

HYPERBARIC OXYGENATION IN A SINGLE OXYGEN HYPERBARIC CHAMBER AS AN EFFECTIVE COMPONENT OF COMPLEX INTENSIVE CARE OF MINE EXPLOSION-CAUSED WOUNDS

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INTRODUCTION. The subject of the present contribution is the results of treating by hyperbaric oxygenation (HBO) the group of persons suffering from mine explosion-caused wounds complicated by wound infection. The work's urgency is related to a sharp increase in the incidence of such injuries in practice of field surgery in the recent years. The comparison of all peculiarities of mine explosion-caused wounds shows that the injuries are multifactorial, whereas the main driving force is a shock wave.

While treating a combat injury, one usually proceeds from that any wound is infected and consequently its treatment requires using methods of active antibacterial therapy. HBO can be regarded as one of such methods due to its ability to increase sensitivity of microflora to some antibacterial drugs and thereby to potentiate the effect of the latter, to increase concentration of antibiotics in the focus of inflammation, to decrease the toxic effect of antibacterial medicines. Also, hyperbaric oxygen possesses a sufficiently marked bacteriostatic action. HBO is also known to reduce the zone of damage along the wound periphery caused by a secondary molecular concussion, reduces the time of appearance of demarcation during formation of tissue necrosis, reduces the time of placement of primary delayed or secondary sutures. Further, it should be emphasized that in the presence of the injury inflicted by modern weapon including mines no early primary surgical treatment of wounds can be truly radical in connection with the difficulty in clinical evaluation of the degree of structural changes in the affected tissues. A specific feature of mine explosion-caused wounds is a combined damage of the locomotor system and viscera. The associated disturbances of microcirculation and trophism of the tissues involved in the pathologic process are a favourable background for the development of wound infection including anaerobic one. Therefore, one of the ways of resolving the problem of treatment of mine explosion-caused wounds is to use means increasing viability of the affected tissues and resistance of the organism as a whole. HBO completely meets the requirements.

CLINICAL OBSERVATIONS AND RESEARCH METHODS. There were observed 114 casualties with wounds of the head, chest, abdominal cavity and extremities admitted to the hospital not later than 3 hours after rendering the first aid and being in a severe (80 persons) and extremely severe (34 persons) condition. The criteria of severity were the level of consciousness, parameters of systemic circulation,

volume of blood loss, presence of damage of the viscera, character of the visceral functions. Seventy-one (62.3%) patients had isolated wounds, 43 (37.7%) patients had combined wounds. According to the findings of the microbiological study, 103 (91%) patients were admitted with infected wounds, and in 29 (28.5%) observations in the first 24 hours non-clostridial anaerobic wound infection was established. In the persons with isolated wounds this type of infection was found more frequently (31%) than in the casualties with combined injuries (16.3%). An extensive clinical picture of non-clostridial anaerobic phlegmon was noted in 10 wounded persons. In 19 cases the diagnosis was established on the basis of the data of gas-liquid chromatography (the discharge from the wound).

The degree of post-traumatic endogenous intoxication of the wounded persons and the character of its changes as a result of the treatment was evaluated not only on the basis of the clinical signs but also by the dynamics of the leukocytic index of intoxication (LII).

It should be noted that the peculiarities of the process of admittance of the casualties in the hospital made it frequently difficult to carry out extensive clinicophysiological studies particularly at the early stages of treatment, however in a number of observations (14 patients) during HBO sessions one succeeded in performing computer monitoring of "physiological functions and also to study the dynamics of parameters of variational pulsometry characterizing as it is known the condition of the systems controlling the functional state of the body.

Barotherapy sessions in the complex of measures of intensive care of the wounded persons were performed in single oxygen hyperbaric chambers BLKS-303 MK made in Russia. The hyperbaric chambers make it possible during sessions to carry out when necessary assisted pulmonary ventilation, to conduct infusion therapy, to perform constant control over the activity of the cardiovascular system. One should regard the presence of the system detecting inflammation and combating fire as an important specific feature of the design of the used hyperbaric chambers. A possible inflammation inside the chamber is detected by means of optic detectors operating in the UV-range. The decision about fire extinction is made automatically.

Depending on the patient's condition the value of isopression pressure fluctuated in the range of 1.5-2.5 atm, the duration of one session was 40-90 minutes. In the first 24 I hours of treatment under HBO 2-3 sessions were carried out, then one session a day. On the average the course of barotherapy lasted 8-12 days. In the presence of the signs of 'encephalopathy, especially in the first 24 hours of barotherapy the value of isopression I pressure decreased to 1.3-1.5 atm. In 40 casualties (35.1%) the methods of extracorporeal detoxication (plasmapheresis, hemodialysis) were used alongside HBO.

RESULT. A marked positive effect of HBO use in treatment of patients with mine explosion-caused wounds was achieved in 78.1% of observations. The effect manifested itself in a certain improvement of the clinical condition of the casualties after the first 2-4 sessions of barotherapy: a decrease or disappearance of encephalopathy, reduction of the degree of hyperventilation syndrome, stabilization of systemic hemodynamics in

combination with an increase in urination rate. The studies of variational pulsometry showed that the positive changes in the patients' clinical condition were associated with a decrease of tension index pressure with a concurrent increase of dispersion of cardiointervalgram. The changes were more frequently revealed before 5-7 HBO sessions indicating normalization of the regulating functions of the vegetative nervous system. An objective criterion of the detoxication effect of HBO was a gradual decrease (on the average from 8-10 units, with the normal value being 0.6-1.5) of LII.

The use of HBO exerted a positive effect on the course of the wound process. Already by the end of 2-3 days of treatment under HBO the wound appearance notably improved: the edema diminished, the character of the wound discharge changed, intensity of the pain syndrome decreased. The process of debridement of the wound surface from necroses accelerated. On the average by the 5th - 6th day of treatment the foci of granulations and marginal epithelization appeared in the wound. In 27 of 29 cases of non-clostridial anaerobic infection after 3-4 sessions of HBO the titer of free fatty acids decreased according to the findings of gas-liquid chromatography.

HBO use resulted in a lowering of the level of secondary purulent complications, decrease in wound healing time on the average from 28 to 21 days. The frequency and the level of amputations of extremities decreased.

At the same time there are grounds to assert that HBO as a method of intensive care realizes its possibilities only within the framework of the general protocol of treating the wounded persons. The absence of a positive effect of barotherapy makes to suggest the presence of the unrevealed complications or mistakes in general tactics of the patients' management.

In addition, the use of single oxygen hyperbaric chambers for treating patients being in the critical condition poses high requirements for the professional level of the staff of the barotherapy departments and poses some problems of the organizational, methodological and administrative character.

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