

# Preoperative and postoperative care (pediatrics)

## Pathophysiology

Every anesthesia and operation causes a stress response in the internal environment. After surgery, **there is a generalized neurohumoral reaction 3-5 days later** → an increase in cortisol, catecholamines, renin, aldosterone and ADH. Increased levels of these hormones cause BP elevation, oliguria, Na and water retention and glycogen mobilization with subsequent hyperglycemia. Hormones return to their original level on the 5th day, then temporarily fall to negative values.

### Schedule of the pathophysiological response to surgery/anesthesia:

- **The corticoadrenergic phase** lasts for 2-4 days → sodium and water retention;
- for the next 2-3 days, the secretion of corticoids decreases → the output of Na and Cl increases;
- next 2-3 days, spontaneous anabolism begins → the ratio of potassium and nitrogenous substances in the urine normalizes (2:1);
- after the 10th day, anabolism is already developed, fat accumulation occurs.

In the first postoperative phase, there is oliguria due to water retention. In the next anabolic phase, water and ions are mobilized from the interstitium, **hypervolemia** occurs → healthy kidneys increase diuresis, the concentration and amount of excreted Na increases. If the kidneys are not in order, the patient is at risk of hypervolemia. In ECT, there is a lack of K, Ca. Acidification processes recede and the release of oxygen from binding to Hb may be inhibited. It is necessary to limit the parenteral supply of water, Na and cover the deficit of K and Ca.

## Premedication

By premedication we mean the administration of certain drugs before the operation under anesthesia, with which the patient is relieved of tension and fear and is calmed down, awakened and cooperative before the induction of anesthesia.

- If necessary, we supplement the premedication with analgesics and drugs that reduce secretion in the respiratory tract.
- Proper premedication not only reduces fear and tension, but also facilitates the introduction to general anesthesia and reduces anesthetic doses.
- The following are used for premedication: **barbiturates, opioids, benzodiazepines, neuroleptics, anticholinergics and antihistamines.**
- Premedication is also given to induce sleep the night before surgery – barbiturates, benzodiazepines and neuroleptics are used.
- Opioids, anticholinergics and sedatives are administered parenterally, mostly i.m., about 45 minutes before the procedure. on the way
  - morphin 0,1 mg/kg i.m.;
  - pethidin 0,5-1 mg/kg i.m.;
  - tramadol 1 mg/kg i.m.;
  - diazepam 0,15 mg/kg i.m.;
  - flunitrazepam 0,03 mg/kg i.m.;
  - midazolam 0,1 mg/kg i.m.;
  - droperidol 0,2-0,5 mg/kg i.m.;
  - promethazin 0,8 mg/kg i.m..
- The basis of premedication is sedatives and hypnotics.
- Analgesics are indicated if the patient suffers from pain before surgery.
- Most often, analgesics are combined with hypnosedatives or neuroleptics.
- Neuroleptics alone are not suitable for premedication.

### Anticholinergics

- It competitively inhibits the muscarinic effect of acetylcholine in postganglionic cholinergic nerves.
- It suppresses the secretion of glands in the nasal cavity, mouth, larynx and trachea → mucous membranes dry out.
- There is also a partial relaxation of the bronchial muscles.
- The heart rate increases, the influence of N. X. on the sinus node is dampened.
- **Indications of anticholinergics:**
  - prophylaxis and treatment of vagally induced bradycardia;
  - prophylaxis and treatment of increased secretion in the respiratory tract;
  - attenuation of unwanted cholinergic effects of cholinesterase activators when
  - antagonizing non-depolarizing peripheral antisynaptic drugs;
- **Atropin 0,02 mg/kg i.m.:** the maximum effect of atropine occurs 30-45 min after i.m. administration with a two-hour effect;
  - anticholinergics are no longer considered a regular and unconditional part of premedication.
- **Drapko's premedication scheme:**

- chlorpromazin 1 mg/kg;
- atropin 0,1 ml/5 kg.

## Planned surgery

- If possible, the patient should go to the surgery in optimal condition, surgery in metabolic disorder, acidosis, with pathological coagulations, etc. is an enormous risk for the patient.
- Ensure adequate hydration and homeostasis within the preoperative period when the patient is without p.o. income.
- Premedication according to the pediatric anesthesiologist.
- Control of preoperative examinations: KO + diff., coagulation, internal examination.

## Unplanned emergency surgery

- It is necessary to examine the **basic laboratory: KO + diff., coagulation, biochemistry, Astrup.**
- Depending on the type of operation, we may add other specific examinations.
- In conditions where the laboratory is unfavorable and it is nevertheless necessary to operate without delay, it is necessary to at least optimize (if possible) the blood picture, coagulation and the filling of the circulation.

## Amount of fluids after surgery

- The operation leads to antidiuretic tendencies → fluid consumption is **max. 50 ml/kg/d.**

## Postoperative complications

### Ventilation problems

- **MAC** - MAC is a sign that the patient was under stress during the operation caused by, for example, inadequate ventilation, hypovolemia, systemic hypotension, tissue hypoxemia.
- **MAL** - if MAL occurs (as a result of excessive suction of gastric juice or iatrogenically induced), it can be the cause of resulting bronchospasms.
- **Atelectasis** - atelectasis arises from hypoventilation during poor airway clearance; the cause can also be painful conditions in a patient who is afraid to cough.
- **Post-extubation stridor** - post-extubation stridor is prevented by consistent nebulization and adequate respiratory rehabilitation.
  - If possible, we extubate on the day of surgery.

### Circulation problems

- **Hypovolemia** - the cause is large blood loss during surgery, low cardiac output, poorly conducted anesthesia with insufficient fluid supply.
- **Myocardial dysfunction** - myocardial dysfunction may be unrecognized and present preoperatively or with intraoperative negative insults.
  - Oxygen consumption in the myocardium is determined by heart rate, LVEDP (left ventricle end-diastolic pressure), afterload, myocardial contractility. When taking catecholamines, TF and peripheral vascular resistance increase, oxygen consumption in the myocardium increases and its damage may occur. Conversely, improved myocardial contractility and thus reduced LVEDP with the use of catecholamines may reduce myocardial oxygen consumption.

### CNS disorders

- CNS function is closely related to the state of the cardiorespiratory system.
- Damage to the CNS during surgery or in the postoperative period has a direct impact on the long-term prognosis.
- It is not recommended to use antidotes (naloxone, flumazenil) to wake up the patient after anesthesia because of their side effects, especially hypertension and tachycardia.

### GIT disorders

- **Ulceration** - flat-rate use of H2-antagonists leads to an increase in nosocomial infections, pneumonia (the effect of the changed pH of the stomach on the growth of the microbial flora in the GIT is assumed).
- **Intestinal ischemia** - its risk is perioperative hypoxic events, hypovolemia and hypotension.
- **GIT motility disorder** - hypovolemia with subsequent hypoxia leads to GIT motility disorder.
- **GIT atony** - leads to transudation of ECT into the intestines.

**⚠ Excessive gastric tube losses can induce MAL.**

### Other problems

- **bleeding**
- **hypoglycemia in diabetics**

- **hypothermia,**
- **aspiration** - premature feeding is a risk,
- **technical problems** - ETC malposition or occlusion, kinking or infection of drains and catheters.

## Links

### related articles

- Scoring systems (pediatrics)

### Source

- HAVRÁNEK, Jiří: *Předoperační a pooperační péče.*