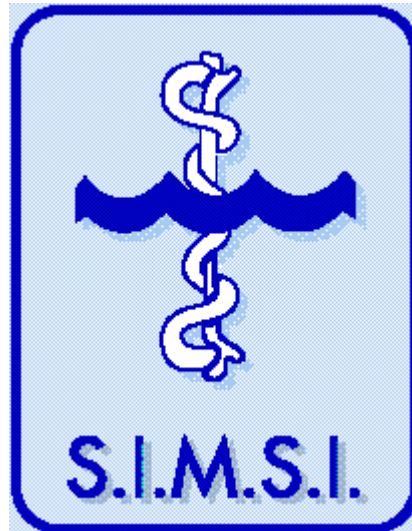


**SOCIETA' ITALIANA
DI
MEDICINA SUBACQUEA E IPERBARICA**



**RICERCA IN MEDLINE DEI LAVORI DI
OSSIGENO TERAPIA IPERBARICA
INDICIZZATI CON PAROLA CHIAVE DI IMPORTANZA RILEVANTE**

**2007
SECONDO SEMESTRE**

a cura del
Dott. Francesco Ruocco
Servizio di Medicina Iperbarica e Subacquea
Anestesia e Rianimazione del Dipartimento di Emergenza
della Azienda Ospedaliera Universitaria di Careggi

Search "**Hyperbaric Oxygenation**"[MAJR] Limits: **Publication Date from 2007/07 to 2007/12**

Search "Hyperbaric Oxygenation"[MAJR] Limits: Publication Date from 2007/07 to 2007/12

1: J Crit Care. 2008 Sep;23(3):295-300. Epub 2007 Dec 11.

Analysis of risk factors associated with complications of hyperbaric oxygen therapy.

Ambiru S, Furuyama N, Aono M, Otsuka H, Suzuki T, Miyazaki M.

Surgical Center and Division of Hyperbaric Medicine, Chiba University Hospital, Chiba 260-8677, Japan.

PURPOSE: The aim of this study was to verify independent risk factors of pressure equalization problems associated with hyperbaric oxygen (HBO(2)) therapy. **METHODS:** We reviewed a single-institutional study of 1609 patients with 17604 treatments who had HBO(2) therapy in a multiplace chamber, in which the factors examined and their relationship to complications were assessed, using multivariate analyses, to determine the significantly independent risk factors of complications related to HBO(2) therapy. **RESULTS:** The compression rate was 0.067 atmospheres absolute/min (6.8 kPa/min). Pressure equalization problems of the middle ear, expressed as pain or discomfort, such as cranial sinus pain, and teeth pain were observed in 156 patients (9.7%). Sixty-six of them could not continue HBO(2) therapy because of these problems. Peripheral circulatory disorders with refractory ulcers or nonhealing wounds and the interval between clinical symptoms and the first day of HBO(2) therapy were independent risk factors of pressure equalization problems. Independent risk factors of cessation due to pressure equalization problems were identified as age more than 61 years, female sex, and interval between symptoms and the first day of HBO(2) therapy. **CONCLUSION:** It is suggested that chamber compression must be performed with particular care when patients have peripheral circulatory disorders and have short interval between clinical symptoms and the first day of HBO(2) therapy.

PMID: 18725032 [PubMed - indexed for MEDLINE]

2: J Cardiothorac Vasc Anesth. 2008 Aug;22(4):576-80. Epub 2007 Dec 3.

Hyperbaric oxygenation in the management of cerebral arterial gas embolism during cavopulmonary connection surgery.

Newcomb A, Frawley G, Fock A, Bennett M, d'Udekem Y.

Division of Cardiovascular Surgery, Toronto General Hospital, Toronto, Ontario, Canada.

Publication Types: Case Reports

PMID: 18662635 [PubMed - indexed for MEDLINE]

3: Srp Arh Celok Lek. 2007 Nov-Dec;135 11-12:669-71.

[Hyperbaric oxygen therapy of angiopathic changes in patients with inherited gene imbalance]

[Article in Serbian]

Brkić P, Mitrović A, Rakić M, Grajić M, Jovanović T.

INTRODUCTION: Phenotype match inherited by genes is in most cases present in monozygotic twins. Their phenotypic resemblance is unfortunately characterized by strong susceptibility for the development of chronic non-infectious diseases. One of the most common non-infectious chronic diseases that are phenotypically represented in twins is diabetes mellitus. Genetic imbalance is, in most cases, placed in 2, 3, 7, 8, 11, 12, 19 and 20 chromosomal pair of the human genome. **CASE OUTLINE:** This study describes a pair of monozygotic twins, aged 54, who were diagnosed for diabetes type 2 ten years earlier. The first patient had trophic changes of muscles and skin tissues of the lower limb, and a necrotic wound on his right leg tibial region with the claudication distance of 50 m. After arteriography, he was referred by a vascular surgeon for hyperbaric oxygen therapy (HBO). HBO protocol implied 70 min. application of 100% oxygen at 2.5 absolute atmospheres. After the first series of HBO therapies consisting of 20 HBO treatments, claudication was eliminated and the necrotic wound healed. Next, surgical aortofemoral bypass was done. During the second HBO treatment, his monozygotic twin brother presented with angiopathic changes due to diabetes. In both patients, biochemical parameters corresponded to the expected level for diabetes type 2 imbalance, and the localization of the chromosomal defect (placed on 3, 11 and 19 chromosomal pair) was also in accordance with the respective disorder. After they were included into next 10 HBO treatments, Doppler imaging of the major arteries of limbs revealed normal findings. **CONCLUSION:** Identical genetic impairment in monozygotic twins can lead to identical somatic changes with resultant consequences. HBO treatment of such patients associated with other therapeutic procedures (conducted by diabetologist, vascular surgeon and physiatrist) can postpone or prevent irreversible changes occurring due to blood vessel disorders.

Publication Types: Case Reports English Abstract

PMID: 18368909 [PubMed - indexed for MEDLINE]

4: Brain Res Bull. 2008 Mar 28;75(5):668-73. Epub 2007 Dec 3.

The effect of hyperbaric oxygen on regional brain and spinal cord levels of nitric oxide metabolites in rat.

Ohgami Y, Chung E, Shirachi DY, Quock RM.

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Hyperbaric oxygen (HBO(2)) therapy is reported to be beneficial in transient brain ischemia. The present study was conducted to determine the influence of HBO(2) on metabolites of nitric oxide (NO) in brain and spinal cord of rats. Rats were exposed to room air (RA), normobaric air (NBA), normobaric oxygen (NBO(2)), hyperbaric air (HBA) or HBO(2), the last two conditions at 2.5ATA (atmosphere absolute) for 60 min. The results demonstrate that, compared to the NBA control, oxygen alone generally reduced tissue levels of NO(x)(-) (nitrite plus nitrate). On the other hand, 2.5ATA alone tended to have a slight, if any, effect on tissue levels of NO(x)(-). The combination of oxygen and pressure (i.e., HBO(2)) generally led to an increase in tissue levels of NO(x)(-). Based on these findings, it is concluded that HBO(2) appears to markedly increase NO function most notably in the corpus striatum, brainstem, cerebellum and spinal cord.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 18355644 [PubMed - indexed for MEDLINE]

5: Rev Infirm. 2007 Dec;(136):29-31.

[Care after accidental exposure to a hyperbaric chamber]

[Article in French]

Jean J.

Ifsi Croix-Rouge de Brest.

PMID: 18257494 [PubMed - indexed for MEDLINE]

6: Undersea Hyperb Med. 2007 Nov-Dec;34(6):389-92.

De novo cataract development following a standard course of hyperbaric oxygen therapy.

Gesell LB, Trott A.

Division of Hyperbaric Medicine, Department of Emergency Medicine, University of Cincinnati College of Medicine, USA.

A 49 y/o female underwent 48 hyperbaric oxygen (HBO2) treatments at 2.5 ATA (atmospheres absolute) (253 kPa) for 90 minutes for chronic refractory osteomyelitis of the sacrum and recurrent failure of a sacral myocutaneous flap. Prior to HBO2 therapy, formal ophthalmic exams revealed myopia but no evidence of cataract formation. Eight weeks following the completion of HBO2 therapy, on repeat ophthalmic exam, the patient was discovered to have worsening myopia. Changes of the crystalline lens, consistent with nuclear cataract development, were identified in each eye. Other common causes of cataract formation including diabetes, corticosteroid use, and excessive exposure to ultraviolet light, were excluded. While transient visual changes are known to occur during HBO2 therapy, cataract formation has only rarely been reported and only after prolonged courses of treatment (150 or more treatments). This case identifies the need to further investigate the ocular effects of HBO2 therapy,

especially with regard to cataract development and progression.

Publication Types: Case Reports

PMID: 18251434 [PubMed - indexed for MEDLINE]

7: Hepatogastroenterology. 2007 Oct-Nov;54(79):1925-9.

Hyperbaric oxygen therapy for the treatment of postoperative paralytic ileus and adhesive intestinal obstruction associated with abdominal surgery: experience with 626 patients.

Ambiru S, Furuyama N, Aono M, Kimura F, Shimizu H, Yoshidome H, Miyazaki M, Shimada H, Ochiai T. Surgical Center, Chiba University Hospital, Chuo-ku, Chiba 260-8677, Japan. ambiru-s@umin.ac.jp

BACKGROUND/AIMS: The results of hyperbaric oxygen (HBO) therapy for treatment of postoperative paralytic ileus and adhesive intestinal obstruction associated with abdominal surgery are unknown. METHODOLOGY: A retrospective review of postoperative paralytic ileus and adhesive intestinal obstruction associated with abdominal surgery in 626 patients required 758 admissions who underwent HBO therapy was undertaken to examine the efficacy of HBO therapy. RESULTS: The overall resolution rates for patients receiving HBO therapy in cases of postoperative paralytic ileus and adhesive intestinal obstruction were 92% and 85%, respectively. Among patients who were more than 75 years old, the therapies resolved 35 (97%) of 36 cases of postoperative paralytic ileus and 42 (81%) of 52 cases of adhesive intestinal obstruction, which was comparable to the results for patients less than 75 years old. The mortality rate was 1.2% overall. Complications related to HBO therapy occurred in 3.8% of the admissions, and most of them were not serious. CONCLUSIONS: These results suggest that HBO therapy might deserve further assessment for use in management of postoperative paralytic ileus and adhesive intestinal obstruction as a new modality. HBO therapy is safe and non-invasive, and may be useful in the elderly patients, since mortality was relatively low in this series.

PMID: 18251130 [PubMed - indexed for MEDLINE]

8: Brain Res. 2008 Feb 27;1196:151-6. Epub 2007 Dec 28.

Mechanism of hyperbaric oxygen preconditioning in neonatal hypoxia-ischemia rat model.

Li Z, Liu W, Kang Z, Lv S, Han C, Yun L, Sun X, Zhang JH.

Department of Pathology, Weifang Medical College, Shandong, 261042, PR China.

Hypoxic ischemic (HI) injury in neonates damages brain tissues. We examined the mechanism of hyperbaric oxygen preconditioning (HBO-PC) in neonatal HI rat model. Seven-day-old rat pups were subjected to left common carotid artery ligation and hypoxia (8% oxygen at 37 degrees C) for 90 min. HBO (100% O(2), 2.5 atmospheres absolute for 2.5 h) were administered by placing pups in a chamber 24 h before HI insult. Brain injury was assessed by

the survival rate, 2,3,5-triphenyltetrazolium chloride (TTC), Nissl, TUNEL staining and caspase-3, caspase-9 activities after HI. In HBO preconditioned animals, survival rate was increased, infarct ratio was decreased, and the positive stained TUNEL cells were reduced, accompanied by the suppression of caspase-3 and -9 activities. These results indicate that a single HBO-PC appears to provide brain protection against HI insult via inhibition of neuronal apoptosis pathways.
PMID: 18221732 [PubMed - indexed for MEDLINE]

9: *Ostomy Wound Manage.* 2007 Dec;53(12):8; author reply 8.

Comment on: *Ostomy Wound Manage.* 2007 Sep;53(9):10-2.

Radiation enteritis: another consideration.

Peterson AB.

Publication Types: Comment Letter

PMID: 18196647 [PubMed - indexed for MEDLINE]

10: *J Drugs Dermatol.* 2007 Dec;6(12):1214-9.

Pyoderma gangrenosum: dermatologic application of hyperbaric oxygen therapy.

Tutrone WD, Green K, Weinberg JM, Caglar S, Clarke D.

St. Luke's-Roosevelt Hospital Center, New York, NY 10025, USA.

Pyoderma gangrenosum (PG) is a rare neutrophilic dermatosis of skin and subcutaneous tissue. The current accepted theory is that PG is an immunologic-based phenomenon. Several therapies have been used to control this disease, including corticosteroids, antibiotics, immunotherapy, dapsone, and hyperbaric oxygen therapy. This article will review the application of hyperbaric oxygen (HBO) therapy in patients with PG. Information for this manuscript was derived from multiple searches of MEDLINE and the National Baromedical Service literature collection. HBO therapy has been shown to effectively treat PG ulcers and reduce pain associated with PG in several case studies. Evidence from the studies cited herein help to establish a foundation for further research to investigate the role of HBO therapy as an adjuvant therapy in the treatment of PG.

Publication Types: Review

PMID: 18189061 [PubMed - indexed for MEDLINE]

11: *Transplantation.* 2007 Dec 27;84(12):1656-61.

Beneficial effects of hyperbaric oxygen pretreatment on massive hepatectomy model in rats.

Mori H, Shinohara H, Arakawa Y, Kanemura H, Ikemoto T, Imura S, Morine Y, Ikegami T, Yoshizumi T, Shimada M.

Department of Surgery, Institute of Health Biosciences, The University of Tokushima, Tokushima, Japan.

BACKGROUND: The purpose of this study was to investigate the impact of hyperbaric oxygen (HBO) pretreatment in massive hepatectomy model, a surrogate model of small-for-size graft, using rats.

METHODS: (Experiment I) Rats were divided into the following four groups: HBO (-), HBO-1D (day), HBO-3D, and HBO-5D. Samples were taken after the completion of HBO pretreatment, and the following parameters were evaluated: reverse transcription polymerase chain reaction and immunohistochemical staining for HSP 70 and HO-1; biochemical parameters; and liver weight to body weight ratio (Lw/Bw ratio). (Experiment II) Rats were divided into four groups as follows; 70% hepatectomy (Hx), 70% Hx-HBO, 90% Hx, and 90% Hx-HBO group. Samples were taken 12, 24, 48, and 72 hr after hepatectomy and the following parameters were investigated: biochemical analysis; Lw/Bw ratio; PCNA labeling index; and survival. **RESULTS:** (Experiment I) The expression of HSP70 mRNA was significantly increased in the HBO-3D group compared with the HBO (-) group ($P < 0.05$). HSP70- and HO-1-positive hepatocytes were significantly increased in the HBO-3D group compared with the HBO (-) group ($P < 0.05$). (Experiment II) Transaminases were significantly decreased in both 70% and 90% Hx-HBO groups compared with Hx alone group ($P < 0.05$). The Lw/Bw ratio and PCNA labeling index of the 90% Hx-HBO group were significantly increased compared with the 90% Hx group, 24, 48 and 72 hr after hepatectomy ($P < 0.05$). The survival rate in the 90% Hx-HBO group was significantly higher than that in the 90% Hx group ($P = 0.01$). **CONCLUSIONS:** HBO pretreatment had beneficial effects in a massive hepatectomy model in rats via the induction of HSP70 and HO-1.

PMID: 18165778 [PubMed - indexed for MEDLINE]

12: *J Trauma.* 2007 Oct;63(4):961.

Air in "extra-dural space" after hyperbaric oxygen therapy.

Michel L, Khanh NM, Cedric B, Eric K, Alain B, Alain F.

Department of Orthopaedic and Traumatology, Teaching Military Hospital, Toulon Naval, France. mlevadoux@aol.com

Publication Types: Case Reports

PMID: 18090031 [PubMed - indexed for MEDLINE]

13: *New Microbiol.* 2007 Oct;30(4):431-7.

Microbiological evaluation of the effects of hyperbaric oxygen on periodontal disease.

Signoretto C, Bianchi F, Burlacchini G, Canepari P. Dipartimento di Patologia, Sezione di Microbiologia, Università di Verona, Italy.

The term periodontitis indicates a variety of clinical manifestations of infectious disorders in which the supporting tissues of the teeth are attacked. The initiation and progression of periodontal disease are attributed to the presence of elevated levels of pathogenic bacteria within the gingival crevice. Approaches to periodontal treatment range from surgical to regenerative therapy and anti-infective chemotherapy. Anti-infective drug therapy should be rationally based on the composition of the pathogenic microbiota. It is also important to recognize that the

periodontopathic plaque constitutes a bacterial biofilm infection that may render the resident microorganisms more resistant than the same organisms grown planktonically. Hyperbaric oxygen (HBO) has been successfully used in several medical applications. The therapeutic effect is related to elevated partial oxygen pressure in the tissues. The aim of this study was to evaluate the effects of HBO on a selected number of patients suffering from adult chronic periodontitis in comparison with surgical intervention (scaling and root planning, SRP), as well as the effects of a combination of both therapies on the evolution over time of the microflora of the periodontal pockets. Bacteria were detected either by culture or by a molecular method (PCR). Microbiological data indicate that the combination of HBO and SRP substantially reduced (by up to 99.9%) the gram-negative anaerobe loads of the subgingival microflora. The low values of pathogens persisted for at least two months after the therapy. HBO or SRP alone produced a temporarily more limited effect on periodontal anaerobes. Additional experimental confirmation of these results was provided by molecular detection of the main periodontopathogenic bacteria with a significant reduction in the number of dental sites which harboured them. It is also shown that HBO both alone and in combination with SRP reduced the Gingival Index value to zero and gingival health persisted for 3 months at least. Thus, in parallel with the loss of periodontopathogenic bacteria, a substantial improvement in oral health was observed. In conclusion, this study has shown that HBO may represent a useful aid, especially in combination with SRP, as far as non-surgical periodontal therapy is concerned.

Publication Types: Research Support, Non-U.S. Gov't
PMID: 18080679 [PubMed - indexed for MEDLINE]

14: J Strength Cond Res. 2007 Nov;21(4):1037-41.
Does hyperbaric oxygen exposure affect high-intensity, short-duration exercise performance?
Rozenek R, Fobel BF, Banks JC, Russo AC, Lacourse MG, Strauss MB.
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Hyperbaric oxygen (HBO) exposure involves the breathing of 100% oxygen under conditions of elevated atmospheric pressure and is used to increase the oxygen content of the plasma fraction of arterial blood. The purpose of this study was to determine the effects of acute HBO exposure on selected physiological responses and performance in response to maximal lower extremity or upper extremity short-term, high-intensity exercise. The study was performed with 2 separate experiments incorporating double-blinded and randomized protocols. In experiment 1, 9 subjects ran on a treadmill at a speed of 268 m x min⁻¹ with a predetermined grade. In experiment 2, 9 different subjects performed a repetitive bench press exercise. Both exercise

protocols were designed to induce fatigue within 1-2 minutes. Within each experiment, subjects received either a 1-hour HBO exposure inspiring 100% O₂ at 202.6 kPa (2.0 atmospheres absolute pressure [ATA]) or a 1-hour sham exposure inspiring ambient air at 121.5 kPa (1.2 ATA) before exercise. No significant differences ($p > \text{ or } = 0.05$) were observed in postexercise blood lactate concentrations, peak heart rate, ratings of perceived exertion, or performance as determined by treadmill running time or number of completed lifts. Unlike other methods that elevate oxygen content of the blood, acute HBO exposure appears to have no significant effect on subsequent high-intensity running or lifting performance.

Publication Types: Randomized Controlled Trial
Research Support, Non-U.S. Gov't
PMID: 18076256 [PubMed - indexed for MEDLINE]

15: World J Gastroenterol. 2007 Dec 14;13(46):6203-7.

Combination of allopurinol and hyperbaric oxygen therapy: a new treatment in experimental acute necrotizing pancreatitis?

Comert B, Isik AT, Aydin S, Bozoglu E, Unal B, Deveci S, Mas N, Cinar E, Mas MR.

Division of Intensive Care, Departments of Internal Medicine, Gulhane School of Medicine, GATA Geriatri BD, Etlik, Ankara 06018, Turkey.

AIM: To investigate the individual and combined effects of allopurinol and hyperbaric oxygen (HBO) therapy on biochemical and histopathological changes, oxidative stress, and bacterial translocation (BT) in the experimental rat acute pancreatitis (AP). METHODS: Eighty-five Sprague-Dawley rats were included in the study. Fifteen of the eighty-five rats were used as controls (sham, Group I). AP was induced via intraductal taurocholate infusion in the remaining seventy rats. Rats that survived to induction of acute necrotizing pancreatitis were randomized into four groups. Group II received saline, Group III allopurinol, Group IV allopurinol plus HBO and Group V HBO alone. Serum amylase levels, oxidative stress parameters, BT and histopathologic scores were determined. RESULTS: Serum amylase levels were lower in Groups III, IV and V compared to Group II (974 +/- 110, 384 +/- 40, 851 +/- 56, and 1664 +/- 234 U/L, respectively, $P < 0.05$, for all). Combining the two treatment options revealed significantly lower median [25-75 percentiles] histopathological scores when compared to individual administrations (13 [12.5-15] in allopurinol group, 9.5 [7-11.75] in HBO group, and 6 [4.5-7.5] in combined group, $P < 0.01$). Oxidative stress markers were significantly better in all treatment groups compared to the controls. Bacterial translocation into the pancreas and mesenteric lymph nodes was lower in Groups III, IV and V compared to Group II (54%, 23%, 50% vs 100% for translocation to pancreas, and 62%, 46%, 58% vs 100% for translocation to mesenteric lymph nodes, respectively, $P < 0.05$ for all). CONCLUSION: The present study confirms the benefit of HBO and

allopurinol treatment when administered separately in experimental rat AP. Combination of these treatment options appears to prevent progression of pancreatic injury parameters more effectively.

PMID: 18069760 [PubMed - indexed for MEDLINE]

16: Aviat Space Environ Med. 2007 Dec;78(12):1108-13.

Oxidative stress levels in rats following exposure to oxygen at 3 atm for 0-120 min.

Oter S, Topal T, Sadir S, Ozler M, Uysal B, Ay H, Yaren H, Korkmaz A, Akin A.

Department of Physiology, Gülhane Military Medical Academy, Ankara, Turkey. fizyoter@gmail.com

BACKGROUND: Hyperbaric oxygen (HBO) is known to cause oxidative stress in several organs and tissues. We previously defined the pressure-related oxidative effects of HBO in several tissues of rats. This study was performed to elucidate the relationship of HBO exposure time to its oxidative effects. **METHODS:** A total of 49 rats were randomly divided into 5 groups. Study groups were subjected to 3 atm HBO for 30, 60, 90, and 120 min except the control group. Their blood and lungs were removed immediately after exposure and used for analysis. Thiobarbituric acid reactive substances (TBARS), superoxide dismutase (SOD), and glutathione peroxidase (GSH-Px) levels were determined to reflect oxidant and antioxidant status. **RESULTS:** TBARS levels were found to increase in a time-dependent manner in both erythrocytes [median (min-max); from 0.65 (0.39-0.84) with 30 min HBO exposure up to 1.26 (1.00-1.44) nmol x g(-1) hemoglobin after 120 min] and lung tissue [from 2140 (1550-2510) up to 5465 (5090-5950) nmol x g(-1) protein]. Similarly, SOD activity also presented a dose-dependent course from 0.06 (0.05-0.10) to 0.18 (0.14-0.26) U x g(-1) hemoglobin in erythrocytes and from 16,660 (3479-25,994) to 52,522.5 (41,362-65,799) U x g(-1) protein in lung tissue. In contrast, GSH-Px activity reflected an irregular trend; its levels were mostly found to be increased, but they were decreased at one stage (in the erythrocytes of 30-min exposed rats). **CONCLUSIONS:** The results of this study exhibited a clear relationship of HBO-induced oxidative action to exposure time. This action was most pronounced from 90 to 120 min of exposure.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 18064914 [PubMed - indexed for MEDLINE]

17: Acta Med Indones. 2007 Oct-Dec;39(4):169-73.

Does hyperbaric oxygen administration decrease side effect and improve quality of life after pelvic radiation?

Sidik S, Hardjodisastro D, Setiabudy R, Gondowiardjo S.

Department of Internal Medicine, Hyperbaric Medicine, dr. Mintohardjo Navy Hospital, Jakarta, Indonesia.

AIM: to evaluate the influence of HBOT to the side effect and quality of life after pelvic radiation. **METHODS:** this is an open randomized, parallel, prospective study conducted in Department of Obstetrics and Gynecology, Oncology Division and Department of Radiotherapy. Endoscopy procedure was performed in Department of Internal Medicine and tissue biopsy in Department of Pathology Anatomy. The hyperbaric oxygen therapy (HBOT) was done in Dr. Mintohardjo, Navy Seal Hospital Jakarta. The side effect was measured using LENT SOMA scale ratio, the quality of life used the Karnofsky score. The difference of two mean was analyzed using student t test. **RESULTS:** of 32 patients undergoing HBOT and 33 patients as control, the ratio of ASE of control group was 44.1+/-28.2%, HBOT group was 0.7+/-30.1%; p<0.001; the LSE of control group was 33.6+/-57.6%, HBOT group was -19.6+/-69.4%; p=0.008. Quality of life of control group after intervention was 4.5+/-10.7%; HBOT group was 19.7+/-9.6%; p <0.001. After 6 months of intervention the quality of life was 2.5+/-16.1% in the control group, and HBOT group was 15.2+/-14.7%; p =0.007. **CONCLUSION:** the study showed that HBOT decreased acute and late side effect, also improved the quality of life of patients with proctitis radiation.

Publication Types: Clinical Trial Randomized Controlled Trial

PMID: 18046062 [PubMed - indexed for MEDLINE]

18: Arch Orthop Trauma Surg. 2009 Jan;129(1):13-20. Epub 2007 Nov 27.

Effects of hyperbaric oxygen therapy on rabbit skeletal muscle during extremity lengthening.

Atesalp AS, Yurttas Y, Kose O, Demiralp B, Yildiz C, Kurklu M, Kurt B, Karacalioglu O, Ozgurtas T, Oztas E, Basbozkurt M.

Department of Orthopedics and Traumatology, Gulhane Military Medical Academy, Ankara, Turkey.

INTRODUCTION: Extremity lengthening through distraction osteogenesis is limited by the surrounding skeletal muscle and neurovascular structures rather than the bone itself. The purpose of this study is to evaluate the effects of hyperbaric oxygen therapy on skeletal muscle during distraction osteogenesis. **MATERIALS AND METHODS:** Twenty New Zealand white rabbits were randomly divided into two groups. Right tibia of all rabbits was distracted at a rate of 0.125 mm per 6 h (0.5 mm/day) for 10 days with circular external fixator. Experimental group rabbits (N=10) underwent 2.5 ATA hyperbaric oxygen therapy for 2 h everyday for 20 days, control group rabbits (N=10) did not receive any corresponding treatment. Skeletal muscle perfusion was evaluated with scintigraphy before and after the distraction period. Serum CPK, LDH and AST levels were measured before and after the distraction period. All animals were killed on the 27th day. The right tibias of all animals were removed and tibialis posterior muscle was harvested for histopathologic

and histomorphometric assessment with light and electron microscopy. RESULTS: Skeletal muscle perfusion was decreased in the control group in comparison with pre-distraction level (P=0.008). However, no significant decrease was observed in the experimental group (P=0.678). There were no statistical differences in serum CPK, LDH and AST levels between groups (P=0.340, P=0.077, P=0.796). The mean area of the muscle fibers was measured as 398.66±9.16 μm^2 in the experimental group and 349.44±5.76 μm^2 in the control group (P=0.000) with light microscopy. Mild fibrosis was observed in connective tissue component of muscle tissue in control group. An average of 26 myofibrils (20-32) was counted in a 16-cm² unit area in experimental group and 50 myofibrils (35-65) in the control group with electron microscopy. Enlargement in the sarcoplasmic reticulum, degenerative changes in nuclear cytoplasm and increase in myofibril diameter were observed in the control group, which was not observed in the experimental group CONCLUSION: Results of this study suggest that HBO treatment alleviates the detrimental effects of distraction on skeletal muscles and preserves its ultrastructure. PMID: 18040699 [PubMed - indexed for MEDLINE]

19: Dev Med Child Neurol. 2007 Dec;49(12):942-7. Systematic review of hyperbaric oxygen therapy for cerebral palsy: the state of the evidence. McDonagh MS, Morgan D, Carson S, Russman BS. Department of Medical Informatics and Clinical Epidemiology, Oregon Health and Science University, Portland, Oregon 97239-3098, USA. mcdonagh@ohsu.edu
A systematic review of the evidence was conducted on the benefits and adverse effects of hyperbaric oxygen treatment (HBOT) for cerebral palsy (CP). Studies of any HBOT regimen in patients with CP were included except for case reports and case series. Electronic databases (e.g. MEDLINE, EMBASE), professional society databases, and reference lists were searched to identify studies. Study quality was assessed using predefined criteria relevant to the study design. Two randomized controlled trials and four observational studies were identified. Best evidence came from a randomized controlled trial which found that HBOT at 1.75 atmospheres (atm) and 1.3 atm of room air resulted in similar improvements in motor function (5-6%). Other outcomes also indicated no difference between the HBOT and room air. Observational studies reported improvements in motor function to a similar degree. Other evidence was insufficient to clarify the benefits and/or adverse effects of HBOT for CP. Both HBOT and pressurized room air resulted in improvements in motor function compared with baseline. Similar improvements were seen in the observational studies. Children undergoing HBOT were reported to experience adverse events, including seizures and the need for ear pressure equalization tube placement, but the incidence was unclear. Future research is needed to determine the efficacy of pressurized room

air or non-pressurized oxygen in equivalent amounts by mask, compared with standard treatments. Publication Types: Review PMID: 18039243 [PubMed - indexed for MEDLINE]

20: Eur J Appl Physiol. 2008 Mar;102(5):525-32. Epub 2007 Nov 22. Mechanisms of protection against pulmonary hyperbaric O₂ toxicity by intermittent air breaks. Chavko M, Mahon RT, McCarron RM. Trauma and Resuscitative Medicine Department, Naval Medical Research Center, 503 Robert Grant Avenue, Silver Spring, MD 20910, USA. chavkom@nmrc.navy.mil
Intermittent exposure to air is used as a protective strategy against hyperbaric O₂ (HBO₂) toxicity. Little is known about optimal intermittent exposure schedules and the mechanism of protection. In this study, we examined the role of antioxidant enzymes, and inflammatory cytokines in the mechanism of HBO₂ tolerance by intermittent air breaks. One group of rats was exposed continuously to 282 kPa O₂ until death. Other groups were exposed to 30, 60, and 120 min intervals of HBO₂ with different numbers of intermittent 30 min air breaks (1-12 breaks). After the final break, animals were exposed to HBO₂ until death. In a separate experiment, animals were sacrificed before terminal exposure and lung tissues were collected for analysis of gene expression. Two intermittent schedules with 6 h cumulative O₂ time (30/30 and 60/30 min schedules) were compared with continuous exposure to HBO₂ for 6 h and with intermittent exposure of 8 h (120/30 min schedule) duration. Continuous exposure resulted in activation of inflammatory cytokine TNF-alpha and IL-1beta mRNA expression, an increase in lung protein nitration and activation of inducible NOS (iNOS) mRNA. Inflammatory response was not observed at intermittent exposures of the same cumulative O₂ time duration (30/30 and 60/30 min schedule). Expression of heme oxygenase-1 (HO-1) mRNA was significantly increased in all exposure groups while manganese superoxide dismutase (MnSOD) mRNA expression was increased only in continuous and 120/30 exposure groups. Results show that intermittent exposure to air protects against pulmonary HBO₂ toxicity by inhibiting inflammation. The mechanism of inhibition may involve the antiinflammatory and antioxidative effect of HO-1 but some other mechanisms may also be involved in protection by intermittent air breaks. Publication Types: Comparative Study Research Support, U.S. Gov't, Non-P.H.S. PMID: 18034261 [PubMed - indexed for MEDLINE]

21: Chir Ital. 2007 Sep-Oct;59(5):723-34. [A new transportable machine for the preservation of livers to be transplanted by means of hyperbaric oxygenation perfusion] [Article in Italian]

Rubbini M, Longobardi P, Rimessi A, Pinton P, Morri A, Semprini G, Pistone P, Volpinari L.

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The preservation of livers to be transplanted is currently obtained by static cold storage at 4 C degrees and flushing with UW solution. New methods of preservation are being studied that take advantage of machines for continuous hypothermic perfusion of the organ. Such machines have permitted a lengthening of preservation times and the use of livers from non-beating-heart donors. In an attempt to eliminate the damage due to hypothermia, to lengthen preservation times, and to extend the availability of livers to be transplanted, also using those subjected to short periods of warm ischaemia, we have constructed a transportable machine that produces a hyperbaric atmosphere and allows continuous perfusion of the liver. Ten pig livers from beating-heart donors were perfused with Ringer solution in hyperbaric conditions with oxygen at temperatures ranging from 10 to 25 degrees C for periods of up to 24 hours and studied by means of histopathological analysis and tests of mitochondrial activity (FAU) in order to verify cell viability. The group of livers perfused up to 15 hours yielded an FAU value of 169.40 +/- 5.5 compared to the value of the non-perfused livers (controls) established as 100 and those perfused up to 24 hours had a FAU value of 139.18 +/- 10.7 compared to the controls established as 100, thus demonstrating cell viability. The viability of the organs after preservation with our procedure in the hyperbaric oxygenation perfusion machine gives us good reason to believe that, after appropriate further confirmation of the results, it will be possible to use the machine for the transplantation both of livers subjected to warm ischaemia and of livers preserved for longer periods than is currently the case.

Publication Types: English Abstract

PMID: 18019646 [PubMed - indexed for MEDLINE]

22: Undersea Hyperb Med. 2007 Sep-Oct;34(5):369-78.

Bubble reduction after decompression in the prawn *Palaemon elegans* by pretreatment with hyperbaric oxygen.

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On the theory that bubbles originate from preexisting micronuclei, we previously demonstrated that pretreatment with hyperbaric O₂ (HBO₂) reduced the number of bubbles in the prawn decompressed from 203 kPa. In the present study, we examined the effect of two HBO₂ pretreatment pressures (405 and 709 kPa) on prawns decompressed from a range of pressures between 203-810 kPa. Prawns from the experimental groups were pretreated with O₂ at 405 or 709 kPa for 5 min (series A and series B, respectively). Prawns from the control groups were

exposed only to air. Following pretreatment, prawns were exposed to air at the desired pressure until saturated with nitrogen, then subjected to rapid decompression and examined under a light microscope. Series A: HBO₂ pretreatment at 405 kPa for 5 min significantly reduced the number of bubbles after decompression from 203, 304 and 405 kPa ($p < 0.05$). The total volume of accumulated gas was not affected by HBO₂. Series B: Pretreatment with HBO₂ at 709 kPa significantly reduced the number of bubbles after decompression from 203, 304, 507 and 608 kPa ($p < 0.05$). Total gas volume after decompression from 507 and 608 kPa was reduced as a result of pretreatment with O₂. This study demonstrates that HBO₂ pretreatment at 405 kPa is sufficient to reduce the number of bubbles that will emerge on decompression from several levels of compression.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 18019088 [PubMed - indexed for MEDLINE]

23: Undersea Hyperb Med. 2007 Sep-Oct;34(5):335-9.

Efficacy of hyperbaric oxygen on survival of random pattern skin flap in diabetic rats.

Zhang T, Gong W, Li Z, Yang S, Zhang K, Yin D, Xu P, Jia T.

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OBJECTIVES: This study was designed to determine if hyperbaric oxygen improved random pattern skin flap survival in diabetic rats. **METHODS:** Cranially-based, 4 x 10 cm dorsal skin flaps were raised in 38 diabetic rats induced by streptozocin (STZ). The animals were randomly divided equally into two groups. Group A was a control group observed in the room air and Group B was the experimental group, which received hyperbaric oxygen (HBO₂) therapy. The HBO₂ regimen consisted of 90 minutes of treatment with 100% O₂ at 2.5 ATA (atmosphere absolute ATA) per day for 7 consecutive days. On the 7th postoperative day, we measured the necrotic flap area and the new growth number of capillary vessel and the granulation tissue thickness. **RESULTS:** The percentage of necrosis flap area for group A was 50.5 +/- 10.5%; for group B it was 38.5 +/- 9.3%. The reduction in necrosis flap area was highly significant ($p < 0.01$) compared with controls. Also, new-growth capillary vessel and granulation tissue thickness were statistically different between the two groups. **CONCLUSIONS:** The findings of this study demonstrated beneficial effects of HBO₂ in improving diabetic rat dorsal skin flap survival.

PMID: 18019084 [PubMed - indexed for MEDLINE]

24: Undersea Hyperb Med. 2007 Sep-Oct;34(5):329-34.

Rate of delivery of hyperbaric oxygen treatments does not affect response in soft tissue radionecrosis.

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BACKGROUND: Soft tissue radiation necrosis (STRN) is effectively treated with hyperbaric oxygen (HBO₂), believed to result from stimulation of angiogenesis in radiation-injured tissue. Thirty to forty HBO₂ treatments are usually recommended for STRN. For various reasons, different hyperbaric facilities offer these treatments once or twice daily and from 5-7 days weekly. It is not known whether the clinical response differs as a result of the rate of administration of HBO₂ treatments. **METHODS:** Details of hyperbaric treatment courses of patients treated for radiation enteritis/proctitis (n = 65) and cystitis (n = 94) at a single institution were reviewed. Outcomes were compared with the total number of HBO₂ treatments administered and also rate of treatment administration. **RESULTS:** Responses were similar for both forms of STRN whether the patient averaged fewer or greater than 5 treatments per week, or even < or = 3 versus > or = 7 treatments weekly. Outcome did differ, however, dependant on the total number of treatments administered. Response was better in patients receiving 30 or more total treatments, as compared with fewer. **CONCLUSIONS:** Soft tissue radionecrosis of the gastrointestinal tract or bladder is (1) effectively treated with hyperbaric oxygen, (2) has a higher response rate if at least 30 treatments are administered, and (3) is equally responsive to rates of hyperbaric treatment ranging from 3 or fewer to 7 or more treatments per week.

PMID: 18019083 [PubMed - indexed for MEDLINE]

25: Undersea Hyperb Med. 2007 Sep-Oct;34(5):321-7.

Reduced nitric oxide concentration in exhaled gas after exposure to hyperbaric hyperoxia.

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The objective of this study was to evaluate exhaled nitric oxide concentration (FENO) and exhaled breath condensate (EBC) pH and H₂O₂ as biochemical markers of pulmonary oxygen toxicity in association with hyperbaric oxygen (HBO₂) therapy. FENO, EBC pH and H₂O₂ were measured during the course of a 4 week HBO₂ treatment period, and the responses to a single HBO₂ exposure at the start and end of the treatment period were assessed. The HBO₂ exposure was at a pressure of 240 kPa for 90 min 5 days a week for 4 weeks. Eight patients undergoing HBO₂ therapy and eight control subjects participated in the study. There was a reduction in FENO immediately after HBO₂ exposure of 33.1 (SD = 7.8) % on Day 1 and 40.7 (SD = 8.9) % on Day 25. EBC pH was reduced after the first exposure only. Baseline F(E)NO and EBC pH and H₂O₂ measured before the HBO₂ exposures did not change throughout the HBO₂ treatment period. A single HBO₂ exposure induces a

significant transient decrease in FENO. Repeated exposures do not appear to induce inflammatory processes in the lung associated with an increase in FENO.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 18019082 [PubMed - indexed for MEDLINE]

26: Undersea Hyperb Med. 2007 Sep-Oct;34(5):315-9.

Clinical case report: treatment of a central retinal vein occlusion with hyperbaric oxygen.

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A case of retinal central vein occlusion (CRVO) in a 43-year-old man is presented in which hyperbaric oxygen (HBO₂) was used as the only treatment method. CRVO is a relatively common cause of visual loss, with hypertension, diabetes, glaucoma and hypercoagulable conditions identified as risk factors. The patient in this report had none of these risk factors and declined treatments other than hyperbaric oxygen. HBO₂ was effective in sustaining the ischemic retina and controlling retinal edema until the retina revascularized and vision stabilized. The initial visual acuity in the left eye was 20/200 (corrected), and after two hyperbaric treatments it was 20/30 (corrected). Following three months of HBO₂ treatments the vision stabilized to 20/20 (corrected) in the affected eye. Treatment considerations in using HBO₂ as adjunctive therapy for CRVO are early institution of treatment, and continuation of HBO₂ until the retinal edema has resolved and vision has stabilized.

Publication Types: Case Reports

PMID: 18019081 [PubMed - indexed for MEDLINE]

27: Aviat Space Environ Med. 2007 Nov;78(11):1042-9.

Cardiovascular and endocrine responses to 90 degree tilt during a 35-day saturation dive to 46 and 37 ATA.

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INTRODUCTION: Hyperbaria-induced diuresis is accompanied by decreased basal and stimulated release of arginine vasopressin (AVP) and decreased blood volume possibly contributing to the reported orthostatic intolerance. Since hyperosmolality is not a consistent finding, the explanation of blood volume reduction at hyperbaria must involve an osmotic component to the diuresis. Investigations of a possible involvement of atrial natriuretic peptide (ANP) to the hyperbaric diuresis have revealed mixed results. **METHODS:** Urinary excretion of electrolytes, AVP, and aldosterone were measured in four male subjects studied at 1 atmosphere absolute (ATA) and at 46 and 37 ATA (0.5 atmospheres pressure O₂: 5% N₂: remainder He) during a 35-d

saturation dive. Also, the supine and 90 degrees tilt-stimulated plasma levels of AVP, plasma renin activity (PRA), and aldosterone, and the suppressed responses of ANP and the cardiovascular responses to tilt were determined at these pressures. RESULTS: Tilt-stimulated levels of PRA were increased two- to threefold and the AVP response was eliminated throughout hyperbaria, except in two episodes of tilt-induced syncope where AVP was elevated 10- to 20-fold. This pattern supports most previous reports. Contrary to some reports, both supine and tilt-suppressed levels of ANP were reduced by about 50% at all three tilt experiments conducted at hyperbaria compared to predive control values. DISCUSSION: These results suggest an altered ANP response at pressures of 37 ATA or greater, which is consistent with an appropriate ANP response to blood volume reduction and further suggest that the hyperbaric diuresis is not dependent on increased ANP.

Publication Types: Research Support, U.S. Gov't, Non-P.H.S.

PMID: 18018436 [PubMed - indexed for MEDLINE]

28: BMC Pediatr. 2007 Nov 16;7:36.

The effects of hyperbaric oxygen therapy on oxidative stress, inflammation, and symptoms in children with autism: an open-label pilot study.

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BACKGROUND: Recently, hyperbaric oxygen therapy (HBOT) has increased in popularity as a treatment for autism. Numerous studies document oxidative stress and inflammation in individuals with autism; both of these conditions have demonstrated improvement with HBOT, along with enhancement of neurological function and cognitive performance. In this study, children with autism were treated with HBOT at atmospheric pressures and oxygen concentrations in current use for this condition. Changes in markers of oxidative stress and inflammation were measured. The children were evaluated to determine clinical effects and safety. METHODS: Eighteen children with autism, ages 3-16 years, underwent 40 hyperbaric sessions of 45 minutes duration each at either 1.5 atmospheres (atm) and 100% oxygen, or at 1.3 atm and 24% oxygen. Measurements of C-reactive protein (CRP) and markers of oxidative stress, including plasma oxidized glutathione (GSSG), were assessed by fasting blood draws collected before and after the 40 treatments. Changes in clinical symptoms, as rated by parents, were also assessed. The children were closely monitored for potential adverse effects. RESULTS: At the endpoint of 40 hyperbaric sessions, neither group demonstrated statistically significant changes in mean plasma GSSG levels, indicating intracellular oxidative stress appears unaffected by either regimen. A trend towards

improvement in mean CRP was present in both groups; the largest improvements were observed in children with initially higher elevations in CRP. When all 18 children were pooled, a significant improvement in CRP was found ($p = 0.021$). Pre- and post-parental observations indicated statistically significant improvements in both groups, including motivation, speech, and cognitive awareness ($p < 0.05$). No major adverse events were observed. CONCLUSION: In this prospective pilot study of children with autism, HBOT at a maximum pressure of 1.5 atm with up to 100% oxygen was safe and well tolerated. HBOT did not appreciably worsen oxidative stress and significantly decreased inflammation as measured by CRP levels. Parental observations support anecdotal accounts of improvement in several domains of autism. However, since this was an open-label study, definitive statements regarding the efficacy of HBOT for the treatment of individuals with autism must await results from double-blind, controlled trials. TRIAL REGISTRATION: clinicaltrials.gov NCT00324909.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 18005455 [PubMed - indexed for MEDLINE]

29: J Surg Res. 2008 Sep;149(1):155-64. Epub 2007 Oct 11.

Pharmacological preconditioning with hyperbaric oxygen: can this therapy attenuate myocardial ischemic reperfusion injury and induce myocardial protection via nitric oxide?

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Ischemic reperfusion injury (IRI) is an inevitable part cardiac surgery such as coronary artery bypass graft (CABG). While ischemic hypoxia and the ensuing normoxic or hyperoxic reperfusion are critical to the initiation and propagation of IRI, conditioning myocardial cells to an oxidative stress prior to IRI may limit the consequences of this injury. Hyperbaric oxygen (HBO₂) is a modality of treatment that is known to generate an oxidative stress. Studies have shown that treatment with HBO₂ postischemia and reperfusion is useful in ameliorating myocardial IRI. Moreover, preconditioning the myocardium with HBO₂ before reperfusion has demonstrated a myocardial protective effect by limiting the infarct size post ischemia and reperfusion. Current evidence suggests that HBO₂ preconditioning may partly attenuate IRI by stimulating the endogenous production of nitric oxide (NO). As NO has the capacity to reduce neutrophil sequestration, adhesion and associated injury, and improve vascular flow, HBO₂ preconditioning induced NO may play a role in providing myocardial protection during interventions that involve an inevitable episode of IRI. This current opinion review article attempts to suggest that HBO₂ may be used to pharmacologically

precondition and protect the myocardium from the effects of IRI that is known to occur during cardiac surgery.

Publication Types: Review
PMID: 17996900 [PubMed - indexed for MEDLINE]

30: *Int J Oral Maxillofac Surg.* 2008 Apr;37(4):404. Epub 2007 Nov 7.

Comment on: *Int J Oral Maxillofac Surg.* 2007 Sep;36(9):783-7.

The influence of hyperbaric oxygen on the outcome of patients treated for osteoradionecrosis: 8 year study.

Kanatas AN.

Publication Types: Comment Letter
PMID: 17988835 [PubMed - indexed for MEDLINE]

31: *Handchir Mikrochir Plast Chir.* 2007 Oct;39(5):328-32.

[The use of oxygen as drug and its relevance for wound healing]

[Article in German]

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Plastic surgeons often have to deal with problematic wounds. In reconstructive surgery, as well as in chronic wounds, tissue oxygen supply is often critically low. Similarly in the treatment of severely burned patients, perfusion and oxygen supply to the areas beneath burn wounds are often critical. This paper explains the mechanisms and impact of oxygen for wound healing. It is important to mention that it has been shown that oxygen even used at ambient pressure can improve wound healing. Whereas treatment with oxygen under hyperbaric conditions is not everywhere available, at least normobaric oxygen is cheap and ubiquitously available and should therefore be used routinely. Oxygen treatment under hyperbaric conditions, especially in critically ill patients, needs a special infrastructure and is quite more expensive. Therefore, it has to be evaluated whether the potential benefit for the patient meets the risk and costs of treatment. In 2006, at the Hyperbaric Centre of the Medical University of Vienna almost 2200 hyperbaric treatments including 330 in critically ill patients have been performed. Beside 2 patients suffering from Fournier's gangrene, 2 suffering from gas gangrene and 4 patients with severe carbon monoxide intoxications, all other intensive-care patients were treated for severe burns. Indications for less severely ill patients mainly included problem wounds mostly of diabetic patients, osteomyelitis of the mandible and less severe carbon monoxide poisoning. Our experience with the use of oxygen under hyperbaric conditions so far has been good enough to consider this kind of therapy at least in our centre as an option in the adjunctive treatment for the so far used indications. However, it has to be mentioned that there is still lack of prospective

randomised controlled studies to introduce this kind of therapy as a level 1 indication in clinical routine.

Publication Types: English Abstract
PMID: 17985276 [PubMed - indexed for MEDLINE]

32: *Neuropathol Appl Neurobiol.* 2008 Aug;34(4):412-23. Epub 2007 Oct 31.

The effect of oxygenation level on cerebral post-traumatic apoptosis is modulated by the 18-kDa translocator protein (also known as peripheral-type benzodiazepine receptor) in a rat model of cortical contusion.

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AIMS: Hyperbaric hyperoxia has been shown to reduce apoptosis in brain injury. As the 18-kDa translocator protein (TSPO), also known as peripheral-type benzodiazepine receptor, is closely associated with the mitochondrial transition pore and because of its role in mitochondrial respiration and apoptosis, we hypothesized that reduction of apoptosis by hyperoxia may involve the TSPO. METHODS: TSPO and transferase-mediated dUTP nick end labelling (TUNEL) immunopositivity was first assessed in cortical contusion, created by dynamic cortical deformation, by immunohistochemistry in rats exposed to normoxia [(dynamic cortical deformation (DCD)), normobaric hyperoxia or hyperbaric hyperoxia [hyperbaric oxygen therapy (HBO)]. In a second step, transmembrane mitochondrial potential (Deltapsi(M)) and caspase 9 activity were assessed in the injured area in comparison with the noninjured hemisphere. Measurements were performed in DCD and HBO groups. A third group receiving both HBO and the TSPO ligand PK11195 was investigated as well. RESULTS: TSPO correlated quantitatively and regionally with TUNEL immunopositivity in the perilesional area. Hyperoxia reduced both the number of TSPO expressing and TUNEL positive cells in the perilesional area, and this effect proved to be pressure dependent. After contusion, we demonstrated a dissipation of Deltapsi(M) in isolated mitochondria and an elevation of caspase 9 activity in tissue homogenates from the contused area, both of which could be substantially reversed by hyperbaric hyperoxia. This protective effect of hyperoxia was reversed by PK11195. CONCLUSIONS: The present findings suggest that the protective effect of hyperoxia may be due to a negative regulation of the proapoptotic function of mitochondrial TSPO, including conservation of the mitochondrial membrane potential.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17973904 [PubMed - indexed for MEDLINE]

33: *Dig Dis Sci.* 2008 Feb;53(2):481-5. Epub 2007 Oct 13.

Hyperbaric oxygen therapy is as effective as dexamethasone in the treatment of TNBS-E-induced experimental colitis.

Atug O, Hamzaoglu H, Tahan V, Alican I, Kurtkaya O, Elbuken E, Ozdogan O, Tozun N.

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INTRODUCTION: Hyperbaric oxygen (HBO) has been demonstrated to be useful as an adjunctive therapy for Crohn's disease. In the present study, HBO was tested as a treatment for trinitrobenzenesulfonic acid-ethanol (TNBS-E)-induced distal colitis, and its effects were compared with dexamethasone therapy. **METHODS:** A total of 48 Sprague-Dawley rats were separated into six groups: the control, and those treated with vehicle, TNBS-E, HBO, dexamethasone, or combined HBO + dexamethasone. The HBO treatment group was exposed to 100% HBO at 2 ATM for 75 min twice daily at 6-h intervals in a HBO chamber, both on the day of colitis induction and 3 days thereafter. Treatment with intraperitoneal dexamethasone twice daily was started 1 h before the induction of colitis and was continued for 7 days in the dexamethasone group. The rats were decapitated 8 days after the induction of colitis, and the colonic tissue wet weight, macroscopic and microscopic lesion score, and tissue myeloperoxidase (MPO) activity were determined. **RESULTS:** HBO therapy decreased the activity of experimental colitis measured by the tissue wet weight, macroscopic score, microscopic score, and MPO activity. The dexamethasone treatment significantly reduced the colitis activity as determined by the tissue MPO activity and wet weight. There were also decreases in the macroscopic and microscopic activity scores with the dexamethasone therapy; however, these changes were not statistically significant. The combined therapy with HBO and dexamethasone provided no additional benefit over HBO therapy alone. **CONCLUSION:** HBO therapy can be a valuable therapeutic option in treatment of patients with inflammatory bowel disease. HBO therapy in the refractory patients deserves further, larger clinical studies.

PMID: 17934837 [PubMed - indexed for MEDLINE]

34: Neuroreport. 2007 Oct 29;18(16):1753-6.

Proliferation of neural stem cells correlates with Wnt-3 protein in hypoxic-ischemic neonate rats after hyperbaric oxygen therapy.

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Hyperbaric oxygen therapy promoted brain cell proliferation. Wnt-3 is closely associated with the proliferation of neural stem cells. We examined whether hyperbaric oxygen promoted neural stem cells to proliferate and its correlation with Wnt-3 protein in hypoxic-ischemic neonate rats. Hyperbaric

oxygen therapy was administered 3 h after hypoxia ischemia daily for 7 days. The proliferating stem cells and Wnt-3 protein were examined dynamically in the subventricular zone. Results showed that stem cells proliferated and peaked 7 days after hyperbaric oxygen therapy. Wnt-3 protein increased to the higher levels 3 days after therapy. Linear regression analysis showed that nestin protein correlated with Wnt-3 protein. We propose that hyperbaric oxygen treatment promote stem cells to proliferate, which is correlated with Wnt-3 protein.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17921881 [PubMed - indexed for MEDLINE]

35: J Gastroenterol Hepatol. 2007 Nov;22(11):2042-6.

Hyperbaric oxygen therapy for severe acute pancreatitis.

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Despite improvements in the supportive management of severe acute pancreatitis over the last decade, the morbidity and mortality rate remains high. The main feature of this condition is pancreatic necrosis leading to sepsis, with both localized and systemic inflammatory response syndromes. Early pathophysiological changes of the pancreas include alterations in microcirculation, ischemia reperfusion injury, and leukocyte and cytokine activation. The efficacy of hyperbaric oxygen (HBO) therapy in improving these pathophysiological disturbances is documented for various conditions. However, its effect in the treatment of severe acute pancreatitis is undetermined. This report documents the case of a 56-year-old woman presenting with severe acute pancreatitis treated by HBO therapy. The severity of disease was based on an Acute Physiology and Chronic Health Evaluation (APACHE II) illness grading score of 11 and a Baltazar based computed tomography severity index (CTSI) score of 9. Administration of 100% oxygen was commenced within 72 h of presentation at a pressure of 2.5 atmospheres for 90 min and given twice daily for a total of 5 days. Therapy was well tolerated with improvements in APACHE II and CTSI grading scores. HBO therapy for severe acute pancreatitis appeared to be safe and may have a role in improving treatment outcomes. Further study is required.

Publication Types: Case Reports

PMID: 17914992 [PubMed - indexed for MEDLINE]

36: Int J Low Extrem Wounds. 2007 Sep;6(3):139-42.

ECHM-ETRS joint conference on oxygen and tissue repair, Ravenna, Italy, October 27-28, 2006: recommendations by the international jury.

Niinikoski J, Bakker D, Cronjé F, Lind F, Mathieu D, Schmutz J, Hunt T, Mani R, Romanelli M, Téot L, Wild T, Marroni A.

Publication Types: Consensus Development Conference Review

PMID: 17909171 [PubMed - indexed for MEDLINE]

37: Int J Low Extrem Wounds. 2007 Sep;6(3):130-8.

The clinical and economic potential of hyperbaric oxygen therapy in the treatment of diabetic ulceration and other conditions.

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Selective use of systemic hyperbaric oxygen therapy (HBOT) is a treatment that deserves further study and analysis. The current situation in the United Kingdom (UK) is discussed in relation to available evidence and practices elsewhere. It would appear that there is increasing evidence that HBOT could benefit many patients and health care budgets through improved clinical efficacy and cost-efficiency in the treatment of specific conditions, notably nonhealing diabetic ulceration of the lower limbs. This is not only disabling, it may lead to amputation. It is also a financial burden to patients and health service providers. In the UK, it is estimated that chronic wound care costs more than pound1 billion a year, with diabetic ulceration accounting for a substantial part of that staggering sum. It has been said repeatedly, and quite correctly, that there is insufficient good-quality evidence upon which a properly informed decision may be made on the contribution HBOT might make to alleviate that situation. It is intriguing that no determined effort is apparent that would seek to settle the issue by encouraging and facilitating appropriately designed and conducted randomized controlled trials to assess the actual effects of this treatment. Indeed, a proposed government research initiative appears to have been cancelled. Is lack of research preventing provision of HBOT?

Publication Types: Review

PMID: 17909170 [PubMed - indexed for MEDLINE]

38: Burns. 2008 Jun;34(4):467-73. Epub 2007 Sep 25.

Effects of hyperbaric oxygen therapy on fibrovascular ingrowth in porous polyethylene blocks implanted under burn scar tissue: an experimental study.

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Effects of hyperbaric oxygen (HBO) therapy on biointegration of porous polyethylene (PP) implanted beneath dorsal burn scar and normal skin were experimentally examined in Sprague-Dawley rats. In Group One (n=20), daily HBO treatments were given after the implantation of PP material under dorsal burn scar, whereas, in Group Two (n=20) no

treatment was given following the same surgical procedure. In Group Three (n=20), PP was placed under dorsal normal skin and subsequently HBO therapy protocol was applied while Group Four (n=20) stayed without HBO treatment after the implantation. One, 2, 3 and 4 weeks after the implantations, sections were respectively taken from five rats from each group. Biointegration process and effects of HBO therapy were evaluated microscopically and the ratio of fibrovascular ingrowth (FVI) was determined for each rat. The results showed significantly superior FVI in Group One compared to Group Two and again FVI into PP under normal skin treated with HBO revealed better results against Group Four (p<0.05). Well-vascularized capsule formation and tissue integration was delayed both in Group Two and in Group Three in the first 3 weeks. In conclusion, HBO therapy enhances biointegration of PP in hypoxic burn scar areas via improving collagen synthesis and neovascularization; otherwise, it apparently delays tissue ingrowth into porous structure implanted in normal healthy tissues.

PMID: 17897787 [PubMed - indexed for MEDLINE]

39: Brain Res. 2007 Oct 12;1174:120-9. Epub 2007 Aug 16.

Hyperbaric oxygen therapy improves spatial learning and memory in a rat model of chronic traumatic brain injury.

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In the present experiment we use a rat model of traumatic brain injury to evaluate the ability of low-pressure hyperbaric oxygen therapy (HBOT) to improve behavioral and neurobiological outcomes. The study employed an adaptation of the focal cortical contusion model. 64 Male Long-Evans rats received unilateral cortical contusion and were tested in the Morris Water Task (MWT) 31-33 days post injury. Rats were divided into three groups: an untreated control group (N=22), an HBOT treatment group (N=19) and a sham-treated normobaric air group (N=23). The HBOT group received 80 bid, 7 days/week 1.5 ATA/90-min HBOTs and the sham-treated normobaric air group the identical schedule of air treatments using a sham hyperbaric pressurization. All rats were subsequently retested in the MWT. After testing all rats were euthanized. Blood vessel density was measured bilaterally in hippocampus using a diaminobenzadine stain and was correlated with MWT performance. HBOT caused an increase in vascular density in the injured hippocampus (p<0.001) and an associated improvement in spatial learning (p<0.001) compared to the control groups. The increased vascular density and improved MWT in the HBOT group were highly correlated (p<0.001). In conclusion, a 40-day series of 80 low-pressure HBOTs caused an increase in contused hippocampus vascular density and an

associated improvement in cognitive function. These findings reaffirm the clinical experience of HBOT-treated patients with chronic traumatic brain injury.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17869230 [PubMed - indexed for MEDLINE]

40: Amyotroph Lateral Scler. 2007 Oct;8(5):274-5.

Comment on: Amyotroph Lateral Scler Other Motor Neuron Disord. 2004 Dec;5(4):250-4.

Negative results of a phase II study of hyperbaric oxygen therapy for amyotrophic lateral sclerosis.

Steele J, Zutshi D, Bradley WG.

Publication Types: Clinical Trial, Phase II
Comment Letter Randomized Controlled Trial
Research Support, Non-U.S. Gov't

PMID: 17852024 [PubMed - indexed for MEDLINE]

41: Neurosci Lett. 2007 Oct 2;425(3):141-5. Epub 2007 Aug 1.

Delayed hyperbaric oxygenation is more effective than early prolonged normobaric hyperoxia in experimental focal cerebral ischemia.

Beynon C, Sun L, Marti HH, Heiland S, Veltkamp R. Department of Neurology, University of Heidelberg, Germany.

Hyperbaric (HBO) and normobaric (NBO) oxygen therapy have been shown to be neuroprotective in focal cerebral ischemia. In previous comparative studies, NBO appeared to be less effective than HBO. However, the experimental protocols did not account for important advantages of NBO in the clinical setting such as earlier initiation and prolonged administration. Therefore, we compared the effects of early prolonged NBO to delayed HBO on infarct size and functional outcome. We also examined whether combining NBO and HBO is of additional benefit. Wistar rats underwent filament-induced middle cerebral artery occlusion (MCAO) for 150 min. Animals breathed either air, 100% O₂ at ambient pressure (NBO; initiated 30 min after MCAO) 100% O₂ at 3 atm absolute (HBO; initiated 90 min after MCAO), or a sequence of NBO and HBO. Infarct volumes and neurological outcome (Garcia score) were examined 7d after MCAO. HBO (174±65 mm³) significantly reduced mean infarct volume by 31% compared to air (251±59 mm³) and by 23% compared to NBO treated animals (225±63 mm³). In contrast, NBO failed to decrease infarct volume significantly. Treatment with NBO+HBO (185±101 mm³) added no additional benefit to HBO alone. Neurological deficit was significantly smaller in HBO treated animals (Garcia score: 13.3±1.2) than in animals treated with air (12.1±1.4), but did not differ significantly from NBO (12.4±0.9) and NBO+HBO (12.8±1.1). In conclusion, HBO is a more effective therapy than NBO in transient experimental ischemia even when accounting for delayed treatment-onset of HBO. The combination of NBO and HBO results in no additional benefit.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17850964 [PubMed - indexed for MEDLINE]

42: Auris Nasus Larynx. 2008 Jun;35(2):192-7. Epub 2007 Sep 10.

Comment in: Auris Nasus Larynx. 2008 Jun;35(2):318; author reply 319.

Prostaglandin E1 versus steroid in combination with hyperbaric oxygen therapy for idiopathic sudden sensorineural hearing loss.

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OBJECTIVE: We conducted a controlled retrospective analysis of patients with idiopathic sudden sensorineural hearing loss (ISSNHL) in order to investigate the effect of prostaglandin E1 (PGE1) plus hyperbaric oxygen (HBO) therapy in comparison with that of steroid plus HBO therapy. **METHODS:** One hundred and ninety-six consecutive patients with ISSNHL (hearing levels > or =40dB; time from the onset of hearing loss to the start of treatment < or =30 days) were enrolled. Ninety-five patients underwent PGE1 plus HBO therapy (PG group) and 101 underwent steroid administration plus HBO therapy (steroid group). Hearing recovery was evaluated by grade assessment and by the improvement in hearing compared to the unaffected contralateral ear. **RESULTS:** The hearing levels after treatment were 52.2±3.0 and 47.5±2.8dB, the hearing gains were 31.3±2.2 and 27.2±2.3dB, the cure rates were 28.4% and 28.7%, the recovery rates were 54.7% and 53.5%, and the hearing improvement rates were 48.4±5.1% and 53.9±4.2% in the PG and steroid groups, respectively. There were no significant differences between the two groups. **CONCLUSION:** We concluded that PGE1 and a steroid are equally effective in the treatment of ISSNHL when used together with HBO therapy. PGE1 plus HBO therapy can be one of the potential alternative treatments for ISSNHL, particularly in steroid-intolerant patients such as those with severe diabetes mellitus, an active peptic ulcer, or viral hepatitis.

Publication Types: Comparative Study

PMID: 17826927 [PubMed - indexed for MEDLINE]

43: Neurobiol Dis. 2008 Jan;29(1):1-13. Epub 2007 Jul 28.

The hyperbaric oxygen preconditioning-induced brain protection is mediated by a reduction of early apoptosis after transient global cerebral ischemia.

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We hypothesized that the brain-protective effect of hyperbaric oxygen (HBO) preconditioning in a transient global cerebral ischemia rat model is mediated by the inhibition of early apoptosis. One hundred ten male Sprague-Dawley (SD) rats (300-350 g body weight) were allocated to the sham group and three other groups with 10 min of four-vessel occlusion, untreated or preconditioned with either 3 or 5 hyperbaric oxygenations. HBO preconditioning improved neurobehavioral scores and reduced mortality, decreased ischemic cell change, reduced the number of early apoptotic cells and hampered a conversion of early to late apoptotic alterations. HBO preconditioning reduced the immunoreactivity of phosphorylated p38 in vulnerable neurons and increased the expression of brain derived neurotrophic factor (BDNF) in early stage post-ischemia. However, preconditioning with 3 HBO treatments proved less beneficial than with 5 HBO treatments. We conclude that HBO preconditioning may be neuroprotective by reducing early apoptosis and inhibition of the conversion of early to late apoptosis, possibly through an increase in brain BDNF level and the suppression of p38 activation.

Publication Types: Research Support, N.I.H., Extramural
PMID: 17822911 [PubMed - indexed for MEDLINE]

44: Mund Kiefer Gesichtschir. 2007 Nov;11(5):285-90. Epub 2007 Sep 4.

[Evaluation of hyperbaric oxygen therapy in treatment of patients with osteomyelitis of the mandible]

[Article in German]

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BACKGROUND: Chronic osteomyelitis of the jaw is a relapsing disease with multiple treatment strategies described in the literature. Hyperbaric oxygen therapy is one of them. The purpose of this study was to evaluate the clinical outcome of hyperbaric oxygen therapy in these patients. **METHOD:** All patients with a chronic osteomyelitis of the mandible who received in our department hyperbaric oxygen therapy between 2000 and 2004 were included in this study. The clinical outcome (lack of symptoms e.g. pain, swelling, etc.) was the pivotal evaluation parameter. All patients were divided in three groups according to their medical history. Group 1: All patients with osteomyelitis of the mandible, who received no treatment before. Group 2: All patients with one local relapse, who received only antimicrobial treatment. Group 3: Patients with at least one local relapse after antimicrobial and surgical treatment. **RESULTS:** 27 patients were evaluated in this study. Seven out of 13 patients in group 1 were relapse free after performing 40 hyperbaric oxygen therapies. However, only 4 of 9 patients in group 3

were relapse free after treatment. In group 2 the hyperbaric oxygen therapy was successful particularly in the younger patients (3 of 4). **CONCLUSION:** Adjuvant hyperbaric oxygen therapy was successful in the treatment of patients with chronic recurrent osteomyelitis of the mandible. Therefore, it is an treatment option which can avoid ablative surgery in some cases.

Publication Types: Comparative Study English Abstract
PMID: 17786490 [PubMed - indexed for MEDLINE]

45: Neurochem Res. 2008 Jan;33(1):185-93. Epub 2007 Aug 22.

Rapid decrease of GAD 67 content before the convulsion induced by hyperbaric oxygen exposure.

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Exposure to hyperbaric oxygen (HBO) can lead to seizures, the etiology of which is not completely understood. Glutamic acid decarboxylase (GAD) plays a very important role in maintaining excitatory-inhibitory balance of the central nervous system (CNS). In the present study we investigated the effects of HBO on the activity and content of GAD in vivo and in primarily cultured neurons to probe in detail its effect on the formation of convulsion induced by HBO exposure. The results obtained from in vivo and in vitro experiments were identical. In the latent period before the onset of seizure, the GAD activity followed a rise-and-fall pattern with the prolongation of HBO exposure. At the time of the onset of seizure, GAD activity descended to the normal level. Besides, in the latent period, GAD content also reduced. Such reduction came from a GAD subtype, GAD67, while the content of another GAD subtype, GAD65, remained almost unchanged. Our investigations indicated that GAD is indeed an enzyme highly sensitive to the effect of HBO exposure. The rapid reduction in GAD67 content may be very closely related to seizures induced by HBO exposure.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17712632 [PubMed - indexed for MEDLINE]

46: Neurochem Res. 2008 Jan;33(1):160-6. Epub 2007 Aug 21.

Exposure time related oxidative action of hyperbaric oxygen in rat brain.

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Hyperbaric oxygen (HBO) is known to cause oxidative stress in several organs and tissues. Due to its high rate of blood flow and oxygen consumption, the brain is one of the most sensitive organs to this

effect. The present study was performed to elucidate the relation of HBO exposure time to its oxidative effects in rats' brain cortex tissue. For this purpose, 49 rats were randomly divided into five groups. Except the control group, study groups were subjected to three atmospheres HBO for 30, 60, 90, and 120 min. Their cerebral cortex layer was taken immediately after exposure and used for analysis. Thiobarbituric acid reactive substances (TBARS), superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), and nitrate-nitrite (NOX) levels were determined. TBARS and SOD levels were found to increase in a time-dependent manner. GSH-Px activity reflected an inconsistent course. NOX levels were found to be increased only in the 120 min exposed group. The results of this study suggests that HBO induced oxidative effects are strongly related with exposure time.

PMID: 17710543 [PubMed - indexed for MEDLINE]

47: *Ann Fr Anesth Reanim.* 2007 Oct;26(10):862-4. Epub 2007 Aug 13.

[Hyperbaric oxygen therapy as an adjunctive treatment for acute mediastinitis due to oesophageal perforation: a case report]

[Article in French]

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In spite of antibiotic treatment, of progress of resuscitation and surgery, acute posterior mediastinitis remains associated to a high mortality. We report a case of man with posterior mediastinitis by performing of the cervical oesophagus. While his state remained still with the classic treatment, the contribution of the hyperbaric oxygen therapy quickly improved his state. This therapeutics in addition in the usual treatment could improve the survival in this affection.

Publication Types: Case Reports English Abstract

PMID: 17706397 [PubMed - indexed for MEDLINE]

48: *Zhongguo Dang Dai Er Ke Za Zhi.* 2007 Aug;9(4):308-12.

[Effect of hyperbaric oxygen therapy administered at different time on white matter damage following hypoxic-ischemic brain damage in neonatal rats]

[Article in Chinese]

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OBJECTIVE: A recent study has suggested that hyperbaric oxygen (HBO) therapy administered within 3 hrs following hypoxic-ischemic brain damage (HIBD) may alleviate brain white matter damage (WMD) in neonatal rats. However it is unclear whether a delayed HBO therapy (more than 3 hrs following HIBD) has neuroprotective effects in neonatal rats. This study aimed to explore the effect

of HBO therapy administered at different time points following HIBD on WMD in neonatal rats. METHODS: The HIBD model was prepared according to the Rice-Vannucci procedure in 7-day-old Sprague-Dawley rats. HBO therapy was administered at 3, 6, 12, 24 or 72 hrs after HIBD, once daily for consecutive 7 days. T-maze test, the foot-fault test and the radial arm maze test were performed after 14 days of HIBD. Myelin basic protein (MBP) in the callositas and corpora striata was examined by immunohistochemical method 28 days after HIBD. RESULTS: The rats receiving HBO therapy at 3, 6 and 12 hrs after HIBD performed significantly better in the T-maze test, the radial arm maze test and the foot-fault test than the untreated HIBD rats. There were no significant differences in the behavioral test results between the HBO-treated groups administered HBO at 24 and 72 hrs after HIBD and the untreated HIBD group. The MBP expression in the HBO-treated groups treated within 12 hrs after HIBD was significantly higher than that in the untreated HIBD group ($P < 0.05$). When the HBO therapeutic window was delayed to 24 hrs after HIBD, there were no significant differences in the MBP expression between the HBO-treated and the untreated HIBD groups. CONCLUSIONS: HBO therapy administered within 12 hrs following HIBD can alleviate brain WMD in neonatal rats, but the efficacy of HBO therapy administered 24 hrs after HIBD does not appear to be satisfactory.

Publication Types: English Abstract Research Support, Non-U.S. Gov't

PMID: 17706027 [PubMed - indexed for MEDLINE]

49: *Am J Respir Crit Care Med.* 2007 Nov 15;176(10):1001-6. Epub 2007 Aug 16.

Apolipoprotein E genotype and response of carbon monoxide poisoning to hyperbaric oxygen treatment.

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RATIONALE: Hyperbaric oxygen (HBO2) reduced the incidence of cognitive sequelae 6 weeks after carbon monoxide (CO) poisoning compared with normobaric oxygen (NBO2). The apolipoprotein (APOE) epsilon4 allele predicts unfavorable neurologic outcome after brain injury and stroke. OBJECTIVES: To assess the effects of the epsilon4 allele on 6-week cognitive sequelae after CO poisoning. METHODS: We tested APOE genotypes in 86 of 152 CO-poisoned patients from our randomized trial. Logistic regression was used to control for risk factors while testing for effects with the epsilon4 allele or interactions with epsilon4 and treatment on 6-week and 6- and 12-month cognitive sequelae. MEASUREMENTS AND MAIN RESULTS: We enrolled 86 patients: 44 received HBO2 and 42 NBO2 therapy. A total of 31 (36%) patients had at least one epsilon4 allele. Six-week cognitive sequelae rates for patients treated with

HBO2 and NBO2, respectively: epsilon4 allele absent, 11% (3/27) and 43% (12/28); epsilon4 allele present, 35% (6/17) and 29% (4/14). The epsilon4 allele was not associated with 6-week cognitive sequelae, 27% (15/55) without and 32% (10/31) with the epsilon4 allele ($P = 0.323$). The interaction between the epsilon4 allele and treatment was significantly associated with 6-week cognitive sequelae ($P = 0.048$). The interaction between the epsilon4 allele and treatment was not associated with 6- and 12-month cognitive sequelae. CONCLUSIONS: HBO2 therapy reduces cognitive sequelae after CO poisoning in the absence of the epsilon4 allele. Because apolipoprotein genotype is unknown at the time of poisoning, we recommend that patients with acute CO poisoning receive HBO2. Publication Types: Randomized Controlled Trial Research Support, Non-U.S. Gov't PMID: 17702967 [PubMed - indexed for MEDLINE]

50: Clin Physiol Funct Imaging. 2007 Sep;27(5):268-74.

Cardiovascular changes induced by cold water immersion during hyperbaric hyperoxic exposure.

Boussuges A, Molenat F, Grandfond A, Regnard J, Wolf JP, Galland F, Robinet C.

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The present study was designed to assess the cardiac changes induced by cold water immersion compared with dry conditions during a prolonged hyperbaric and hyperoxic exposure (ambient pressure between 1.6 and 3 ATA and PiO_2 between 1.2 and 2.8 ATA). Ten healthy volunteers were studied during a 6 h compression in a hyperbaric chamber with immersion up to the neck in cold water while wearing wet suits. Results were compared with measurements obtained in dry conditions. Echocardiography and Doppler examinations were performed after 15 min and 5 h. Stroke volume, left atrial and left ventricular (LV) diameters remained unchanged during immersion, whereas they significantly fell during the dry session. As an index of LV contractility, percentage fractional shortening remained unchanged, in contrast to a decrease during dry experiment. Heart rate (HR) significantly decreased after 5 h, although it had not changed during the dry session. The changes in the total arterial compliance were similar during the immersed and dry sessions, with a significant decrease after 5 h. In immersed and dry conditions, cardiac output was unchanged after 15 min but decreased by almost 20% after 5 h. This decrease was related to a decrease in HR during immersion and to a decrease in stroke volume in dry conditions. The hydrostatic pressure exerted by water immersion on the systemic vessels could explain these differences. Indeed, the redistribution of blood volume towards the compliant thoracic bed may conceal a part of hypovolaemia that developed in the course of the session.

Publication Types: Comparative Study Research Support, Non-U.S. Gov't PMID: 17697022 [PubMed - indexed for MEDLINE]

51: J Pain. 2007 Dec;8(12):924-30. Epub 2007 Aug 9.

Hyperbaric oxygen treatment is comparable to acetylsalicylic acid treatment in an animal model of arthritis.

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Approximately 1 in 5 adults in the United States are affected by the pain, disability, and decreased quality of life associated with arthritis. The primary focus of treatment is on reducing joint inflammation and pain through a variety of pharmacotherapies, each of which is associated with various side effects. Hyperbaric oxygen therapy is an alternative treatment that has been recommended to treat a variety of inflammatory diseases, ranging from chronic brain injury to exercise induced muscle soreness. The purpose of this set of experiments was to explore the effect of hyperbaric oxygen therapy on joint inflammation and mechanical hyperalgesia in an animal model of arthritis, and compare these effects to treatment with aspirin. Hyperbaric oxygen therapy significantly reduced both joint inflammation and hyperalgesia. As compared with aspirin treatment, hyperbaric treatment was equally as effective in decreasing joint inflammation and hyperalgesia. PERSPECTIVE: This article reports that hyperbaric oxygen treatment decreases pain and inflammation in an animal model of arthritis. The effect of hyperbaric oxygen treatment is very similar in magnitude to the effect of acetylsalicylic acid treatment. Potentially, hyperbaric oxygen could be used to treat pain and inflammation in patients with arthritis.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17690013 [PubMed - indexed for MEDLINE]

52: Eur J Appl Physiol. 2007 Nov;101(5):571-6. Epub 2007 Aug 3.

Hyperbaric oxygen pretreatment reduces the incidence of decompression sickness in rats.

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We have previously hypothesised that the number of bubbles evolving during decompression from a dive, and therefore the incidence of decompression sickness (DCS), might be reduced by pretreatment with hyperbaric oxygen (HBO). The inert gas in the gas micronuclei would be replaced by oxygen, which would subsequently be consumed by the mitochondria. This has been demonstrated in the transparent prawn. To investigate whether our hypothesis holds for mammals, we pretreated rats

with HBO at 304, 405, or 507 kPa for 20 min, after which they were exposed to air at 1,013 kPa for 33 min and decompressed at 202 kPa/min. Twenty control rats were exposed to air at 1,013 kPa for 32 min, without HBO pretreatment. On reaching the surface, the rat was immediately placed in a rotating cage for 30 min. The animal's behaviour enabled us to make an early diagnosis of DCS according to accepted symptoms. Rats were examined again after 2 and 24 h. After 2 h, 65% of the control rats had suffered DCS (45% were dead), whereas 35% had no DCS. HBO pretreatment at 304, 405 and 507 kPa significantly reduced the incidence of DCS at 2 h to 40, 40 and 35%, respectively. Compared with the 45% mortality rate in the control group after 24 h, in all of the pretreated groups this was 15%. HBO pretreatment is equally effective at 304, 405 or 507 kPa, bringing about a significant reduction in the incidence of DCS in rats decompressed from 1,013 kPa.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17674026 [PubMed - indexed for MEDLINE]

53: Graefes Arch Clin Exp Ophthalmol. 2008 Jan;246(1):93-8. Epub 2007 Aug 3.

Slowing the degenerative process, long lasting effect of hyperbaric oxygen therapy in retinitis pigmentosa. Vingolo EM, Rocco M, Grenga P, Salvatore S, Pelcia P.

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BACKGROUND: Retinitis pigmentosa (RP) therapy is still an unsolved challenge. Recent reports have underlined that hyperbaric oxygen (HBO) therapy could play a role in slowing the retinal degenerative process. The aim of this study was to assess the efficacy of HBO therapy on visual function in RP patients. **METHODS:** We performed a single-center, comparative, longitudinal case-controlled randomized clinical trial, which lasted 10 years. We randomly divided RP patients into two groups. Group 1, the control group, consisted of 44 RP patients (21 males and 23 females; mean age 35.5) who took Vitamin A. Group 2, with 44 RP patients (21 males and 23 females; mean age 35.02), underwent HBO therapy. No statistically significant difference was found at the beginning of the study between the two groups. We compared the results concerning visual acuity, Goldmann perimetry, static perimetry Humphrey field analyzer (HFA), and electroretinogram (ERG) obtained in the two groups at 5 and 10 years follow-up. Statistical analysis was performed with Kaplan-Meier life-table with the evaluation of log-rank coefficient. **RESULTS:** At 5 year follow-up, 87.5% of group 2 patients preserved 80% of the initial visual acuity, while the same result was achieved in only 70.4% of group 1 patients ($X(2) = 8.2$; $p < 0.01$); at 10 year follow-up, 63.33% of group 2 patients preserved 80% of the initial visual acuity, while the same percentage of residual visual

acuity was maintained in 40% of group 1 patients ($X(2) = 3.22$; $p = 0.05$). At 10 year follow-up, Goldmann perimetry (target I4e) did not change in 31.6% of group 2 and in 10.5% of group 1; evaluation of mean defect (MD) with static perimetry HFA showed that 53% of HBO patients had 80% of residual mean sensitivity compared to 23.5% of the control group patients ($X(2) = 4.72$; $p = 0.035$). ERG b-wave mean values at the end of the protocol were significantly higher in the HBO treated group ($X(2) = 4.53$; $p = 0.013$). **CONCLUSION:** Our study underlines that HBO therapy can be a safe alternative approach to RP patients, contributing to the stabilization of their visual function concerning visual acuity, visual field, and ERG responses while waiting for a definite cure.

Publication Types: Comparative Study
Randomized Controlled Trial
PMID: 17674017 [PubMed - indexed for MEDLINE]

54: J Drug Target. 2007 Aug-Sep;15(7-8):487-95.

Evaluation of the effect of SMA-pirarubicin micelles on colorectal cancer liver metastases and of hyperbaric oxygen in CBA mice.

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Department of Surgery, Austin Health Hospital, University of Melbourne, Heidelberg, Vic., Australia. Tetrahydropyranlyladiamycin (THP or pirarubicin) destroys tumors via several mechanisms; one of which involves the production of ROS that requires molecular oxygen for its generation. SMA forms stable self-assembled associated micelles with pirarubicin (SMA-pirarubicin), and confers macromolecular characteristics to pirarubicin. This micellar macromolecular drug is selectively delivered to solid tumors via the EPR effect and its preferential tumor accumulation suppresses the systemic toxicity whilst its prolonged high concentration at the site of tumor enhances its efficacy much higher compared to free pirarubicin. Administration of SMA-pirarubicin micelle under HBO can further enhance the delivery of molecular oxygen that facilitates tumor selective generation of ROS, thus augmenting its antitumor potency. In this study, we evaluated the efficacy of SMA-pirarubicin micelles either as single drug or in combination with HBO in a mouse metastatic colorectal cancer model. At or below the maximum tolerated dose, SMA-pirarubicin remarkably reduced metastatic tumor nodules and it was far more effective than free pirarubicin. The data also suggests a potential benefit of combined therapy of HBO with micellar anthracyclins.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17671895 [PubMed - indexed for MEDLINE]

55: J Am Coll Cardiol. 2007 Jul 31;50(5):397-405. Epub 2007 Jul 16.

Comment in: J Am Coll Cardiol. 2007 Jul 31;50(5):406-8.

Acute Myocardial Infarction with Hyperoxemic Therapy (AMIHOT): a prospective, randomized trial of intracoronary hyperoxemic reperfusion after percutaneous coronary intervention.

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OBJECTIVES: This study sought to determine whether hyperoxemic reperfusion with aqueous oxygen (AO) improves recovery of ventricular function after percutaneous coronary intervention (PCI) for acute myocardial infarction (AMI).

BACKGROUND: Hyperbaric oxygen reduces myocardial injury and improves ventricular function when administered during ischemia-reperfusion.

METHODS: In a prospective, multicenter study, 269 patients with acute anterior or large inferior AMI undergoing primary or rescue PCI (<24 h from symptom onset) were randomly assigned after successful PCI to receive hyperoxemic reperfusion (treatment group) or normoxemic blood autoreperfusion (control group). Hyperoxemic reperfusion was performed for 90 min using intracoronary AO. The primary end points were final infarct size at 14 days, ST-segment resolution, and delta regional wall motion score index of the infarct zone at 3 months. **RESULTS:** At 30 days, the incidence of major adverse cardiac events was similar between the control and AO groups (5.2% vs. 6.7%, $p = 0.62$). There was no significant difference in the incidence of the primary end points between the study groups. In post-hoc analysis, anterior AMI patients reperfused <6 h who were treated with AO had a greater improvement in regional wall motion (delta wall motion score index = 0.54 in control group vs. 0.75 in AO group, $p = 0.03$), smaller infarct size (23% of left ventricle in control group vs. 9% of left ventricle in AO group, $p = 0.04$), and improved ST-segment resolution compared with normoxemic controls.

CONCLUSIONS: Intracoronary hyperoxemic reperfusion was safe and well tolerated after PCI for AMI, but did not improve regional wall motion, ST-segment resolution, or final infarct size. A possible treatment effect was observed in anterior AMI patients reperfused <6 h of symptom onset.

Publication Types: Multicenter Study
Randomized Controlled Trial Research Support,
Non-U.S. Gov't

PMID: 17662390 [PubMed - indexed for MEDLINE]

56: Dis Colon Rectum. 2007 Sep;50(9):1466-74.

Radiation-induced sequelae affecting the continence organ: incidence, pathogenesis, and treatment.

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INTRODUCTION: Incontinence is a late complication that causes symptoms years after radiation treatment and is difficult to deal with; it poses a particular challenge for care-providing physicians. **REVIEW:** This review looks at our current knowledge of the incidence, symptoms, and treatment of fecal incontinence induced by radiation treatment. An approximate estimation based on retrospective data suggests an incidence of fecal incontinence of up to one-third of patients. The mechanism that causes incontinence are changes in anal resting tone, squeeze pressure, and rectal volume or rectal compliance. The other associated aspects of incontinence include such further disorders as proctitis, colitis, and other disturbances involving the lower digestive tract. The therapeutic options mainly comprise the treatment of associated aspects, such as proctitis or diarrhea. **CONCLUSION:** Surgical treatment should be the absolute exception. If the creation of a stoma is being considered, a resective procedure offering freedom from symptoms seems to be the more advantageous option.

Publication Types: Review

PMID: 17661143 [PubMed - indexed for MEDLINE]

57: J Clin Nurs. 2007 Aug;16(8):1454-9.

An exploration of patients' memories and experiences of hyperbaric oxygen therapy in a multiplace chamber.

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AIMS AND OBJECTIVES: To examine patients' memories and experiences of hyperbaric oxygen therapy in a multiplace chamber of a hyperbaric medicine unit in Australia. **BACKGROUND:** There is minimal literature available documenting patients' feelings and memories of hyperbaric oxygen therapy, particularly in a multiplace chamber. **DESIGN:** Exploratory. **METHODS:** A convenience sample of seven non-emergency patients was interviewed separately at the conclusion of their multi-session therapy. A semi-structured approach elicited in-depth information regarding their experiences and memories of the hyperbaric oxygen therapy. Interviews were 30-45 minutes long and audiotaped for transcription and analysis. Field notes were also used to note non-verbal cues and other observations not evident from the audio material. Data collection ceased when data saturation was evident from the interviews. Interview transcripts were examined using a content analysis approach, with textual coding and thematic development. **RESULTS:** Issues derived from the data included: the uncertainty of the treatment; the noise and cold of the chamber; the discomfort of the mask or hood; and the boredom. Participant responses to the therapy related to previous noxious experiences and the individual's personality. **CONCLUSIONS:** This information was used to examine ways of reducing any negative feelings and experiences associated with hyperbaric

oxygen therapy, thus improving the service provided to patients. RELEVANCE TO CLINICAL PRACTICE: Identification of these stressors and related issues may also enable subsequent development of a risk-stratification instrument to predict patients who do not complete treatment. PMID: 17655533 [PubMed - indexed for MEDLINE]

58: *Angiology*. 2007 Aug-Sep;58(4):429-34. Epub 2007 Jul 24.

Autologous bone marrow transplantation and hyperbaric oxygen therapy for patients with thromboangiitis obliterans.

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Many patients suffering from severe ischemic limb disease inevitably experience amputation, despite intensive therapies. Sympathectomy and hyperbaric oxygen therapy are optional therapies for patients with peripheral circulation disorders. Recently, several clinical studies have established that implantation of bone marrow-mononuclear cells into ischemic limbs increases collateral vessel formation. In the present study, autologous implantation of bone marrow-mononuclear cells was prescribed to 7 patients with ischemic limbs because of peripheral arterial disease. Although the extent of the improvement was not consistent among the 7 cases, all of the patients experienced some improvement in their symptoms. Transcutaneous oxygen partial pressure measured in a hyperbaric chamber increased in 5 patients. No side effects were observed. In conclusion, combined use of autologous bone marrow transplantation and hyperbaric oxygen therapy may be safe and effective for achievement of therapeutic angiogenesis.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17652224 [PubMed - indexed for MEDLINE]

59: *Orv Hetil*. 2007 Jul 29;148(30):1415-20.

Comment in: *Orv Hetil*. 2007 Oct 28;148(43):2056-7; author reply 2057.

[The effect of oxygenation on the biological behaviour of tumours]

[Article in Hungarian]

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Malignant tumours often display hypoxic tissue areas where the oxygen tension is < 7 mm Hg. Studies in this field have proved that the hypoxic state boosts tumour progression and aggressive behaviour. In tissue culture experiments "in vitro" oxygenation was found to inhibit in itself the proliferation of cells of healthy tissues as well as benign and malignant tumours. It is a very important observation from oncotherapeutic point of view that in the presence of partial oxygen pressure < 2.5 mm Hg the radiosensitivity decreases (intrinsic radioresistance).

Most of the anticancer drugs (cytostatics) are also ineffective in hypoxic tumours (chemoresistance). The same is true for photodynamic treatments in oxygen deficiency or hypoxia. From time to time attempts based on these experimental and clinical observations are made to use oxygenation either as an adjuvant or an independent treatment in tumour patients. The most frequent treatment forms are: inhalation of oxygen gas (hyperbaric oxygen therapy), use of oxygen saturated water either in water or drinking cure. Recent international studies unanimously confirm the beneficial effect of oxygen intake on therapy, radio- and chemosensitization. The widespread erythropoietin treatment underlines the significance of oxygenation in tumour therapy. It seems reasonable to extend the preliminary studies on the tumour inhibitory, radio- and chemosensitizing effect of oxygenation to large study populations in major medical institutes in Hungary.

Publication Types: English Abstract Review

PMID: 17631480 [PubMed - indexed for MEDLINE]

60: *J Gastrointest Surg*. 2007 Aug;11(8):1008-15.

Hyperbaric oxygen therapy reduces severity and improves survival in severe acute pancreatitis.

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Severe acute pancreatitis is characterized by pancreatic necrosis, resulting in local and systemic inflammation. Hyperbaric oxygen (HBO) therapy modulates inflammation, but has not been extensively studied in pancreatitis. This study investigates the effects of HBO in a rat model of severe acute pancreatitis. Sixty-four rats were induced with severe pancreatitis using 4% sodium taurocholate and randomized to HBO treatment or control. HBO was commenced 6 h after induction (100% oxygen at 2.5 atmospheres for 90 min) and continued every 12 h for a maximum of eight treatment episodes. Surviving animals were killed at 7 days. Severity of pancreatitis was graded macroscopically and microscopically. Lung edema was calculated using wet and dry lung weights. Macroscopic and microscopic severity scores (mean +/- SE) of HBO-treated animals with pancreatitis (8.3 +/- 0.7; 9.6 +/- 0.4) were lower than those of controls (10.5 +/- 0.5; 11.1 +/- 0.4) (p = 0.02 and p = 0.03, respectively). The HBO-treated group had reduced pancreatic necrosis compared to controls (40 +/- 4% vs. 54 +/- 4%; p = 0.003). There was no difference in pulmonary edema between the groups. Median survival in the HBO-treatment group was 51 h, compared to 26 h in controls. Day-7 survival was significantly improved in the HBO-treated animals compared to controls (40% vs. 27%; p = 0.04). HBO therapy reduces overall severity, decreases the extent of necrosis, and improves survival in severe acute pancreatitis.

PMID: 17623267 [PubMed - indexed for MEDLINE]

61: *Adv Skin Wound Care*. 2007 Jul;20(7):382-8.
Hyperbaric oxygen therapy mediates increased nitric oxide production associated with wound healing: a preliminary study.

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OBJECTIVE: The objective of this preliminary study was to document general somatic and wound nitric oxide (NO) levels during and after hyperbaric oxygen therapy (HBOT). **DESIGN:** The study evaluated 6 chronic wound patients that responded favorably to HBOT treatment (20 treatments; 2.0 atmosphere absolute [ATA] x 90 minutes). Successful HBOT was associated with increased wound granulation tissue formation and significantly improved wound closure. Wound fluid and fasting plasma samples were obtained for measurement of nitrate and nitrite (NO_x), the stable oxidation products of NO; plasma L-arginine (L-Arg); and asymmetric dimethylarginine (ADMA). NO_x measurements were obtained before treatment (baseline), after 10 and 20 treatments, and at 1 and 4 weeks after therapy. **RESULTS:** Wound fluid NO_x levels tended to increase during treatments, were significantly elevated at 1 and 4 weeks after therapy, and correlated with reductions in wound area. Plasma L-Arg and ADMA were unchanged during and after HBOT. **CONCLUSION:** This preliminary study documents a significant increase in local wound NO levels (by NO_x measurements) after successful HBOT and suggests that this mechanism may be an important factor in promoting enhanced wound healing and wound closure associated with this therapy.

Publication Types: Controlled Clinical Trial
Research Support, N.I.H., Extramural

PMID: 17620739 [PubMed - indexed for MEDLINE]

62: *Int J Oral Maxillofac Surg*. 2007 Sep;36(9):783-7. Epub 2007 Jul 5.

Comment in: *Int J Oral Maxillofac Surg*. 2008 Apr;37(4):404.

The influence of hyperbaric oxygen on the outcome of patients treated for osteoradionecrosis: 8 year study.

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This study was a retrospective review of treatment outcomes of osteoradionecrosis (ORN) of the mandible over an 8-year period, with specific reference to the role of hyperbaric oxygen therapy (HBOT). The presentation and management of 23 patients treated for ORN was studied by categorising them into three grades according to the severity of clinical and radiographic involvement. At presentation there were 13 patients with grade I ORN, six patients with grade II ORN and four

patients with grade III ORN. HBOT was given to 10 patients in the grade I group, four patients in the grade II group and two patients in the grade III group. Overall eight patients (62%) with grade I, three patients (50%) with grade II and two patients (50%) with grade III were cured. In the patients who received HBOT the cure rate was 12.5% whilst in those without HBOT it was 86%. Although the cohort was small it seems that HBOT was of little benefit. HBOT is demanding for patients and has cost implications for the NHS; hence further clinical outcome data are urgently required with regard to its role in the management of ORN.

PMID: 17614258 [PubMed - indexed for MEDLINE]

63: *Clin Podiatr Med Surg*. 2007 Jul;24(3):529-46, x.
Bioengineered alternative tissues and hyperbaric oxygen in lower extremity wound healing.

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With the advent and clinical application of recombinant chemical and cellular mediators of wound healing and a better understanding of the importance of serial debridement, most foot wounds can be healed with little morbidity. Despite these advances, there remains the recalcitrant wound for which more heroic efforts seem warranted. For these patients, advanced wound healing technologies, orthobiologics, and bioengineered alternative tissues may tilt the scales in the direction of definitive wound closure.

Publication Types: Review

PMID: 17613390 [PubMed - indexed for MEDLINE]

64: *Eur J Pharmacol*. 2007 Sep 10;570(1-3):229-34. Epub 2007 Jun 12.

Prevention and suppression of pyrogenic fever in rabbits by hyperbaric oxygen.

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Current investigation was to determine whether hyperbaric oxygen had an effect on the febrile responses to systemic administration of lipopolysaccharide. An intravenous dose of lipopolysaccharide (2 microg/kg) caused an increase in core temperature accompanied by both plasma tumor necrosis factor-alpha and hypothalamic prostaglandin E(2) overproduction in rabbits. Administering hyperbaric oxygen (100% at 253 kPa) but not normobaric oxygen (100% at 101 kPa), once a day for consecutive 7 days prior to or 1 h after injecting lipopolysaccharide significantly reduced the lipopolysaccharide-induced elevation of both core temperature and circulating tumor necrosis factor-alpha. As compared to those of the simultaneous administration of normobaric air and lipopolysaccharide, administering hyperbaric oxygen or air plus lipopolysaccharide simultaneously had lesser febrile effects in terms of core temperature

elevation, tumor necrosis factor-alpha overproduction and hypothalamic prostaglandin E(2) accumulation. However, the febrile responses produced by simultaneous application of normobaric oxygen plus lipopolysaccharide were not significantly different from those of normobaric air plus lipopolysaccharide. The results indicate that hyperbaric oxygen, and to some extent hyperbaric air, may cause prevention and suppression of pyrogenic fever by reducing overproduction of both circulating tumor necrosis factor-alpha and hypothalamic prostaglandin E(2).

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17610874 [PubMed - indexed for MEDLINE]

65: Clin Exp Pharmacol Physiol. 2007 Aug;34(8):787-91.

Time-dependent course of hyperbaric oxygen-induced oxidative effects in rat lung and erythrocytes.

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1. The oxygen toxicity of hyperbaric oxygen (HBO) treatment has long been of interest. There is an extensive amount of information regarding the role oxidative stress plays after HBO exposure in different tissues, but the question of the persistence of this oxidative effect has not been thoroughly elucidated. 2. The present study was performed to elucidate the persistence of the oxidative effects of HBO on rat lungs and erythrocytes after they had been subjected to 100% oxygen exposure. 3. Rats were divided into five groups. All animals, except those in the control group, were subjected to 100% oxygen for 2 h at 3 ATA (identical with 300 kPa). Rats were killed at 30, 60, 90 or 120 min after exposure and thiobarbituric acid-reactive substances (TBARS) levels and the activity of superoxide dismutase (SOD) and glutathione peroxidase (GPx) were determined. 4. Thiobarbituric acid-reactive substances levels and SOD and GPx levels were found to be significantly increased in lung tissue up to 60 min after exposure. Superoxide dismutase activity persisted at significantly high values for 90 min after exposure in erythrocytes and the lung. The TBARS levels in erythrocytes were also significantly higher for 60 min, whereas increased GPx activity was observed to persist for only 30 min. 5. The oxidative effect of HBO exposure declines to physiological levels within 90 min at most for erythrocytes and in lung tissue in rats. Further studies should focus on the molecular mechanisms that can be activated during this time interval.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17600558 [PubMed - indexed for MEDLINE]

66: Otolaryngol Head Neck Surg. 2007 Jul;137(1):176-7.

Comment on: Otolaryngol Head Neck Surg. 2006 Dec;135(6):838-43.

Radionecrosis or tumor recurrence after radiation: importance of choice for HBO.

Narozny W, Kuczkowski J, Mikaszewski B.

Publication Types: Comment Letter

PMID: 17599595 [PubMed - indexed for MEDLINE]

67: Eur J Neurol. 2007 Jul;14(7):777-82.

Diffusion-tensor MR imaging for evaluation of the efficacy of hyperbaric oxygen therapy in patients with delayed neuropsychiatric syndrome caused by carbon monoxide inhalation.

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The purpose of this study is to assess the efficacy of hyperbaric oxygen therapy (HBOT) in patients with delayed neuropsychiatric syndrome (DNS) caused by carbon monoxide (CO) inhalation using diffusion tensor magnetic resonance (MR) imaging and neuropsychological test. Conventional and diffusion tensor brain MR imaging exams were performed in six patients with DNS immediately before and 3 months after the HBOT to obtain fractional anisotropy (FA) values. Six age- and sex-matched normal control subjects also received MR exams for comparison. Mini-Mental State Examination (MMSE) was also performed in patients immediately before and 3 months after the HBOT. A significantly higher mean FA value was found in control subjects as compared with the patients both before and 3 months after the HBOT ($P < 0.001$). The mean FA value 3 months after the HBOT was also significantly higher than that before the HBOT in the patient group ($P < 0.001$). All of the patients regained full scores in the MMSE 3 months after the HBOT. Diffusion tensor MR imaging can be a quantitative method for the assessment of the white matter change and monitor the treatment response in patients of CO-induced DNS with a good clinical correlation. HBO may be an effective therapy for DNS.

Publication Types: Evaluation Studies Research Support, Non-U.S. Gov't

PMID: 17594334 [PubMed - indexed for MEDLINE]

68: Hear Res. 2007 Aug;230(1-2):88-92. Epub 2007 May 24.

Hyperbaric oxygenation with corticoid in experimental acoustic trauma.

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Among possible therapies after acute acoustic trauma, hyperbaric oxygenation (HBO) combined with corticoid was found effective in several animal studies. Such evidence was obtained for moderate 20-

25 dB losses. The aim of this study was to further assess this therapy for noise-induced hearing losses greater than previously examined. Sixty-five ears from thirty-six adult guinea pigs were used. Acoustically evoked responses from intracranial electrodes chronically implanted bilaterally into the ventral cochlear nucleus were used to assess acoustic sensitivity alterations. Trauma sound was a third-octave noise-band around 8 kHz presented bilaterally at 115 dB SPL for 45 min. One control group received no treatment, one group was treated with HBO only and another with corticoid only both starting within one day post-trauma, two groups were treated with both HBO and corticoid starting for one group within one day post-trauma, and for the second group at 6 days post-trauma. Acoustic thresholds were measured between the 6th and the 16th days after acoustic trauma. Animals treated with HBO alone or corticoid alone did not differ from controls. Combined HBO and corticoid therapy provided significant protection from noise-induced loss of auditory thresholds, especially when started one day post-exposure. Hearing loss reduction induced by HBO combined with corticoid was of similar magnitude (about 10-15 dB) as in previous studies although the induced hearing loss was considerably greater (about 40 dB instead of 20-25 dB). PMID: 17590548 [PubMed - indexed for MEDLINE]

69: J Oral Maxillofac Surg. 2007 Jul;65(7):1321-7.
Comment in: J Oral Maxillofac Surg. 2007 Jul;65(7):1275-6.
Hyperbaric oxygen treatment and bisphosphonate-induced osteonecrosis of the jaw: a case series.
Freiberger JJ, Padilla-Burgos R, Chhoeu AH, Kraft KH, Boneta O, Moon RE, Piantadosi CA.
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PURPOSE: Bisphosphonate (BP)-associated osteonecrosis of the jaw (ONJ) is an emerging problem with few therapeutic options. Our pilot study of BP-ONJ investigated a possible role for hyperbaric oxygen (HBO(2)) therapy. PATIENTS AND METHODS: A total of 16 patients, ranging in age from 43 to 78 years, with BP-ONJ were treated with adjunctive HBO(2) between July 2003 and April 2006. Staging was based on the size and number of oral lesions. Clinical response after treatment and at distant follow-up; the odds of remission, stabilization, or relapse; and time to failure analysis were calculated. RESULTS: The median time on BP therapy before appearance of ONJ symptoms was 18 months, and that from symptom onset to HBO(2) therapy was 12 months. Fourteen of 16 patients (87.5%) improved in stage. The size and number of ONJ lesions were decreased after HBO(2) therapy ($P < .001$ and $P = .008$, respectively; Wilcoxon signed-rank test). Immediately after HBO(2) therapy, 7 of 16 patients (44%) were in remission and 8 (50%) had stabilized; however, stabilization without remission was sustained in only 2 patients. At follow-up, 10 of

the patients (62.5%) were still in remission or had stabilized. The 7 patients who continued on BP treatment during HBO(2) therapy had a shorter time to failure (8.5 months; 95% confidence interval [CI] = 7.1 to 9.8) than those who discontinued the drug (20.1 months; 95% CI = 17.5 to 23.9; $P = .006$ by the log-rank test). Clinical response was not associated with cancer type or malignancy remission status. CONCLUSIONS: Adjunctive HBO(2) therapy may benefit patients with BP-ONJ; however, the outcome is improved with cessation of BP administration.

PMID: 17577496 [PubMed - indexed for MEDLINE]

70: Shock. 2007 Oct;28(4):491-7.

Systemic and regional hemodynamic effects of high-dose epinephrine infusion in hypoxic piglets resuscitated with 100% oxygen.

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Shock and poor regional perfusion are common in asphyxiated neonates. We compared the systemic and regional hemodynamic effects of high-dose epinephrine (E) with those of dopamine combined with low-dose epinephrine (DE) infusions in a neonatal model of hypoxia-reoxygenation. Neonatal piglets (1-3 days, 1.5-2.5 kg) were acutely instrumented to continuously monitor systemic arterial pressure (SAP), pulmonary artery pressure, cardiac index (CI), and blood flows at the left common carotid, superior mesenteric, and renal arteries. Either epinephrine (1 microg.kg(-1).min(-1)) or dopamine (10 microg.kg(-1).min(-1)) and epinephrine (0.2 microg.kg(-1).min(-1)) were given for 2 h in hypoxic piglets resuscitated with 100% oxygen ($n = 8$ per group) in a randomized blinded fashion. Control piglets received hypoxia and reoxygenation but no catecholamine infusion ($n = 7$). Alveolar hypoxia (PaO₂, 33-37 mmHg) caused reduced CI (89-92 vs. 171-186 mL.kg(-1).min(-1) of baseline, $P < 0.05$), hypotension (SAP, 28-32 mmHg) with pH 7.05 to 7.10, and decreased regional flows. Upon reoxygenation, CI and SAP improved but gradually deteriorated to 131 to 136 mL.kg(-1).min(-1) and 41 to 49 mmHg at 2 h of reoxygenation, respectively. E and DE administration similarly improved CI (167 +/- 60 and 166 +/- 55 vs. 121 +/- 35 mL.kg(-1).min(-1) of controls) and SAP (53 +/- 7 and 56 +/- 10 vs. 39 +/- 8 mmHg of controls), respectively, and the pulmonary vascular resistance (vs. controls, all $P < 0.05$). Heart rate and pulmonary artery pressure were not different between groups. Systemic oxygen delivery and consumption were increased in E- and DE-treated groups with no difference in extraction ratio between groups. There were no differences in regional blood flows and oxygen delivery between groups. After hyperlactatemia with hypoxia, plasma lactate levels decreased with no difference between groups. Epinephrine given as the sole agent is as effective as

dopamine and low-dose epinephrine combined in treating shock and hypotension that follow the resuscitation of hypoxic neonatal piglets, with no reduction in regional perfusion.

Publication Types: Research Support, Non-U.S. Gov't

PMID: 17577139 [PubMed - indexed for MEDLINE]

71: *Neurochem Res.* 2007 Sep;32(9):1586-91. Epub 2007 Jun 13.

Pressure-related increase of asymmetric dimethylarginine caused by hyperbaric oxygen in the rat brain: a possible neuroprotective mechanism.

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A decrease in nitric oxide availability in the brain tissue due to the inhibition of nitric oxide synthase (NOS) activity during the early phases of hyperbaric oxygen (HBO) exposure was found to be involved in hyperoxic vasoconstriction leading to reduced regional cerebral blood flow. We hypothesized that the concentration of asymmetric dimethylarginine (ADMA), an endogenous inhibitor of nitric oxide synthase (NOS), may be an important factor during this hyperoxic vasoconstriction state. Rats were exposed to 1, 2 and 3 atmospheres pure oxygen for two hours. A fourth group of animals served as control. Asymmetric dimethylarginine, L-Arginine and nitrite/nitrate (NO_x) concentrations were measured from deproteinized rat brain cytosols. In rat brains exposed to 3 atmospheres O₂, ADMA and L-Arginine levels were found to be significantly higher and NO_x significantly lower than control levels. Additionally, statistically significant correlations between ADMA and L-Arginine, and ADMA and NO_x concentrations were detected. In conclusion, this is the first study indicating increased ADMA levels in rat brains exposed to HBO. The simultaneously decreased NO_x values suggest that ADMA elevation resulted in NOS inhibition and therefore may be responsible for the early phase hyperoxic vasoconstriction.

PMID: 17564837 [PubMed - indexed for MEDLINE]

72: *J Neurosci Methods.* 2007 Aug 30;164(2):312-9. Epub 2007 May 5.

Reliability of the microdialysis pump CMA 107 under hyperbaric conditions.

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OBJECTIVE: Microdialysis measurements of extracellular substances under hyperbaric conditions were manifold used in several investigations. However, to our knowledge there is no analysis, which verified the applicability of microdialysis pumps under hyperbaric conditions. Thus, a goal of this study was to investigate the reliability of the

microdialysis pump (MDP) CMA 107 in a hyperbaric environment up to 2.4bar absolute pressure. **METHODS:** The CMA 107 with a perfusion rate of 2µL/min was stored in a decompression chamber. The ambient pressure was increased from 1 to 2.4bar absolute within 15min, maintained for 90min and then decreased to 1bar within 15min. The vials were changed every 15min, weighed before as well as after collecting the sample volume and the absolute recovery of glutamate, pyruvate, lactate, glucose and glycerol was determined. The same setup was performed under normobaric conditions. **RESULTS:** The pumping capacity was 1.7% greater than expected under normobaric conditions, 36.5% less than expected in the compression phase, 10.5% less than expected in the isopression phase and 26.3% greater than expected in the decompression phase under hyperbaric conditions. The absolute recoveries under hyperbaric conditions were affected during the isopression phase with a deviation from -6 to +20% compared to normobaric environments. **CONCLUSION:** The study demonstrated that an absolute ambient pressure up to 2.4bar did influence the pumping capacity and the reliability of the absolute recovery. These results need to be taken into consideration when interpreting microdialysis studies performed under hyperbaric conditions.

PMID: 17560660 [PubMed - indexed for MEDLINE]

73: *J Neurooncol.* 2007 Nov;85(2):191-202. Epub 2007 Jun 8.

Hyperoxia retards growth and induces apoptosis, changes in vascular density and gene expression in transplanted gliomas in nude rats.

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This study describes the biological effects of hyperoxic treatment on BT4C rat glioma xenografts in vivo with special reference to tumor growth, angiogenesis, apoptosis, general morphology and gene expression parameters. One group of tumor bearing animals was exposed to normobaric hyperoxia (1 bar, pO₂ = 1.0) and another group was exposed to hyperbaric hyperoxia (2 bar, pO₂ = 2.0), whereas animals housed under normal atmosphere (1 bar, pO₂ = 0.2) served as controls. All treatments were performed at day 1, 4 and 7 for 90 min. Treatment effects were determined by assessment of tumor growth, vascular morphology (immunostaining for von Willebrand factor), apoptosis by TUNEL staining and cell proliferation by Ki67 staining. Moreover, gene expression profiles were obtained and verified by real time quantitative PCR. Hyperoxic treatment caused a approximately 60% reduction in tumor growth compared to the control group after 9 days (p < 0.01). Light microscopy showed that the tumors exposed to hyperoxia contained large "empty spaces" within the tumor mass. Moreover, hyperoxia induced a significant increase in the fraction of

apoptotic cells (approximately 21%), with no significant change in cell proliferation. After 2 bar treatment, the mean vascular density was reduced in the central parts of the tumors compared to the control and 1 bar group. The vessel diameters were significantly reduced (11-24%) in both parts of the tumor tissue. Evidence of induced cell death and reduced angiogenesis was reflected by gene expression analyses. Increased pO₂-levels in experimental gliomas, using normobaric and moderate hyperbaric oxygen therapy, caused a significant reduction in tumor growth. This process is characterized by enhanced cell death, reduced vascular density and changes in gene expression corresponding to these effects.

Publication Types: Comparative Study
Research Support, Non-U.S. Gov't
PMID: 17557137 [PubMed - indexed for MEDLINE]

74: World J Surg. 2007 Aug;31(8):1702-6.

Role of hyperbaric oxygen therapy in the treatment of postoperative organ/space sternal surgical site infections.

Barili F, Polvani G, Topkara VK, Dainese L, Cheema FH, Roberto M, Naliato M, Parolari A, Alamanni F, Biglioli P.

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BACKGROUND: A prospective trial was designed to evaluate the effect of hyperbaric oxygen (HBO) therapy on organ/space sternal surgical site infections (SSIs) following cardiac surgery that requires sternotomy. **METHODS:** A total of 32 patients who developed postoperative organ/space sternal SSI were enrolled in this study from 1999 through 2005. All patients were offered HBO therapy. Group 1 included the patients who accepted and were able to undergo HBO therapy (n = 14); group 2 included patients who refused HBO therapy or had contraindications to it (n = 18). **RESULTS:** The two groups were well matched at baseline with comparable preoperative clinical characteristics and operative factors. Staphylococcus was the most common pathogen for both groups. The duration of infection was similar in groups 1 and 2 (31.8 7.6 vs. 29.3 5.7 days, respectively, p = 0.357). The infection relapse rate was significantly lower in group 1 (0% vs. 33.3%, p = 0.024). Moreover, the duration of intravenous antibiotic use (47.8 +/- 7.4 vs. 67.6 +/- 25.1 days, p = 0.036) and total hospital stay (52.6 +/- 9.1 vs. 73.6 +/- 24.5 days, p = 0.026) were both significantly shorter in group 1. **CONCLUSION:** Hyperbaric oxygen is a valuable addition to the armamentarium available to physicians for treating postoperative organ/space sternal SSI.

Publication Types: Evaluation Studies
PMID: 17551783 [PubMed - indexed for MEDLINE]

75: Eur Arch Otorhinolaryngol. 2007 Oct;264(10):1163-9. Epub 2007 May 30.

Invasive aspergillosis of the paranasal sinuses and the skull base.

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Invasive aspergillosis (IA) originating from the paranasal sinuses can cause an intracranial growth mainly along the skull base and larger vessels. This study reports our experience in the diagnosis and treatment of a series of patients with IA. A retrospective chart review of four patients with chronic invasive intracranial aspergillosis was performed. Clinical signs, physical examinations, radiographs, histological samples, and outcome were demonstrated. The patients demonstrated different symptoms like exophthalmus, ophthalmoplegia, loss of vision, and hyphaesthesia of the ophthalmic and maxillary nerve. Computed tomography and MRI revealed extensive sino-orbital and skull base lesions. The patients were treated with aggressive endonasal debridement, intravenous antifungal agents and daily irrigations with antimycotic suspensions. Furthermore, we applied hyperbaric oxygenation. Two patients died from complications due to subarachnoidal hemorrhage and accompanied complications respectively. Despite the high mortality rate patients with an invasive aspergillosis can be effectively treated in some cases by an early and rigorous treatment schedule using all surgical and conservative therapeutic options.

Publication Types: Case Reports
PMID: 17534639 [PubMed - indexed for MEDLINE]

76: Eur J Pharmacol. 2007 Aug 13;569(1-2):94-102. Epub 2007 Apr 30.

Hyperbaric oxygen improves survival in heatstroke rats by reducing multiorgan dysfunction and brain oxidative stress.

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Hyperbaric oxygen has been found to be beneficial in treating heatstroke animals. We attempted to further assess the possible mechanism of therapeutic protection offered by hyperbaric oxygen in experimental heatstroke. Anesthetized rats, immediately after the onset of heatstroke, were randomized into the following groups and given: a) hyperbaric oxygen (100% O₂ at 253 kPa for 1 h); or b) normal air. They were exposed to 43 degrees C temperature to induce heatstroke. When the untreated rats underwent heat stress, their survival time values were found to be 20-24 min. Resuscitation with hyperbaric oxygen increased the survival time to new values of 152-176 min. All untreated heatstroke rats displayed cerebrovascular dysfunction (evidenced by hypotension, intracranial hypertension, and cerebral hypoperfusion, hypoxia, and ischemia),

hypercoagulable state (evidenced by increased levels of activated partial thromboplastin time, prothrombin time, and D-dimer, but decreased values of platelet count and protein C in plasma), and tissue ischemia/injury (evidenced by increased levels of creatinine, serum urea nitrogen, aspartate aminotransferase, alanine aminotransferase, and alkaline phosphatase in plasma, and dihydrobenzoic acid, lipid peroxidation, and oxidized-form glutathione/reduced-form of glutathione ratio in hypothalamus). The cerebrovascular dysfunctions, hypercoagulable state, tissue ischemia/injury, and brain oxidative stress that occurred during heatstroke were all suppressed by hyperbaric oxygen therapy. The current results indicate that hyperbaric oxygen therapy may resuscitate rats that had a heatstroke by decreasing multiple organ dysfunction and brain oxidative stress.

PMID: 17509557 [PubMed - indexed for MEDLINE]

77: J Shoulder Elbow Surg. 2007 Jul-Aug;16(4):454-60. Epub 2007 May 15.

Hyperbaric oxygen therapy facilitates surgery on complex open elbow injuries: preliminary results.

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Complex open elbow injuries present a significant challenge to orthopaedic surgeons because of the poor potential for achieving a good functional level, even given good anatomic realignment. Associated massive soft-tissue damage impedes surgical fixation, delays rehabilitation, and therefore, further deteriorates the functional outcome. We studied a prospective, consecutive series of 16 patients with complex open elbow injuries who were treated with a combination of treatment modalities including early bony stabilization, debridement of soft tissue, and early coverage. The treatment protocol also used hyperbaric oxygen therapy to facilitate immediate internal fixation. The median value of the Mangled Extremity Severity Score was 5.5 (range, 3-10). Successful reconstruction was achieved in all 16 patients. No deep infection occurred, but there were 3 self-limited superficial infections. The average elbow functional result at 12 months after surgery, based on the Mayo score system, was good (mean value, 80.9; range, 55-100). Of the patients, 75% achieved satisfactory functional results for the elbow. The results of this study demonstrate that the studied treatment protocol provides a promising alternative for managing these complex open elbow injuries.

PMID: 17507249 [PubMed - indexed for MEDLINE]

78: Am J Respir Crit Care Med. 2007 Sep 1;176(5):491-7. Epub 2007 May 11.

Comment in: Am J Respir Crit Care Med. 2008 Aug 1;178(3):314; author reply 314-5.

Carbon monoxide poisoning: risk factors for cognitive sequelae and the role of hyperbaric oxygen. Weaver LK, Valentine KJ, Hopkins RO.

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RATIONALE: Carbon monoxide poisoning is common and causes cognitive sequelae. Hyperbaric oxygen (HBO(2)) reduces cognitive sequelae incidence, but which patients may benefit from HBO(2) is unclear. OBJECTIVES: Risk factor determination for 6-wk cognitive sequelae from CO poisoning and risk modification with HBO(2). METHODS: Patients were from a randomized controlled trial, enrolling acutely CO-poisoned patients more than 15 years of age. Patients eligible but not enrolled in the randomized trial, and not receiving HBO(2), were followed during the study interval. In patients not receiving HBO(2), we performed univariate analyses including risk factors identified by randomized trial subgroup analyses. A multivariable analysis was performed using univariate results with and without HBO(2). MEASUREMENTS AND MAIN RESULTS: In 163 patients not receiving HBO(2), 68 (42%) manifested sequelae. Risk factors for sequelae from subgroup analyses were loss of consciousness, age of 36 years or more, and carboxyhemoglobin levels greater than or equal to 25%. By univariate analyses, risks for sequelae were age of 36 years or more (odds ratio [OR], 2.6; 95% confidence interval [CI], 1.3-4.9; P = 0.005), and exposure intervals greater than or equal to 24 hours (OR, 2.4; 95% CI, 1.2-4.8; P = 0.019). Including 75 patients receiving HBO(2), cognitive sequelae was reduced in patients age of 36 years or more (OR, 0.3; 95% CI, 0.2-0.6; P < 0.001). Exposure intervals greater than or equal to 24 hours are an independent risk factor for sequelae (OR, 2.0; 95% CI, 1.0-3.8; P = 0.046). CONCLUSIONS: HBO(2) oxygen is indicated for patients with acute CO poisoning who are 36 years or older or have exposure intervals greater than or equal to 24 hours. In addition, subgroup analyses support that patients with loss of consciousness or higher carboxyhemoglobin levels warrant HBO(2).

Publication Types: Comparative Study
Research Support, Non-U.S. Gov't

PMID: 17496229 [PubMed - indexed for MEDLINE]

79: Neurochem Res. 2007 Sep;32(9):1547-51. Epub 2007 May 8.

Effects of methylprednisolone and hyperbaric oxygen on oxidative status after experimental spinal cord injury: a comparative study in rats.

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The effects of hyperbaric oxygen (HBO) therapy or methylprednisolone on the oxidative status were evaluated in experimental spinal cord injury. Clip compression method was used to produce acute spinal cord injury rats. Hyperbaric oxygen was administered twice daily for a total of eight 90 min-

sessions at 2.8 atmospheres. Methylprednisolone was first injected with a bolus of 30 mg/kg followed with an infusion rate of 5.4 mg/kg/h for 24 h. Five days after clip application animals were sacrificed and their traumatized spinal cord segment were excised. Tissue levels of thiobarbituric acid reactive substances (TBARS), superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px) were evaluated to reflect oxidant/antioxidant status. Non-treated clip-operated animals reflected significantly higher SOD, GSH-Px and TBARS levels that were found to be significantly higher than the sham-operated. Methylprednisolone was not able to lower these levels. HBO administration diminished all measured parameters significantly; however, their levels appeared already to be high when compared with sham animals. According to these results obtained on the 5th day after induction, HBO, but not methylprednisolone, seems to procure prevention against oxidative spinal cord injury.

Publication Types: Comparative Study

PMID: 17486444 [PubMed - indexed for MEDLINE]

80: Br J Nutr. 2007 Oct;98(4):826-33. Epub 2007 May 3.

Effect of hyperbaric oxygen and vitamin C and E supplementation on biomarkers of oxidative stress in healthy men.

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The objectives of the present study were to evaluate the effect of normobaric and hyperbaric O₂ (HBO) on plasma antioxidants and biomarkers of oxidative stress in plasma and urine and to investigate the effect of a 4-week vitamin C plus E supplementation on HBO-induced oxidative stress. Nineteen healthy men were exposed to HBO (100 % O₂; 240 kPa) before and after 4 weeks' supplementation with 500 mg vitamin C plus 165 mg alpha-tocopherol equivalents. Exposure to 21 % O₂ at 100 kPa served as intra-individual controls (control). Samples for the analysis of plasma antioxidants and oxidative stress biomarkers were collected before and immediately after each treatment. The present results showed that when compared with 'control', a single exposure to HBO resulted in a decrease of plasma vitamin C (P = 0.027) and an increase of lipid peroxides (P = 0.0008) and urinary 8-oxo-deoxyguanosine (8-oxodG) excretion (P = 0.006). Oxidative stress was not prevented by a 4-week supplementation with vitamins C and E. HBO-induced changes in plasma parameters correlated with basal antioxidant levels. The increase of urinary 8-oxodG after HBO plus supplementation correlated negatively with vitamin E intake (P = 0.023). We concluded that in healthy men HBO caused oxidative stress, which could not be prevented by dietary vitamin C plus E supplementation. The present data support the idea

that HBO is a suitable model for oxidative stress in healthy volunteers.

Publication Types: Meta-Analysis Research Support, Non-U.S. Gov't

PMID: 17475085 [PubMed - indexed for MEDLINE]

81: Eur Arch Otorhinolaryngol. 2007 Aug;264(8):951-3. Epub 2007 Mar 15.

Hyperbaric oxygen in the treatment of sudden deafness.

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Currently, the treatment of sudden deafness (SD) is based mainly on complete bed rest and the administration of corticosteroids. Hyperbaric oxygen therapy (HBOT) has previously been suggested as adjunctive treatment. We describe two cases of successful HBOT for SD. The first patient presented with moderate mid-frequency hearing loss without accompanying symptoms, whereas the second patient had moderate low-frequency hearing loss with persistent tinnitus and a single episode of vertigo. HBOT in addition to conventional treatment soon after diagnosis resulted in full recovery of hearing in both patients. The pathogenesis of SD may involve a reduction in cochlear blood flow and perilymph oxygenation, making early HBOT a reasonable treatment modality for this condition.

Publication Types: Case Reports

PMID: 17361409 [PubMed - indexed for MEDLINE]

82: Eur Arch Otorhinolaryngol. 2007 Aug;264(8):861-6. Epub 2007 Mar 6.

Hyperbaric oxygen and steroid therapy for idiopathic sudden sensorineural hearing loss.

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In our controlled retrospective analysis of medical records in tertiary care academic medical center, we aimed to investigate the therapeutic effects of hyperbaric oxygen (HBO) therapy combined with steroid administration for idiopathic sudden sensorineural hearing loss (ISSNHL) in comparison with that of steroid administration alone. Our subjects were 130 consecutive inpatients with ISSNHL (hearing levels \geq 40 dB; time from the onset of hearing loss to the start of treatment \leq 30 days). Sixty-seven patients underwent HBO plus steroid therapy (HBO group), and 63 were given steroids alone (steroid group). Hearing recovery was evaluated by grade assessment and by the improvement in hearing compared to that in the unaffected contralateral ear. The cure rate and hearing improvement rate were not statistically different between the two groups; however, the recovery rate was significantly higher in the HBO group than in the steroid group (59.7% vs. 39.7%; P

< 0.05). With regard to patients with initial hearing levels of ≥ 80 dB, the hearing improvement rate was significantly higher in the HBO group than in the steroid group (51.1 \pm 7.0% vs. 27.1 \pm 7.8%; $P < 0.05$), while in patients whose initial hearing levels were < 80 dB, hearing outcomes were not statistically different between the two groups. In both the HBO and steroid groups, patients with initial hearing levels of < 80 dB showed a better hearing improvement rate than those with initial hearing levels of ≥ 80 dB. In conclusion HBO therapy shows a significant additional effect in combination with steroid therapy for ISSNHL, particularly in patients with severe hearing loss.

Publication Types: Comparative Study
PMID: 17340130 [PubMed - indexed for MEDLINE]

83: Eur Arch Otorhinolaryngol. 2007 Aug;264(8):917-22. Epub 2007 Mar 6.

Necrotizing fasciitis in the head and neck region: an analysis of standard treatment effectiveness.

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A standard treatment procedure for necrotizing fasciitis in the head and neck region was introduced in 1999 at Rigshospitalet (National Hospital of Denmark) Copenhagen. The new procedure introduced more drastic surgical debridement than before, combined with a set antibiotic regime and intravenous gamma globulin and adjunctive hyperbaric oxygen treatment (HBO). To evaluate the effect of this, a retrospective study was undertaken, involving 19 patients treated for NF at the ENT department from 1996-2004. Between 1996 and 1999 eight patients were treated (non-HBO) from 1999-2004 eleven patients were treated (HBO group). Length of antibiotic treatment was very similar in the two groups (mean 22.5 days) as was bacteriology. Aetiological focus differed marginally with the HBO group showing a clear tendency towards odontogen focus. The HBO group was found to undergo significantly more debridement procedures (3.36). The most drastic difference in the two groups however, was the reduction in mortality. The non-HBO group had a mortality of 75% and in the HBO group they all survived. This obviously resulted in a prolonged hospital stay for the HBO group (mean 30.8 days). The study concluded that the reduction in mortality was due to the combined effects of the different entities in the new treatment guidelines. It was not possible to isolate a specific factor responsible for the change.

PMID: 17340128 [PubMed - indexed for MEDLINE]

84: Br J Oral Maxillofac Surg. 2007 Jul;45(5):433-5. Epub 2006 Dec 27.

Survey of fellows regarding a national study into treatment with hyperbaric oxygen.

Rogers SN, Magennis P.
Publication Types: Letter

PMID: 17194511 [PubMed - indexed for MEDLINE]

85: Atherosclerosis. 2007 Jul;193(1):28-35. Epub 2006 Sep 14.

Chronic hyperbaric oxygen treatment elicits an anti-oxidant response and attenuates atherosclerosis in apoE knockout mice.

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We previously demonstrated that hyperbaric oxygen (HBO) treatment inhibits diet-induced atherosclerosis in New Zealand White rabbits. In the present study we investigate the mechanisms that might be involved in the athero-protective effect of HBO treatment in a well-accepted model of atherosclerosis, the apoE knockout (KO) mouse. We examine the effects of daily HBO treatment (for 5 and 10 weeks) on the components of the anti-oxidant defense mechanism and the redox state in blood, liver and aortic tissues and compare them to those of untreated apoE KO mice. HBO treatment results in a significant reduction of aortic cholesterol content and decreased fatty streak formation. These changes are accompanied by a significant reduction of autoantibodies against oxidatively modified LDL and profound changes in the redox state of the liver and aortic tissues. A 10-week treatment significantly reduces hepatic levels of TBARS and oxidized glutathione, while significantly increases the levels of reduced glutathione, glutathione reductase (GR), transferase, Se-dependent glutathione peroxidase and catalase (CAT). The effects of HBO treatment are similar in the aortic tissues. These observations provide evidence that HBO treatment has a powerful effect on the redox state of relevant tissues and produces an environment that inhibits oxidation. The anti-oxidant response may be the key to the anti-atherogenic effect of HBO treatment.

Publication Types: Research Support, N.I.H., Extramural

PMID: 16973170 [PubMed - indexed for MEDLINE]

86: Pediatr Blood Cancer. 2007 Nov;49(6):854-6.

Hyperbaric oxygen should not be used in the management of hemorrhagic cystitis in patients with Fanconi anemia.

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Hemorrhagic cystitis (HC) is a common complication after stem cell transplantation (SCT) that occurs more frequently in patients with Fanconi anemia (FA) because of hypersensitivity of their cells to the agents used in the preparation for SCT (chemo and radiation). Many HC cases respond to therapy with hyperhydration and maintenance of adequate platelet counts, but refractory cases may require additional measures such as the use of prostaglandins, alum, or hyperbaric oxygen (HBO). We report here an unusual

complication to HBO therapy in a FA patient consisting of generalized edema mimicking capillary leak syndrome but with no pulmonary edema or ascites. (c) 2005 Wiley-Liss, Inc.

Publication Types: Case Reports

PMID: 16317730 [PubMed - indexed for MEDLINE]