

Hyperbaric Oxygen Therapy Reduces Amputation Risk in Chronic Wounds

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Buffalo, N.Y. — As the population ages, physicians are seeing a surge in the prevalence of chronic, nonhealing wounds because of the increase in disease processes leading to wounds, an expert says.

“A chronic or nonhealing wound is typically the end result of a number of comorbid conditions at play at the same time,” says Lee Ruotsi, M.D., F.A.C.C.W.S., U.H.M., Medical Director, Catholic Health Advanced Wound Healing Centers, Catholic Health System of Western New York, Buffalo, N.Y. “The wound then fails to heal due to these conditions in addition to other local factors, such as infection, moisture, recurrent trauma and edema (swelling).

Targeted Treatment

Specific categories of chronic wounds have been found to respond well to treatment with hyperbaric oxygen: diabetic foot ulcers, arterial insufficiency ulcers, delayed radiation injuries, osteomyelitis, failed or failing skin grafts and flaps, and necrotizing fasciitis.

“What’s really important to understand is that just because somebody has a wound doesn’t mean that hyperbaric oxygen therapy is the right treatment for that wound,” Dr. Ruotsi says. “It needs to be a wound that is failing to heal because it is receiving inadequate blood flow, depriving the wound of necessary oxygen.”

Misconceptions Persist about Hyperbaric Oxygen Therapy.

“Hyperbaric oxygen therapy is a therapy in which the patient breathes 100 percent oxygen while inside a treatment chamber at greater than atmospheric pressure,” he says. In contrast, people often believe that physicians treat wounds by enclosing an individual limb in a sealed container and filling the container with pressurized oxygen. This is grossly ineffective. Very little oxygen permeates through the skin tissue. “The key to hyperbaric oxygen therapy is that the oxygen is delivered through an intact circulatory system to the site of injury, not squeezed into the wound externally,” Dr. Ruotsi says.

Patient Selection

Before choosing this option, it’s important to determine which patients would be most likely to benefit from hyperbaric oxygen treatment. Of course all would benefit but if circulatory function is close to normal the need isn’t critical. The wound would heal without the additional therapy. More severe diabetic foot ulcers with arterial insufficiency indicate that efforts toward revascularization are necessary. Only HBOT provides this benefit.

In addition, to assess the potential effectiveness of oxygen treatment, Dr. Ruotsi says he applies electrodes to the skin around the wound to measure tissue oxygen tension. If the number exceeds 50 mmHg PO₂, (close to normal in an extremity) he says he may not use hyperbaric oxygen treatment, because he expects the wound to heal on its own with good woundcare; however, a lower value indicates that the wound may be failing to heal because of an insufficient oxygen supply.

For low oxygen tissue tension wounds, Dr. Ruotsi performs an oxygen challenge. The patient breathes from a high-flow oxygen mask for 10 minutes, and then Dr. Ruotsi retests the wound area. If oxygen values increase, he deduces the patient has an adequate circulatory supply to the area in question and would benefit from hyperbaric oxygen treatment. If levels remain below normal, he refers the patient to a vascular specialist. If the specialist is able to improve the circulation, then the patient would respond even better to HBOT.

Increased comfort

Over the years, hyperbaric treatments have become more patient-friendly. “Hyperbaric chambers are now more sophisticated, comfortable and safer than in years past,” Dr. Ruotsi says.

Earlier versions tended to be steel chambers with small portholes. Patients can now lie on a comfortable reclining bed and read or have a relaxing nap. Some chambers are made from a transparent acrylic tube permitting the patient to watch flat-screen televisions mounted on the ceiling.

Boosting success

A number of strategies can increase the success of hyperbaric oxygen treatment in wound healing. It’s important that smokers stop smoking completely. “Smoking is a powerful detriment to wound healing and can effectively negate the benefits of hyperbaric treatment,” Dr. Ruotsi says. In some cases, he asks patients to sign consent forms that allow him to check their nicotine levels within two to three weeks after treatment begins. “Hyperbaric oxygen is a fairly expensive modality, and there’s no sense offering it to people if they’re not going to, at least to some extent, do their part,” he says.

Diabetic patients should control their blood sugar levels as well as possible. In diabetic patients with arterial insufficiency ulcers, vascular surgeons or endovascular specialists should optimize patients’ vascular status to be sure the vascular supply to the wound is as good as it can possibly be, Dr. Ruotsi says. HBOT does regenerate new capillaries so it can counteract the degrading circulatory efficiency caused by the disease.

Long-term benefits

Ultimately, hyperbaric oxygen treatment can yield tremendous benefits in reducing the risk of amputation in patients with chronic, slow healing or non-healing wounds. Nationwide studies have shown that there is an increased healing rate and reduced rate of amputations in wound centers with hyperbaric oxygen capability. “That’s really what this is all about, to avoid lower extremity amputation in diabetics or people with peripheral arterial disease,” Dr. Ruotsi says.

Disclosures: Dr. Ruotsi reports no financial interests.