

CASE REPORTS
КЛИНИЧНИ СЛУЧАИ**HYPERBARIC OXYGENATION IN SEPTAL DERMOPLASTY**

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MHAT Varna MMA

ХИПЕРБАРНА ОКСИГЕНАЦИЯ ПРИ СЕПТОДЕРМОПЛАСТИКА

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Abstract:	In this article we present a clinical case in which we covered the enlarged septal defect left after the removal of a nasal papilloma by septal dermoplasty. The patient was then subjected to hyperbaric oxygenation (HBO), which increased the chances of survival of the free graft. The applied method becomes more accessible, in view of the increasing number of hyperbaric complexes in the Republic of Bulgaria, and can be included in the subsequent management of various surgical interventions.
Key words:	septal dermoplasty, hyperbaric oxygenation
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Резюме:	В настоящата статия описваме клиничен случай, при който чрез септодермопластика покриваме обширен дефект на септума, останал след отстраняването на назален папилом. Следоперативно пациентът бе подложен на хипербарна оксигенация (ХБО), с което увеличихме шансовете за преживяемост на свободния трансплантат. Приложеният метод става достъпен с оглед нарастващия брой на хипербарните комплекси в Р. България и може да се включи в следоперативния мениджмънт на различни хирургични интервенции.
Ключови думи:	септодермопластика, хипербарна оксигенация
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INTRODUCTION

Septal dermoplasty is a surgical technique which involves the removal of damaged mucosa and its replacement with a split-thickness skin graft (STSG). This technique was first described in 1960 by Saunders [1] for the treatment of severe epistaxis in hereditary hemorrhagic telangiectasia (HHT, Rendu-Osler disease).

Evidence for attempts to use hyperbaric oxygenation (HBO) dates back to 1662, when the English physician Henshaw [2] attempted to treat

patients by placing them in air environment with various pressures different from the atmospheric pressure. This method reached its peak of development during the second half of the twentieth century and is currently used successfully for the treatment of various diseases [3].

CLINICAL CASE

A 65-year old male patient was hospitalized in the Department of Otorhinolaryngology, Varna Military Medical Academy Hospital, with complaints of

impaired left-sided nasal breathing (Fig. 1a, Fig. 1b). On examination, we identified a cauliflower-like mass, occupying the left nasal cavity and deformation of the septal cartilage on the right side.

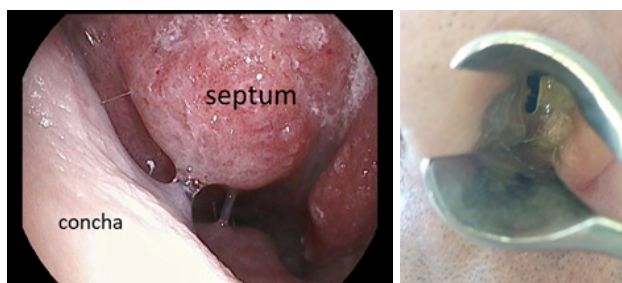


Fig. 1a, 1b. Right nasal cavity



Fig. 2. Left nasal cavity

MATERIALS AND METHODS

A biopsy was performed and the results from histological examination revealed a “nasal papilloma” (Fig. 3, 4).

The deformity of the septal cartilage was most likely attributed to frequent sport-related trauma during the patient's youth.

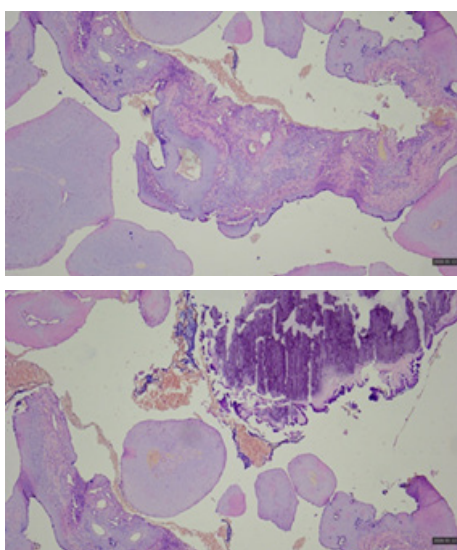


Fig. 3, 4. Histological image of the lesion, H&E X40

The lesion was radically excised. However, after its removal, an extensive defect remained. The defect was covered with a skin graft harvested from the patient's brachial region.



Fig. 5. Macroscopic image of the lesion

Postoperatively, the patient underwent three sessions of hyperbaric oxygenation according to the following protocol: $P=0.12$ MPa, 100% O_2 , $T=40'$ (Fig. 6, 7). Despite the nasal packing, he tolerated the pressure changes well.

For hydration of the graft, Terazal ® spray was applied locally.



Fig. 6, 7. Hyperbaric chamber at MBAT VARNA MMA

What were the challenges in our case?

- To achieve radical removal of the papilloma while preserving the perichondrium to ensure adequate nourishment of the graft;
- To harvest a graft with optimal thickness without the use of dermatome;
- To perform proper compression/decompression in the hyperbaric chamber while the patient

had nasal packing in place. (The nasal packing may obstruct the Eustachian tubes and potentially cause middle-ear barotrauma)

RESULTS

Four weeks after the intervention, endoscopic examination was performed. The graft showed good vascularization and viability, although mild edema was still present (Fig. 8, 9).

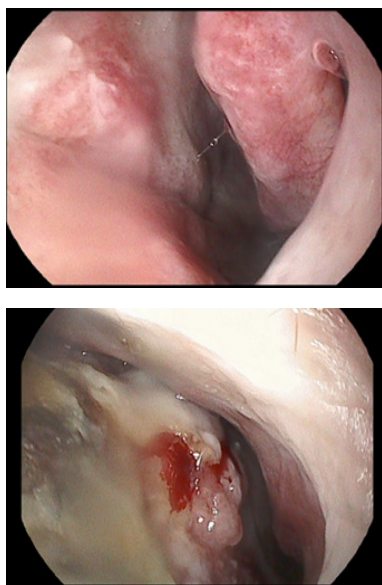


Fig. 8, 9. Endoscopic image of the nasal cavity 4 weeks post-excision

Six months later, a follow-up examination was performed to assess the late postoperative results. The free graft was viable and demarcation line between the graft and the nasal mucosa was visible (Fig. 10).

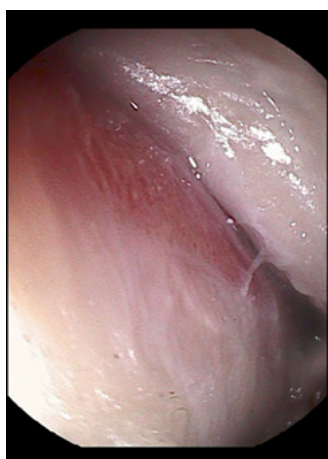


Fig. 10. Endoscopic image 6 months post septal dermoplasty

DISCUSSION

Official statement of the Undersea and Hyperbaric Medical Society: "Hyperbaric oxygen therapy (HBO) is neither necessary nor recommended for the support of normal, uncompromised grafts or flaps. However, in tissue compromised by radiation, or in cases of reduced perfusion or hypoxia, HBO was proven extremely useful for flap salvage. Hyperbaric oxygen may help increase the viability of compromised tissue, thereby reducing the need for repeat grafting or additional flap procedure" [4].

This statement is based on the fact that during trials involving uncomplicated grafts the control group without HBO demonstrated good survival outcomes, with no significant improvement attributable to HBO. In cases of flap compromise, however, the application of hyperbaric oxygen substantially improves the chances of graft survival.

In recent decades, HBO has been repeatedly applied in the postoperative period, both in uncompromised grafts and in the treatment of diabetic foot ulcers, as well as gangrene of vascular origin, with very promising results.

Many authors believe that the application of HBO, particularly when a reasonable dose is exceeded, may lead to the formation of free radicals that may be harmful to the body. In 2006 and 2011, Thom [5] proposed the concept that reactive oxygen species (ROS) and components of lipid peroxidation chains formed during HBO act as signaling molecules that initiate reparative processes and neovascularization.

CONCLUSION

Hyperbaric oxygen therapy may be considered an element of perioperative management in various surgical procedures. When applied preoperatively, it reduces edema of parenchymal tissues and grafts. Postoperatively, it increases pO₂ and stimulates neovascularization.

Hyperbaric chambers are steadily increasing in number and offer accessible new treatment opportunities for patients.

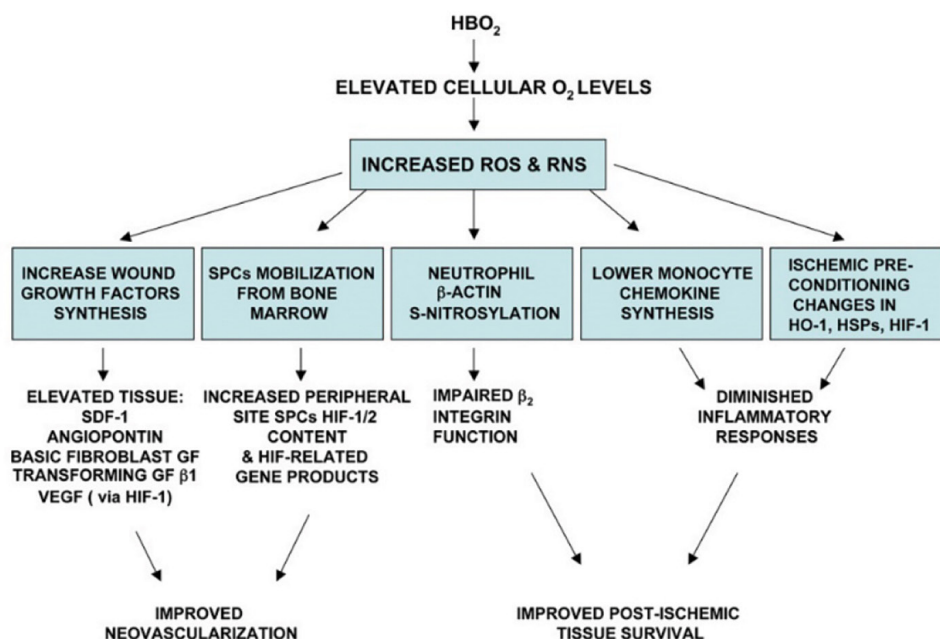


Fig. 11. Mechanism of enhanced neovascularization according to S. Thom [5]. Other abbreviations: GF=growth factor, VEGF=vascular endothelial growth factor, HIF= hypoxia inducible factor, SPCs=stem/progenitor cells, HO-1=heme oxygenase-1, HSPs=heat shock proteins

Conflict of interest: The authors declare no conflict of interest.

The research is conducted in compliance with the ethical considerations and all principles for medical research involving human subjects according to the WMA Declaration of Helsinki. Our patients sign a package of informed consents regulating various aspects of their stay in the hospital – funding, diagnostic and clinical methodologies, student training, and processing of the results obtained.

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Received May 4th 2026.