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Hyperbaric Oxygen Therapy in the Treatment of Sickle Cell Leg Ulcers

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Rudge FW. Hyperbaric oxygen therapy in the treatment of sickle cell leg ulcers. J Hyperbaric Med 1991; 6(1):1–4.—Chronic sickle cell leg ulcers can be painful and debilitating and are often refractory to standard medical and surgical therapy. These lesions, although rarely fatal, are a source of significant morbidity in patients with sickle cell anemia. The author reports 2 patients with sickle cell anemia with chronic leg ulcers who were treated with hyperbaric oxygen (HBO) therapy. In 1 patient the ulcer healed and did not recur during the 2-yr follow-up period. The ulcer remained unchanged in the second patient. The addition of HBO therapy to other treatment modalities may be of benefit in the management of sickle cell leg ulcers.

sickle cell anemia, wound, leg ulcer, hyperbaric oxygen

Introduction

Chronic lower extremity ulcers occur in a variety of hemolytic disorders, including hereditary spherocytosis, Felty's syndrome, and sickle cell anemia (1). In sickle cell ulcers, the results of standard medical and surgical therapy are generally poor, recurrence is frequent, and when healing occurs it is often a slow process.

The treatment of chronic foot ulcers in diabetics with hyperbaric oxygen (HBO) therapy has been well documented (2, 3), but the use of HBO to treat sickle cell leg ulcers has not been previously reported. This paper reports the results of treatment of 2 patients with sickle cell leg ulcers with adjunctive HBO therapy.

Case Reports

Case 1

The patient was an 18-yr-old male with sickle cell anemia and a history of an ulcer of the left lateral malleolus. Four months before coming to our institution, he was bitten by an insect in this area and developed an ulcer which healed over the next 2 wk. One month later, the ulcer recurred and began draining purulent material. He was treated with antibiotics, immobilization, oral zinc sulfate supplements, and wet-to-dry dressings. The ulcer persisted unchanged despite these interventions. Tests for osteomyelitis proved

negative. He was referred for adjunctive HBO therapy to aid in healing. At the time he was noted to have a necrotic ulcer near the left lateral malleolus (Fig. 1). The ulcer was 1.0 × 0.5 cm, no granulation tissue was present, and the area was extremely tender to palpation.

The patient was treated with 100% oxygen at 2.4 atm abs for 90 min daily, 6 days per week. Two weeks after HBO was begun the wound began to granulate, and in 4 wk the wound had completely healed (Fig. 2). At follow-up 2 yr later, the area remained completely healed.

Case 2

A 36-yr-old female with sickle cell anemia had an 8-mo. history of an ulcer overlying the left medial malleolus. The ulcer had failed to heal with local wound care and a trial of Trental. Vascular studies of the lower extremities revealed no large vessel disease. She was referred for HBO therapy to aid in healing. At that time she had an extremely tender 1.5 × 1.5-cm ulcer overlying the left medial malleolus (Fig. 3). No evidence of infection was present.

The patient was treated with 100% oxygen at 2.4 atm abs for 90 min daily, 5 days per week. After 32 HBO treatments, no change in the wound was noted (Fig. 4), and HBO therapy was discontinued. The patient was considered an HBO-treatment failure.

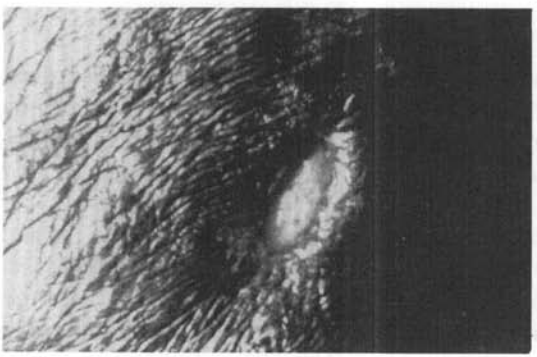

FIG. 1—Case 1 before start of HBO therapy.

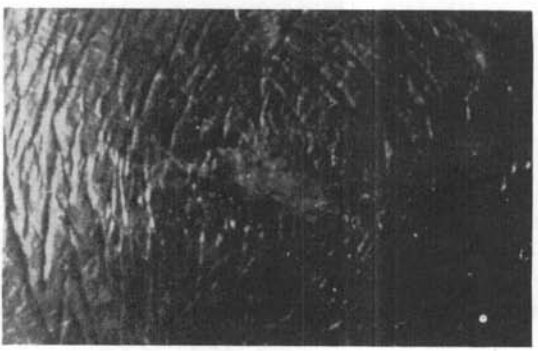

FIG. 2—Case 1 after 4 wk of HBO therapy. Wound is completely healed.

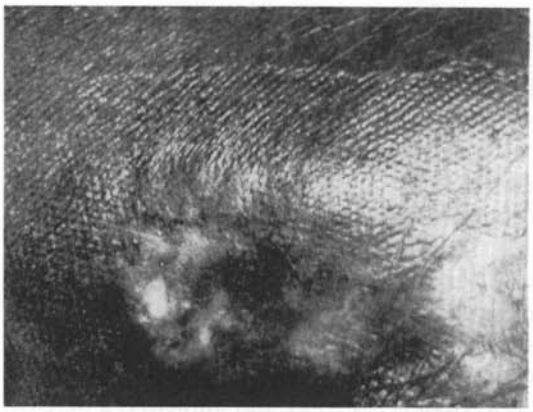

FIG. 3—Case 2 before start of HBO therapy.

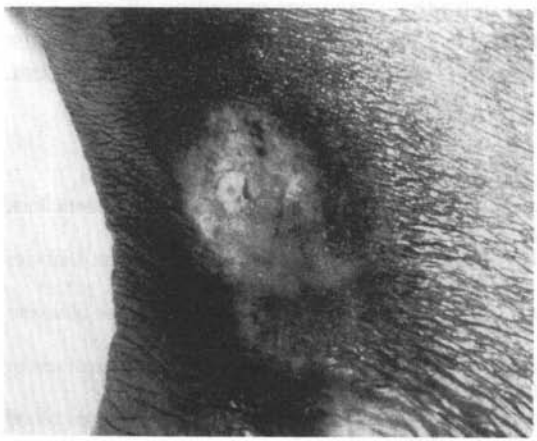

FIG. 4—Case 2 after 6 wk of HBO therapy. Wound shows no evidence of healing.

Discussion

The first report of leg ulcers in sickle cell anemia was published in 1910 (4), and other reports of this condition soon followed (5, 6), although a causal relationship between sickle cell anemia and leg ulcers was not suggested until 1940 (7). The incidence of leg ulceration in sickle cell disease has been reported as up to 75% in adults with the disease (8), and 12% in children (9). The average age of onset has been reported by Diggs and Ching as 15 yr (10). Whether patients with sickle cell trait have increased risk of leg ulcers is uncertain.

The etiology of leg ulcers in sickle cell anemia is probably multifactorial (1). Many patients describe a history of minor trauma before development of an ulcer. In others, trauma is denied, and the ulcers are presumed to arise spontaneously. The most common locations for the development of ulcers

are the ankles and the anterior tibia, where the skin is thin and the blood supply is relatively poor (11).

The ideal treatment of sickle cell ulcers has yet to be defined. Chernoff et al. (12) state that rapid healing of these ulcers frequently occurs when the hemoglobin level is restored to normal for periods of 1–3 mo. by repeated transfusions. Sergeant (1) notes that bedrest can result in dramatic improvement. Reindorf et al. (8) noted complete healing in 2 patients after application of a collagen dressing (Collistat). Surgical treatment of these lesions with debridement and flaps or split thickness skin grafts has been disappointing. In most reports, the rate of recurrence after treatment is high.

Hyperbaric oxygen therapy may improve healing in sickle cell leg ulcers by elevating tissue oxygen tension within the wound, resulting in increased collagen formation, enhanced fibroblast replication, and improved leukocyte function (2). Our experience in the treatment of sickle cell ulcers with HBO therapy is insufficient to make a definitive statement regarding efficacy. Controlled studies, combining HBO therapy with other treatment modalities, must be conducted to determine the role of HBO therapy for this vexing problem.

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