

Case reports

Results of hyperbaric oxygen treatment in an at-risk nasal flap following trauma

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Key words

Injuries; Hyperbaric medicine; Outcome; Skin; Surgery

Abstract

(Kara S, İnci E, Gözen ED, Gülgün KC, Yener HM. Results of hyperbaric oxygen treatment in an at-risk nasal flap following trauma. *Diving and Hyperbaric Medicine*. 2021 June 30;51(2):207–209. doi: 10.28920/dhm51.2.207-209. PMID: 34157737.) Hyperbaric oxygen treatment (HBOT) is widely used in otorhinolaryngology for various purposes. A 20-year-old male patient was admitted following a traumatic nasal wound which occurred several hours prior. He had a nasal glass cut from the radix to the supratip area which was primarily closed by non-absorbable suture. The following day, there was a haematoma and necrosis of the skin. The haematoma was drained under local anaesthesia. Blood supply to the nasal skin was severely compromised and only the columellar artery remaining intact, by definition designating this a difficult to heal wound with the risk of overall healing failure. Necrosis of the skin had developed within the first 24 hours. Accordingly, the patient underwent 30 HBOT sessions (two hours at 253.3 kPa) twice daily for four days and daily thereafter. Antibiotic cover and conservative wound management were also used. Complete healing was achieved without the need for additional surgical intervention. We conclude that timely use of HBOT may be a valuable adjunct to conservative wound management in a case of sharp nasal trauma.

Introduction

Hyperbaric oxygen treatment (HBOT) is widely used in otorhinolaryngology for various purposes. It is used in wounds that are difficult to heal.^{1,2}

Blood supply to the nasal skin is derived from two separate branches. The first is the columellar artery branch of the superior labial artery and the angular artery which is a branch of facial artery. The second arises from the dorsal nasal branch of the ophthalmic artery. Therefore, this situation puts the blood supply of the tissue in a risky situation in nasal skin incisions and cuts. We present a case in whom the nasal skin had a large cut interrupting most of its blood supply; only the columellar artery was intact. There was progressive skin ischaemia and necrosis but complete recovery was achieved using a strategy that combined conservative wound management, antibiotics and early adjunctive HBOT.

Case report

The patient gave permission for this report and the photographs to be published. A 20-year-old male patient was admitted with a traumatic cut to the nose occurring a few

hours earlier. The cut extended from from the radix to the supratip area (Figure 1a). The skin flap appeared to have lost most of its blood supply. Haemostasis was achieved by using electrocautery. The cut was closed by interrupted suture with 5.0 propylene (Figure 1b). Oral antibiotics were prescribed (500 mg cefuroxime twice daily for two weeks and 500 mg ornidazole three times a day for one week).

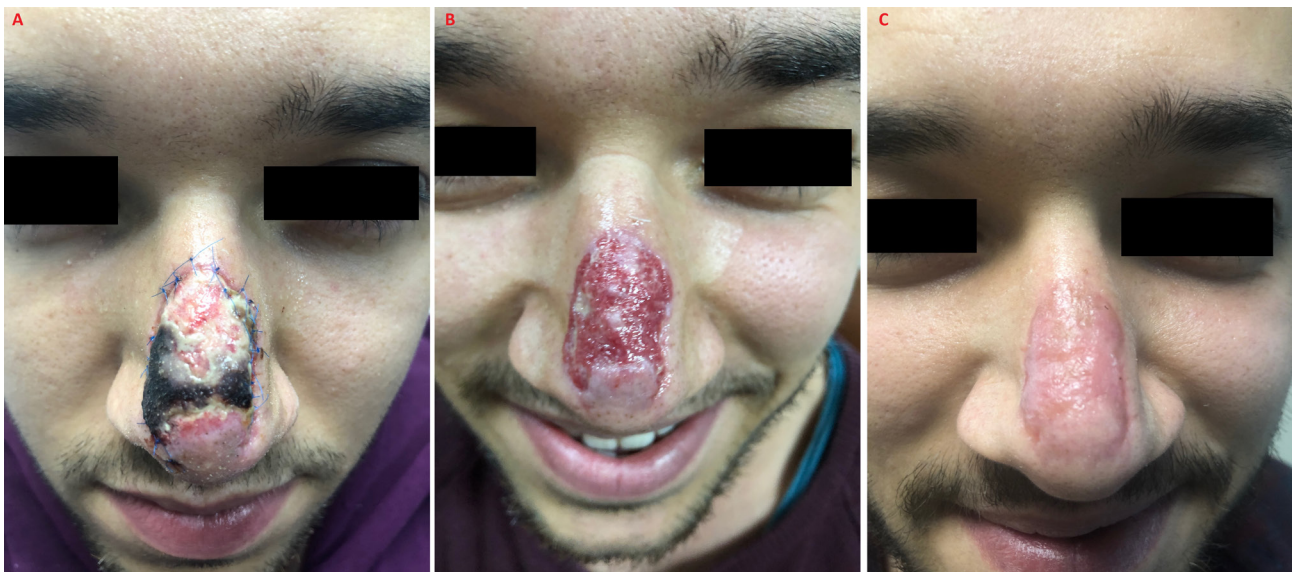
At the first follow-up visit the following day, the patient had a haematoma and necrosis of the dorsal skin (Figure 1c). The hematoma was drained under cover of local anaesthesia (1 ml of 2% lignocaine + 0.0125 mg adrenaline diluted with 1 ml of isotonic solution). HBOT was immediately initiated with the intent of correcting immediate signs of ischaemia and ischaemic reperfusion injury, preventing progression of necrosis and facilitating healing and angiogenesis. Treatment was undertaken in a HYTECH multiplace hyperbaric oxygen chamber (HYTECH, Phoenix, USA). The treatment sessions were planned so that the patient was breathing pure oxygen (100% O₂) for two hours at 253.3 kPa (2.5 atmospheres absolute) pressure. HBOT was administered twice daily for the first four days, and once daily thereafter for a total of 20 sessions. As a result of significant improvement observed (with the contraction of the necrosis and the onset

Figure 1

A. Sharp trauma to the nasal skin at the first admission; B. After the primary closure (day 1); C. Haematoma and skin necrosis at the first visit (day 2)

**Figure 2**

A. Appearance at the 15th HBOT session; B. Appearance at the 30th HBOT session; C. Full recovery, one month after the last HBOT session



of vigorous granulation), the treatment was extended for 10 sessions, and was completed in 30 sessions. Air-breaks were not used during the treatment. The patient had daily wound dressing in that period using povidone iodine as an antiseptic. The skin sutures were removed at one week and no further debridement was needed. Necrotic skin detected in the first visit sloughed off and epithelisation started following granulation (Figures 2a and b). One month after the 30 HBOT sessions, the patient had full recovery. (Figure 2c).

Discussion

This report presents a difficult case of sharp nasal trauma with depleted blood supply of the skin which was treated with adjunctive HBOT. This, together with haematoma drainage, electrocautery, sutures and daily wound dressing prevented further surgical intervention.

Two recent reviews suggest that adjunctive use of HBOT in some surgical patients is associated with improved

outcomes.^{3,4} Another study highlighted the use of HBOT as an additional treatment in acute wounds.⁵ Although it is already known that HBOT is beneficial in chronic non-healing wounds, it is emphasised here that HBOT may also be beneficial in compromised acute wounds.

The role of reactive oxygen species, microvascular vasoconstriction and endothelial cell-neutrophil adhesion in ischaemia-reperfusion injuries is well known, and early application of HBOT is crucial in acute ischaemic wounds.⁶ In the present case, when acute ischaemic damage was observed, HBOT was started urgently, and was associated with early signs of healing.

Studies have shown that hyperbaric oxygen therapy improves tissue hypoxia, increases perfusion, decreases oedema, decreases inflammatory cytokines, increases fibroblasts, increases collagen production and increases angiogenesis.⁵ Therefore, we advise that HBOT be considered as an additional treatment in cases where tissue blood supply is considered to be insufficient. As seen in the present case, some tissues are more prone to ischaemic hypoxia due to poor blood supply.

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