As a hyperbaricast actively practicing the specialty for more than 18 years, I have several thoughts on the articles included in “The oxygen issue” (June 2010) of Ostomy Wound Management.

I am somewhat dismayed after reading Mutluoglu M, Uzun G, Yildiz S. Hyperbaric oxygen therapy in the treatment of diabetic foot ulcers — prudent or problematic. A case report. Ostomy Wound Manage. 2010;56(6):32–35. The authors have misled the readers by inappropriately titling the article. The title suggests that hyperbaric oxygen therapy (HBOT) in advanced wound care for diabetic wounds can cause problems. The title missed the importance of the article, which was the lack of basic wound care provided to the patient discussed in this case.

The body of the article defines the importance of the advanced wound care role of hyperbaric oxygen in treating recalcitrant wounds. The authors also emphasize the importance of providing basic wound care for a diabetic neuropathic ulcer before considering any advanced modalities. There should never be a concern regarding the appropriate use and benefit of HBOT in treating recalcitrant diabetic foot ulcerations, especially when they meet the “appropriate” hyperbaric diagnostic criteria, which is not reflected in the article title. The authors also stated that the presence of a pedal pulse and a transcutaneous oxygen (TcpO2) >40 mm Hg was an indication that “HBOT is not recommended.” TcpO2 values are used for microvascular assessment and serve as a direct quantitative indicator of periwound skin oxygen availability. These values are a good predictor of negative wound healing and can further delineate the need for further vascular surgical assessment and intervention. Also, all diabetic foot ulcers deserve a formal vascular evaluation irrespective of presumed etiology or palpable pulses and should not stop short at a normal TcpO2 value (per national wound care guidelines). Lastly, TcpO2 results should be used cautiously and not determine the need for hyperbaric oxygen as an advanced wound care modality. TcpO2 cannot be used as a positive predictor of wound healing; rather, when critical ischemic TcpO2 values are demonstrated, it is as a useful predictor of failure to heal. More appropriately, the title should have focused on the importance of the multidisciplinary wound care team and the lack of basic wound care support in non-hospital-affiliated hyperbaric oxygen centers.

In addition, Strilko’s Pearls for Practice (“Management of a Patient with Fournier’s Gangrene”) fails to mention the important role of adjuvant HBOT in treating this condition. The hyperbaricast is an important member of the multidisciplinary wound care team. When a hyperbaricast and hyperbaric facility are available to treat patients with life-threatening necrotizing infections such as Fournier’s gangrene, the role and importance of using hyperbaric oxygen should not be underscored or dismissed. Adjuvant hyperbaric oxygen, when available, is considered standard medical therapy in the treatment of Fournier’s gangrene and other necrotizing infections.

Lastly, the article Blackman E, Moore C, Hyatt J, Rainlorn R, Frye C. Topical wound oxygen therapy in the treatment of severe diabetic foot ulcers: a prospective controlled study (Ostomy Wound Manage. 2010;56[6]:24–31) was underpowered (28 patients), biased, and lacked randomization and blinding. An important take-home message is that the “potential” benefit and “possible” physiologic mechanism of topical oxygen therapy should never be confused with the multiple proven benefits of systemic hyperbaric oxygen therapy. The positive physiologic, biochemical, and anatomical changes consistently identified in tissues treated with systemic hyperbaric oxygen could never be reproduced using topical oxygen therapy. The use of hyperbaric oxygen therapy always should be considered first in those patients who are candidates, have no absolute or relative contraindications to the procedure, and can tolerate the full course of therapy needed to achieve the desired outcomes.

I encourage readers to seek out the Undersea & Hyperbaric Medical Society’s (UHMS) 12th Edition of Hyperbaric Oxygen Therapy Indications, a publication of the Society’s Education Committee. This document gives an in-depth explanation of all acceptable indications for HBOT, rationale for treatment, significant and extensive references for all indications presented, and when peer review is indicated if the expected number of treatments is exceeded for the diagnosis. This should serve as an excellent reference to all who may be unfamiliar with HBOT; it has a place on the shelf of everyone involved in wound care seeking the “oxygen factor” as an adjunctive modality for their patients. Interested persons may visit UHMS.org.

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Reply

As hyperbaric practitioners, we respect and understand Dr. O’Neill’s concerns. Our article focuses primarily on the importance of the multidisciplinary wound care team, which we believe should include also a hyperbaric practitioner where available.

Although the evidence regarding adjunctive hyperbaric oxygen therapy (HBOT) in the management of chronic wounds such as diabetic foot ulcers is growing, more studies are needed to define robust criteria for choosing the patients who are likely to benefit from HBOT.

Patients who have claimed they would expect their wounds to heal with HBOT only (including the case in question) would not seek comprehensive wound care. The term “problematic” was used to describe this situation, which may delay adequate interventions for wound management and contribute to wound chronicity.

We think that concerns regarding the misuse or overuse of HBOT should not be ignored and should be discussed among hyperbaric practitioners.

Dr. O’Neill criticizes our statement that “HBO therapy was not recommended in patients who had normal pedal pulses and transcutaneous partial oxygen pressure (TcpO₂) measurement higher than 40 mm Hg.” He also argues that TcpO₂ is valuable only to predict wound healing failure and should not be used to determine the need for HBOT. We agree with him on some points. Chronic hypoxia within the wound and in the periwound environment is known to impede wound healing through various means in patients with diabetes. TcpO₂ levels <40 mm Hg are defined as wound hypoxia, which has long been regarded as the best predictor of wound healing failure.

Nevertheless, TcpO₂ levels >40 mm Hg may not necessarily indicate that a wound will heal spontaneously because etiological factors other than hypoxia such as foot pressure, infection, venous congestion, or malnutrition also may contribute to impaired wound healing.

The primary benefit of HBOT in nonhealing chronic wounds is to correct wound hypoxia. Hence, if a well-oxygenated wound without infection fails to heal in a timely fashion, other underlying disorders or comorbid diseases should be addressed. This rational also is emphasized in Hyperbaric Medicine Practice, where it is stated, “If all (TcpO₂) values are greater than 40 mm Hg, tissue hypoxia is not a significant etiologic factor and hyperbaric oxygen therapy is unlikely to benefit the patient, in the absence of infection.”

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References


[Editor’s response: Pearls for Practice typically does not address all possible therapeutic options. In addition, similar comments regarding the Blackman et al article were addressed by the authors in a previous Letter to the Editor, published in the August 2010 issue of OWM.]