Hyperbaric Therapy Could Help Diabetics?

By Susan A. Steeves WebMD Medical News

May 24, 2000 (Dallas/Fort Worth) -- Two months ago, a surgeon told Thelma Bell that wounds on her right foot had progressed to gangrene and she was facing amputation. She'd already lost two toes because of nerve and circulatory damage caused by diabetes.

But last week, Bell's wounds were nearly healed, and the tissue on her foot appeared pink and healthy. Doctors now say her foot and leg will be saved, and once she is fitted with a special shoe, she should be able to walk normally.

Bell escaped the fate of the estimated 86,000 people each year who have lower limb amputations because of diabetic complications; they account for half of all leg and foot removals performed annually in the U.S. Her outcome was different because of wound care aided by hyperbaric oxygen therapy, says Jeffrey Stone, DO, MPH.

Stone, director of the hyperbaric medicine unit at the Institute for Exercise and Environmental Medicine (IEEM), is studying whether use of the therapy can reduce diabetic amputations. "One of my questions has been the role of hyperbarics in diabetic wounds," he tells WebMD. He received a $208,000 grant from the American Diabetes Association (ADA) to investigate the method.

Patients are put in a large, submarine-like chamber and don a clear plastic hood into which 100% oxygen is pumped. This increases the amount of oxygen in their blood, which in turn helps generate growth of vessels, says Stone, who also is a physician with the Wound Care Clinic of North Texas, part of Presbyterian Hospital of Dallas.

Vessel growth is crucial for diabetics because they have circulatory problems due to blocked arteries and capillaries. They also have nerve problems, called sensatory neuropathy, so they often can't feel cuts on their feet. "I've had patients come in with a nail in a foot and not know it," Stone says.

Once an injury occurs, it may not heal if there's not enough oxygen-enriched blood reaching the area. Often, as in Bell's case, the wound may fester until the only option is amputation, at a cost of about $40,000 per case.

For military veterans alone, this results in about 9,000 amputations annually at a total cost for surgery, hospitalization, medical care, and rehabilitation of $341 million, according to the Department of Veterans Affairs. Diabetics are 15 to 40 times more likely to have a leg amputated than someone not suffering from the disease.

Diabetics and others also must cope with hardening of the arteries, a condition usually treated by angioplasty, bypass, or stent placement. But there also are microvascular changes -- clogged capillaries that occur in the feet of many diabetics. "I think it's these folks that are helped by hyperbarics," Stone says.

"It's important to point out that hyperbarics is not a panacea. It isn't. There are many other things we do first such as check for infection, seeing if we can get weight off the foot, if we can control edema, help with proper nutrition, including glycemia control."

Bell says she was lucky and credits Stone and his staff at IEEM, a joint project of Presbyterian and UT Southwestern Medical Center at Dallas.

"When they found the gangrene in March, I thought that they just took you out in the field and shot you," Bell jokes. "But now my surgeon says that my foot has been saved."

So far, Stone has treated about 30 diabetes patients under the ADA grant. He wants to treat a total of 100 to 120 people in the double-blind study, in which neither medical personnel nor patients know whether the participant is receiving pure oxygen or regular air during their 90 minutes to two hours in the chamber.

Hyperbaric medicine is not new. It has been used since the 1940s to treat decompression sickness from scuba diving, carbon monoxide poisoning, and chronic bone infections. For the past 35 years, it also has been used for healing wounds. Stone also previously used it for patients with diabetes, but this is the first time a double-blind study has been done to determine if the treatment is effective enough to significantly reduce amputations resulting from diabetic ischemic foot ulcers, or wounds not getting sufficient oxygenated blood for healing.

In an earlier retrospective study, Stone and his colleagues looked at results for 1,633 patients treated for wounds over 33 months. Of those, 501 were diabetic; 119 received hyperbaric oxygen therapy and the rest received conventional treatment. They found that the limb salvage rate was 72% for those on pure oxygen and only 53% for the rest. Stone cautions that this was not a controlled study, so not a true measure of the effectiveness of hyperbarics in reducing amputation.

Ben Gallegos, administrator of the hyperbarics unit at Medical City Dallas Hospital, says that though they haven't conducted an official study of the use of the therapy in diabetics, they have had great success in using it against gangrene. Medical City is the only other facility besides Presbyterian in the Dallas area that has a multichamber hyperbaric unit.

Roger Unger, MD, who is not involved in the ADA study, also expressed caution. He is director of the Touchstone Diabetes Center at UT Southwestern Medical Center at Dallas, and a diabetes clinician at the Dallas Veterans Affairs Medical Center.

"We have sent patients for hyperbaric treatment," says Unger, a member of the National Academy of Sciences (NAS). "Diabetic foot ulcers and amputation is a terrible problem, and almost anything you do fails.

"At this point, no one knows how effective hyperbaric treatment is, so it's important to do such a study. We've seen temporary improvement from hyperbarics, but it's hard to tell whether it's because of that therapy or because other treatment the patient is receiving is focused on the wound," Unger says.

Jean Wilson, MD, former chief of endocrinology at UT Southwestern who has treated numerous cases of diabetic wounds and amputation at Parkland Health and Hospital System, also expresses skepticism but commends IEEM for doing the study.

"We need effective therapies, and I'm enthusiastic that the ADA is funding such research," says Wilson, also an NAS member. "It's very important that hyperbaric medicine be studied because its effectiveness for most of its applications has never been scientifically investigated."

Stone says that in the retrospective study, they found that patients accepted for hyperbarics had larger wounds, more wounds, and were more likely to have been recommended for amputation than the rest of the people receiving wound care.

"Interestingly, 31% of the hyperbaric group had been recommended for amputation versus 19% of those who did not have hyperbarics," he says. "Based on this, we applied for the ADA grant.

"Hyperbarics is important. It's just one of the things done to treat wounds. The majority of patients don't need hyperbarics. My average patient presents with a wound that has been there 11.8 months. I think the key in many of these cases is a multidisciplinary approach. ... We need to better define which patients will respond to hyperbarics."