Chapter 2.4.2

CEREBROVASCULAR INCIDENTS (STROKE)

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Abstract: Over the past 40 years various experimental and clinical studies have suggested that hyperbaric oxygenation (HBO) may be beneficial in treating acute, sub-acute and chronic stroke. In acute stroke, timing, HBO dosage and lack of pathophysiological stratification may be disguising the effectiveness of HBO in a subset of the stroke population. Anecdotally, HBO appears to be most effective in the treatment of small, sub-cortical, non hemorrhagic stroke in which perfusion has recovered early or where the clinical picture undulates – suggesting a functional penumbra. Although feasible and seemingly safe, it is not yet possible to recommend the use of HBO in the treatment of acute and sub-acute stroke based on the scientific evidence available today. In chronic stroke, the cost of HBO would seem prohibitive – given the prevalence of the condition. However, greater independence and productivity in those successfully rehabilitated may affect the equation in favor of treatment. For the time being, however, this cannot be recommended other than as a promising area for further research

Keywords: hyperbaric oxygen; stroke; acute cerebrovascular incidents; rehabilitation

1. INTRODUCTION

Over the past 40 years various experimental and clinical studies have suggested that hyperbaric oxygenation (HBO) may be beneficial in treating acute, sub-acute and chronic stroke¹-³. Various therapeutic mechanisms have been proposed; these include: hyperoxygenation, vasoconstriction, resolution
of oedema, preservation of “idling neurons”, improving glucose-oxygen utilization, preventing adherence of polymorphonuclear leukocytes to endothelium, attenuation of the inflammatory process, and prevention of cell apoptosis. Although the mechanisms of HBO in chronic stroke may be less obvious, it appears almost logical to apply a recognized treatment for arterial gas embolism in the treatment of acute stroke. Nevertheless, its application in such cases remains controversial; experimental and clinical results are often conflicting.

A recent review of the clinical literature on acute stroke concluded that HBO could not be recommended for brain injury or stroke based on research predating 2001. A subsequent pilot RCT has extended the relevance of this position to the present. Similarly the value of HBO in chronic stroke remains undefined. Large, evidence based studies remain lacking, and the parameters for improvement are difficult to evaluate, particularly in terms of cost-benefit and improved quality of life.

Before excluding a possible role of HBO in the treatment of stroke, it should be realized that many agents in use today, even the use of aspirin as a prophylactic agent in stroke, remain controversial. One of the reasons for this are the many confounding factors and variables that complicate any stroke trial which include the:

- time from occlusion to intervention
- site of the lesion and volume of necrosis
- control of haemodynamic parameters – particularly blood pressure, glucose levels and body temperature
- prevention of secondary complications
- duration of the occlusion
- demographics of the subjects (gender; age; co-morbidity; etc.)
- outcome measures (anatomical imaging; functional imaging; functional or clinical measurements; disability scales and scores)
- interval between clinical or functional assessments
- dynamic pathophysiology and the natural history of the disease

In terms of HBO, there are an additional number of variables:

- time from onset of stroke to receiving HBO
- pO2 used
- duration of treatment
- number of treatments
- interval between treatments
- combination with or without rehabilitation

The diversity and the interrelated nature of all these factors deny us a clear picture on the effectiveness of the variety of interventions proposed in the management of stroke, including HBO. The question to ask is therefore not whether HBO is effective in the treatment of stroke, but rather whether