ENT LITERATURE

Hyperbaric oxygenation for tumour sensitisation to radiotherapy: a systematic review of randomised controlled trials.
Cancer Treat Rev. 2008 Nov;34(7):577-91. Epub 2008 Jul 21.
Bennett M, Feldmeier J, Smee R, Milross C.
BACKGROUND: Radiotherapy is a well-established treatment for some solid tumours. Hyperbaric oxygenation (HBO) may improve radiotherapeutic killing of hypoxic cancer cells, so the simultaneous administration of radiotherapy and HBO may reduce mortality and tumour recurrence. METHODS: We performed a systematic search of the literature in September 2007 for randomised controlled trials, and made pooled analyses of pre-determined clinical outcomes. RESULTS: Nineteen trials contributed to this review (2286 patients). There was a reduction in mortality for head and neck cancers at one and five years after therapy (at five years RR 0.82, P=0.03, NNT=5), and improved local tumour control at three months (RR 0.58, P=0.006, NNT=7). Any advantage is achieved at the cost of an increased rate of both severe radiation tissue injury (RR 2.35, P<0.0001, NNH=8) and the chance of seizures during therapy (RR 6.76, P=0.03, NNH=22). CONCLUSIONS: There is some evidence that HBO improves local tumour control and mortality for cancers of the head and neck, and local tumour recurrence in cancers of the uterine cervix. These benefits may only occur with unusual fractionation schemes. HBO is associated with significant adverse effects including oxygen toxic seizures and severe radiation tissue injury. The methodological and reporting inadequacies of the studies included in this review demand a cautious interpretation. More research is needed for head, neck and uterine cervical cancer, but is probably not justified for bladder cancer. There is little evidence available concerning malignancies at other sites.

Hyperbaric oxygen therapy seems to enhance recovery from acute acoustic trauma.
Acta Otolaryngol. 2008 Oct;128(10):1110-5
Ylikoski J, Mrena R, Makitie A, Kuokkanen J, Pirvola U, Savolainen S.
CONCLUSION: The average recovery of hearing and cessation of tinnitus was significantly better after hyperbaric oxygen therapy (HBOT) than after normobaric oxygen therapy (NBOT). HBOT can be valuable adjuvant therapy for patients with acute acoustic trauma (AAT). OBJECTIVES: AAT was one of the early indications for the use of HBOT. The rationale of administering oxygen to patients with AAT is based on experimental studies showing that noise exposure results in cochlear hypoxia, which could be compensated by HBOT. The aim of this study was to investigate the efficacy of HBOT in patients with AAT. PATIENTS AND METHODS: We compared the recovery from hearing impairment and tinnitus in 60 ears treated with HBOT with 60 ears treated with NBOT. The HBOT was given daily for 1-8 days. There were no significant differences in clinical or audiological data between HBOT and NBOT groups. RESULTS: The average recovery of hearing both at high and speech frequencies was significantly better and tinnitus persisted less commonly after the HBOT than after the NBOT. Normal hearing at the end of the follow-up period was regained in 42 ears in the HBOT group and in 24 ears in the NBOT group (p<0.01).

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Fungal malignant otitis externa treated with hyperbaric oxygen.
Int J Infect Dis. 2008 Sep;12(5):550-2. Epub 2008 May 27.
Ling SS, Sader C.
OBJECTIVE: To report a case of Aspergillus flavus malignant otitis externa, successfully treated with antifungal agents, surgical debridement, and hyperbaric oxygen treatment. PATIENT: The case was a 77-year-old man with non-insulin dependent diabetes mellitus, who presented with otalgia and purulent otorrhea. Intervention was with surgical debridement, antifungal agents, and hyperbaric oxygen treatment. The main outcome measures were radiological and histological findings. CONCLUSIONS: A. flavus is a rare cause of malignant otitis externa. Aggressive treatment should include surgical debridement, with appropriate antifungal agents and hyperbaric oxygen therapy.

Evaluation of hyperbaric oxygen and pharmacological therapy in sudden hearing loss
Otolaryngol Pol. 2007;61(5):887-91
Jadczak M, Rapiejko P, Kantor I, Szczygielski K, Usowski J, Piechocki J, Jurkiewicz D.
Treatment of idiopathic sudden hearing loss (SHL) is still a big problem for the otolaryngologists, due to the still unexplained etiopathogenesis of the illness. The aim of this study was to evaluate effectiveness of pharmacotherapy combined with the hyperbaric oxygen (HBO) in idiopathic sudden sensorineural hearing loss treatment. Patients who received HBO and medical treatment in the Department of Otolaryngology of Military Institute of Health Service and Warsaw Center for Hyperbaric Therapy and Wounds Treatment were studied. MATERIAL AND METHODS: Nine patients, with idiopathic sudden hearing loss--patients treated in 2007 year were studied. There were 5 women and 4 men involved in our study--mean age: 41 years old. Patients with sensorineural hearing loss of minimum 15 dB at 0.25-8 kHz and tinnitus were included in the treatment group. Improvement of hearing of minimum 10 dB at 0.25-8 kHz in pure tone audiometry and decrease in the intensity of tinnitus was considered as an improvement. RESULTS: Statistically significant difference in Pure Tone Audiometry results obtained before and after the treatment was noted in 500 Hz, 1 kHz, 2 kHz, 3 kHz, 4 kHz and 8 kHz. Statistically significant difference was noted in 500 Hz, 2 kHz, 3 kHz when treatment was started within 6 days since the acoustic trauma. No side effects of therapy were observed. CONCLUSIONS: Hyperbaric oxygen therapy is the unique method of increasing concentration of oxygen in the inner ear fluids thus facilitates the regeneration process. Hyperbaric oxygen therapy combined with steroids is an effective method of sensorineural hearing loss treatment. Important is to start the therapy quickly after hearing loss.

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Hyperbaric oxygen therapy. Otorhinolaryngological indications.
Acta Otorrinolaringol Esp. 2007 Dec;58 Suppl 2:70-8.
Casamitjana Claramunt JF, Desola Ala J.
Hyperbaric oxygen therapy is based on the increase in partial pressure of oxygen in the tissues through oxygen diffusion from plasma. This increase has positive physiological effects on tissues, such as an increase in cell renewal and the bactericidal action of polymorphonuclear leukocytes, a direct bactericidal action, and neovascularization. The large increase in partial pressure of oxygen in plasma allows direct diffusion through tissues, reaching hypoxic areas and regions with little capillary permeability. In the last 40 years, the possible applications of hyperbaric oxygen therapy in otorhinolaryngology (ORL) have been investigated. Possible areas of application are hypoxic processes secondary to radiotherapy (radionecrosis, osteonecrosis, osteomyelitis), infections (malignant otitis externa, fasciitis) or vascular disorders (sudden hearing loss syndrome). We describe the physiological mechanisms of the application of hyperbaric oxygen therapy and review its indications in ORL.

Hyperbaric oxygen in the treatment of sudden deafness.
Eur Arch Otorhinolaryngol. 2007 Aug;264(8):951-3. Epub 2007 Mar 15.
Domachevsky L, Keynan Y, Shupak A, Adir Y.
Currently, the treatment of sudden deafness (SD) is based mainly on complete bed rest and the administration of corticosteroids. Hyperbaric oxygen therapy (HBOT) has previously been suggested as adjunctive treatment. We describe two cases of successful HBOT for SD. The first patient presented with moderate mid-frequency hearing loss without accompanying symptoms, whereas the second patient had moderate low-frequency hearing loss with persistent tinnitus and a single episode of vertigo. HBOT in addition to conventional treatment soon after diagnosis resulted in full recovery of hearing in both patients. The pathogenesis of SD may involve a reduction in cochlear blood flow and perilymph oxygenation, making early HBOT a reasonable treatment modality for this condition.

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Hyperbaric oxygen and steroid therapy for idiopathic sudden sensorineural hearing loss.
Eur Arch Otorhinolaryngol. 2007 Aug;264(8):861-6. Epub 2007 Mar 6
Fujimura T, Suzuki H, Shiomori T, Udaka T, Mori T.
In our controlled retrospective analysis of medical records in tertiary care academic medical center, we aimed to investigate the therapeutic effects of hyperbaric oxygen (HBO) therapy combined with steroid administration for idiopathic sudden sensorineural hearing loss (ISSNHL) in comparison with that of steroid administration alone. Our subjects were 130 consecutive inpatients with ISSNHL (hearing levels >/=40 dB; time from the onset of hearing loss to the start of treatment </=30 days). Sixty-seven patients underwent HBO plus steroid therapy (HBO group), and 63 were given steroids alone (steroid group). Hearing recovery was evaluated by grade assessment and by the improvement in hearing compared to that in the unaffected contralateral ear. The cure rate and hearing improvement rate were not statistically different between the two groups; however, the recovery rate was significantly higher in the HBO group than in the steroid group (59.7% vs. 39.7%; $P < 0.05$). With regard to patients with initial hearing levels of >/=80 dB, the hearing improvement rate was significantly higher in the HBO group than in the steroid group (51.1 +/- 7.0% vs. 27.1 +/- 7.8%; $P < 0.05$), while in patients whose initial hearing levels were <80 dB, hearing outcomes were not statistically different between the two groups. In both the HBO and steroid groups, patients with initial hearing levels of <80 dB showed a better hearing improvement rate than those with initial hearing levels of >/=80 dB. In conclusion HBO therapy shows a significant additional effect in combination with steroid therapy for ISSNHL, particularly in patients with severe hearing loss.

Combination steroid and hyperbaric oxygenation therapy for sudden idiopathic sensorineural hearing loss
Nippon Jibiinkoka Gakkai Kaiho. 2007 May;110(5):395-402.
Kawamata T, Ohki S, Sakuma T, Suzaki H.
We retrospectively evaluated the efficacy of combination therapy with steroid and hyperbaric oxygenation for sudden idiopathic sensorineural hearing loss (SISNHL). Patients (n: 109; 111 ears) visited our clinic within 14 days from onset before receiving treatment between January 1999 and March 2003. Hearing loss was assessed based on criteria prepared by the Ministry of Health and Welfare Acute Severe Hearing Loss Study Group. Patients were distributed into Group I-95 patients who started treatment within 7 days from onset-, and Group II-14 patients who started treatment within 8-14 days from onset. We evaluated the outcome of therapy using grading established by The Research Committee on Acute Profound Deafness, Ministry of Health and Welfare, Japan. The complete recovery of hearing was worse in patients with severe hearing loss. It was 4.8% in grade 4a, 18.2% in grade 3a, 25% in grade 2a, 20.0% in grade 4b, 38.5% in grade 3b, and 66.7% in grade 2b. We studied the relationship between type of hearing loss and recovery after treatment. The complete recovery of hearing was most favorable in patients with low tone hearing loss, followed by those with middle tone hearing loss and those with horizontal hearing loss. These findings indicate that the type of hearing loss was the most significant determinant of SISNHL prognosis and course. Twenty patients with acute stage SISNHL had diabetes mellitus. The recovery of hearing was almost the same in those with and without diabetes mellitus. Recovery was complete in 32.4%, marked in 32.4%, and slight in 21.6%. In 13.5%, no change was observed. Our results and data from previous reports, involving more than 70 Japanese patients treated with steroids alone, suggest that combination therapy with steroid and hyperbaric oxygenation is effective for SISNHL.

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Hyperbaric oxygen for idiopathic sudden sensorineural hearing loss and tinnitus.
Cochrane Database Syst Rev. 2007 Jan 24;(1):CD004739
Bennett MH, Kertesz T, Yeung P.

BACKGROUND: Idiopathic sudden sensorineural hearing loss (ISSHL) with or without tinnitus is common and presents a health problem with significant effect on quality of life. Hyperbaric oxygen therapy (HBOT) may improve oxygen supply to the inner ear and, it is postulated, may result in an improvement in hearing and/or a reduction in the intensity of tinnitus. OBJECTIVES: To assess the benefits and harms of HBOT for treating ISSHL and/or tinnitus. SEARCH STRATEGY: We initially searched in June 2004 and repeated the search in June 2006. Our search included the Cochrane Ear, Nose and Throat Disorders Group Trials Register, the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, Issue 2 2006), MEDLINE (1951 to 2006), EMBASE (1974 to 2006), CINAHL, Database of Randomised Trials in Hyperbaric Medicine (DORCTHIM), AMED, LILACS, KOREAMED, INDMED, National Research Register (NRR), CSA, ISI PROCEEDINGS and ZETOC. SELECTION CRITERIA: Randomised studies comparing the effect on ISSHL and/or tinnitus of therapeutic regimens which include HBOT with those that exclude HBOT. DATA COLLECTION AND ANALYSIS: Three authors independently evaluated the quality of the relevant trials using the validated Oxford-Scale (Jadad 1996) and extracted the data from the included trials. MAIN RESULTS: Six trials contributed to this review (308 subjects). Pooled data from two trials involving 114 patients did not show any significant improvement in the chance of a 50% increase in hearing threshold on Pure Tone Average (PTA) when HBOT was used (relative risk [RR] with HBOT 1.53, 95% CI 0.85 to 2.78, P = 0.16), but did show a significantly increased chance of a 25% increase in PTA (RR 1.39, 95% CI 1.05 to 1.84, P = 0.02). There was a 22% greater chance of improvement with HBOT, and the number needed to treat (NNT) to achieve one extra good outcome was five (95% CI 3 to 20). A single trial involving 50 subjects also suggested significantly more improvement in the mean PTA threshold with HBOT, expressed as a percentage of baseline (WMD 37%, 95% CI 22% to 53%, P < 0.001). The significance of any improvement following HBOT in a subjective rating of tinnitus could not be assessed due to poor reporting.There were no significant improvements in hearing or tinnitus reported in the single study to examine chronic presentation (six months) of ISSHL and/or tinnitus. AUTHORS' CONCLUSIONS: For people with early presentation of ISSHL, the application of HBOT significantly improved hearing loss, but the clinical significance of the level of improvement is not clear. We could not assess the effect of HBOT on tinnitus by pooled data analysis. The routine application of HBOT to these patients cannot be justified from this review. In view of the modest number of patients, methodological shortcomings and poor reporting, this result should be interpreted cautiously, and an appropriately powered trial of high methodological rigour is justified to define those patients (if any) who can be expected to derive most benefit from HBOT.There is no evidence of a beneficial effect of HBOT on chronic presentation of ISSHL and/or tinnitus and we do not recommend use of HBOT for this purpose based on the single study available.

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Applications of hyperbaric oxygen in otolaryngology head and neck surgery: facial cutaneous flaps.
Otolaryngol Clin North Am. 2001 Aug;34(4):753-66, vi.
Bill TJ, Hoard MA, Gampper TJ.
Hyperbaric oxygen therapy is of significant benefit in the setting of an ischemic flap of the head and neck. Mechanistically, hyperbaric oxygen decreases local tissue edema and improves oxygen delivery to compromised tissues. Both capillary and fibroblast in-growth occur at a greater rate with hyperbaric oxygen therapy, and there is an increase in the tensile strength of the wound. Additional indications in the head and neck include traumatic composite amputations, necrotizing soft-tissue infections, and osteoradionecrosis of the facial skeleton.

The value of hyperbaric oxygen therapy (HBO) in treatment of problem wounds in the area of plastic-reconstructive head and neck surgery
Laryngorhinootologie. 2000 May;79(5):304-10.
Grundmann T, Jaehne M, Fritze G.
BACKGROUND: Hyperbaric oxygenation therapy is presently predominantly discussed in connection with sudden deafness and tinnitus. Amongst this ongoing controversy, the primary indications of this in the middle of the 20th century established therapy, especially in regard to problem wounds in the plastic-reconstructive surgery go mainly underrated. The present paper reviews the attention towards this area in plastic surgery. PATIENTS AND METHODS: Three typical cases (traumatic nasal tip reconstruction, wound ulceration after radiotherapy and lobe necrosis together with fistula following laryngopharyngectomy) are presented. RESULTS: Because of protracted and complicated wound healing HBO was applied in all three cases, eventually leading to very satisfying subconsequent wound-healing. In connection with these cases, the underlying problems and the effects of HBO are discussed. SUMMARIZING: The authors conclude, that HBO primary clinical application in treatment of problematic wound healing in head and neck appears to be very effective and helpful and should not be underrated whilst discussing this therapy in different contexts.

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