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INNOVATIVE TECHNOLOGIES AND TRANSLATIONAL THERAPIES

The Role of Hyperbaric Oxygen Therapy in the Treatment of Sudden Hearing Loss

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Abstract

Materials and Methods: A retrospective descriptive analytical study conducted over 14 years (2009–2023) included 80 patients (87 ears) treated for sudden hearing loss. We used Siegle's criteria to evaluate auditory improvement at 4 to 6 months post-therapy, considering patients with no recovery, slight recovery, or worsening hearing thresholds as having a poor prognosis. Chi-square and Student's t-test were used for statistical analysis, with a significance threshold set at 0.05.

Results: The average age was 44.59 years. The gender ratio (M/F) was 1.35. Unilateral impairment was predominant (91.3%), with 8.8% presenting bilateral impairment. Initial audiometry showed total deafness in 16 ears and average thresholds of 50.3 dB. All patients received intravenous corticosteroid therapy, and 44 patients (55%) underwent HBO therapy. These patients began HBO therapy after an average of 16.14 days [1-90] from symptom onset, with the majority (65.9%) starting HBO within two weeks of symptom onset. On average, patients received 8.7 HBO sessions [1-20]. For those treated with HBO, 5 ears remained totally deaf, while the rest improved to an average threshold of 25.8 dB with an auditory gain of 24.5 dB. Twenty-eight patients were considered to have a poor prognosis and 16 a good prognosis. For patients not treated with HBO, 4 ears remained totally deaf, while the rest improved to a hearing threshold of 23.5 dB with an auditory gain of 26.8 dB. Seventeen patients were considered to have a poor prognosis and 19 a good prognosis. Statistical analysis showed that HBO was not a significant factor influencing prognosis (p=0.213), which might be explained by selection bias. Indeed, in our series, patients who received HBO were those with severe to profound initial deafness or were poor responders to corticosteroid therapy. The timing of starting HBO was not a statistically significant factor (p=0.416), but the odds ratios (ORs) for timing before and after 15 days (respectively 0.85 and 1.17) suggest that starting HBO before a delay of 15 days might slightly decrease the chances of a poor prognosis. We also found that the number of HBO sessions approached the significance threshold (p=0.052), suggesting a trend where more sessions could potentially be associated with a better prognosis.

Conclusion: The study indicates that while hyperbaric oxygen therapy is not statistically proven to influence the overall prognosis of sudden hearing loss, certain trends suggest its potential benefits, especially when initiated early and with a higher number of sessions. However, further studies are necessary to fully determine HBO's efficacy due to the potential confounding factors observed in this analysis, such as initial severity of hearing loss and response to corticosteroids.

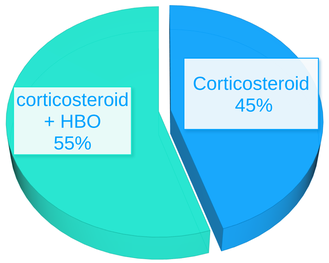

Figure 1 : Treatment modalities

Objectifs

Explore the role of hyperbaric oxygen therapy (HBO) as a therapeutic modality in the treatment of sudden hearing loss.

Méthodes et Matériels

A retrospective descriptive analytical study conducted over 14 years (2009–2023) included **80 patients (87 ears)** treated for sudden hearing loss. We used Siegle's criteria to **evaluate auditory improvement at 4 to 6 months post-therapy**, considering patients with no recovery, slight recovery, or worsening hearing thresholds as having a poor prognosis. Chi-square and Student's t-test were used for statistical analysis, with a significance threshold set at 0.05.

Résultats

- Average age = 44.59 years.
- Gender ratio (M/F) = 1.35.
- Laterality of sudden deafness = Predominance of unilateral impairment (91.3%)
- Initial audiometry = total deafness in 16 ears and average thresholds of 50.3 dB.
- Treatment= **Figure 1**
- Time to HBO initiation = 16.14 days [1-90] from symptom onset with 65.9% starting within two weeks of symptom onset.
- Sessions number = 8.7 HBO sessions [1-20].
- Outcomes =

Table 1 : Outcomes of sudden deafness after corticosteroid therapy and combined (+HBO) therapy

	Corticosteroid + HBO	Corticosteroid
Cophotic ears	5	4
Average threshold	25.8 dB	23.5
Auditory gain	24.5 dB	26.8 dB
Good prognosis	16 ears	17
Bad prognosis	28 ears	19

- Statistical analysis = **HBO** was not a significant factor influencing prognosis (p=0.213), which might be explained by selection bias. Indeed, in our series, patients who received HBO were those with severe to profound initial deafness or were poor responders to corticosteroid therapy.
- **Timing of starting HBO** was not a statistically significant factor (p=0.416), but the odds ratios (ORs) for timing before and after 15 days (respectively 0.85 and 1.17) suggest that starting HBO before a delay of 15 days might slightly decrease the chances of a poor prognosis.
- **Number of HBO sessions** approached the significance threshold (p=0.052), suggesting a trend where more sessions could potentially be associated with a better prognosis.

Conclusion

The study indicates that while HBO is not statistically proven to influence the overall prognosis of sudden hearing loss, certain trends suggest its potential benefits, especially when initiated early and with a higher number of sessions. In 3 Randomized Controlled Trials, the mean Pure Tone Auditory threshold (PTA) change following treatment, final PTA, and hearing recovery were all associated with significant improvements in patients assigned to the HBO therapy intervention (a combination treatment regimen) compared with control therapy alone. Further research is required to determine the optimal HBO therapy protocol.

Références

(1) Joshua, T. G., Ayub, A., Wijesinghe, P., & Nunez, D. A. (2022). Hyperbaric oxygen therapy for patients with sudden sensorineural hearing loss: a systematic review and meta-analysis. JAMA Otolaryngology–Head & Neck Surgery, 148(1), 5-11.

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