

Abstracts

The effect of hyperbaric oxygenation on the viability of human fat injected into nude mice.

Shoshani O; Shupak A; Ullmann Y; Ramon Y; Gilhar A; Kehat I; Peled IJ. *Plastic and reconstructive surgery* 2000 Nov; 106 (6), pp. 1390-6; discussion 1397-8.

Abstract:

Autologous free-fat injection for the correction of soft-tissue defects has become a common procedure in *plastic surgery*. The main shortcoming of this method for achieving permanent soft-tissue augmentation is the partial absorption of the injected fat, an occurrence that leads to the need for both overcorrection and repeated fat reinjection. Improving the oxygenation of the injected fat has been suggested as a means of helping to overcome the initial critical phase that occurs postinjection (when the fat cells are nourished by osmosis), increasing phagocyte activity, accelerating fibroblast activity and collagen formation, and enhancing angiogenesis. In addition, the *hyperbaric oxygen*-mediated decrement in endothelial leukocyte adhesion will decrease cytokine release, thereby reducing edema and inflammatory responses. The purpose of the present study was to examine the effect of *hyperbaric* oxygenation on improving the viability of injected fat. Adipose tissue obtained from human breasts by suction-assisted lipectomy was injected into the subcuticular nuchal region in nude mice. The mice were then exposed to daily *hyperbaric oxygen* treatments, breathing 100% *oxygen* at 2 atmospheres absolute (ATA) for 90 minutes. The duration of the administered *hyperbaric oxygen* therapy was 5, 10, or 15 days, according to the study group. Mice exposed to normobaric air alone served as the control group, and each group included 10 animals. The rats were killed 15 weeks after fat injection. The grafts were dissected out, weight and volume were measured, and histologic evaluation was performed. In all of the study groups, at least part of the injected fat survived, giving the desired clinical outcome. No significant differences could be found between the groups regarding fat weight and volume. Histopathologic examination of the dissected grafts demonstrated a significantly better integrity of the fat tissue in the group that received *hyperbaric oxygen* for 5 days ($p = 0.047$). This finding was manifested by the presence of well-organized, intact fat cells, along with a normal appearance of the fibrous septa and blood vessels. The worst results were found in animals treated by *hyperbaric* oxygenation for 15 consecutive days. An inverse correlation was found between an increased dose of the high-pressure *oxygen* and fat tissue integrity ($r = -0.87$, $p = 0.076$). The toxic effects of highly reactive *oxygen* species on fat cells might explain the failure of an excessively high dose of *hyperbaric oxygen* to provide any beneficial outcome. The clinical relevance of these results should be further investigated.

[The value of hyperbaric oxygen therapy (HBO) in treatment of problem wounds in the area of plastic-reconstructive head and neck surgery.]

Der Stellenwert der hyperbaren Sauerstofftherapie (HBO) in der Behandlung von Problemwunden im Bereich der plastisch-rekonstruktiven Kopf-Hals-Chirurgie. Grundmann T; Jaehne M; Fritze G. *Laryngo- rhino- otologie* [Laryngorhinootologie] 2000 May; 79 (5), pp. 304-10.

Abstract:

BACKGROUND: *Hyperbaric* oxygenation therapy is presently predominantly discussed in connection with sudden deafness and tinnitus. Amongst this ongoing controversy, the primary indications of this in the middle of the 20th century established therapy, especially in regard to problem wounds in the *plastic-reconstructive surgery* go mainly underrated. The present paper reviews the attention towards this area in *plastic surgery*. **PATIENTS AND METHODS:** Three typical cases (traumatic nasal tip reconstruction, wound ulceration after radiotherapy and lobe necrosis together with fistula following laryngopharyngectomy) are presented. **RESULTS:** Because of protracted and complicated wound healing HBO was applied in all three cases, eventually leading to very satisfying subsequent wound-healing. In connection with these cases, the underlying problems and the effects of HBO are discussed. **SUMMARIZING:** The authors conclude, that HBO primary clinical application in treatment of problematic wound healing in head and neck appears to be very effective and helpful and should not be underrated whilst discussing this therapy in different contexts.

Plastic surgery.

Zook EG. *JAMA : the journal of the American Medical Association* [JAMA] 1994 Jun 1; 271 (21), pp. 1703-4.

Abstract:

Animal studies and early clinical trials have shown that growth factors can be powerful agents in manipulating wound repair. *Hyperbaric oxygen* therapy does not contribute to reperfusion injury and appears to protect the microcirculation.

Hyperbaric oxygen therapy in plastic surgery: a review article.

Kindwall EP; Gottlieb LJ; Larson DL. *Plastic and reconstructive surgery*, 1991 Nov; 88 (5), pp. 898-908.

Abstract:

The most important effects of *hyperbaric oxygen* (HBO), for the surgeon, are the stimulation of leukocyte microbial killing, the enhancement of fibroblast replication, and increased collagen formation and

neovascularization of ischemic tissue. Preoperative **hyperbaric oxygen** induces neovascularization in tissue with radionecrosis. Refractory osteomyelitis and necrotizing fasciitis appear to respond to adjunctive **hyperbaric oxygen**. Crush injury and compartment syndrome appear to benefit through preservation of ATP in cell membranes, which limits edema. **Hyperbaric oxygen** in burn injury permits shorter hospital stays, a reduced number of surgeries, and less fluid replacement. Skin grafts and flaps are reported to take more completely and more rapidly. The same mechanisms may apply in ischemic problem wounds such as infected diabetic extremities. Contraindications and side effects are described. **Hyperbaric oxygen** will not heal normal wounds more rapidly but may, under certain circumstances, induce problem wounds to heal more like normal ones.

[Hyperbaric oxygenation: physical and physiological premises, clinical uses, review of the literature]

L'ossigenoterapia iperbarica (OTI): premesse fisiche e fisiologiche, applicazioni cliniche, revisione della letteratura.

Gasparini G; Fasano D. Acta bio-medica de L'Ateneo parmense : organo della Societa di medicina e scienze naturali di Parma [Acta Biomed Ateneo Parmense] 1989; 60 (5-6), pp. 249-55.

Abstract:

The physic and physiologic principles regarding the mechanism of **hyperbaric oxygen** are referred. On the basis of the literature, the possible clinical applications of **hyperbaric oxygen** therapy in **plastic surgery** are reported. The Authors underline the usefulness of this method in traumatic lesions of the legs, in gaseous gangrene, in ulcers of different etiology, in X-rays lesions, in burns and in improving the viability of cutaneous flaps.

Case report: multidisciplinary treatment of a patient with gas-producing phlegmone.

Vasic G; Plazineic M; Zivanovic V; Ignjatovic D. Acta chirurgica iugoslavica [Acta Chir Iugosl] 2002; 49 (1), pp. 85-8.

Abstract:

The authors present a 51-year-old patient with a severe case of gas-producing phlegmone following incision of a perianal abscess. Early diagnosis and extensive surgical excision during the first 12 hours from the onset of symptoms are crucial. Treatment of sepsis complicated by multiple organ failure: lung insufficiency (respiratory distress requiring mechanical ventilation), kidney insufficiency (requiring rehydration, furosemid, manitol), circulation (blood derivatives, saline, colloid solutions, cardio tonics, anti-arrhythmic drugs) and liver must be aggressive. **Hyperbaric oxygen** therapy is essential with repeated identification of aerobic and anaerobic bacteria (hemoculture, tissue sample, wound swab), their sensitivity to antibiotics and repeated surgical debridement of the wound. Following this treatment the patient was transferred to **plastic surgery** where Thiersh transplants covered skin defects. He survived with an abdominal wall hernia due to a team effort and aggressive multidisciplinary treatment by the general surgeon, anesthesiologist, **hyperbaric** medicine specialist, microbiologist and **plastic** surgeon. He refused hernia repair.

Vibrio cholerae non-O1 facia cellulitis in a North Queensland, Australian child.

Norton R; Vucak M; Stalewski H. Pediatric infectious disease journal [Pediatr Infect Dis J] 2001 May; 20 (5), pp. 550-1

Abstract:

Vibrio cholerae is an uncommon cause of cellulitis in Australia. Most reported cases worldwide have involved marine or brackish water contact. A recognized risk factor for acquiring this infection is chronic liver disease secondary to hepatitis B. We describe a case of extensive **facial** cellulitis caused by Vibrio cholerae non-O1, non-O139, in an 11-year-old indigenous girl from North Queensland, Australia, who was hepatitis B surface antigen-negative. Treatment consisted of extensive debridement, antibiotics, **hyperbaric oxygen** and **facial reconstructive surgery**. Early microbiologic diagnosis and a combined therapeutic approach are important in the management of this condition.

Salvage of limb and function in necrotizing fasciitis of the hand: role of hyperbaric oxygen treatment and free muscle flap coverage.

Yuen JC; Feng Z. Southern medical journal [South Med J] 2002 Feb; 95 (2), pp. 255-7.

Abstract:

We report a case of necrotizing fasciitis of the hand treated by urgent debridement followed by serial debridements, **hyperbaric oxygen**, and delayed free muscle flap coverage. After control of the infection, a major soft-tissue defect remained on the dorsum of the wrist and hand, exposing all extensor tendons. A rectus muscle free flap was used for wound coverage and salvage of the exposed tendons; the muscle flap was covered with a delayed skin graft. The patient regained satisfactory function with ability to extend all digits. This case emphasizes the importance of aggressive debridement and **hyperbaric oxygen** treatment and shows the valuable role of free muscle flap wound coverage for preservation of function in cases of necrotizing fasciitis of the hand.