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Original Article

The role of hyperbaric oxygen therapy in Sudden Sensorineural Hearing Loss: A retrospective review of 50 patients

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ABSTRACT

Background: Sudden Sensorineural Hearing Loss (SSNHL) is a hearing impairment of more than 30 dB occurring within a period of upto 3 days in three consecutive pure tone frequencies. Hyperbaric oxygen therapy (HBOT) in recent years has gained relevance for treating SSNHL in combination with other agents. The aim of this study is to review the outcomes in patients with SSNHL treated with HBOT at our centre.

Materials & methods: Records of 50 patients with SSNHL who received HBOT with conventional management were retrospectively reviewed. They were treated in a multiplace hyperbaric chamber at 2.4 ATA, for 90 min once a day. Pre and post treatment audiograms at 500, 1000, 2000, 4000 and 6000 Hz were compared to assess improvement. Hearing gain in relation to severity, age of patients, therapeutic delay and coexisting symptoms in prognosis was evaluated.

Results: 94% patients had overall hearing improvement. 82% patients of severe hearing loss presenting to us within 2 weeks of onset showed maximum gain. Those who received treatment within 14 days showed highest gain from 76 ± 20.06 dB to 51.9 ± 17.1 dB as compared to other patients. The hearing gain was greater at frequencies above 500 Hz. Patients younger than 50 years showed greater gain of 25 ± 13.2 dB as compared to those older than 50 years with gain of 19 ± 10.2 dB.

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Conclusion: Addition of HBOT to standard treatment significantly improves outcome of SSNHL in a subset of patients. We recommend additional multicentric, prospective studies be carried out to define the role of HBOT in SSNHL.

1. Introduction

Sudden Sensorineural Hearing Loss (SSNHL) is hearing impairment of more than 30 dB of three consecutive pure tone frequencies developing within 3 days or less.[1–3] It is a clinical manifestation with proposed diverse aetiologies such as viral infection, vascular compromise, intra-cochlear membrane rupture or inner ear disease among others.[3–5] It is more common in young and middle aged people with unilateral ear involvement in more than 90% cases.[1,5–8]

Due to lack of definite cause of SSNHL, its treatment is largely empirical and includes use of a wide variety of therapies like systemic and intratympannic steroids, vasodilators, osmotic drugs, antiviral and anticoagulants to counteract possible inflammatory mechanism, modify hydrostatic pressure and improving cochlear blood flow.[8–12] The possible final goal of any treatment modality of SSNHL has been the restoration of oxygen tension in the cochlea to encourage healing and return of hearing to normal levels.

Hyperbaric oxygen therapy (HBOT) is a treatment modality involving the intermittent inhalation of 100% oxygen in chambers pressurized above 1 atmosphere absolute (ATA). HBOT has been used as an adjunctive therapy for SSNHL as it raises the amount of oxygen in the inner ear by diffusion which activates cell metabolism leading to restoration of ionic balance and electrophysiological functions of cochlea.[2,13–16]

This study aims to analyse retrospective data of this centre to evaluate the efficacy of addition of HBOT to conventional treatment in patients with SSNHL and identify specific groups of patients likely to benefit from the addition of this therapy.

2. Materials and methods

In this retrospective study we reviewed records of 150 patients with SSNHL who presented to our unit during the period 2006–2011. 50 Patients who met the following inclusion criteria were taken for the study: unilateral onset of SSNHL of 30 dB or greater in atleast three contiguous frequencies, unknown cause of hearing loss and no previous surgery in the affected ear. These patients received HBOT in addition to conventional treatment as prescribed by the referring ENT Surgeon. The conventional treatment however was not standardized for patients in our study. HBOT was administered in a multiplace chamber at 2.40 ATA for 90 min once daily for atleast 10 days. The data collected included demographics, initial symptoms of hearing loss, tinnitus, vertigo or any other coexisting symptom, pure tone audiogram (PTA) and duration of onset of hearing loss from starting of HBOT.

The patient's audiograms were reviewed before starting treatment and after 10 sessions of HBOT. If the audiogram showed improvement after 10 treatments, patients were advised for additional 10 sessions of HBOT, this process was repeated after further 10 sessions and a maximum of 30 sessions were given if they continuously showed improvement. All patients were assessed with PTA at 500, 1000, 2000, 4000 and 6000 Hz and hearing gain at these frequencies was calculated separately. The level of hearing loss at these 5 frequencies was evaluated in 3 groups: <40 dB (mild), between 41 and 70 dB (moderate), >70 dB (severe). The average of mean hearing gain of patients according to age group and therapeutic delay along with presence of associated complaints as contributory factors to prognosis of SSNHL was assessed.

Data of study was evaluated using descriptive statistical methods i.e. mean and standard deviation.

3. Results

The clinical profile of the patients in our study is shown in Table 1. The 50 subjects in our study were in the age range of 18–75 (28 males and 22 females). The co-morbid factors in them were hypertension (8% cases), Diabetes Mellitus (16% cases) and coronary artery disease (8%). There was history of smoking in 22% of cases and 34% additionally complained of tinnitus and vertigo.

Table 1 – Clinical profile of patients with sudden sensorineural hearing loss.

Variables		$n = 50$	%
Gender	Male	28	56
	Female	22	44
Age	≤50 yrs	34	68
	>50 yrs	16	32
Affected ear	Right	37	74
	Left	13	26
Time lag	≤14 days	26	52
	15–30 days	17	34
	>30 days	07	14
Severity	Mild	06	12
	Moderate	12	24
	Severe	32	64
Presence of associated complaints	Tinnitus	13	26
	Vertigo	04	08
Coexisting illnesses	Hypertension	05	10
	Diabetes	08	16
	CAD	04	08
	Smoking	11	22