

## **The Effect of Hyperbaric Oxygen Treatment on Functional Outcomes in Children with Cerebral Palsy: A Single Case Description**

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*Objectives:* To document functional gains and qualitative progress in a young child with Cerebral Palsy following Hyperbaric Oxygen Treatment.

*Design:* Single Case Description

*Setting:* Hospital out-patient.

*Participant:* 15 month old diagnosed with Level V (severe) spastic quadraparetic cerebral palsy, cortical vision impairment, seizure disorder.

*Intervention:* Hyperbaric Oxygen Treatment was administered at 24mmHg for one hour. Thirty-three treatments occurred over a three week period.

### ***Measurements and Main Results:***

Hyperbaric Oxygen Therapy (HBO) is a medical treatment that uses pure oxygen administered under pressure to alleviate hypoxia at the cellular level. The concept behind HBO for the treatment of anoxic brain insults is that of increasing oxygen delivery, and therefore, metabolic activity of inactive brain cells(5). After an injury or infarct, brain matter dies and is replaced by glial cells. The area around the gliosis, the peri-infarctional zone, appears as gliosis on scans, but may in fact be viable for years following the initial insult. HBO delivers high doses of oxygen to these peri-infarctional zone cells surrounding the dead neurons, and may be causing these cells to become metabolically active(3).

The subject was the product of a full term uncomplicated birth. He experienced severe asphyxia at birth (APGARS 1,2) and required mechanical ventilation for 5 days. He was removed at that time as part of DNR orders and was not expected to survive. The subject remained hospitalized for four months when he was discharged to the home with a nasogastronomy tube in place. The subjects diagnoses includes cortical vision impairment and seizure disorder. His MRI reveals damage to the basal ganglia, brainstem and cerebellum with the white matter preserved. At 12 months of age subject developed seizures which are controlled with Valproate.

At 15 months of age, this boy had Level V Cerebral Palsy and severe opisthotonus. He traveled from his home in Oslo, Norway to Tottenham, United Kingdom to receive HBO treatment. The subject received a total of 33 treatments at 24mmHg, lasting one hour each over the course of three weeks. The treatment was received in a large tank that held eight patients. The subject wore

a large hood that covered his head and upper body. He sat in his father's lap for the entire session.

Subject was tested using the Gross Motor Function Measure prior to and immediately following the Hyperbaric Oxygen Treatment (HBO). Tests were administered three weeks apart with child receiving no other interventions (including Physical Therapy) during that time. Immediately following HBO, the subject appeared to have gained the skills of lifting his head up in sitting and prone on elbows, and the ability to sit with minimal assistance. The GMFM showed the subject gained 8% in the lying and rolling dimension, 10% in the Sitting Dimension and had no change in the crawling and kneeling, standing or walking, running and jumping dimensions. Overall the subject gained 3.6 points (total score 11.8 before, 15.4 after HBO). Other changes noted by parent and therapist include increase in endurance (child now holding up head in prone on elbows greater than 10 minutes) and head righting (child no longer gets stuck in cervical extension, but can right his head indep).

The subject is, at this time, 3 months post HBO and reportedly continues to make gains. He is vocalizing more, is more alert, has improved passive and active range of motion, is more responsive visually, and opens his hands when reaching. Parents report child erupted 10 teeth in the single week following HBO and has experienced rapid hair growth as well.

### ***Conclusions:***

The subject appeared to make moderate gains in his gross motor skills following treatment with HBO. Most notably, he was able to prop sit and hold his head up in a variety of positions. Head righting was also markedly improved. While these results are based on a single case description, it suggests that further study is warranted.

### ***References:***

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