damage. The rationale for the use of hyperbaric oxygen to treat ISSNHL is supported by an understanding of the high metabolism and paucity of vascularity to the cochlea. The cochlea and the structures within it require a high oxygen supply. The direct vascular supply, particularly to the organ of Corti, is minimal. Tissue oxygenation to the structures within the cochlea occurs via oxygen diffusion from cochlear capillary networks into the perilymph and the cortilymph. The perilymph is the primary oxygen source for these intracochlear structures. Unfortunately, perilymph oxygen tension is decreased significantly in patients with ISSNHL. To achieve a consistent rise of perilymph oxygen content, the arterial-perilymphatic oxygen concentration difference must be extremely high. This can be restored with hyperbaric oxygen therapy. Subject and Methods: A 37 year old man was presented at the clinic with a five days history of muffled hearing and tinnitus of the right ear. Symptoms were sudden onset, with no associated pain, dizziness or otorrhea and no past history of hearing problems or medical illness. Family history was negative. Physical examination was normal. Otologic examination revealed normal tympanic membranes bilaterally, with no evidence of cerumen or middle ear effusion. Tuning fork examination showed positive Rinne test bilaterally but with lateralization of Weber test to the left side, indicating right ear sensorineural hearing loss. Audiometric analysis confirmed sensorineural hearing loss across all frequencies of about 70- dB in the right ear. Routine lab work were all within normal limits. Clinical diagnosis of idiopathic sudden sensorineural hearing loss of the right ear was made and the patient began a medical treatment (corticosteroid, vasodilator and HBO therapy). The recommended treatment profile consists of 100% O₂ at 2.5 atmospheres absolute for 60 minutes daily (six days per week) for 40 treatments. The optimal number of HBOT treatments will vary, depending on the severity and duration of symptomatology and the response to treatment. Results: As HBOT is not yet a standard for idiopathic sudden sensorineural hearing loss, it was introduced to this patient as an adjuvant therapy. The HBOT program was scheduled for 40 sessions, we used a 12-seat multi place chamber for the HBOT, which was started at day seven after the hearing loss onset. After the tenth session of HBOT, improvement of both hearing (by audiogram) and tinnitus was obtained in the affected ear (right). Conclusions: In conclusion, HBOT may be used for idiopathic sudden sensorineural hearing loss as an adjuvant therapy. It may promote oxygenation to the inner ear apparatus and revive hearing ability. Patients who fail to respond to oral and intratympanic steroids may benefit from this treatment. Further investigation is warranted, including animal studies to understand the molecular and histopathological aspects of HBOT and randomized control clinical studies.

Keywords : idiopathic sudden sensorineural hearing loss (issnhl), hyperbaric oxygen therapy (hbot), the decibel (db), oxygen (o₂)

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