Hyperbaric Oxygen Therapy

To the Editor:

We applaud the authors’ efforts in attempting to use randomized controlled trials to study the effects of hyperbaric oxygen (HBO) in acute ischemic strokes. Although we agree that the pressure at which the patients were treated (2.5 atm absolute [ATA]) is appropriate, we feel that several of their other methodologies and interpretations require comments.

First: The time interval from onset of symptoms to the first HBO treatment is critical. The “golden period” from blockage of a vessel of the brain by thrombus or embolus with onset of neurological dysfunction is 3 hours.¹ This is defined as the first reperfusion period. The second reperfusion period occurs from 3 to 5 hours² after the occlusion. Successful outcomes in the treatment of cerebral gas embolism with HBO during the second reperfusion have been observed.³ Hence, any study using HBO has to consider these 2 reperfusion times.

Second: The complication of cerebral edema associated with the treatment of arterial gas embolism has been observed⁴,⁵ even with immediate HBO treatment. We have reported evidence of a post-HBO exposure vasodilatation occurring in otherwise healthy volunteers.⁶ We do not feel these observations are a cause of morbidity.

Third: The minimum of a 1-hour HBO exposure at 2 ATA is required to saturate the mixed venous hemoglobin return to the right atrium in normal resting males.⁷ An additional 30 minutes is needed to saturate the other tissues of the body. Treatment duration less than this would not be expected to give optimal results.

Fourth: For optimal results with acute ischemia of the brain, repetitive HBO treatments are recommended.⁸,⁹ Adequate treatment pressures, durations, and repetitions improve outcomes.⁹

An earlier controlled study, which also showed no benefit from HBO, has some of the same criticisms as this study: for example, treatment durations were 40 minutes and treatment pressures were only 1.5 ATA.¹⁰

In view of our experience we recommend the following management for all thrombotic/embolic cerebrovascular episodes within 6 hours of onset of symptoms. This management has been used in >80 patients treated in a monoplace chamber compressed in and breathing HBO without using air breaks—improvement percentages using the Rankin scoring system equaled the NIH-PA study.¹¹

I. HBO and thrombolytic routine (thrombolysis) is to be used within the first 3 hours from symptom onset) prior to CT scan. Note: The combinations of thrombolysis and HBO have been reported as safe and with benefits in myocardial infarction.¹²

II. HBO at 3 ATA for 30 minutes then 2.0 to 2.5 ATA for 60 minutes (with time needed for compression and decompression, total exposure to elevated oxygen pressure approaches 2 hours). (A) Methylpapa 250 mg IV every 6 hours if normotensive and 500 to 1000 mg if hypertensive prior or during first HBO treatment. (B) One-hour air break on the surface. A CT scan is obtained immediately following the first HBO treatment. Additional HBO treatments are based on the following permutations: (1) If CT scan reveals intracranial hemorrhage (ICH): (a) resume HBO if neurological improvement has occurred with first treatment, or (b) stop HBO if neurologically unchanged or deterioration is observed. (2) If CT scan reveals no ICH, continue HBO.

III. HBO 1.5 ATA × 3 hours—may use air breaks at 30-minute intervals.

IV. Eight hour HBO period with indicated supportive and diagnostic care.

V. Then HBO at 2.0 to 2.5 ATA for 90-minute duration without air breaks twice a day if improvement continues for 7 to 10 days.

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Stroke. published online August 21, 2003;
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/early/2003/08/21/01.STR.0000087115.91721.6E.citation

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