

Hyperbaric Oxygen and Your Heart

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What's the first treatment an emergency room doctor would administer to you if you were wheeled into the E.R. with angina pain, or a heart attack?

After evaluating my question, if your answer is "An oxygen mask," you are correct.

In angina pectoris, you have a literal suffocation of the heart. It simply isn't getting the oxygen it needs because of an insufficient blood supply that ordinarily carries cellular oxygen molecules. This deficiency can be from blocked arteries heading toward the heart, or from a temporary vasoconstriction of those same arteries as occurs in stress.

In a heart attack, there is an occlusion, also due to blockage or constriction, but such clogging involves the coronary arteries which actually feed the heart muscle. This lack of nourishing blood to the pumping muscle most commonly leads to "myocardial infarction" (development of a dead part within the heart) and could very well result in the victim's death.

Recognition of oxygen's physiological importance is age-old knowledge, but only recently has medical science provided us with guidelines as to how much and when. Simple cause and effect has been the basis of most of our past wisdom. For example, we feel better when we exercise, increasing our oxygen intake. Today, many doctors are utilizing hyperoxia -- forcefully increasing oxygen intake by use of an oxygen (O₂) mask or chamber -- as a part of their overall therapy in reversing or treating heart disease.

There are perhaps only two main reasons why all doctors aren't routinely using pressurized oxygen hyperbaric oxygen therapy (HBOT). First is ignorance as to its efficacy for a wide variety of ailments, and second is the unavailability of hyperbaric medicine chambers for the delivery of oxygen under pressure.

Cardiac Therapy

After being exposed to the pioneering work of hyperbaricist George Hart, MD, at the American Heart Association's (AHA) 65th Scientific Session held in New Orleans on November 16, 1992, the AHA issued a press release praising the use of hyperbaric oxygen to boost emergency treatment for heart attack. It advised medical journalists that hyperbaric oxygen (HBO) as treatment enhances clot-dissolving drugs' ability to minimize heart damage and save the lives of heart attack patients.

The addition of HBOT resulted in earlier relief of chest pain and electrocardiogram (ECG) changes toward normal in patients treated with the clot-dissolver, tissue plasminogen activator (TPA). HBOT also tended to preserve more of the heart's blood-pumping capacity, compared to treatment with TPA alone, said Myrvin H. Ellestad, MD, director of research at the Memorial Heart Institute at Long Beach Memorial Medical Center in Long Beach, California.

Laboratory studies have shown that hyperbaric oxygen minimizes cell damage and death by reducing fluid accumulation in the injured cells. "We believe the same thing happens in patients," said Dr. Ellestad. "In heart attacks, sort of the last straw that kills cells is increasing cell water, which finally breaks the cell membrane. We believe hyperbaric oxygen's primary effect in heart attack may be to reduce edema [fluid accumulation] in heart cells."

The Long Beach group studied forty-six heart attack patients, twenty-two of whom received only TPA. The remaining twenty-four patients got TPA, followed by two hours of treatment in a hyperbaric chamber. It provided a pure oxygen environment with twice the normal atmospheric pressure (two atmospheres absolute).

Patients treated with HBOT felt chest pain relief an average of 271 minutes after the onset of heart attack symptoms, a statistically significant difference compared to the 671 minutes for patients who received only TPA. Dr. Ellestad said patients generally reported an easing of chest pain within ten minutes of entering the hyperbaric chamber.

HBO therapy reduced by 50 percent the time required for the heart to resume normal electrical activity, as determined by an electrocardiogram (ECG) finding called "ST normalization." ("S" and "T" waves are two points on an ECG tracing.) The time was 188 minutes for patients who went into the chamber vs 374 for those who did not.

"We've clearly shown that pain goes away very quickly and ST elevation, which we think is a sign of the heart muscle dying, returns to normal more rapidly," said Dr. Ellestad. "To me, the most dramatic aspect of the study was watching as ST elevation returned to normal after a patient went into the chamber. That tells me we're salvaging heart muscle cells."

There's some evidence that HBOT decreases activity by oxygen free radicals. These are unstable molecules known to damage or destroy cells.

Two other findings provided additional evidence of benefits from HBO therapy. Patients sent to the chamber had significantly lower blood levels of the enzyme creatine phosphokinase, which is released during a heart attack and indicates the extent of heart muscle damage. Patients treated in the hyperbaric chamber also had a higher ejection fraction, a measurement that reflects how well the heart can pump blood.

Dr. Ellestad sees potential for even better results with HBOT if patients can begin oxygen therapy sooner. Transporting patients to the chamber and preparing them for treatment require about thirty minutes. He and his colleagues hope to reduce that time at Long Beach Memorial by relocating the hyperbaric chamber to the hospital's emergency room.

Physician interest in HBO treatment for heart attack patients goes back a number of years; however, the interest had dwindled after the emergence of TPA and other clot-dissolving agents. Then, an unusual event prompted Dr. Ellestad and his colleagues to take another look at HBOT.

George Hart, MD, director of the hyperbaric unit at the hospital and an investigator in the study reported at the AHA 1992 New Orleans meeting, began having chest pains and decided to treat himself in the oxygen chamber. The HBOT relieved his heart pain in minutes. Being friends, Dr. Ellestad checked out what Dr. Hart explained about his HBOT experience.

Hyperbaric chambers are not standard equipment at hospitals and medical centers. If HBOT proved beneficial for a hospital, most likely it could afford the \$80,000 to \$90,000 cost for a single-patient chamber. This is the type used in the test at Long Beach Memorial Hospital. HBOT adds about \$200 to the daily cost of treating a heart attack patient, Dr. Ellestad said.

Besides Drs. Ellestad and Hart, investigators in the study included Adrian H. Shandling, MD, John C. Messenger, MD, Bruce VanNatta, MD, Daniel D. Whitcraft, MD, Roger H. Rizi, MD, Ronald H. Selvester, MD, Michael Hayes, MD, and Clyde W. Smith, MD.

More Studies Show the Efficacy of HBO for Heart Disease

The Long Beach Memorial Hospital's investigation is just one among thousands proving the efficacy of HBO for heart disease. Medical professionals and hyperbaric scientists around the world have proven the benefits of applying HBO for the reduction of actual reversal of most heart disease signs and symptoms. Their presentations are highly significant for furthering heart health.

The renowned Russian hyperbaricist Serge I. Rodionov, MD, who practices HBOT in Moscow, told how pharmaceutical agents prescribed for the treatment of cerebrovascular disease, cardiomyopathy, and heart failure are potentiated by hyperbarics. Drug effects increased when the heart patient was placed in a pressure chamber for just one hour per week.

By the date of his 1989 lecture, Dr. Rodionov affirmed there were over 3,000 HBO chambers strategically located around the country, which was then the original Union of Soviet Socialist Republics. And, he said, acceptance of the modality was gaining in the medical community for the treatment of heart disease. Today, just in the newly formed smaller nation of Russia itself, 3,000 chambers have been installed and are functioning.

Thirteen Benefits the Heart Receives from Oxygen Under Pressure

The nature of heart disease is such that insufficient oxygen is getting to the heart. This results in the various discomforts which affect a patient: difficulty breathing, inability to exert oneself, pressure in the chest, and other problems. Breathing normal air results in a mere 0.3 ml of oxygen dissolving into each 100 ml of blood. Any other oxygen is bound by the hemoglobin attached to red blood cells, and it essentially becomes unavailable. The need in heart disease is to get more oxygen molecules into the body and brain.

From the published scientific papers on HBO, Dr. Steenblock offers thirteen true benefits that the heart receives from exposure to oxygen under pressure. Clinical investigations by prime users of HBO from around the world, especially from Russian exponents, have shown the following heart advantages:

1. Hyperbaric oxygen therapy applied to the heart during critical loss of oxygen exerts a remarkable defibrillating effect so that tremulous, rapid, ineffectual contractions are prevented; total death of the heart muscle cells is avoided; and abnormal dilation of the blood vessels with subsequent complications is controlled.
2. Using HBOT in conjunction with various drugs enhances the effectiveness of both the oxygen and the drugs.
3. Combining HBOT with drugs completely arrests or considerably reduces angina attacks in patients otherwise resistant to prolonged drug treatment.
4. Patients with cardiac pain from ischemic heart disease experience total relief, along with disappearance of dyspnea (difficulty breathing), when they receive HBOT.
5. Administering HBOT lowered elevated blood cholesterol in all 220 patients cited in a study conducted by the Russian internist Dr. S.A. Borukhov and her colleagues.
6. HBOT normalized electrocardiograms in all patients in that same Soviet study.
7. For diminished muscular power of the heart, HBO exerts long-term normalizing effects for circulating blood through the body.
8. HBOT exerts antiarrhythmic action on the heart.
9. HBOT increases heart patients' tolerance to hard work and taking on physical loads
10. HBO taken at three atmospheres of pressure (a pressure rarely used in the United States) protects any individual's heart from damages due to lack of oxygen.
11. One's entire heart conduction system functions better from receiving HBO treatment (even when prophylactically administered).
12. Without taking drugs of any kind, breathing oxygen under pressure stabilizes impaired fat metabolism and improves liver function for someone with ischemic heart disease.
13. Due to its characteristic of mollifying stress and distress, HBO has long-term and short-term protective effects for a person with a heart problem.

How HBOT Further Enhances the Ailing Heart

As a result of elevating the atmospheric pressure inside the hyperbaric chamber by 1-1/2 to 2 atmospheres absolute (ATA), plus administering 100 percent oxygen to the cardiac patient by means of a face mask, this ill person receives a sharply increased amount of oxygen dissolved in the plasma. Such improved blood oxygen content tends to give the damaged heart an assist in oxygenating body tissues which provides time for the myocardium to recover and develop extra circulation around the area of the infarct, a localized area of decay in the heart muscle resulting from the interruption in blood supply.

As shown in the studies cited above, hyperbaric oxygen therapy for the relief of myocardial infarction has tremendous value for recovery of the patient. It increases oxygen intake for building collateral circulation in cases of angina pectoris, as well. HBO should not be reserved only for patients in cardiac intensive care units.

Family practice physicians sometimes stop themselves from requesting HBO therapy for their cardiac patients because they suspect there's a vasoconstrictive effect of HBO. Erroneously the doctors may conclude that such

treatment is dangerous and shouldn't be utilized on already constricted blood vessels. That's not true! Medical studies well-performed according to the scientific method show that hyperoxic vasoconstriction occurs in healthy tissue only. On the damaged ischemic tissue, vasodilation that occurs naturally counteracts any vasoconstriction produced by HBO. Higher amounts of blood flowing to areas of hypoxia create the opening of collateral blood vessels.

Hyperbaric oxygen therapy is an assist to the body's own healing mechanism. By itself, HBO would probably not offer the desired results. Numerous studies on animals conducted in the 1960's, in fact, showed unfavorable results using the treatment for heart disease. A closer look at the studies, however, reveals that they were performed on anesthetized dogs, laying helplessly on a table with various tubes running in and out of them. These animals were given drugs to induce some type of heart malfunction, then hyperbaric oxygen was administered, usually at far too high a pressure, for either too long or too short a time.

Such procedures on animals don't translate neatly into the human condition. The human patient can alter his or her risk factors by improving diet, stopping smoking, increasing exercise, and doing those various other beneficial things that I've mentioned. Definitely, chelation therapy taken along with the HBO received at the proper pressure, for the time needed to effect heart disease reversal, is the ideal way to go. Retaining risk factors is ridiculous, but that was done in experiments with the anesthetized dogs. Such experiments were fated for failure and did fail. Still, the studies were reported in the clinical journals and threw off physician/readers from following the correct path as regarding the use of hyperbaric oxygen as therapy for angina, myocardial infarction, and other heart ailments.

As we have stated, very little oxygen is dissolved in blood plasma at the normal atmospheric pressure of 102 millimeters of mercury (mm Hg). HBO therapy forcefully puts oxygen unbound by hemoglobin into the blood plasma. This increases the blood oxygen level fourteen times to 1433 mm Hg and thereby delivers much greater quantities of oxygen to oxygen-starved tissues. Those organs, tissues, and cells that have been suffering from a lack of oxygen because of poor circulation or damage then will become revitalized and begin to function more effectively.

The London Westminster Hospital Experience with HBOT

In London, C.J. Gavey, MD, chief of the cardiac department at Westminster Hospital, pressurized heart-attack patients to save their lives. For four days, He subjected them to 2 ATA in 100 percent oxygen for two hours, followed by a rest of one hour in plain air, and then continued the cycle of two hours in the chamber and one hour out. His idea was to send oxygen through the unblocked blood vessels to the ischemic tissues at the edge of the infarct area, preventing the impending death of additional heart muscle. He figured that this procedure might avoid the triggering of fatal arrhythmias.

Forty men and women who had suffered serious heart attacks within twenty-four hours were treated this way by Dr. Gavey. They ranged in age from thirty-five to seventy-two years. Surviving their cardiovascular accidents as a result of undergoing the HBO procedure directly upon their admittance to London's Westminster Hospital were 92.5 percent of the acutely affected patients. Of these thirty-seven initial survivors, three died within fifteen days, giving a final survival rate of 85 percent.

Quite significant was the reduction of heart pain experienced by these patients. Almost a quarter-century before Dr. Myrv in Ellestad made his AHA conference presentation, Dr. Gavey reports that twenty-three of his patients arrived in severe pain and fourteen had difficulty breathing. Once settled into the pressure chamber, none of the patients felt any more pain. Within thirty minutes of pressurization, their breathing problems eased too.

Inasmuch as only the really critical cases (those who potentially could die on the spot) have been administered HBO, such results were quite heartening to the Westminster Hospital authorities. They considered that HBO therapy saved some patients from fatal cardiogenic shock. The optimum hyperbaric regimen for cardiac conditions, however, was not defined and was still being decided upon twenty-five years after Dr. Gavey's clinical experiment. Dr. Ellestad confirmed Dr. Gavey's report.

How Strange It Is That Cardiologists Don't Prescribe HBOT

If heart disease allows insufficient oxygen to get into the heart muscle as stated earlier, various symptoms that most of us can identify must result. With O₂ being inhaled at normal atmospheric pressure but not preventing cardiovascular problems for the more than 1,200,000 heart attack victims each year in the United States alone, obviously greater amounts of this life-giving element must be obtained. HBO administered at the established two atmospheres absolute to force O₂ into the body, allows the doctor to effect 4.3 ml of oxygen being dissolved into each 100 ml of blood. Thus a cardiologist or other doctor is furnishing therapeutic oxygen amounting to a fourteenfold increase! Simply, this is Henry's gas law of physics at work.

Using modern equipment in this way, any skilled physician can safely elevate available oxygen for his patient to provide pain relief, to prevent fatal arrhythmias or shock, and to allow time for collateral blood circulation to develop. Yet, HBO seldom is used in the U.S. to reverse heart disease before it becomes near fatal. Isn't it strange that cardiologists don't routinely utilize hyperbaric oxygen as a valid therapy? Even odder is that they almost never employ the modality to benefit their cardiac patients at all. That's because the average American allopathic physician, traditionally trained primarily in the use of drugs and surgery, usually fails to have access to and certainly does not personally own a hyperbaric chamber. Moreover, the doctor probably is unfamiliar with what taking oxygen under pressure can do for promoting human homeostasis.

We have a most peculiar conundrum here, for which the answer would be funny if we were not dealing with matters of life and death. Note the irony: Of the hundreds of published scientific studies applied to heart disease, the set of elements you will seldom read or hear about is the mention of diet, exercise, smoking, and drinking habits of the cardiac patient in conjunction with administering HBOT to him or her. This is a commonsense procedure: the use of hyperbaric oxygen with one's everyday healthy lifestyle.

Instead, detailed instructions usually are given only for the various drugs being tested with HBO. Combining hyperbaric oxygen with those other more vital factors involving lifestyle, poor lifestyle practices probably being the source of heart weakness or disease in the first place, could optimize the outcome for an involved cardiac patient.

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