

MULTIPLE SCLEROSIS

Multiple sclerosis is a disease involving the central nervous system with areas of loss of myelin covering of the neuronal processes (demyelination). The cause of the disease is unknown, but among the popular theories have been viruses and immunological factors. None of the treatments based on immunologic concepts, however, have been proven effective.

The disease has a gradual downhill course with periods of remissions and exacerbations (increases in symptoms or severity of the disease). Over a period of five years most of the patients show a definite deterioration. Various treatments that have been used for multiple sclerosis (MS) are not satisfactory. All of these treatments have some serious side effects and drawbacks and none of them have been proven to be effective. Current therapies for MS and their side effects are listed below:

- 1) Steroids (for example, ACTH) -Many complications, including: Short term therapy - puffiness, psychosis, ulcer, infections, and acne. Long term therapy - abnormalities of blood sodium and potassium levels, softening of bone, cataracts, hypertension, diabetes and adrenal exhaustion.**
- 2) Cyclophosphamide - Several deaths have been reported from the use of these compounds.**
- 3) Imuran - This substance is carcinogenic (cancer causing).**
- 4) Plasmapheresis - In this procedure the plasma is removed from the withdrawn blood and the cellular elements of the blood are retransfused into the donor. Generally the type specific fresh frozen plasma albumin is used to replace the withdrawn plasma. The main danger of this procedure is possible contamination of the plasma during retransfusion.**
 - 5) Interferon - This is supposed to be an antiviral therapy, but there are undesirable effects on the liver and the blood.**
- 6) Snake Venom - This has been used, but it can lead to an anaphylaxis (a shock like reaction).**
- 7) Monoclonal antibodies - These have been used, but they can produce derangements of the immune system.**
- 8) HBO - Only insignificant side effects such as slight damage to the ear drums and transient visual effects.**

One of the more recent theories proposed by Dr. P.B. James of Dundee, Scotland, indicates that the disease may be due to damage to the blood-brain barrier by fat embolization. The obstruction to blood flow leads to areas of brain damage surrounding the veins. This resembles the brain and spinal cord damage seen in diver's suffering from decompression sickness. The cause of the damage to the blood-brain barrier is not clear.

An explanation of this has been given by Drs. Gottlieb and Neubauer. According to their hypothesis, the primary defect in MS is a blood vessel disturbance leading to lack of blood supply to certain areas of the brain. This in turn leads to production of free radicals and narrowing of veins. The result is damage to the blood-brain barrier, swelling of the brain tissues affected, and lack of oxygen supply which eventually leads to demyelination. MS is a wound of the central nervous system and is therefore an indication for the use of HBO in the same way as for wounds in any other part of the body. This hypothesis provides a rational basis for HBO therapy in this disease. HBO reduces swelling and corrects the hypoxia due to ischemia. HBO enhances remyelination and stabilizes the blood-brain barrier.

The first report in the medical literature of the effectiveness of hyperbaric oxygenation is that by Boschetty of Czechoslovakia in the year 1970. In the United States, the first application of HBO in multiple sclerosis was carried out by Dr. Neubauer in 1975. The first randomized double-blind controlled study was carried out by Dr. Boguslav Fischer in 1983 at the New York University Medical Center. His results were published in the New England Journal of Medicine (Vol 308: 181-186). Forty patients with chronic MS were divided randomly into two matching groups. The experimental group received pure oxygen and the control group received a mixture of 10% oxygen plus 90% nitrogen. Both groups were treated at a pressure of 2 ATA for 90 minutes, once daily for a total of twenty exposures. The state of oxygenation in the control group at 2 ATA was comparable to that which would be found in the same subjects breathing room air (20% oxygen plus 80% nitrogen). Improvement occurred in 12 of the 17 patients (70%) treated with hyperbaric oxygen and 1 in 20 (5%) of the control patients. Improvement was transient in 7 of the patients treated with HBO and long lasting in 5. Those with less severe forms of the disease had a more favorable and lasting response. After one year of follow-up, deterioration was noticed in only two of the patients (12%) in the oxygen group as compared to 11 patients (55%) in the control group. Fischer and his colleagues suggested further trials of HBO in MS. The chamber at New York University was dismantled and no further work was done on this subject. A number of other studies were done on this topic and reported good results, whereas other studies reported no effects of HBO on MS patients. **The controversy continued. The most extensive experience in MS with HBO in the United States is that of Dr. Neubauer in Lauderdale-by-the-Sea, Florida (1200 patients). The long-term longitudinal studies have shown improvement in the majority of the patients. Dr. Neubauer has also reviewed the world literature on this subject. Over 10,000 MS patients treated by HBO in 14 different countries were reviewed in 1984 in Toulon, France and improvement was noticed in 70% of the patients: objective improvement (measured scientifically) in 25%, and subjective improvement (improvement noted by doctor or patient, but not calculated or measurable scientifically) in 45%. What then are the criteria of improvement resulting from the treatment of an MS patient? MS is a slowly progressive disease. Surely one cannot cure it with any of the known therapies. In the treatment of multiple sclerosis, objective evidence of improvement does not necessarily correspond with recovery of function. Absence of deterioration which normally occurs over the course of some years is in itself evidence of the effectiveness of a therapy. Improvement of bladder function, reported frequently in MS patients treated with HBO is not considered significant, but it certainly should be and it is a definite evidence of an improvement. If one applies these criteria in evaluating the results of HBO in MS even the reported negative studies have several positive aspects. Some of the benefits of HBO are obvious from the recent report by Dr. Perrins of Oxford.**

He has reviewed the records of over 5,600 MS patients from Action for Research in Multiple Sclerosis (ARMS) treated with HBO for up to six years. Through this association in the U.K. patients treat themselves with HBO. The conclusions of this long term study are that: 1) The progressive nature of MS is modified by prolonged HBO treatment. 2) The extent of the response is related to the duration and frequency of the treatment. 3) The initial response is an unreliable guide to the outcome of the prolonged treatments.

The significant finding was the lack of deterioration over a 5 year period. The results were better in those that continued with "booster" sessions or "top-ups" after completing an initial course of HBO. Those who stopped booster sessions did not do as well. HBO is like a drug which has to be administered over a long period and the dose (pressure) of which has to be adjusted to individual response. Maximum improvement was observed in the relief of spasticity and in the bladder and bowel functions. Many of the patients who were confined to wheelchairs prior to HBO treatment were able to walk independently after HBO treatments.

Why then is the use of HBO in MS attended with so much controversy? This question is rather difficult to answer. Emotionalism and political issues seem to cloud this form of treatment more than they have any other therapy for this disease in the past. However, modern techniques of neurological diagnosis such as evoked potentials and MRI have objectively confirmed the subjective improvement reported by MS patients. The indications for the use of HBO in MS are: 1) The acute stage - HBO may be used during the first attack. In combination with MRI it may help in the eventual diagnosis of the disease. 2) Relapses in the sub-acute stage. 3) Chronic progressive form of MS with: a) Bowel and bladder dysfunction, b) Visual impairment, c) Problems with balance, d) Partial paralysis of limbs, e) Subjective symptoms of fatigue, (lack of stamina, etc..).

Concern has been expressed about using HBO in patients with visual impairment due to inflammatory changes of the optic nerve (optic neuritis). Because HBO leads to narrowing of the blood vessels, it may further impair the blood supply of the optic nerves. However, in practice, I have not observed this to impair the vision.

Case History of a Patient with Multiple Sclerosis:

The case of J.L. illustrates some of the experiences of a patient suffering from multiple sclerosis which was eventually treated with HBO. Here is the story in her own words:

"In the early part of 1984, I was a 40 year old woman who felt as though she had the world in her palm: a great husband, three neat kids, a very satisfying career, and good health gave me an abundance of personal, professional, emotional and intellectual satisfaction. Suddenly everything changed.

On June 25, 1984 I was involved in a car accident in which the car I was driving was hit by another car. By the time I had dealt with injured passengers, an officious policemen, and eyewitnesses, and arrived home that night, I had a severe headache, pain in my neck and shoulders and a loss of feeling in my hands. During the next two days I began to drop items which I was trying to hold. There also seemed to be an involuntary

salivation from the right side of my mouth and both eyes were watering. Frightened, I made an appointment with an orthopedic physician and had my neck x-rayed. He diagnosed a severe whiplash. He prescribed physical therapy and Tylenol-3. Over the next 3 days my headaches became so severe that I had a constant stream of tears rolling from my eyes. I was feeling both physically and emotionally unstable and somewhat confused. I am not a wimp by nature and I do not cry very often, but during those days I did cry; not only from severe pain, but also from the knowledge that my body was behaving far differently from what it ever had. The whiplash I had suffered eight years previously had felt nothing like this. My husband called the doctor back and asked him if he would admit me into the hospital and if there was something else that could be done. He said "no", it was just a whiplash; he would not admit me into the hospital. He added: "I could go to the emergency department or I could live with the pain; it would eventually get better". A couple of days later I made an appointment with a neurologist for second opinion about the "whiplash". After his examination he also said it was a whiplash and prescribed Elavil, a drug my body found very hard to tolerate. I have always had severe reactions to almost any kind of drug. At the same time I entered a traditional physical therapy program at a different hospital and found that, rather than feeling better, I was feeling worse; the therapy hurt. The headaches persisted, as did dizziness and nausea; all of which were disabling. I was in a bad mood. Laughter and song, two of my best allies, deserted me. At this time, I called a friend who is a psychiatrist and told him I needed to see him because I was having a hard time dealing with all the frustration, tiredness and anxiety and needed him to help me make sense of what was going on in my life. He saw me immediately. I began working with the psychiatrist and we changed from the traditional therapy at the hospital to having a physical therapist come into my home. With the inhome physical therapist's help, I was able to begin to walk more securely; perhaps it was due to her suggestion that I use a cane. I also had a considerable relief from the pain in my shoulders and was able to control the nausea. By October the headaches were decreasing and my eyes watered far less. However, I was experiencing loss of bladder control, a tingling in my face, a drooping on the right side of my mouth, and I felt at that time I was losing all my ability to think. My thoughts seemed scrambled and my word retrieval system was very inadequate. I observed myself stumbling through life, not as the controlled and caring person that I used to be. I would like to remind you at this point that I had not been diagnosed as having MS. All I was told, twice, was that I had a severe whiplash. I did not believe that, but I could get no professional person with whom I came into contact to listen to what I was saying about my body, except for the psychiatrist and the physical therapist. Both of them believed me and helped me a great deal to maintain the little health I had and my sanity.

October, 1984 was a somewhat better month. However, beginning in the early part of November I began to experience dizzy spells again; I was stumbling. I had a loss of feeling in my legs. I took several falls downstairs and I was depressed. I was doing everything I knew. I had talked with a nutritionist in Oregon and begun a no-fat, no-sugar diet, which was not hard as I had not had much of that in my diet anyway. I had begun taking vitamins and primrose oil. I was taking as good care of myself as I could and I didn't seem to be going anywhere but backwards. In late December I had another

fall down the stairs in my home and was once again confused because my efforts were not getting the results I desired and needed. In the early part of January, while leaving my home accompanied by another person, I fell again. She, along with the psychiatrist and physical therapist insisted that I should see another physician and try to get an MRI (magnetic resonance imaging) test. I was taken to see a neurologist who wrote a prescription for the MRI. By mid-January 1985 I had lost my sight and was paralyzed from the waist down. I had no feeling for approximately 3 1/2 months in my lower extremities. I was relieved in February when the second neurologist reviewed my scan with me and said it looked to him as though I had Lupus, MS, or a brain tumor at the base of my brain. My symptoms were not all due to a whiplash! When I asked about treatments for each disease, he told me about my options and about the side effects of the more invasive treatments. I asked him if there wasn't some non-invasive aid for these disease, especially the Lupus and MS. He told my about hyperbaric oxygen. I thanked him, left, set up an appointment for consultation at the Houston Hyperbaric Center. I only began to regain my sight and to have feeling in my legs after I began hyperbaric oxygen treatments. These treatments were begun at the Hyperbaric Oxygen Center in Houston, Texas and seemed to restore my vision after 10 sessions and feeling in my legs to the extent that I was able to begin walking after 20 treatments. In fact, I began driving after about 35 of those treatments. The first treatments with the hyperbaric oxygen were of one hour's duration, five days in a row, skipping the weekends. However, after I got to where I could walk and I could see, I had three treatments a week and have continued the routine since mid-April, 1985 until today. On May 12, 1985 I was finally diagnosed to have multiple sclerosis. Since that time it seems to have leveled out somewhat. My family and I have moved from Houston where the climate seemed to bother me. I do not get to jog, jump rope or go skiing anymore, and I have given up some of my practice as a psychologist. But I have added to my life daily exercise - swimming, doing yoga or walking - and I meditate and/or rest in the middle of the day every day.

I feel confident that I am coping with this disease in the best way possible for me, but I know that without the hyperbaric oxygen I could not have improved the strength of my mind and body." - J.L.

J.L.'s story is not that unusual for an M.S. patient. The diagnosis is not always made early at the onset. The history of her injuries is interesting. It very likely precipitated the onset of M.S. This story also illustrates how the quest of a patient for better medical care can eventually lead to optimal therapy which may have been otherwise denied to the patient. J.L. subsequently had MRI scanning after HBO therapy. The lesion in the left temporal lobe decreased while her brainstem lesions remained unchanged. SPECT scanning also showed improvement in cerebral metabolism in the affected hemisphere of the brain. J.L. was last seen by the authors in May, 1989 and continues to be active in her life.