



RESOLUTION

of the Teleconference «Opportunities of the Infusion Therapy and Rehabilitation under the Conditions of Wartime»

April 21, 2022

Kyiv, Ukraine

Almost 6 000 health care specialists have registered to participate in the Teleconference «Opportunities of the Infusion Therapy and Rehabilitation under the Conditions of Wartime».

Within the framework of the event the leading experts of the country in the sphere of emergency medicine and military medical training, anesthesiology and intensive therapy, internal medicine, neurology and cardiology have shared their opinions and practical experience in management of patients with battle trauma, medical emergencies (battle trauma, non-conventional weapon attack, acute cerebral stroke) and other important medical conditions under the conditions of wartime.

Seven main reports were offered to the participants for review and discussion and they were dealing with the following issues:

- Battle trauma: modern approaches to treatment.
- The primary response of health-care institutions to use of chemical, radiation and bacteriological factors.
- Acute cerebral stroke: peculiarities of management under the conditions of wartime.
- Correction of iron deficiency under the conditions of wartime: fast and efficient.
- Concussion and postconcussional syndrome: management algorithms.
- Anxiety during war: how to help the patient?

Conclusions and decisions based on discussion of reports:

1. The main objects of therapeutic influence in case of a gunshot wound are the zone of primary damage (necrosis) of tissues and the area of secondary necrosis around it, as well as the microbial flora of the wound. From the first hours after the injury, together with anaesthesia and arrest of bleeding, it is necessary to provide conditions for the wound self-cleaning and limit the distribution of secondary necrobiosis. Treatment begins with a primary bandage. The latter protects the wound from adverse effects of the external environment and from repeated microbial contamination, ensures the outflow of the wound exudate with partial removal of small elements of the primary contamination. Large gunshot wounds require immobilization of the damaged segment, which protects it from re-traumatization. The central component of the therapeutic effect is the surgical treatment of the gunshot wound. Most gunshot wounds are subject to early surgical treatment. Depending in indications there are primary, secondary treatment of wounds and re-treatment.
2. As a response to any severe injury in the body a complex series of general and local changes develops, which are based on both general and specific pathophysiological mechanisms, including not only traumatic, but also neuro-reflective, toxic-infectious, allergic ones as well as microcirculation disorders. Early effective therapy aims to eliminate enzymes and inflammation mediators, reduce endotoxemia, and restore microcirculation. The use of balanced hyperosmolar solution leads to a rapid improvement in the general condition, the restoration of disturbed organ functions and a reduction in the manifestation of intoxication syndrome. Thanks to its convincing anti-inflammatory effects, infusion pentoxifylline in

combination with a balanced solution of electrolytes and sodium lactate can be an ideal candidate for use as an immunomodulatory supplement to infusion therapy and correction of microcirculation disorders in case of battle trauma. Pentoxifylline has been shown to be effective in treating symptoms caused by endotoxins in shock or inflammation due to reduced activation of leukocytes and endogenous cytokines. The effect of microcirculatory disorders correction is realized through such mechanisms as reducing plasma and whole blood viscosity, reducing fibrinogen, increasing erythrocyte elasticity and inhibiting their aggregation, inhibiting neutrophil activation.

3. Capillary leak syndrome is the outlet of the intravascular fluid to the interstitial sector of the extracellular water space. It is pathognomonic for critical conditions and diseases that are accompanied by the development of systemic inflammatory reaction syndrome, and is in one way or another present in intoxication of different genesis. The pathogenesis is based on an endless circle: inflammation mediators – endothelial dysfunction – immune responses. Treatment of capillary leak syndrome should be aimed at restoring the structure and function of the endothelium, reducing vascular inflammation, activation and adhesion of leukocytes. A fixed combination of levocarnitine and L-arginine will solve this problem. The second direction of therapy is provided by a hyperosmolar balanced solution based on sorbitol, which is aimed at maintaining the volume of circulating blood and at reducing the volume of fluid that is in the intracellular space.
4. Today's realities force doctors to know action plan in case of use of the non-conventional weapons: nuclear, chemical, biological one. Radiation injury risk factors: light flash, shock wave, fire, radiation. Potassium iodide is used to prevent radiation exposure, and in the absence of it, a water-alcohol iodine solution is used. «Perfect» chemical weapons have the following properties: no color and odor, low chemical activity, high toxicity, durability, quick effect. Both individual and collective methods of protection are used to protect against chemical weapons. Order of the Ministry of Health of Ukraine #322 as of 27.05.2011 regulates the procedure for decontamination of victims of chemical and radiation factors and biological agents.
5. In wartime, iron deficiency correction is very important and is due to battle traumas, the exacerbation of comorbid pathology, stressful nutritional conditions. Correction of iron deficiency is effective only in case of use of intravenous iron preparations, for example, ferric (III) hydroxide sacharose complex, which is transferred to the transferrin and ferritin directly from the drug, and then deposited. The latter explains the impossibility of overdose, in contrast to salt iron compounds, which include intramuscular forms of iron, which are absorbed behind a gradient of concentration. Ferric (III) hydroxide sacharose complex without dextran does not form free radicals when ingested into the body, which gives high tolerability. Prolonged injection (on autoblood) let us compensate iron deficiency even in the outpatient settings.
6. Concussion is a general lesion of the body due to a sharp mechanical effect. Battle neurotrauma means CNS injury (Traumatic Brain Injury – TBI according to NATO classification), traumatic injury of spine and spinal cord (Spinal Cord Injury – SCI) and peripheral nerves injury. The pathogenesis of the neuroinflammatory process after the occurrence of the craniocerebral injury and its remote consequences form primary damage (e.g., damage to blood vessels and cell membranes) or secondary (e.g., ion imbalance, calcium overload and mitochondrial dysfunction). These injuries together lead to the cytotoxicity of mitochondrial stress and secondary damage to the vascular system. Over time, astrocytes and microglia are activated with the release of proinflammatory cytokines, chemokines. Prolonged chronic inflammation can also lead to neurodegeneration, leading to a number of irreversible pathological changes such as tau protein hyperphosphorylation. Over the years, neurodegeneration can eventually lead to dementia. Even today, immediate intervention in patients with acute craniocerebral injury is still a clinical problem, despite various new technologies. Clinical treatment remains mainly symptomatic. A promising remedy for additional treatment of craniocerebral injury and its long-term consequences can be edaravone, which affects all the above mentioned links, namely blocks the ischemic cascade (prevents calcium influx, reduces glutamate excitotoxicity, neutralizes oxidative stress, prevents mitochondrial dysfunction), inhibits the development of systemic inflammatory reaction syndrome (release of cytokines, chemokines), reduces neuroinflammation, inhibits p-tau hyperphosphorylation.

7. A stroke is a clinical syndrome of rapid development of signs of focal and global loss of brain functions lasting 24 hours and more or resulting in death in absence of any other (non-vascular) reasons. According to the current Order of the MoH #602 as of 03.08.2012 treatment of patients with acute stroke includes baseline therapy, which aims to stabilize the condition of heavy patients, and specific (differentiated) drug therapy, in particular, treatment of cerebral edema. Edaravone, an ischemic cascade blocker, is recommended as an intravenous drug for patients with acute brain ischemic stroke. According to the instruction on medical use of the drug (Xavron®) in the acute stage of brain white infarct Xavron® exhibits protective action, inhibiting the onset and development of ischemic cerebrovascular disorders such as cerebrovascular edema, neurological symptoms. Assessment of efficiency and safety of Edaravone in acute ischemic stroke is described in the Cochrane Reviews which are source of clinical directions and may be used by doctors during their medical practice. Based on this assessment in the Edaravone group there was an increase in the portion of participants with a significant neurological improvement in comparison to the control group, and the difference was substantial. Edaravone therapy demonstrates twice as good result as a baseline therapy on the Rankin scale.
8. Anxiety is a normal and necessary basic emotion, but when the normal functioning of a complex alarm system is disturbed, there are anxiety disorders. Such patients often come to general practitioners, cardiologists, neurologists, as anxiety disorders can both accompany and cause somatic diseases. Anxiety is a predictor of the development of arterial hypertension and fatal coronary heart disease. Disturbance of the sympathetic nervous system may be the key mechanism. To reduce anxiety, you can use Ethylmethylhydroxypyridine succinate, identical to the original, which helps to reduce the anxiety level by 3 points on the HADS scale, but does not cause sleepiness, addiction, withdrawal syndrome, etc. To improve endothelium function, L-arginine hydrochloride can be used, which inhibits endothelin-1 synthesis, as well as relieves vasospasm and improves endothelium-dependent vasodilatation. In the case of concomitant coronary heart disease, a fixed combination of levocarnitine and L-arginine is recommended, as levocarnitine improves myocardial energy supply and reduces the risk of developing ventricular arrhythmias and atrio-ventricular blocks.