

**Medical Studies:
Proven Effectiveness and Safety of HBOT for Stroke**

Jain, K.K. Chapter 17: Role of HBO in the Management of Stroke.” Pp 227-252; in Textbook of Hyperbaric Medicine, 1990

HBO should be started in the acute phase of a stroke as an adjunct to conventional medical management. Sometimes or often there is no improvement with conventional medical management and physical therapy. Animal studies and uncontrolled human trials have shown the effectiveness and safety of HBO after stroke. Evaluation of patients during an HBO session have revealed response rates of 100% (improvement of spasticity or motor power or both). Improvement may be initially transient but can be maintained following daily treatments 1.5 ATA for 45 minutes for 6 weeks.

Jain, K.K. Effect of HBO on Spasticity in Stroke Patients. J Hyperbaric Med, 1989; 4(2): 55-61

#21 post-stroke patients

HBO 1.5 ATA / supplemental oxygen / 45 min session

100% response to HBO

- decreased spasticity
- but transient / lasting on 24 hours
- HBO effects were more marked than PT

Continued HBO and PT results were maintained after 5 weeks of therapy (#30)

Marroni, A. et al. “Hyperbaric Oxygen Therapy at 1.5 or 2.0 ATA as an adjunct to the Rehabilitation of Stabilized Stroke Patients. A controlled study.” Proceedings of the 9th International Congress on Hyperbaric Medicine, March 1-4, 1987; Sydney, Australia, pp 161-167

#80 patients chronic stroke; average of 59 months / 5 years

HBO 1.5 and 2.0 ATA 30 sessions

Similar improvement

Benefits maintained at 3 months.

Neubauer, R.A et al. “Cerebral oxygenation and the recoverable brain.”

Neurology Research, 20 suppl 1: S33-6, 1998

HBO can result in permanent improvement in blood flow and tissue metabolism. Recoverable brain tissue can be identified with SPECT imaging and HBO.

Neubauer, R.A. et al. “HBO and Imaging Techniques in Diagnosis and Therapy of Stroke. Does the Ischemic Penumbra Alter the Outcome in Stroke?” International Symposium: Neuropsychomotor, Neuro-Pharmacological, Psychosocial and Ethical Aspects, Oct 7-11, 1992

Recovery of stroke is more related to the oxygen content than to blood flow.

SPECT can demonstrate ischemic penumbras.

SPECT before and after HBO 1.5 ATA for 60 minutes

#15 patients post stroke - 6 hour to 15 years

Significant and marked changes in flow and metabolism were observed in ALL 15 patients.

Neubauer, R.A. et al.” Enhancing idling neurons.” Letter. The Lancet, March 3, 1990; 542.

After HBO there was a sharp increase in tracer uptake in areas showing hypometabolism on the pre-HBO study ... Reduced spasticity, improved ambulation and speech, and cessation of drooling were noted.”

Neubauer, R.A. “Generalized small-vessel stenosis in the brain. A case history of a patient treated with HBO at 1.5 to 2 ATA.”

Minerva Medical, 1983; 74:2051-2055

Small cerebral blood vessel disease

Initial presentation – gross mental confusion, memory loss, irrational speech, and occasional violence.

HBO therapy
Good response – well functioning patient
Intermittent HBO * 4 years
Acute stroke, total disorientation and confusion
HBO – regained function

Neubauer, R.A. et al. “HBO as an Adjunct Therapy in Strokes due to Thrombosis.” STROKE, 1980; 11(3): 297-300

122 patients who had an improved response with conventional and HBO as compared to conventional alone.

Nighohossian, N et al. “Hyperbaric Oxygen in the Treatment of Acute Ischemic Stroke. Double-blind pilot study.” STROKE, 1995; 26:1369-1372

#34 patients – acute stroke – middle cerebral artery occlusion
HBO 1.5 ATA 40 minutes * 10 treatments or HBO with air
17 in each group
27 completed the full study of 1 year of observation
Conclusion

HBO is safe – none of the major side effects of HBO were observed while using lower pressure.
No significant improvement difference in the groups at 1 year,
They detected an outcome trend favoring HBO therapy.

Neuroscience, Behaviour, and Physiology 1985; 15: 13-16

#104 patients with cerebrovascular disease or decreased brain circulation

#72 transient
#32 chronic

Results

72% good / positive
20% satisfactory / moderate
6% no response

1. 72% had a good response

2. Observation over 3-5 years of patients receiving HBO every 6 months supports use HBO as a preventive therapy.

Stroke, 1971; 2: 247-250

Patient with a R Middle Cerebral Artery occlusion
HBO 2.5 ATM * 15 days + drug therapy (methyl dopa, hydrochlorothiazide)
Significant improvement noted
Rest period * 30 days – to assess for spontaneous (natural healing) remission
No further improvement noted
HBO restarted
Response – return to near normal
1. dramatic response to HBO after acute stroke

Proceedings of the 6th International Congress on Hyperbaric Medicine – 1979

Deteriorations in brain function can be improved by HBO therapy in the acute and chronic post-stroke stage

Reversibility of the Chronic Post-Stroke State

STROKE, 1976; 7(3): 296-300

#40 stroke patients - #20 early post-stroke stage and #20 chronic
HBO therapy and EEG analysis and neurological assessment
27% considerable / dramatic improvement
53% moderate improvement

