

Case Report

Hyperbaric oxygen in the management of wound tissue necrosis after external dacryocystorhinostomy

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Abstract

Hyperbaric oxygen is an adjunctive treatment for promoting wound healing and reducing infection. We present an unusual case of wound tissue necrosis occurring after external dacryocystorhinostomy (ExtDCR) that was subsequently treated with hyperbaric oxygen (HBO) and advancement flaps with good outcome. HBO improves vascularization of ischemic tissues after ExtDCR for greater success after reconstructive surgery.

Keywords: External dacryocystorhinostomy, Tissue necrosis, Hyperbaric oxygen therapy, Treatment

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Introduction

Tissue necrosis at an infected external dacryocystorhinostomy (ExtDCR) incision site is a rare complication that is challenging to surgically reconstruct due to tissue avascularity. One method to address tissue avascularity is hyperoxygenation. Good outcomes have been reported after hyperbaric oxygen (HBO) treatment of carbon monoxide poisoning, compromised grafts and flaps, radiation injury to soft tissue and bone, clostridial myonecrosis, necrotizing infections, refractory osteomyelitis, compromised cutaneous ulcers, thermal burns, and peripheral ischemia.^{1–4}

HBO has been proposed for ophthalmic conditions such as central retinal artery occlusion, radiation optic neuropathy, acute post-radiation scleral necrosis, orbital implant vascularization and compromised periorbital soft tissue grafts.^{5–7}

This report describes the use of HBO as an excellent adjunctive treatment for a case of tissue necrosis post-ExtDCR that was unresponsive to conventional therapy.

Case report

A 70-year-old female with systemic hypertension presented with tearing in the left eye. The patient was diagnosed with obstruction of the common canaliculus. An ExtDCR was performed using the Dupuy-Dutemps technique. Briefly, a U-flap was constructed between the lacrimal sac and nasal mucosa and bicanalicular stents were placed. Intraoperatively, there was severe bleeding from the orbicularis muscle, angularis vein and nasal mucosa which was controlled with extensive bipolar cauterization. At the end of the surgery, nasal packing was performed with 5 cc of physiologic saline combined with 5 cc diluted adrenaline in the left nostril for 24 h. Postoperative surgical wound site care included application of neomycin, bacitracin and dexamethasone ointment (Maxitrol, Alcon Inc., Fort Worth, Tx, USA) 4 times a day over 10 days and erythromycin ointment (Erythromycin, Alcon Inc., Fort Worth, Tx, USA) for 2 weeks. Systemic antibiotics were not prescribed preoperatively or postoperatively. Four days after surgery, the patient complained of pain and discharge

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at the wound site. On examination, there was breakdown of the skin in the left medial canthal region of the wound, which progressed to full thickness necrosis by 3 weeks postoperatively. There was extensive discharge from the wound, dehiscence of the incision site, an area of necrotic black tissue that measured 12 × 18 cm over the entire thickness of the surgical wound. Bone exposure occurred over a small portion of the osteotomy and there was loss of mucosal coverage over the anterior ethmoidal cells (Fig. 1A and B). The remainder of the ophthalmic examination was unremarkable. The patient was afebrile. The patient was started on intravenous antibiotics (gentamicin 100 mg (Hospira, Inc., Lake Forest, IL 60045, USA) every 8 h and cefazolin 1gr (Glaxosmithkline Research Triangle Park, NC 27709) every 8 h) and application of erythromycin ointment (Erythromycin, Alcon Inc., Fort Worth, Tx, USA) over the wound.

Computed tomography (CT) scans showed an air filled cavity with bone dehiscence at the anatomical location of the wound into the adjacent area of the nasal cavity (Fig. 1C–E). The antineutrophil cytoplasmic antibodies (ANCA) test and routine laboratory work was normal.

The patient underwent endoscope assisted debridement of devitalized tissue, removal of the bicanalicular stent and drainage of the medial canthal abscess. Tissue specimens obtained during debridement contained necrotic tissue with signs of inflammation (Fig. 1F).

The culture was positive for *Serratia marcescens* sensitive to amikacin, ciprofloxacin, meropenem, trimethoprim/sulfamethoxazole and *Corynebacterium* sensitive to erythromycin. The patient was prescribed Clindamycin Hydrochloride (Clindamycin capsules, Pfizer Inc., Greenstone LLC, US) 300 mg every 6 h to reduce chances of a secondary anaerobic infection and Ciprofloxacin hydrochloride tablets (Cipro, Bayer HealthCare Pharmaceuticals Inc., Wayne, NJ, US) 500 mg twice daily. Daily dressing was performed and the volume of discharge diminished as dressings with erythromycin ointment were applied to the osteotomy site.

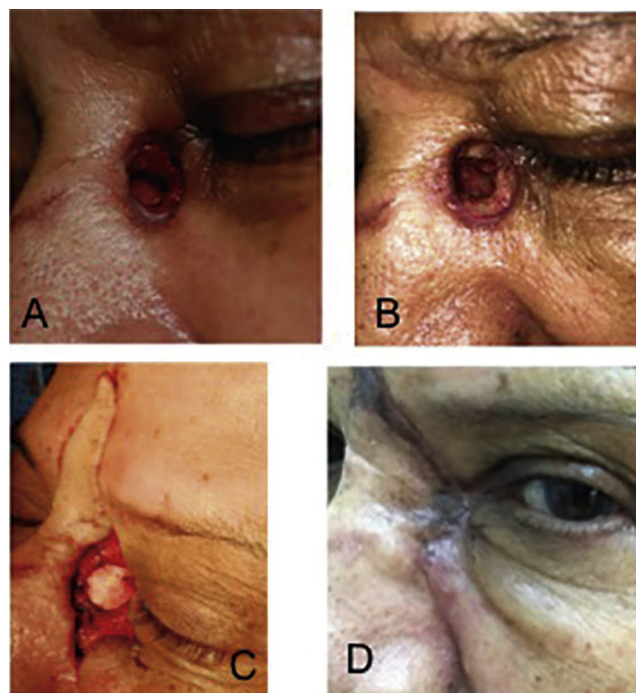


Fig. 2. A. Day 7 post-intravenous antibiotics and post-debridement, shows a palid-colored nasal mucosa and necrotic margins of the wound. B. Day 10 post hyperbaric oxygen shows the wound margins recovering the red color. C. Reconstructive surgery was performed using round ear cartilage graft to occlude the previous bone surgical ostium, associated with a skin muscle malar advancement and a V-Y forehead flap. D. Three months post-surgical repair, the wound was closed and healed.

On the 11th postoperative day, ExtDCR hyperbaric oxygen therapy (HBO) was added to the treatment regimen. The Oxyvet VM2000 hyperbaric chamber (Oxytec Inc., Waukesha, WI, USA) was used for 20 sessions over 10 consecutive days to improve vascularization of the affected area.

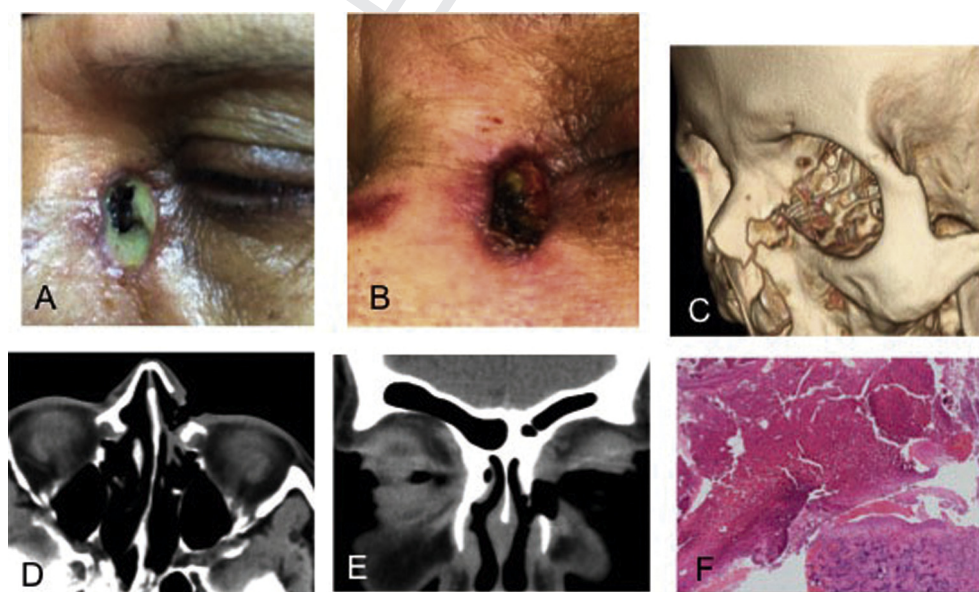


Fig. 1. Progress of an infection and tissue necrosis following external dacryocystorhinostomy (DCR) on the left side. A. Twenty-one days post-ExtDCR the incision opened, with necrotic margins and secretion. B. Three days post-intravenous antibiotics, necrotic tissue is present at the bottom of the open wound. C. Computerized tomography scan in 3D-CT reconstructions (surface-shaded display showing the left bone defect post-ExtDCR opened in the surgical area). D–E Axial and coronal CT scans. F. Microphotograph showing large areas of necrosis and polymorphonuclear leukocytes infiltration. Mucosal epithelium and foreign body material consistent with surgical material (Hematoxylin and eosin; 4X original magnification).

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