



Lymphotropic Therapy in Patients with Acute Brain Injury in the Acute Period

Eshonov Olim Shoyimkulovich ¹, Boltayev Elmurod Bekmurod ugli ²

¹ Associate Professor of the Department of Surgical Diseases and Resuscitation of the Bukhara State Medical Institute named after Abu Ali ibn Sina, Turan Academy of Sciences

² Assistant of the Department of surgical diseases and resuscitation of Bukhara State Medical Institute named after Abu Ali ibn Sina, independent researcher of the Republican Scientific Center for emergency medical care

Abstract: The results of the study show that lymphotropic anti-edematous and antibacterial therapy in the complex of treatment improves the results of TBI treatment in the acute period, thereby reducing the mortality rate.

Keywords: lymphotropic, decongestant, antibacterial therapy.

At present, the molecular mechanisms of the development of BT are being actively studied and the search for targets for targeted therapy is underway [1, 2,12,20].

Research work on the search for biomarkers is carried out in all areas of medicine, including in the field of cerebrovascular pathology and traumatic brain injuries. Due to its epidemiological characteristics, traumatic brain injury (TBI) undoubtedly seems to be an important object, since, in addition to high mortality, it is accompanied by a significant incidence of complications and disability, which ultimately result in significant economic costs, since it allows individualizing the approach to treatment and rehabilitation of patients [11,13,17,23].

In practice, procalcitonin (PCT), presepsin (PSP), C-reactive protein (CRP) are most often used. All of these markers can play a significant role in the diagnosis of infection, but none of them has absolute sensitivity and specificity. Therefore, the search for available reproducible and highly informative markers is still ongoing [14,18,21,27].

Today, clinical laboratory medicine has a huge number of methods for early and accurate diagnosis of a large number of diseases, dynamic control over the pathological process. Quantitative analysis of the leukocyte formula is an important research method that has diagnostic value in critical conditions. A thorough analysis of the leukoformula makes it possible to judge the course of the disease, the occurrence and severity of inflammatory manifestations, and the effectiveness of the therapy [3,25,29]. Along with modern methods of neuroimaging such as MSCT and MRI, successful therapy of critically ill patients with severe forms of TBI is based on laboratory parameters [6,15,19]. In order to objectify the assessment of these results, a number of indices have now been proposed that make it possible to judge the course of the pathological process in the body, including the severity of inflammatory manifestations and the effectiveness of the therapy [9,24,28]. According to a number of authors, one of these indicators is the index of the ratio of neutrophils to lymphocytes (IRNL) of blood [5,8,22,].

The use of inflammatory biomarkers is one of the routine tools in monitoring the postoperative period. Surgical interventions are closely associated with the development of a systemic inflammatory response of the body, characterized by metabolic and immunological changes. During this period, there is an increase in the level of circulating neutrophils in the blood and a decrease in

the level of lymphocytes, which leads to immunosuppression as one of the key aspects of the development of an infectious complication [7,26]. In this regard, the assessment of the level of the neutrophil-lymphocyte ratio can serve as a simple and effective tool for identifying patients with a high risk of developing infectious complications [10,16]. The discovered biomarkers will allow, as knowledge is accumulated, to refine the criteria for prescribing a particular type of therapy, to conduct timely preparation for possible complications, which undoubtedly increases the effectiveness of treatment of patients with neuroresuscitation profile [4].

Studies aimed at studying the prognostic significance of laboratory tests and their evaluation as biomarkers, due to the insufficiency and inconsistency of existing information, continue to be relevant and in demand.

Purpose of the study: to study the effect of lymphotropic therapy on IRNL in critical conditions in patients with TBI.

Materials and methods of research: data of 50 patients who were treated in the neuroreanimation department of the Bukhara branch of the Republican Scientific Center for Emergency Medical Care during 2021-2022 were studied as the object of the study. 35 patients with traumatic brain injury, whose data were analyzed as the source of the study, who were injured as a result of a traffic accident. Due to the possibility of data confounding, the study did not include patients with injuries of the musculoskeletal system and with damage to other organs. During the primary CT scan of patients of the main group (22 patients), 15 patients had subdural, 4 epidural and 3 intracerebral hematomas. In cases when a hematoma detected on CT scan led to dislocation of the median structures of the brain, the hematoma was surgically removed (n=18) - resection decompressive craniotomy was performed. At the time of admission to the hospital, the level of consciousness was assessed: in 4 patients - in a state of stupor (GCS 12-14 points), 8 patients - in stupor (GCS 10-11 points), 5 - in superficial coma (according to GCS 8-9 points, and 3 were regarded as deep coma (below GCS scores 7), 2 patients were treated in clear consciousness (GCS scores 15). Clinical symptoms of brain contusion (amnesia, vomiting, psychomotor agitation) occurred in almost all patients with focal cerebral symptoms - anisocoria, hemisymphomatics. In patients who at the time of admission, consciousness was assessed below 10 points on the Glasgow scale and all patients treated surgically, mechanical ventilation was performed. The duration of mechanical ventilation ranged from 2 to 18 days.

On the first day after the operation, patients whose level of impaired consciousness was less than 20 points on the Glasgow-Pittsburgh scale underwent controlled mechanical ventilation in the CMV mode (controlled mechanical ventilation). And in the following days, depending on changes in neurostatus, in patients with a level of impaired consciousness, which was within the coma of I-II degree (according to the Glasgow-Pittsburgh scale 20-29 points), as well as on the restoration of independent respiratory movements, mechanical ventilation continued in the mode SIMV (synchronized intermittent mandatory ventilation) - synchronized intermittent mandatory ventilation of the lungs. As consciousness recovered above the stupor (more than 30 points on the Glasgow-Pittsburgh scale), mechanical ventilation was carried out in the ASV (adaptive support ventilation) mode - adaptive supportive ventilation.

All patients of the main group underwent lymphotropic therapy in the intensive care complex. Submastoid injections were performed by a doctor in an intensive care unit. The bone landmark was the mastoid process of the temporal bone. The lower edge of the appendix was palpated, and at this point an injection was made with a conventional hypodermic needle attached to a syringe with a drug mixture. After the skin was punctured, the mixture was injected into the subcutaneous tissue when the needle entered. The depth of needle insertion averaged 3-4 mm. The introduction of the drug mixture was carried out at two points - on the right and on the left, the frequency of administration - every day, starting from the second day of TBI, for 5 days. Anti-edematous lymphotropic therapy: lidocaine 2%-1ml, dexamethasone 4mg-1ml, 10% glucose solution 3ml. in one syringe, the frequency of administration is once daily. Lymphotropic antibiotic therapy: ceftriaxone 100 mg, the frequency of administration once daily for 5 days. All patients underwent a single standard of examination, which included: a general blood test, a general urinalysis, a biochemical blood test, a

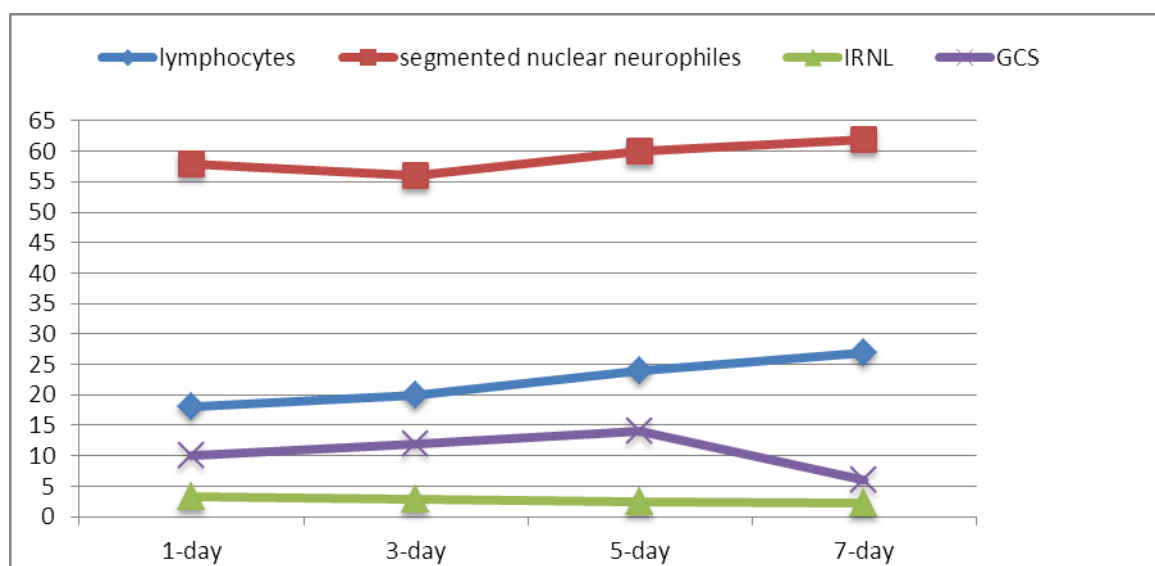
cerebrospinal fluid examination, an examination of the fundus, a CT scan of the skull, and an assessment of the functions of the central nervous system. But to achieve this goal, the main parameters of comparison were determined: assessment according to the Glasgow Scale (GCS) and IRNL on the first, fifth days of TBI and when transferring from the neurocritical care unit to the profile one. The control group consisted of 15 patients with TBI.

Results and discussion

When performing lymphotropic decongestant and antibiotic therapy in combination with standard therapy, the most important criterion for evaluating the effectiveness of the therapy was the timing of the recovery of the level of consciousness, which was recorded according to the Glasgow Scale and the dynamics of IRNL. At the time of the first GCS assessment, the results in the control group were 8,1+1,3 points, and in the main group – 7,5+1,8 respectively, which indicates the comparability of the groups in this study.

Patients of the main group with severe traumatic brain injury (n=22) were divided into three subgroups depending on the number of GCS scores assessed on the 1st and 5th day of hospitalization after TBI: 1) 3-4 points on the GCS– 2 patients; 2) GCS scores 5-8 - 4 patients; 3) GCS scores 8-10 - 7 patients. Having divided the patients into initial subgroups, we obtained the following results on the fifth day of TBI: 1) 3-4 points – 0; 2) 5-8 points - 10; 3) 8-10 points - 3 patients. Against the background of the therapy, on the 5th day there was a significant improvement in the GCS score in patients of the main group: from 7,5+1,8 points to 10,97+1,33 respectively. Mortality during the first five days of TBI in the main group was 2 patients. Transfer to the specialized department after 5 days of stay in the intensive care unit took place in all 20 cases, while there was a further improvement in the GCS score to 12,88+1,20 but this was not statistically significant, $p \geq 0,05$. Survival of patients after 5 days of TBI in the main group was 100%.

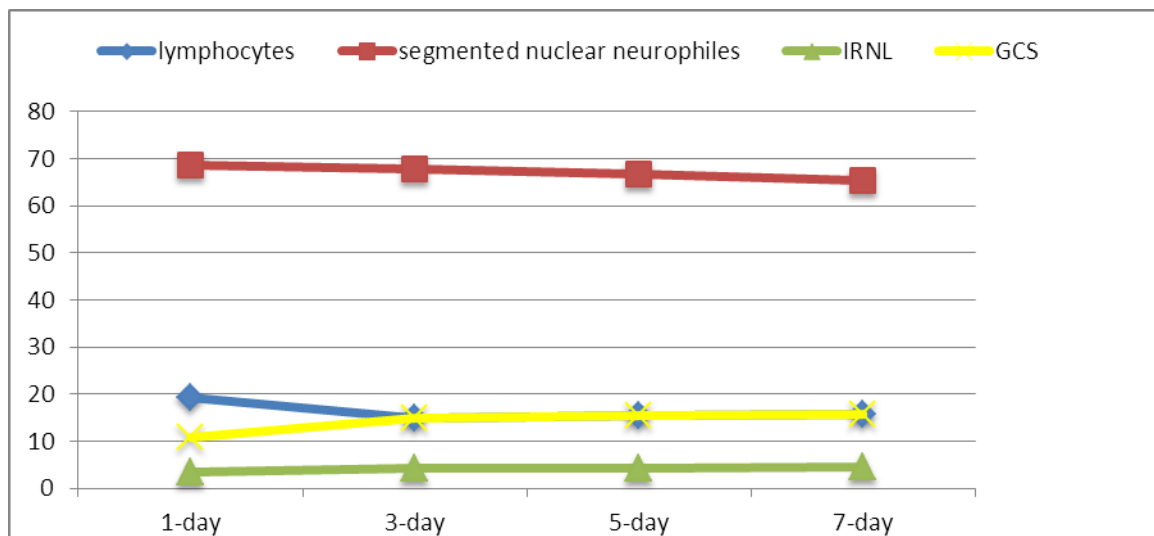
In the study of laboratory tests and clinical and neurological changes in patients of the main group, compared with the control, quantitative changes in neutrophils and lymphocytes in the blood were observed in accordance with changes in the general condition of patients. The general condition of 20 patients changed in a positive direction against the background of intensive therapeutic measures carried out after the operation, which manifested itself in the form of a clarification of consciousness and an increase in the total GCS score. During dynamic MSCT examination, it was noted that the dislocation of the median structures of the brain in these patients was eliminated, the sizes of the basal cisterns and ventricles of the brain were normalized, there were no signs of impaired CSF circulation. The results of laboratory analysis showed that the ratio of segmented neutrophils to lymphocytes in these patients was below 3,2 (graph 3^a).



Graph 3^a. Indicators of the main group of patients with TBI.

To compare the effectiveness of the therapy in the study groups, patients in the control group (n=15) were also divided into three subgroups, similarly to patients in the main group, depending on the

number of GCS points: 1) 3-4 GCS points - 0; 2) 5-8 points - 3 patients; 3) 8-10 points - 12 patients. On the fifth day of TBI, the following results were obtained: 1) 3-4 points - 0; 2) 5-8 points - 2 patients; 3) 8-10 points - 9 patients. In 4 patients of the control group on the fifth day it was from 10 to 12 points. Against the background of standard therapy on the 5th day, there was a tendency to improve the GCS score in patients in the control group: from 8,1+1,3 points to 9,97+1,16 points, respectively, with $p \geq 0,05$. Mortality during the first five days of TBI in the control group was observed in 5 patients. Transfer to a specialized department after 5 days of stay in the intensive care unit took place in 10 cases, with a further improvement in GCS scores in these patients from 9,97+1,16 points to 12,57+1,03 points. But the survival rate of patients after 5 days of TBI in the control group was 76%.



Graph 3^b. Indicators of the control group of patients with TBI. Thus, lymphotropic anti-edematous and antibacterial therapy for TBI in the acute period made it possible to effectively influence the course of the pathological process and improve the results of treatment, which is confirmed by significantly better data on GCS, IRNL and mortality and length of stay in the neuro-reanimation ward in patients of the main group compared to the control group.

Conclusion. Conducting lymphotropic decongestant and antibiotic therapy for TBI in the acute period allows you to effectively influence the course of the pathological process and improve the results of treatment of patients with TBI.

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