

DRUG PREVENTION OF CEREBRAL COMPLICATIONS OF GENERAL ANESTHESIA IN CHILDREN

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ABSTRACT: General anesthesia is understood as a change in the physiological state, characterized by reversible loss of consciousness, complete analgesia, amnesia and some degree of muscle relaxation [6,15]. The introduction of anesthetics into the body is accompanied by changes in all vital organs and systems. The degree of these changes depends on many factors: chemical, pharmacodynamic properties of the anesthetic, concentration, duration of action, age of the patient, nature, severity of the disease, etc. [61]. In addition to the analgesic effect, general anesthesia has a number of side effects. The main target of anesthetics is the central nervous system. Direct and indirect effects of anesthetic drugs are distinguished: indirect - the effect of anesthetics on the metabolism of brain tissue, direct - direct effect on the tone of cerebral vessels [66,72,86]. A number of studies have proven the suppression of bioelectrical activity of the brain and a decrease in cerebral blood flow under general anesthesia [18,51]. Even when anesthesia is administered in the "standard" mode, dysmetabolic and circulatory disorders can apparently lead to the initiation of an ischemic cascade of metabolic reactions. And at least 9% of patients undergoing surgery experience at least one intraoperative complication: arrhythmia, hypotension, inadequate ventilation of the lungs, aggravating hypoxia and, in combination with surgical trauma, oxidative stress. The range of damage to the nervous system during general anesthesia is very wide: from minimal dysfunction to stroke and even death [3,5,14,26,47,48,88,126].

Despite numerous studies devoted to various aspects of general anesthesia, a number of issues remain controversial and not fully understood. The full range of mechanisms of pathogenic effects of general anesthesia on the nervous system has not been studied; the problem of timely detection of the risk of neurological complications has not been resolved; The search for ways of neurometabolic protection, in particular, using pharmacological agents, during general anesthesia remains urgent [58]. The aim of the study: development of a method for drug prevention of cerebral complications of general anesthesia based on the results of assessing its effect on cerebral hemodynamics and functional activity of the brain.

Research objectives:

1. To study the dynamics of cerebral blood flow in the pre- and postoperative periods.
2. To assess changes in the state of bioelectrical activity of the brain in the pre- and postoperative periods.
3. To study the effect of general anesthesia on the state of cognitive functions.

4. To assess the effectiveness of the drugs "Instenon" and "Encephabol" as means of neurometabolic protection of the brain.

Scientific novelty of the study.

For the first time, a synchronous study of cerebral hemodynamics and bioelectrical activity of the brain in the pre- and postoperative periods was conducted.

A decrease in cerebral blood flow and a disruption of the functional activity of the brain in the postoperative period were noted, while no stable correlation was found between changes in cerebral hemodynamics and bioelectrical activity of the brain. The negative impact of even short-term general anesthesia on cognitive functions in children was confirmed. The effectiveness of the drugs "Instenon" and "Encephabol" as neurometabolic protection agents during general anesthesia was assessed for the first time.

CONCLUSIONS

1. In the postoperative period, patients who did not receive neuroprotective therapy in all cases develop various cerebral complications of general anesthesia: cognitive impairment, disorders of cerebral hemodynamics and bioelectrical activity of the brain.
2. After the operation, a reliable decrease in systolic and diastolic linear velocity of cerebral blood flow and an increase in the Gosling pulsation index are observed, which are sonographic signs of a breakdown in the autoregulation of cerebral circulation.
3. Frequency-spectral analysis of electroencephalograms has established that in the postoperative period there is a reliable increase in the power spectrum and low-frequency activity index, indicating an imbalance in the functional state (synchronizing and desynchronizing effects) of non-specific brain structures.
4. Neuropsychological testing showed that general anesthesia causes cognitive impairment: 3-5 days after surgery, a significant decrease in concentration and memory is detected.
5. Prescribing Instenon for 5-6 days before surgery helps prevent the development of cerebral complications of general anesthesia. In the pre- and postoperative periods, cerebral hemodynamics, bioelectrical activity, and cognitive functions did not differ significantly.
6. When taking Encephabol for less than 10 days, a significant deterioration in cerebral blood flow, inhibition of bioelectrical activity, and cognitive functions is observed in the postoperative period. When prescribing Encephabol for more than 10 days, no significant changes in cerebral hemodynamics and functional brain activity were observed compared to the baseline data.

PRACTICAL RECOMMENDATIONS.

1. The data obtained in the study confirm sufficient neuroprotective properties of the drug "Instenon", which, given the short "therapeutic latency", allows us to consider "Instenon" as

a drug of choice for the prevention of cerebral complications of general anesthesia. The drug should be prescribed during the preoperative preparation for 5-6 days at 1 tablet Zr/day.

2. During planned surgical interventions for preventive neuroprotective therapy, it is possible to use the drug "Encephabol" for a course of at least 10 days

3. The developed method of synchronous study of cerebral hemodynamics and bioelectrical activity of the brain in the future can be considered an important component of anesthesia, allowing to increase the efficiency of determining the degree of risk of developing neurological complications of general anesthesia.

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