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THE PROBLEM OF POSTOPERATIVE COGNITIVE DYSFUNCTION IN PATIENTS WITH OBESITY IN EMERGENCY SURGERY

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ABSTRACT

The occurrence of postoperative cognitive dysfunction is a negative consequence of vascular endothelial dysfunction in patients with grade I-II obesity with appropriate metabolic shifts and comorbid background, which increases the duration of treatment and worsens the prognosis in patients with acute surgical pathology. It is important to add endothelioprotectors to the intensive care unit. L-arginine hydrochloride has been shown to be pathogenetically justified as a prophylaxis for an increase in the level of antigens to von Willebrand factor in the blood of obese patients with acute surgical pathology. Administration of this substance before and during surgery is likely to improve mental performance in the postoperative period in patients with elevated body mass index, who underwent emergency cholecystectomy.

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Introduction. One of the indicators of the quality of surgical treatment is the course of the early postoperative period. It is considered smooth if successful [1, 2]. The causes of complications in the early postoperative period are many. Most often they are due to various objective reasons. One of such reasons is the inevitable impact on the body of surgical trauma [3, 4].

Any surgery is a serious stress for the patient's body. During them, the patient is exposed to various aggressive factors that significantly affect the functioning of many body systems. As a result, in some patients, surgical treatment induces the occurrence of pathological conditions that require special rehabilitation [5]. That is why there is a need to study the impact of the level of surgical trauma on the postoperative period.

In turn, it is known that obesity in the body there are numerous changes characterized by reduced functionality of organs and systems, reduced, and in some cases, distortion of metabolic processes, reduced reactivity and resistance (or resistance) to stress [6, 7]. In this regard, anesthesia and intensive care in patients with high body mass index differs from that in other weight groups due to altered metabolism of drugs, altered sensitivity to them of organs and tissues, excellent distribution of drugs in altered water sectors and associated with increased surgical and anesthetic risk, complications [8].

It should be noted that at present there is a lot of information about the traditional list of postoperative complications, which are mostly somatic disorders. However, it is important to take into account the fact that surgical treatment can induce various inconspicuous abnormalities that are difficult to diagnose. These deviations do not cause severe disorders of life, but can significantly reduce the quality of life in the postoperative period in a significant proportion of operated patients. One such pathological condition is postoperative cognitive dysfunction syndrome (POCD). POKD - syndrome of cognitive impairment due to general anesthesia and surgery, which has a multifactorial etiology, develops in the early and persists in the late postoperative period, clinically manifests itself in the form of memory impairment, difficulty concentrating and impaired other cognitive functions language, etc.), which is confirmed by neuropsychological testing [9, 10].

Recently, around the world began to appear quite a lot of work on this issue. However, specific data on the etiology of POCD, especially in patients with elevated body mass index in the emergency clinic is not enough.

The questions of the dependence of the severity of POCD on the body mass index and the concomitant somatic condition of such patients, on the impact of surgical trauma and severity at the time of admission to the hospital also remain unexplored [11, 12].

The aim of the study was to increase the effectiveness of intensive care in patients with high body mass index in the emergency clinic by improving the methods of influencing perioperative risk factors.

Materials and methods. The study selected 84 patients who were treated in the surgical department for acute surgical pathology (cholecystectomy), had grade I-II obesity lasting more than 10 years. All patients had concomitant somatic diseases, which in their clinical development adversely affected the functional state of the vascular endothelium. Given that the operation itself and general anesthesia led to the pathogenetic mechanism of surgical stress, it was important to maintain the functional state of the endothelium at the most satisfactory level, which directly affected the state of POCD in the studied patients.

All patients were divided into 3 groups: group I, 28 patients who received the standard protocol of perioperative intensive care, group II, 28 patients who in addition to the standard protocol of perioperative intensive care was prescribed a solution of meglumine sodium succinate intravenously at a rate of 90 drops per minute immediately before the operation and on the 30th minute 200 ml of 1.5% solution (N-methylglucamine (meglumine)) - 8.725 g, succinic acid - 5.28 g). The appointment was due to the fact that one of the most important factors in postoperative cognitive dysfunction is the possible biochemical changes in homeostasis that may occur during general anesthesia and be associated with the activation of lipid peroxidation; group III, group II, 28 patients who in addition to the standard protocol of perioperative intensive care was prescribed a solution of L-arginine hydrochloride intravenously at a rate of 90 drops per minute immediately before surgery and at the 30th minute in 100 ml of a solution of 42 mg / ml.

To confirm the adequate randomization of patients in terms of endothelial function in all patients before surgery and 12 hours after it was determined the level of von Willebrand factor antigen, % (reference values 50-150%).

The integrative function was assessed by mnestico-intellectual indicator using a short scale of mental status research MMSE (maximum score on the MMSE scale 30 points); in order to eliminate the effect of memorization in the tests, used different options for their implementation. A decrease in the MMSE test by 10% or more was regarded as a manifestation of POCD.

Short-term memory was evaluated by the indicator of auditory short-term memory by the method of Luria - memorization of 5 words.

Control points were selected 12 hours after awakening after anesthesia, 3rd and 5th days of treatment.

To be able to use the Student's t test, the Fischer-Snedekor test was calculated - the ratio of the larger variance to the smaller one. All mathematical operations and graphical constructions were performed using the software packages "Microsoft Office XP": "Microsoft XP Home" and "Microsoft Excel XP".

Results of the research. When assessing the functional status of the endothelium in terms of the percentage of antigens to von Willebrand factor as a leading marker for the determination of endothelial dysfunction (VWF: Ag), no significant difference was found between groups of patients. Thus, before the operation, in patients of group I its average level was 182.1 ± 26.2%, in patients of group II - 196.4 ± 22.9%, in patients of group III - 189.6 ± 28.2%, $p > 0.05$. The presence of endothelial dysfunction in all studied patients, which was caused by somatic pathology, was determined.

When conducting a statistical analysis of indicators that characterize the functional state of the endothelium (table 1), we identified probable differences between indicators in the groups.

Table 1. The level of VWF: Ag, %, in the blood of the studied patients

Moment of control	Groups		
	Group I	Group II	Group III
Before surgery	182,1±26,2	196,4±22,9	189,6±28,2
12 hours after regaining consciousness after anesthesia	204,2±16,6	198,4±19,2	182,1±7,9 *I,III

* - $p<0,05$ - probable difference between indicators

Thus, during intensive care according to the standard protocol 12 hours after surgery in patients of group I was found to increase the level of VWF: Ag, 204.2 ± 30.6%, relative to baseline in the vast majority of patients in this group, which indicated about the deterioration of endothelial function caused by surgical stress. In patients of group II, who were additionally prescribed meglumine solution, the level of the studied indicator remained at the initial level, 198.4 ± 19.2%, which indicated the presence of endothelioprotective properties in the complex of intensive care of this group of patients. In patients of group III, who were additionally prescribed a solution of L-arginine hydrochloride, the level of antigens to von Willebrand factor was probably ($p<0.05$) less than in patients of group I, 182.1 ± 7.9%, and less in the predominant the number of patients of group II, which indicated the severity of endothelioprotective properties of the intensive care unit in patients of group III.

Important from the point of view of the pathogenetic necessity of prescribing endothelioprotectors on the 3rd and 5th days of treatment (table 2), given the presence at the time of admission in all patients of compromised endothelial function on the background of obesity and concomitant somatic pathology.

Table 2. Dynamics of cognitive parameters in the studied patients

Groups	Terms of inspection, days		
	1 (12 hours after surgery)	3	5
MMSE, points			
Group I	24,2±0,6	25,7±0,4	26,1±0,2
Group II	26,1±0,4	26,1±0,6	26,9±0,4
Group III	28,8±0,2*^{1,3}*^{2,3}	29,2±0,4*^{1,3}*^{2,3}	29,6±0,1*^{1,3}*^{2,3}
Test 5 words, points			
Group I	7,2±0,7	7,9±0,4	8,2±0,4
Group II	7,4 ±0,9	8,3±0,2	8,6±0,1
Group III	9,4±0,2*^{1,3}*^{2,3}	9,6±0,4*^{1,3}*^{2,3}	9,7±0,2*^{1,3}*^{2,3}

* - $p<0,05$ - probable difference between indicators

Statistical analysis of changes in cognitive abilities on the MMSE scale in the postoperative period in patients of groups I, II and III found that surgery in itself - surgical stress, as well as general anesthesia during surgery adversely affect almost all cognitive parameters. Thus, in patients of group I and group II the dynamics of deterioration of cognitive abilities coincided with an increase in the level of VWF: Ag in the blood. Thus, 12 hours after surgery, the total score of the functional state of higher nervous activity on the MMSE scale in patients of group I was 24.2 ± 0.6 points, group II - 26.1 ± 0.4 points, which corresponded to the unsatisfactory state of cognitive abilities for this contingent of patients. In group III, this indicator was 28.8 ± 0.2 points, which was probably ($p<0.05$) more than in groups I and II and indicated in favor of more pronounced endothelioprotective properties of the intensive care protocol in this group. The dynamics of cognitive changes was identical according to the Luria test.

On the 3rd day and the 5th day of treatment, there was a corresponding trend in the restoration and realization of cognitive abilities in the studied patients.

Conclusions.

In patients with urgent surgical pathology and surgical intervention in this regard (cholecystectomy), who for more than 10 years have grade I-II obesity with appropriate metabolic changes and comorbid background, it is important to implement endothelioprotection as a prophylactic method of cognitive dysfunction in the period after.

Oxidative stress does not have a pathogenetically destructive effect on the vascular endothelium in such patients, so the appointment of meglumine in intensive care is not important.

In contrast, the administration of L-arginine hydrochloride is important, provides endothelioprotection and counteracts the occurrence of postoperative cognitive dysfunction.

Conflict of interest. The authors do not declare a conflict of interest.

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