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Postoperative Cognitive Changes in Elderly Patients

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Abstract The analysis of data on the problem of postoperative cognitive impairment in elderly and senile patients is presented. The definition of the concept of postoperative cognitive dysfunction, its etiology and factors contributing to its development, clinical symptoms, features of its diagnosis, as well as factors for preventing postoperative cognitive dysfunction and its possible pharmacological correction are considered. The appendix contains psychological tests used to diagnose postoperative cognitive dysfunction. It is important to note that adequate diagnosis of postoperative cognitive dysfunction is impossible without an assessment of the preoperative neuropsychological status.

Keywords Postoperative cognitive dysfunction, Pathogenesis, Etiology, Developmental factors, Diagnosis, Prevention

1. Introduction

The problem of the development of cognitive dysfunction in elderly patients in the early postoperative period in the intensive care unit and intensive care is a frequent complication with the subsequent transition of dysfunction into delirium. The incidence of postoperative cognitive dysfunction and postoperative delirium disorders in this category of patients, according to different authors, ranges from 10 to 64% [2,3]. The development of cognitive dysfunction in the postoperative period leads to an increase in the risk of mortality, lengthening the duration of treatment. Prevention and treatment of cognitive dysfunction does not currently have a clear algorithm of action. Despite some success in the conservative treatment of acute cognitive dysfunction and complications, the mortality rate for this disease remains high. The number of postoperative cognitive dysfunctions over the past 10 years has increased from 53% to 75%. The overall mortality in the case of the transition of postoperative cognitive dysfunction to delirium increased by 15%, and in old age it reaches 28-80%. Currently, clinicians are focusing on the problems of assessing the neurological status and severity of the general condition in preparing patients for surgery [4].

Postoperative cognitive dysfunction is a common and serious complication in elderly patients after surgery. The incidence of postoperative cognitive dysfunction and postoperative delirium disorders in this category of patients, according to different authors, ranges from 10 to 64% [2,3]. Obviously, such a significant variation in performance is due to the lack of uniformity and clarity in identifying and documenting the symptoms of delirium. Interest in the study of this postoperative complication is not only not diminishing, but is constantly increasing, as evidenced by a significant number of foreign works published, in recent years. As risk factors indicate older age, type of anesthesia (general or regional), hypernatremia and plasma hyperosmolarity, hyponatremia, presence of bad habits (smoking and alcohol abuse), concomitant diseases of the cardiovascular and respiratory systems, diabetes mellitus, the duration of surgical intervention [1,4]. Nevertheless, despite the long-term efforts and a significant number of publications, the interpretation of many aspects of the problem, above all the spectrum and specific weight of risk factors, the prognosis of the development of this complication in a particular patient and, accordingly, measures of its targeted prevention, remains controversial.

The concept of brain damage under the influence of general anesthesia has been discussed at the interdisciplinary level for many years. Currently, the majority of specialists in various fields (neurologists, neuroscientists, psychologists, anesthesiologists, surgeons) support this hypothesis [2,4,5]. However, at the present stage of development of neuroscience and neurophysiology, it should be recognized that we know very little about the mechanisms of development of postoperative cognitive dysfunction, as a result of which there are no strategic directions for its prevention and therapy. In addition, at present, the possible social and/or economic consequences of postoperative cognitive dysfunctions have not been studied, which is very important due to the unfavorable demographic situation in our country.

In the literature there are numerous data on the negative impact on the central nervous system even of general therapeutic doses of drugs for general anesthesia, including:

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Morphine, Fentanyl, amphetamine, Halothane, sodium oxybutyrate, Hexenal, Ketamine, Nembutal, Propofol (Diprivan) [1,2,5]. In recent years, the question of the damaging effects on the brain of hypotensive anesthesia has been raised [3,4].

Due to the multifactorial nature of postoperative cognitive dysfunctions in recent years there has been a tendency towards a multidisciplinary approach to solving this problem with the involvement of specialists of various specialties, including not only anesthesiologists, but also neurologists, clinical neurophysiologists, pathophysiologists, medical psychologists.

In view of the heterogeneity of the research, data on the prevalence of postoperative cognitive dysfunction are contradictory. The frequency of early postoperative cognitive dysfunctions in general surgical practice varies from 10 to 30%, and persistent postoperative cognitive dysfunction is observed on average in 1-10% of patients [1,6-8]. It has been shown that in patients of middle age (40–60 years), subjective complaints of persistent cognitive impairment after operations under general anesthesia are observed in 29% of patients, in elderly people over 70 years old) persistent postoperative cognitive dysfunction is registered in 4-6% of cases. Data on the prevalence of postoperative cognitive dysfunction in elderly and middle-aged patients were updated as a result of international prospective randomized studies, early and persistent postoperative cognitive dysfunction in 19.2% and 6.2% of middle-aged patients, respectively. Within 1–2 years, postoperative cognitive dysfunction persisted in 10.4% of patients and in 1–2% after 2 years. The risk of postoperative cognitive dysfunction persisting for 2 years after surgery under general anesthesia was determined, which amounted to 1:64000 cases of general anesthesia, but a prospective study was performed on a small subgroup of patients during a two-year period [5,10].

Among the risk factors for postoperative cognitive dysfunction were indicated: general anesthesia [3,7], chronic cerebrovascular diseases and the state of cognitive functions in the preoperative period, age of patients [6]. The frequency and severity of postoperative cognitive dysfunction is influenced by the dose of anesthetics and the duration of general anesthesia. The increase in the risk of damage to the central nervous system is observed when the duration of general anesthesia lengthens more than 3.5-4 hours, reaching maximum values by 5-6 hours of anesthesia [4]. However, the question of the likelihood of development, risk groups and the prevalence of postoperative cognitive dysfunction in young patients is currently far from being resolved.

Under the cognitive functions understand the most complex functions of the brain, through which the process of rational knowledge of the world [4,5]. Decrease in cognitive functions is manifested in impaired memory, attention, speech, counting, spatial and temporal orientation, ability to abstract thinking, signs of slowing thinking. To assess cognitive functions, neuropsychological research methods are used, representing various tests and tests for memorizing and reproducing words and pictures, recognizing images, solving intellectual problems, and studying movements. As before, the issue of cognitive impairment as a consequence of anesthesia remains little studied. There are 2 main options: postoperative delirium and so-called postoperative cognitive dysfunction.

Postoperative cognitive dysfunction is a cognitive disorder that develops in the early and possibly persisting in the late postoperative periods, clinically manifested in the form of memory disorders, difficulty concentrating and prolonged attention, as well as disorders of other higher cortical functions (thinking, speech, etc.) confirmed by neuropsychological testing data (in the form of a decrease in testing indicators in the postoperative period by at least 10% of the preoperative level), which entails a problem with training, reduced mental performance, mood (depression).

During the last 10-15 years, there has been a revival of interest in the study of the functional state of the central nervous system after operations under general anesthesia [2,6,9], works have appeared indicating the development of metabolic changes at the neuronal level, disruption of synaptic transmission processes, changes in bioelectronic brain activity, impaired microcirculation and tissue hypoxia. Publications indicating damage to the functional state of the central nervous system (in particular, cognitive functions) after various types of general anesthesia have been found. These include: reduced cognitive abilities, impaired motor functions, attention, memory impairment, the occurrence of psychotic reactions. It was shown that the frequency and severity of the side effects of anesthesia on the central nervous system are influenced by the dose of anesthetics and the duration of general anesthesia [3,5,9,10].

However, neurologists do not take into account the adverse effects of central anesthetics on the central nervous system in young patients after long surgical interventions in general surgery and, especially, in microsurgical practice (including plastic surgery), since such manipulations are not accompanied by significant blood loss, threatening the patient's life with changes in peripheral and central hemodynamics, and are seemingly "uncomplicated" surgical interventions.

Taking into account the recommendations of the neurologist allows the anesthesiologist, to the extent possible, to minimize the risk of neurological complications of general anesthesia. In addition, patients with a high risk of neurological complications should be examined and examined by a neurologist over a period of at least the first 7-10 days of the postoperative period [4,8].

Objective of research: to study the state of cognitive functions in elderly patients with uncomplicated neurological and psychosomatic history before and after microsurgical operations under general anesthesia and to evaluate the effectiveness of therapeutic measures to prevent persistent cognitive disorders in the late postoperative period.

2. Material and Methods

The object of the study was a contingent of patients from 65 to 90 years. All patients received planned surgical treatment in general, regional and combined anesthesia at the Andijan State Medical Institute clinic, in the period from 2015 to 2018. The sample size was 100 patients.

3. Results and Discussion

The study was conducted in two stages: the first stage, performed on a sample of 100 patients, was devoted to the search for risk factors for the development of postoperative cognitive deficit and postoperative delirium in order to reduce their risk and manage them. The second stage, the assessment of the possibilities for the prevention of postoperative cognitive deficit and delirium in this category of patients, required an analysis of an additional sample of 30 patients.

The criteria for inclusion in the study were: surgical profile of patients, age from 65 to 90 years and the need for elective surgery.

The exclusion criteria were a history of mental illness, dementia, psychotropic drugs, head injury, alcohol intoxication, and cardio and neurosurgical operations.

To exclude dementia, all patients were tested before surgery using the MMSE questionnaire (abbr. English. Mini mental state examination), aimed at assessing cognitive functions. For follow-up of changes in the indices for all patients included in the study, MMSE testing was also conducted on the first, fourth and seventh days after surgery. The diagnosis of delirium in the postoperative period was established on the basis of a survey based on the diagnostic criteria ICD-10 and DSM-IV (American Psychiatric Association, 1994) and verified by consultation of a psychiatrist.

All patients underwent a comprehensive examination, which included clinical, biochemical and instrumental studies. In blood tests of patients in 70% of cases, hyperlipidemia, azotemia, hypoproteinemia, coagulopathy in the form of increased fibrinogen and a decrease in active partial thromboplastin time were noted.

All patients underwent surgery under general combined anesthesia with artificial ventilation of the lungs, balanced intravenous without artificial ventilation of the lungs and regional anesthesia.

During the first two days after surgery, delirium developed in 17 patients (9 men and 8 women). The average age of these patients was 77.9 ± 8.1 years, whereas in the rest of the group it was 74.7 ± 6.5 years ($p > 0.05$).

In the group of patients who developed delirium, 7 patients underwent general surgical operations, and 10 - hip and knee joint arthroplasty. In 10 patients, a hyperactive form of delirium was observed with a predominance of agitation, irritability and aggression, in 3 patients a hypoactive form with a predominance of inhibition, drowsiness and apathy, in 4 patients a mixed form was noted with an approximately equal proportion of these disorders. The clinic had a tendency to grow in the evening, even more intense at night and decreasing by the morning.

Analysis of the influence of background risk factors and data of pre-operative blood tests on the development of postoperative delirium showed no statistically significant links.

During the entire observation period, a gradual improvement in cognitive status was noted in each of the three subgroups, but even on the seventh day after the operation, the initial state was not achieved; the difference in assessment from baseline in all subgroups remained significant ($p<0.05$).

Thus, in the group of elderly patients with general surgical, trauma-orthopedic and urological profiles, postoperative delirium develops in every sixth patient; while the proportion between hyperactive, hypoactive and mixed forms of delirium is 10:3:4, respectively. Despite the absence of delirium, surgery and anesthesia, regardless of the choice of the method of the latter, lead in elderly patients to a significant deterioration in cognitive functions. Their gradual recovery does not allow reaching the initial level even by the seventh day after the intervention.

4. Conclusions

Cognitive impairment in the postoperative period, especially in elderly and senile persons, necessitates a rational study and understanding of the mechanisms of their formation in this category of patients. Prophylactic neuroprotective therapy together with adequate correction, hemodynamics, homeostasis and gas exchange are of crucial practical importance in preventing damage to neurons or correcting already occurring disorders of higher mental functions in the early postoperative period, when these changes are potentially reversible.

REFERENCES

[1] Fedorovsky N.M., Kosachenko V.M., Korsunsky S.B., et al. Monitoring of transcranial blood flow during regional anesthesia in the elderly patients. Russian Medical Magazine. 2003; 3: 23-26.

[2] Davydov V.V., Neimark M.I. State of higher mental functions in patients undergoing anesthesia using Diprivan and Ketamine. General reanimatol. 2005; 1 (2): 48–52.

[3] Isaev S.V., Likhvantsev V.V., Kichin V.V. The influence of perioperative factors and the choice of anesthesia method on the incidence of cognitive disorders in the postoperative period. In: Proceedings of the IX Congress of the Federation of Anaesthesiologists and Resuscitators. September 27—29, 2004 Irkutsk; 2004. 113-114.

[4] Yakhno N.N., Zakharov V.V. Mild cognitive disorders in old

age. Neurol. journal 2004; 9 (1): 4–8.

[5] International statistical classification of diseases and problems related to health. Tenth revision (ICD-10). M .: Medicine; 2003: 317.

[6] Zakharov V.V., Damulin I.V. Diagnosis and treatment of cognitive impairment in the elderly. Method. recommendations. Ed. N.N. Yakhno. M .: MMA them. I.M. Sechenov; 2000.

[7] N.A. Schneider, V.Shprakh, A.B. Salina. Postoperative cognitive dysfunction (diagnostics, prevention, treatment). In book: New computer technologies. Krasnoyarsk; 2005. 95.

[8] Sazonova A. Nootropic drugs - the desire for reason. Pharmacist 2005; 16: 4.

[9] Parrots K.A., Savin I.A., Goryachev A.S. Delirium in neuroreani ation. In the book: II National Congress. "Emergency conditions in neurology". Moscow, 2011, pp. 185-191.

[10] Preobrazhenskaya I.S., Yakhno N.N. Vascular cognitive disorders - clinical manifestations, diagnosis, treatment. Neurol. Magazines, 2007; 12: 45-51.