

COAGULATION AND ANTICOAGULATION SYSTEM OF BLOOD IN NEWBORNS WITH MALFORMATIONS IN COMMUNICATION WITH ANESTHESIA AND SURGICAL INTERVENTIONS

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ABSTRACT — The article presents data on the state of coagulation and anticoagulation systems of blood in newborn with developmental disabilities, in connection with anesthesia and surgical intervention.

KEYWORDS — the system collapse, newborn babies, anesthetic injury

Coagulation and anticoagulation system of blood is a sensitive indicator of adaptation — adaptive reactions forming the main component of homeostasis. Depending on various factors, internal and external environment it is exposed to constant changes.

Clotting reaction itself, like many biological and chemical reactions, is a chain reaction: the individual links clotting process are mutually connected with each other. In the blood of a violation of a dynamic equilibrium between coagulation factors and inhibitors may be a trigger for thrombosis. The mechanism of blood coagulation plays a significant role autocatalytic process. Autocatalysis throughout the complex dynamics of the clotting process is the enzyme thrombin. The more forms of thrombin, the more there is to accelerate the formation conditions of thrombin and thereby increases the possibility of intravascular coagulation.

Coagulation system has a high degree of self-regulation. Physiological balance between the numerous clotting factors, the presence of buffer systems of blood leads to the fact that the balance is maintained to help prevent blood clots in the circulatory system and at the same time providing bleeding in vascular lesions. (0,2)

Modern multi anesthesia and extensive, traumatic surgery cause profound changes in the coagulation and anticoagulation blood system, resulting in an operating period of the dangers of thrombosis and embolism. Therefore, it is important to recognize the development of phenomena prethrombosis. According to the literature on the blood coagulation system is subject to change character of the age.

State of blood coagulation during surgical intervention in children remains almost unexplored. Remain unknown rate of blood coagulation indicators in children at different ages, although they exist (3, 4).

MATERIALS AND METHOD OF RESEARCH

A study of indicators of coagulation system 107 infants with developmental disabilities received in the Department of Anesthesiology, Intensive Care National Medical Center in RT from 2005–2010. Studies were performed before surgery, during it and in the postoperative period.

In the study of coagulation factors in newborns during the first day of birth there is a low concentration of fibrinogen, whereas prothrombin complex is somewhat higher than that of newborn received a 10–15 days from birth. Tolerance to heparin plasma increased in children by 20–25 days from birth. They also noted a decrease in fibrinolytic activity, expressed in percent decrease in the spontaneous lysis of up to $11.2 \pm 1.2\%$ (at a rate of 14–15%).

THE RESEARCH RESULTS

Pathological processes in the lung, kidney and urinary tract have an influence on blood coagulation, taking an active part in the synthesis and utilization of coagulation factors, and fibrinolytic systems of blood (1, 3, 4, 5).

In the study of blood coagulation factors in infants with anal atresia without fistula (25) was detected in the preoperative period, a significant increase in plasma tolerance to heparin at low levels of plasma fibrinogen. In infants with anorectal malformations fistulous form (33) found the phenomenon anticoagulation: decrease in prothrombin index. Lengthening the time of recalcification of the plasma.

In infants with congenital intestinal obstruction index decreased prothrombin, increased tolerance to heparin plasma and reduced fibrinolytic activity.

Thus, studies of blood coagulation parameters in newborns with congenital malformations found some of the features of blood coagulation, which may cause bleeding complications during surgery and thromboembolic complications in the postoperative period,

which should be taken into account when preparing for surgery.

The factors of blood coagulation in surgical interventions for endotracheal anesthesia combined (33), central analgesics (30), epidural analgesia on the background (44).

When combined epidural anesthesia on the background of analgesia, we found the state of anticoagulation, which is expressed in the reduction of the prothrombin index trombotesta, fibrinogen, plasma recalcification time extension and the sharp rise in blood fibrinolytic activity. The revealed changes particularly pronounced in infants aged 10–15 days, less severe in children 20–25 days.

When combined endotracheal anesthesia occurred summed effects of drugs (barbiturates, muscle relaxants), blood transfusion during surgery, as well as extensive tissue trauma with the release of large amounts of tissue thromboplastin, affecting the coagulation process. Under these conditions, changes procoagulants are compensated in nature: with an increase in prothrombin observed decrease in fibrinogen, fibrinolytic system of blood, several activating the beginning, rises sharply at the end of the operation (200%). Retraction decreased ability of blood at the beginning and the end of surgery.

Investigation of the blood coagulation system in newborns with surgical interventions by the central analgesic effects of hypercoagulation notes, growing by the end of manipulation. This is evidenced by: a shortening of AVC. (At baseline, equal to 160 ± 0.7 , a decline to 129 ± 9 seconds in the beginning and up to 114 ± 10.8 seconds by the end of the operation), the increase in coagulation index of 4 ± 0.2 to 6.6 ± 0.4 by the end of the operation.

Thus, the study of coagulation parameters during the pain of various surgical interventions reveal a variety of changes on the part of the system depending on the type of anesthesia, and the severity of surgical intervention. Changes in the coagulation system due to complex nerve-reflex, endocrine-humoral shifts associated operative trauma and anesthesia.

In the central analgesic analgesics changes in blood coagulation system are compensated more than character. Thus, when surgical intervention indicated moderate hypercoagulability, manifested in increased procoagulants (prothrombin, fibrinogen), more pronounced at 25–28 days from birth. All infants with procoagulants increase observed increased fibrinolytic activity. This played an important role in maintaining the balance between coagulation and anticoagulation systems of blood.

Epidural analgesia on the background of combined anesthesia was used in infants and young

children with anorectal malformations. These children have noted before surgery significantly reduced procoagulants and inhibition of fibrinolysis process, which is associated with symptoms of chronic fecal intoxication. Under these conditions during treatment with epidural analgesia with combined anesthesia occurred a significant increase in procoagulants, increased rates of general coagulation (trombotest, plasma recalcification time). Fibrinolytic activity of blood did not undergo drastic changes.

The main role in reducing blood coagulation factors during anesthesia belongs to dysfunction of the liver, where the synthesis of many factors, blood coagulation. There are factors that stimulate the action of drugs on the fibrinolytic activity of blood, this increase in calcium concentration and its inhibitory effect on the activity of free heparin blood. But the main application of anesthesia is a central nervous system and especially the reticular formation. By changing the functional state of central nervous system. Anesthesia affects both the activity and the ratio of coagulation and anticoagulation system of blood, which are regulated by the nervous system (1, 3, 5). Increased blood fibrinolytic activity is a compensatory response of the body, aimed at preventing and eliminating the effects of intravascular coagulation.

The state of blood coagulation in the postoperative period was carried out in dynamics: by the end of the first day, at 3 and 5 days after surgery. Infants with severe operations received postoperative analgesia in the first 2–5 days. Shifts of the coagulation system depended on the nature of the main anesthetic during surgery, type of analgesia therapy, severity of surgery.

By the end of the first day after surgery under endotracheal anesthesia, surgical intervention for severe tendency to reduce the degree of trombotesta and prothrombin index, fibrinogen, prolongation of recalcification time, other factors remain at the previous stage study (the end of surgery). On the third and fifth postoperative day in all groups of patients examined there was a significant increase in blood coagulation activity, level of activity which depended on the severity of surgical trauma, type of anesthesia. Postoperative analgesia contributed to medical compensation increased content of paracoagulants due process of fibrinolysis.

For leveling of the pain (4 and 5 days) to the fore the severity of surgical trauma and age-specific blood coagulation. All babies, regardless of surgical trauma there was a marked elevation in blood coagulation, fibrinolytic system activation. On the seventh day after surgery, blood coagulation system tends to return to its original level only some parameters of coagulation (prothrombin index, clot of blood).

CONCLUSION

1. Newborn and young children age to surgery under endotracheal anesthesia, central analgesia, epidural analgesia in the postoperative period observed increase in activity and paracoagulants general coagulation system.
2. Depression of fibrinolytic activity and system paracoagulants indicates hypercoagulability. This state begins at the end of the first day, and will return to the original after the operation begins on the fifth day.
3. Complex nerve-reflex (operating and anesthetic trauma), humoral factors, receipt of various products of the wound chamber tissue decay are the cause of hypercoagulability in the postoperative period.
4. Postoperative analgesia for physiotherapy 2–5 days have a stimulating effect on blood clotting.
5. Lowering blood fibrinolytic activity in the postoperative period due to a temporary depression of physiological anticoagulation blood system.

REFERENCES

1. **V. M. ZHENILO ET AL.** Basics of the modern general anesthesia. — Rostov-on-Don. — Phenix 1998, P. 62–66.
2. **L. E. TSYPIN ET AL.** Postoperative pain management in children. — 1999, P. 33–47