

## **Treatment of Children's Epilepsy by Hyperbaric Oxygenation: Analysis of 100 Cases**

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More than half of epilepsy patients are children. The treatment is difficult because of epilepsy itself and its therapy. In order to find an effective anticonvulsant treatment for children, we began a treatment using hyperbaric oxygen in 1987. The result was satisfactory.

### **Materials**

**Sex and Age:** The whole group included 100 patients (72 males, 28 females), ages 4 days to 14 years. Eighty-four percent of them were between 1 month and 9 years old.

**Causes of Disease:** The causes in 23 patients were unknown (primary epilepsy), while others had the following established causes: 1) cerebral lesion due to birth injury in 55 patients; 2) encephalitis in 14 patients; 3) high fever in 2 pediatric patients; 4) anoxic cerebropathy in 4 children; 5) brain tumor in 1 child; and 6) cerebrovascular malformation in 1 child.

**Neuropsychiatric Manifestation:** Intelligence was impaired in 68 patients; 45 children had mental symptom and personality change; local neurosystemic signs were detected in 47 patients.

**Family History:** In this group, relatives (within three generations) of 14 patients had a history of epilepsy, while 12 had a history of mental disorders. Seven children's parents had consanguineous marriages.

Table 1. Patterns of Seizures

Grand Mal	3
	2
Psychomotor Seizures	1
	2
Petit Mal	1
	0
Focal Seizures	4
	4
Autonomic Symptoms	2

**EEG Examination:** All patients in this group had an EEG test. It was found that 1) 92 patients had abnormal EEGs; 66 patients had focal sparkle or sharp wave; 10 patients had paroxysmal sparkle-slow wave and sharp-slow wave; 6 patients had paroxysmal cerebral dysrhythmias; 10 patients had confusing abnormal EEGs; 2) 3 patients had normal EEGs; 3) 5 other

patients had boundary EEGs.

**CT and MRI Scanning:** Seventy-six patients were proved abnormal, including ventricular enlargement due to atelencephalia, focal encephalatrophy, tumors and local low density pathy, skull fracture. The other 24 patients were normal.

**Seizure Frequency:** 21 patients seized every week; 18 patients did every month; 23 patients did every two months, and the other 38 patients seized more than twice a year.

## **Treatment**

**Anticonvulsant Medication:** 39 patients were treated systematically. Twenty patients could be controlled by little diazepam and r-aminobutyric acid. Forty-one patients received no anticonvulsant because of their parents' objection, since they thought the children were too young. Some individuals were controlled by luminal intramuscular injection on convulsion.

**Hyperbaric Oxygenation Treatment:** The private hyperbaric oxygen chamber was manufactured by Ninpo Hyperbaric Oxygen Chamber Factory. In the chamber, the pure oxygen pressure is 1.7-2.0 atm. The patients were treated for 80 minutes every day. A course was 15-30 days. Some patients had therefore been treated 35-45 times.

**Curative Effect:** The treatment was found effective in 82 patients (82%), significantly effective in 68 patients (68%). It showed that the seizures greatly diminished, and the EEG was improved. Forty-three patients had stopped anticonvulsant medication, while in other patients the amount of antiepileptic was decreased. After hyperbaric oxygenation treatment, 82 patients' intelligence, personality, and mentalities were improved; 51 children studied very well; 10 primary and 4 secondary epilepsy children had no change after being treated 30 times.

**Electroencephalogram (EEG):** After hyperbaric oxygenation treatment, 45 patients had normal EEGs; 28 patients had focal abnormal EEGs; 3 patients had paroxysmal sharp-slow wave and another 20 patients' EEGs were slightly abnormal, 4 patients had boundary EEGs.

**Follow-up:** Seventy-six patients had been observed for more than 3 years. Forty children had been completely free of anticonvulsants. Three children had 1 or 2 slight attacks every year. Twenty-five patients were administered a little anticonvulsants and their seizures diminished a lot. The attacks did not change in 11 children with systemic therapy.

## **Discussion**

Questions on pathogeny of children's epilepsy: \_The causes of children's epilepsy are varied. Fifty-five of 77 patients (2/3) who had established causes were due to birth injury. How to prevent this is a complicated problem. For those fetuses which we guess are too big to labor normally, we suggest an operation as early as possible, so as to decrease the damage to the brain.\_

### **Mechanism of treatment of children's epilepsy with HBO**

00. Hyperbaric oxygenation could improve cerebral circulation, provide the brain with more oxygen, and reduce edema. Hyperbaric oxygen could also promote the energy metabolism of cerebral cells and improve the recovery of epileptic foci.

00.

### **Reduction of handicapped children due to epilepsy**

00. Epilepsy often impairs the children's intelligence and personality; hyperbaric oxygenation could not only control the attacks of epilepsy but also prevent the occurrence of intelligence impairment and abnormal personality so as to diminish the ratio of handicapped children due to illness.

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### **The way of gaining a good effect in the treatment**

The effect is good in the cases whose causes are known, especially those caused by brain damage due to birth injury. As to the period of treatment, most patients need 2-3 years. If the infants due not have high fever or respiratory inflammation, the treatment can begin from several days after birth. Fifteen to 20 days make a course, and 2 courses a year.