

Hyperbaric Oxygen Therapy Can Reverse Radiation Induced Vascular Injury

Hyperbaric oxygen therapy (HBO) has become an important treatment to reduce the uncommon but serious, late effects of radiation therapy.

"About one in 20 people will experience the late effects of radiation therapy and experience microvascular loss in that area," says [Jeffrey Cooper, MD](#), emergency specialist and medical director of the Hyperbaric Medicine Center at Nebraska Medicine. "We typically see an 80 to 85 percent success rate depending on the condition and how soon we see the patient. The longer the problem goes on before we treat the patient, the more difficult it is to treat the tissue."



[Jeffrey Cooper, MD](#)

HBO, which has been available at Nebraska Medicine since the mid-1980s, involves breathing 100 percent oxygen in a sealed chamber under pressure to treat a variety of disorders, including carbon monoxide intoxication, decompression sickness, diabetic wounds, air emboli and life-threatening processes including gas gangrene and other necrotizing infections.

By delivering oxygen at two to three times normal atmospheric pressure, the therapy works by forcing more oxygen into areas that aren't getting adequate amounts due to tissue damage or swelling. This increases the oxygen concentration in the blood and body tissues, which promotes healing. It also helps revive the immune system and helps the antibiotics work more effectively.

HBO treats the delayed side effects of radiation therapy by reversing the radiation-induced vascular injury to affected bone and soft tissues. During radiation, many of the smallest of blood vessels may be damaged or destroyed, which then limits the access of ingredients necessary for healing such as oxygen, antibiotics, nutrition, vitamins and growth factors.

One study showed that when hemorrhagic cystitis was treated within the first six months, the success rate was nearly 100 percent, says Dr. Cooper. The success rate for patients who were treated after six months dropped to 66 percent.

"Necrosis tends to be progressive and many tissues won't heal even with surgical intervention," he says. "The key is to reverse the necrotic process so the body can start to heal itself again. If we see the patient early enough, we can sometimes reverse the process without surgery. While some patients may still need surgical intervention, the patient will likely require less aggressive surgery and it will be more successful."

Treatment for osteoradionecrosis typically requires 30 to 40 two-hour daily treatments, notes Dr. Cooper. An additional 10 treatments may be required after surgical interventions.

Head and neck cancers are some of the most common cancers that lead to osteoradionecrosis. Other common cancers in which treatment can lead to radiation injury include bladder, bowel, jaw and skin cancers.

HBO has also become an important therapy in treating hard-to-heal diabetic wounds, anemia, and problem flaps or grafts from plastic surgery. Head and neck surgeons at Nebraska Medicine have also seen success in promoting healing for various soft tissue and bone restorative and reconstructive procedures.

Nebraska Medicine is the only hospital with a 24/7 Hyperbaric Oxygen Unit that can treat acute and critically ill patients in the area. Acute cases include patients with gas gangrene, necrotizing fasciitis, carbon monoxide poisoning, crush injuries to the limbs and those suffering from diving accidents. The unit now houses four monoplace (one person) chambers in total.

"HBO is an adjunctive treatment that can change a person's odds," says Dr. Cooper. "It is most often used in combination with antibiotics and surgery, and if we see the patient early enough, it can stack the deck in a person's favor. We're seeing a marked reduction in morbidity and mortality in patients whom we treat. We're seeing fewer complications and in some cases, it can mean the difference between an amputation and saving a limb. The key to its success is getting the patient to us before things get out of control. HBO can salvage at risk tissue, but it can't recover lost tissue."