

Long-Term Outcomes of Hyperbaric Oxygen Pretreatment in Autologous Hematopoietic Stem Cell Transplantation: A Pilot Clinical Trial

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Introduction. Autologous hematopoietic stem cell transplant (aHSCT) is an effective treatment for hematologic malignancies. Hyperbaric oxygen (HBO) pretreatment has demonstrated safety, feasibility, improved neutrophil engraftment and mucositis in patients treated with aHSCT.

Methods. This was a retrospective review of patients treated with HBO before aHSCT in a pilot trial, compared to a historic control cohort. The primary outcome was overall survival (OS), while secondary outcomes included disease-free survival (DFS), post-transplant organ damage, autoimmune disease development, and secondary malignancy occurrence.

Results. Of the 240 patients reviewed, 19 received HBO and 221 did not. Median OS was not reached in the HBO pretreatment group and was 8.9 years for the historical control ($p = 0.5749$). Median DFS was 4.2 years in the HBO group and 3.6 years in historical controls ($p = 0.34$). The incidence of secondary malignancies was significantly lower in the HBO group (5.26% vs. 22.17%, $p = 0.0408$). Rates of cardiac (5.26% vs. 23.9%, $p = 0.03$) and renal (15.7% vs. 43%, $p = 0.010$) end-organ damage were reduced in the HBO group. There was a trend towards fewer developing autoimmune diseases post-HSCT in the HBO group compared to historical controls (0.0% to 7.69%, $p = 0.10$).

Conclusions. HBO therapy before aHSCT significantly reduced secondary malignancy rates compared to historical controls. OS and DFS showed no significant difference. Long-term cardiac and renal damage decreased in the HBO group, likely from reduced inflammation at transplant time. These findings indicate that HBO is well-tolerated and could improve outcomes for aHSCT patients.