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The use of naropin with promedol for caudal anesthesia in newborn

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Keypoints

The study was conducted in 21 neonates operated on for atresia of the anus and Hirschprung's disease.

We identified the benefits of caudal anesthesia in combination with naropin and promedol during surgery of the anorectal area in newborns. The combined administration of naropin with promedol to the caudal canal lengthens the analgesic effect by up to 24 hours.

Abstract

Introduction

Optimization of anesthesia in newborns during surgical interventions of the anorectal and pelvic organs.

Material and methods

The study was conducted in 21 neonates operated on for atresia of the anus and Hirschsprung's disease. Depending on the methods of anesthesia, patients are divided into three groups. Patients of group I underwent general anesthesia with caudal administration of narupin, and in patients of group II, narupin 3 mg / kg in a volume of 1.0 ml / kg and promedol 0.2 mg / kg. A multicomponent general anesthesia was performed in group III patients. Induction anesthesia was carried out using O2: Air 1: 1 in combination with sevorane 6-8% and fentanyl 3 μg / kg and esmerona 0.1 mg / kg.

Results

At the first stage of the study, the indices of central hemodynamics in all the study groups were stable. At the second stage of the study, patients of groups I and II experienced a reduction in the heart rate by 12% and 15%, respectively, which was due to adequate anesthesia due to the caudal block. In children of group III, who underwent multicomponent general anesthesia with high doses of narcotic analgesic fentanyl, there was a significant increase in the heart rate by 29% and mean arterial pressure by 27% in the first stage of the study. At the third stage of the study, patients of Groups I and III showed a significant increase in the indices of both central hemodynamics and stress markers, which was associated with the appearance of pain. In Group II patients, 24 hours after the operation, the stability of anesthesia adequacy indicators was observed, which was associated with the prolongation of the action of the caudal

Conclusions

1. The combination of a caudal block with general anesthesia helps to reduce the consumption of both narcotic analgesics and the concentration of inhalational anesthetics and muscle relaxants.

2. The introduction of promedol with naropin in the caudal canal has prolonged the analgesic effect up to 24 hours.

Keywords

Caudal block, naropin, promedol, general anesthesia.

Introduction

Given the trend of a multimodal approach to the implementation of anesthesia in newborns, regional anesthesia methods have become increasingly widespread in recent

years. The modern concept of "balanced anesthesia" considers regional blockades not as an alternative to general anesthesia, but as one of its components (1,2). Especially relevant are central regional blockades in pediatric anesthesia practice due to the fact that they provide reliable antinociceptive protection during surgery and a milder post-operative period, rapid rehabilitation (3,4,5).

In pediatric anesthesia, "clean" regional anesthesia is almost not used, more often it is used as part of a combined anesthesia technique. One can not violate the basic principle of pediatric anesthesiology - "a child should not be present at his own operation" (6,7,8). The use of regional methods allows to significantly reduce the consumption of both inhalation and non-anionic anesthetics, narcotic analgesics and muscle relaxants, which significantly improves the controllability of general anesthesia. In this regard, regional anesthesia can be considered as one of the components of a "balanced anesthetic tool" in pediatric practice. The essence of this combination is to take advantage of each of the individual methods without increasing the degree of overall risk. Popular among the regional methods of anesthesia is caudal anesthesia, which is the introduction of a local anesthetic into the caudal space through the sacral slit, a U-shaped bone defect at the S4-S5 level. Caudal anesthesia is especially effective in surgical interventions below the navel (T10) in all childhood periods. Conducting complex reconstructive surgical interventions on the anorectal area in young children creates a number of requirements for anesthesia in these operations. First of all, the rich innervation of this anatomical zone leads to the fact that general anesthesia does not always completely block nociceptive impulses. Carrying out surgical interventions mostly at an early age (from the neonatal period to 6 months of life) requires special attention to ensure quality postoperative analgesia. With operational accommodations in the anorectal zone and in the pelvic organs, effective anesthesia can be achieved by introducing a local anesthetic into the sacral canal. At the same time, anesthesia of zones innervated not only by sacral, but also by lower limb and lumbar spinal nerves develops (9,10). Hence, in spite of the access used when administering a local anesthetic, it is more appropriate to call anesthesia caudal, rather than sacral. Caudal access to the epidural space with the introduction of local anesthetics is often used in infants during surgery to improve the quality of anesthesia. And this provides a significant reduction in narcotic analgesics for general anesthesia. Because caudal access is better to administer local anesthetics once because of the risk of infectious complications during catheterization, many authors suggest using adjuvants in combination with them (11,12).

The purpose of the study

Optimization of anesthesia in newborns in case of operative accommodation of the anorectal and pelvic organs.

Material and Methods

The study was conducted in 21 neonates operated on for atresia of the anus and Hirschsprung's disease. Depending on the method of anesthesia, patients are divided into 3 groups. Group I patients (n = 7) had combined endotracheal anesthesia with caudal administration of naropin. In children of this group, induction of anesthesia was carried out using propofol at a rate of 3 mg / kg.

After complete falling asleep patients, an esmerone was administered intravenously at a rate of 0.6 mg / kg, and after irrigation of the vocal cords with an aerosol of 10% lidocaine, intubation of the trachea was performed. The maintenance of anesthesia was carried out with an inhalational anesthetic of isoflurane 0.6 M All patients underwent mechanical ventilation in normocapnia mode (EtCO2 36-40 mm Hg) using the Drager Fabius apparatus. After the induction of anesthesia, the patient was transferred to the lateral position to perform the caudal block.

In patients of this group, narupin was injected into the sacral canal at a rate of 3 mg / kg in a volume of 1.2 ml / kg. In patients of group II (n = 7), endotracheal anesthesia with caudal administration of narupin was made at the rate of 3 mg / kg in a volume of 1.0 ml / kg in dilution with physiological saline and promedol 0.2 mg / kg.

Maintenance of anesthesia in this group was carried out in the same way as in patients of Group I.

Patients of group III (n = 7) underwent multicomponent endotracheal anesthesia. Induction anesthesia was carried out using O2: Air 1: 1 in combination with sevorane 6-8ob% and fentanyl at a rate of 3 mcg / kg and esmerona 0.1 mg / kg.

Technique for conducting the caudal block.

In our practice, when carrying out caudal blockade, the position on the left side is usually used without strong bending of the legs in the knee joints. Then the skin is carefully treated with alcohol-containing antiseptic solutions. The diameter and length of the needle is 23G. A sufficient internal diameter of the needle allows you to quickly see the reflux of blood or cerebrospinal fluid in the pavilion of the needle, and a sufficient external diameter makes the needle rigid and allows you to clearly feel the passage of the needle through the membrane. In our practice, when carrying out caudal blockade, the position on the left side is usually used without strong bending of the legs in the knee joints. Then the skin is carefully treated with alcohol-containing antiseptic solutions.

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The needle is guided at an angle of 90 ° to the surface of the skin with a subsequent rotation of 30-40 ° in the cranial direction, its cut is directed ventrally, and after passing through the ligament the needle is redirected 3-4 mm into the caudal canal. This method in newborns should be carried out with special care and caution, because their spinal cord descends to the level of S3-S4 and only at the age of about 2-3 years it is installed in its final position at an altitude of S2. In our daily practice, we use the "no turn technique" technique, which consists in puncturing the sacrococcygeal ligament at an angle of 60 ° without holding the needle into the caudal canal. After the aspiration test, if not blood or liquor is aspirated, then a local anesthetic is injected within 60-90 seconds.

To determine the adequacy of the methods of anesthesia, central hemodynamics and stress markers (cortisol and glucose in the blood) were studied at three stages of the study: Stage 1 - before surgery (before the cut of the skin); Stage 2 - at the end of the operation (after the application of skin seams); Stage 3 - 24 hours after the operation.

Results and discussion

At the first stage of the study, the indices of central hemodynamics in all study groups after the corresponding preoperative preparation were stable and corresponded to their mean age values (Table 1). At the 2 nd stage of the study, patients of the I and II group experienced a decrease in heart rate of 12% -15%, respectively, and SI and AD mean. decreased unreliably.

These changes are due to a sympathetic blockade caused by caudal administration of local anesthetics, which did not cause a significant reduction in SI because children were given infusion therapy at a rate of 12 ml / kg / h. In children of group III, who underwent multicomponent endotracheal anesthesia with high doses of narcotic analgesic fentanyl, there was a significant increase in heart rate by 29%, SI-26%, and AD-mean. - 27% at the first stage of the study despite high doses of it. At the third stage of the study, in patients of group II, to which caudal channel was administered promedol together with stool, the indices of central hemodynamics did not change significantly.

And in patients of Groups I and III, the tendency to hyperdynamics of blood circulation remained at the third stage of the study. And patients of these groups with the purpose of anesthesia in the postoperative period were

administered intravenously promedol in age dosages under the control of a cardiomonitor.

The level of cortisol in patients of the I and II groups in the second stage of the study was reliably reduced by 25% and 22%, respectively, which indicated the adequacy of both anesthesia procedures in the surgical interventions of the anorectal area in newborns (Table 2). However, at the third stage of the study in patients of group II the level of cortisol did not change, and the I group experienced an increase of 40% compared with the previous stage.

In patients of group III, who underwent multicomponent general anesthesia with high doses of fentanyl, there was a significant increase in the level of cortisol by 36% and glucose by 24% at this stage of the study. And this indicates the appearance of severe pain 24 hours after the operation.

Group of patients	Stages of research	Heart rate, sec^{-1}	$BP_{aver.}$	Cardiac Index l / (min × m2)
I (caudal block with naropin)	I stage	146,4±5,3	49,4±3,18	3,41±0,41
	II stage	126,3±4,2	47,5±2,82	3,19±0,32
	III stage	130,1±4,6	50,1±4,1	3,39±0,12
II (caudal block with naropin/ promedol)	I stage	140,8±6,2	49,5±2,5	3,21±0,22
	II stage	126,7±5,8	46,6±1,7	3,18±0,11
	III stage	121,6±5,2	48,7±2,2	3,42±0,12
III (endotracheal anesthesia without caudal block)	I stage	147,5±7,1	51,2±2,9	3,59±0,14
	II stage	182,3±6,4	66,2±3,2	4,47±0,09
	III stage	172,5±8,9	62,1±2,13	4,52±0,16

Table 1. Indices of central hemodynamics

Group of patients	Stages of research	Cortisol nmol / l	Glucose mmol / l
I (caudal block with naropin)	I stage	232,2±18,11	3,85±0,11
	II stage	181,21±21,33	4,02±0,19
	III stage	258,23±22,16	4,19±0,16
II (caudal block with naropin and promedol)	I stage	218,06±24,22	3,71±0,08
	II stage	159,3±23,54	3,91±0,11
	III stage	155,5±22,43	4,02±0,12
III (endotracheal anesthesia without caudal block)	I stage	261,18±31,52	3,92±0,11
	II stage	359,22±27,85	4,55±0,09
	III stage	369,18±28,35	6,31±0,13

Table 2. Dynamics of of stress markers

Conclusion

1. The combination of a caudal block with general anesthesia helps to reduce the consumption of both narcotic analgesics and the concentration of inhalational anesthetics and muscle relaxants. And thus, there is a decrease in their possible side effects on the body of newborns.

2. Adding promedol as an adjuvant to a solution of local anesthetic - narropin introduced into the caudal canal during surgical interventions of the anorectal region in newborns resulted in prolongation of the analgesic effect up to 24 hours, which was confirmed by the stability of central hemodynamics and the absence of significant changes in the concentration of stress markers (cortisol and glucose).

Author declaration

Conflict of interest: none

Non-financial interest

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