

Use of hyperbaric oxygen to treat chronic anal fissure

J. D. Cundall¹, A. Gardiner¹, G. Laden²,
P. Grout² and G. S. Duthie¹

¹Academic Surgical Unit, Castle Hill Hospital, Cottingham and ²North England Hyperbaric Unit, East Riding Hospital, Hull, UK
Correspondence to: Dr J. D. Cundall, Academic Surgical Unit, Castle Hill Hospital, Cottingham HU16 5JQ, UK
(e-mail: jeremy@cundall7771.freereserve.co.uk)

Paper accepted 27 September 2002

Published online in Wiley InterScience (www.bjs.co.uk)

DOI: 10.1002/bjs.4054

Introduction

Chronic anal fissures are caused by internal anal sphincter hypertonia, which leads to reduced blood flow and tissue hypoxia, and consequent failure of healing¹. Hyperbaric oxygen therapy provides a significant increase in tissue oxygenation in hypoperfused wounds. This increase in oxygen tension induces positive changes in the wound repair process by enhancing fibroblast replication, collagen synthesis and neovascularization²⁻⁴.

It was hypothesized that recalcitrant chronic anal fissures would heal with hyperbaric oxygen therapy.

Patients and methods

Patients with chronic anal fissure, who had failed conservative treatment including glyceryl trinitrate ointment, were eligible for the trial. Each patient received 15 hyperbaric treatments over 3 weeks. Each treatment consisted of 90 min of breathing 100 per cent oxygen at 2.4 atmospheres. There is no standard treatment protocol for wound healing in hyperbaric medicine, although 30 treatments are usually given. In this study, because of small wound size and for patient convenience, the number of treatments was reduced to 15. Symptoms were assessed by means of visual analogue scales. The fissure was inspected for signs of healing at the end of the treatment and at 1- and 3-month follow-up. A healed fissure was defined as one with complete epithelialization.

Results

Eight patients (four men and four women; median age 49 (range 20-75) years) with chronic anal fissure were entered into the trial. All patients completed the treatment, with no complications. One patient, whose fissure had healed

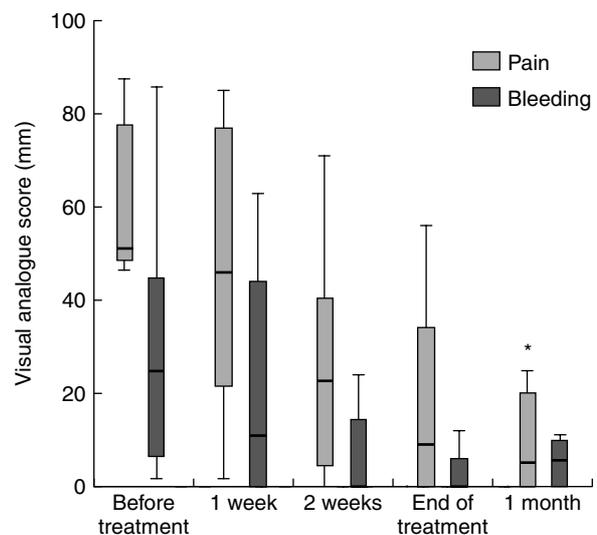


Fig. 1 Visual analogue scores for patient symptoms before and after hyperbaric oxygen therapy for chronic anal fissure. * $P = 0.043$ versus pain score before treatment (Wilcoxon signed ranks test). Boxes are interquartile range and horizontal lines show the median; whiskers are the 95 per cent range

by the end of the treatment, died from unrelated causes 29 days after completion of the therapy. All patients showed signs of healing at the end of the treatment, and three had healed completely. By the 3-month follow-up, five fissures had healed, one had relapsed following an episode of constipation, and two had failed to heal.

Visual analogue scores of patients' symptoms showed improvements in both pain and bleeding (Fig. 1). Visual analogue data were not determined at the 3-month follow-up. Wilcoxon signed rank analysis showed that, when comparing data obtained before treatment with those obtained 1 month after therapy, the improvement was significant for pain ($P = 0.043$) but not for bleeding ($P = 0.078$).

Discussion

The natural history of chronic anal fissure is unknown, although it is believed that fewer than 5 per cent of patients will heal without treatment. Hyperbaric oxygen therapy healed more than half of the fissures in this study.

It is not envisaged that hyperbaric oxygen treatment would ever be used as first-line therapy, because it is costly in terms of time and resources. However, this treatment may be appropriate in patients who have failed medical treatment, in those at risk of faecal incontinence, and in patients who are unfit for operation or in whom surgery has failed.

Hyperbaric oxygen therapy has been shown in this study to induce healing in more than half of patients with a chronic anal fissure that failed to respond to other therapies. It has been shown to be a safe procedure. A more extensive dose-ranging trial is being organized to determine the most appropriate treatment protocol.

Acknowledgements

J.D.C. was sponsored by a Royal College of Surgeons of England research fellowship.

References

- 1 Schouten WR, Briel JW, Auwerda JJ, De Graaf EJ. Ischaemic nature of anal fissure. *Br J Surg* 1996; **83**: 63–65.
- 2 Bayati S, Russell RC, Roth AC. Stimulation of angiogenesis to improve the viability of prefabricated flaps. *Plast Reconstr Surg* 1998; **101**: 1290–1295.
- 3 Marx RE, Ehler WJ, Tayapongsak P, Pierce LW. Relationship of oxygen dose to angiogenesis induction in irradiated tissue. *Am J Surg* 1990; **160**: 519–524.
- 4 Zhao LL, Davidson JD, Wee SC, Roth SI, Mustoe TA. Effect of hyperbaric oxygen and growth factors on rabbit ear ischemic ulcers. *Arch Surg* 1994; **129**: 1043–1049.