Received: 5 October 2017 | Accepted: 12 October 2017

DOI: 10.1111/iwj.12852

WILEY IWJ

LETTER TO THE EDITOR

Hyperbaric oxygen therapy and intermittent ischaemia in the treatment of chronic wounds

Dear Editors.

Non-healing ulcers and their sequelae are associated with reduced quality of life and are a financial burden on the national health service (NHS).[1] The underlying cause of chronic wounds is multifactorial; however, hypoxia is an important cause.[1,2] The benefits of hyperbaric oxygen therapy (HBOT) in healing of chronic wounds is cited by numerous studies.[1–3] There is emerging, contradictory evidence of the benefits of ischaemic preconditioning in these wounds.[4,5]

A review of the literature found over 20 reviews, 7 systematic reviews and 3 systematic reviews of randomised controlled trials for HBOT in chronic wounds. Whilst they all concur that there is evidence supporting the use of HBTO in chronic wounds, the quality of the evidence remains low. The studies show clinical heterogeneity with regards to wound characteristics, vascular status, oxygen therapy regimes, outcomes and follow up and methodological shortcomings.[1–3] Roeckl-Wiedmann et al reported that HBOT reduces the risk of amputation in diabetic patients, but data to support its use in venous, arterial or pressure ulcers were limited.[1] Kranke et al found that HBOT improved diabetic foot ulcer healing when used in the short term (up to 6 weeks) but also highlighted the flaws in the study designs, limiting the overall conclusion.[2] This is further supported by Stoekenbroek et al, who drew similar conclusions. Furthermore, the publications supporting HBOT is mainly concentrated on diabetic wounds, and its applicability to other causes of chronic wounds is uncertain.[2,3]

There is emerging evidence that intermittent cycles of remote ischaemic preconditioning augment diabetic ulcer healing.[4,5] As hypoxia is one of the causes of chronic wound healing, the concept appears counterintuitive, and the exact mechanisms remain unknown. The idea of ischaemic conditioning was first noted in 1986 by Murry et al. They found that intermittent cycles of complete coronary artery occlusion, followed by reperfusion, decreased the size of a subsequent induced myocardial infarction by up to 75%.[5] This has been found to protect against a more significant ischaemic insult and end-organ damage, which is not limited to skin and wounds.[4,5] The treatment is inexpensive with few noted complications. This concept is a novel and promising treatment option moving from bench to bedside.[4]

Overall, the literature suggests that there is insufficient evidence and poor understanding of the treatment options for chronic wounds. There is an urgent need to produce good-quality evidence to ensure that patients receive safe, effective and economic treatment. Ultimately, we feel that this will reduce the vast costs associated with chronic wound care. Well-designed, randomised, controlled trials are required to provide evidence for the beneficial effects of ischaemic preconditioning. Furthermore, the current literature on wound healing remains limited to diabetic wounds, and further studies are required to address other causes of chronic wounds. To do so requires the recruitment of large numbers of patients and a willingness of both clinicians and patients to enter into such trials.

Sarvnaz Sepehripour

Kiran Dhaliwal

Baljit Dheansa

Department of Plastic Surgery, Queen Victoria Hospital NHS Foundation Trust, Queen Victoria Hospital, East Grinstead, UK

Email: kiran.dhaliwal@qvh.nhs.uk

DOI 10.1111/iwj.12852

REFERENCES

1. Roeckl-Wiedmann I, Bennett M, Kranke P. Systematic review of hyperbaric oxygen in the management of chronic wounds. *Br J Surg*. 2005;92(1):24–32.
2. Kranke P, Bennett M, Roeckl-Wiedmann I, Debus S. Hyperbaric oxygen therapy for chronic wounds (Cochrane review). *Cochrane Database Syst Rev*. 2004;2:CD004123.
3. Stoekenbroek RM, Santema TB, Legemate DA, Ubbink DT, Van den Brink A, Koelemay MJ. Hyperbaric oxygen for the treatment of diabetic foot ulcers: a systematic review. *Eur J Vasc Endovasc Surg*. 2014;47(6):647–655.
4. Lim SY, Hausenloy DJ. Remote ischemic conditioning: from bench to bedside. *Front Physiol*. 2012;3:27.
5. Epps JA, Smart NA. Remote ischaemic conditioning in the context of type 2 diabetes and neuropathy: The case for repeat application as a novel therapy for lower extremity ulceration. *Cardiovasc Diabetol*. 2016;15(1):130.

