

中文題目：高壓氧治療導致中耳氣壓傷之風險因子分析 - 一個回溯性觀察型研究

英文題目：Risk Factors of Middle Ear Barotrauma in Patients Receiving Hyperbaric Oxygen Therapy– a Retrospective Observational Study

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Background:

Hyperbaric oxygen (HBO) therapy is increasingly applied in numerous medical fields and in patients with variable comorbidities. HBO therapy is considered relatively safe, the main side effects associated to HBO therapy includes barotrauma, central nervous system- and pulmonary oxygen toxicity, claustrophobia, anxiety and visual disturbances. Of them, the most common complication is middle ear barotrauma (MEB), which can cause discomfort, otalgia, otorrhagia and even permanent hearing loss. MEB has a wide reported incidence of 8.9% to 66.7%, and most of the episodes occur at first chamber session of HBO therapy. In previous studies, risks factors of MEB include senile age (>60 years old), female, artificial airway and increased compression rate. However, limitations exist while interpreting those studies, and incidence of MEB at first chamber session was not emphasized. The purpose of this study is to investigate the risk factors and actual incidence of MEB at first chamber session in the real-world setting.

Methods:

We conducted a retrospective analysis of 846 adult patients undergoing first chamber session of HBO therapy at the Hyperbaric Oxygen Therapy Center of Tri-Service General Hospital in Taipei, Taiwan, from June 2014 through March 2016. The patients were divided into MEB group and non-MEB group according to the presence of MEB. The factors were examined and their relationship to HBO therapy related MEB were assessed using multivariate analyses to determine the significantly independent risk factors. An otoscopic examination was performed pre-and post the treatment of first chamber session of each patient, self-reported otological symptoms were also recorded. The MEB was graded from Grade 0 to Grade 5 using Modified Teed Classification.

Results:

From a total of 846 patients, the most common indication for HBO therapy were acute CO poisoning (183, 21.63%), problems wounds (114, 13.47%) and decompression sickness (DCS)/gas emboli/dysbaric osteonecrosis (DON) (93, 10.99%). 250 of the patients had MEB

(29.55%), otological symptoms were experienced by 173 patients while 77 patients' MEB were found by otoscopy. Most of the recorded MEBs were bilateral (59.2%) and were grade 2 (31.8%) and grade 4 (35.6%) by Modified Teed Classification. Univariate analysis showed significant differences for several factors, including ages of > 60 years, without previous experience of HBO therapy, supine position during HBO therapy, maximum pressure greater than 2.5 atmospheres of absolute pressure (ATA), and indications of treatment such as DCS/gas emboli/DON and sudden sensorineural hearing loss (SSNHL). Multivariate logistic regression analysis identified ages of > 60 years (adjusted odds ratio: 2.646, $p < 0.001$), without previous experience of HBO therapy (adjusted odds ratio: 2.279, $p = 0.001$), supine position during HBO therapy (adjusted odds ratio: 1.760, $p = 0.001$), DCS/gas emboli/DON (adjusted odds ratio: 7.922, $p < 0.001$) and SSNHL (adjusted odds ratio: 2.400, $p = 0.001$) as independent risk factors for MEB. A risk-predicting score which equivalent to adjusted odds ratio was created for each factor. Based on the receiver operating characteristic curve (ROC) analysis, the cut-off risk score value was 15.11 with a ROC area of 0.702 (95% CI, 0.665-0.740), with the sensitivity 73.2% and the specificity 58.3%.

Conclusion:

In our study, the incidence of MEB at first chamber session of HBO therapy was nearly 30%. The incidence may be underestimated previously due to the absence of self-reported otological symptoms. Multiple variables including age, without previous experience of HBO therapy, supine position during HBO therapy, DCS/gas emboli/DON and SSNHL are identified as risk factors for MEB at the first chamber session of HBOT. Our risk-predicting model may assist better identification for high-risk patients before encountering first HBO therapy session.