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PECULIARITIES OF POST-OPERATIVE ANALGESIA AFTER THE EXTENSIVE SURGICAL INTERVENTIONS IN CHILDREN

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INTRODUCTION. Postoperative pain syndrome remains a serious problem in pediatric surgery and anesthesiology. Epidural analgesia is considered to be effective in the early postoperative period, as it provides better pain control compared with the use of opioids.
PURPOSE OF THE WORK. To evaluate the the effectiveness and safety of epidural analgesia after extensive surgical interventions on abdominal organs in children.
MATERIALS AND METHODS. The study included 22 children from 1 year to 17 years. They were divided into two groups: 1 group included children who received opioid analgesics parenterally as a postoperative analgesia (n = 10), in group 2 there were patients in whom a prolonged epidural anesthesia was carried out (n = 12).
RESULTS AND DISCUSSION. When studying the variability of blood pressure and heart rate during the day, as a marker of pain, it was found that in children of the first group, these fluctuations were much more expressed than in the second group. Peristalsis appeared in 54.61 ± 9.66 hours after surgery in patients of the first group and in 14.22 ± 6.89 hours – in the second group. Diluting the 0.25% solution of anesthetic to a concentration of 0.125% gave an opportunity to increase the rate of solution delivery to cover more dermatomes and expand the analgesia zone.
CONCLUSIONS: 1. Prolonged epidural analgesia has advantages over the use of opioids, providing more reliable and effective analgesia in children. 2. Prolonged epidural anesthesia, with the correct technique of catheter placement and strict dosing of local anesthetic, does not have clinically significant side effects in children, and can be recommended for postoperative analgesia after extensive surgical interventions on abdominal organs in children.

Key words: *children, post-operative analgesia, epidural analgesia.*

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INTRODUCTION

The development of modern surgery, colossal progress and its undoubted successes are directly related to the expansion of the possibilities of anesthetic management and the improvement of anesthesia, but the postoperative pain syndrome continues to be a serious problem [6]. In a study conducted in 250 operated adult patients, 82% of patients complained of postoperative pain, 47% of whom regarded it as moderate, 21% regarded it as strong, and 18% – as extremely intense [2]. No less urgent is the problem in pediatric surgery and anesthesiology. The negative consequences of the pain borne by the child are comparable to its effect on the adult patient, but there may be a significant effect on the development of the growing organism [5]. For example, for an adult needle prick – it's just an unpleasant event, whereas for a child he can be the "epitome of evil" of his disease [4].

Assessment of pain in children is more complicated than in adults [4]. Individual features of the painperception and the properties of opioid receptors can cause different pain intensity and the need for analgesics in patients undergoing the same operations [2, 5]. The standard for assessing pain intensity is the visual analogue scale (VAS). The left edge of the scale corresponds to the absence of pain, the right side to unbearable pain ranging from 1 to 10 points, dividing by 1 cm [4, 5]. As a rule, it is considered that pain above three centimeters (points) requires treatment, and above 6 – it is considered to be strong [3]. For children under 7 years of age, the Wang-Baker "face" scale is proposed. The child is shown a picture depicting emotions from laughing to crying and asking to show which of the "faces" corresponds to the intensity of his pain. In children up to 4–5 years of age, the intensity of pain is assessed by indirect signs – increased blood pressure, tachycardia, grimace of pain, etc. [5].

For a long time, the systemic administration of opioid analgesics was considered as the basis for postoperative analgesia, but their effectiveness as a monotherapy does not exceed 25-30%. This is because the effective analgesic dose is often close to the dose at which respiratory depression, paresis of the gastrointestinal tract, dysfunction of the biliary and urinary tract develop [6]. Epidural analgesia is considered to be effective in the early postoperative period [4], as it provides better pain control compared with the use of opioids [3]. In addition, the advantage of epidural anesthesia is the development of a sympathetic block, which improves microcirculation and tissues oxygenationin the field of surgical intervention [1].

PURPOSE OF THE WORK

To evaluate the the effectiveness and safety of epidural analgesia after extensive surgical interventions on abdominal organs in children.

MATERIALS AND METHODS

The study included 22 children from 1 year to 17 years of age who received treatment after extensive surgical intervention on the abdominal organs. In 14 patients, acute gangrenous-perforated appendicitis complicated by grade 2–3 peritonitis was observed, in 4 patients – adhesive intestinal obstruction, in 2 cases – Hirschsprung's disease, one patient was operated on for intussusception and one – for duodenal ulcer perforation. As for the concomitant pathology, 2 patients had food allergies, one had chronic gastroduodenitis and a vegetative dysfunction syndrome, one had out-of-hospital focal pneumonia, one had a mitral valve prolapse. All patients were divided into two groups: 1 group included children who received opioid analgesics (promedol) parenterally as a postoperative analgesia within 3 days after surgery (n = 10), in group 2 there were patients in whom the method of a prolonged epidural anesthesia by the continuous infusion of local anesthetics into the epidural catheter was carried out (n = 12). Epidural catheter was inserted under general anesthesia. As a local anesthetic, bupivacaine 0.25% or ropivacaine 0.2%were used. From the 3th day after operation, anesthesia was performed using paracetamol or non-steroidal anti-inflammatory drugs parenterally. The groups were comparable in age, sex, underlying pathology and the presence of concomitant diseases. The intensity of pain was evaluated by the visual analogue scale (VAS) and its modifications for children (Wang-Baker scale). The variability of hemodynamic parameters (heart rate (HR), blood pressure (BP)), the timing of the appearance of peristalsis, stool and the initiation of enteral feeding also were assessed. Statistical processing was performed using the "StatSoft6" software package.

RESULTS AND THEIR DISCUSSION

When examining the intensity of pain with the help of a visual analogue scale and its modification for children, we found that the intensity of pain in children of the second group during the first 3 days was 1–2 points (10–20 mm). In patients of the first group who received anesthesia with bolus administration of promedol 4 times a day, the intensity of pain reached 3–4 points. There were no active complaints of pain in patients of the 2nd group; among patients of the 1st group such complaints were noted in 40% of cases.

When studying the variability of blood pressure and heart rate during the day, as a marker of pain, it was found that in children of the first group, these fluctuations were much more expressed than in the second group. Thus, the variability of systolic BP (SBP) in the first day after surgery in children of the first group was 23.2 ± 11.01, in children of the second group – 11.14 ± 3.8 mm Hg. Art. ($P<0.05$). The fluctuations ofHR during the first day in the first group were 20.9 ± 15.5, in the second group – 9.14 ± 4.52 ($p<0.05$). In the following days, the variability of hemodynamic parameters was also lower in patients of the 2nd group, which may indicate a better quality of analgesia (Table 1).

Peristalsis in patients of the first group appeared on the second-third day, on average – 54.61 ± 9.66 hoursafter operation. In patients of the second group, peristaltic movements were recorded significantly earlier – on the 1–2 day, on average – 14.22 ± 6.89 hours after surgery ($p<0.05$). The stool in patients of the first group was observed on average in 60,88 ± 6,88 hours, whereas in patients of the second group – in 43,3 ± 20,28 hours. Due to this, the patients of the second group started enteral nutritionearlier, which also probably contributed to a decrease in the severity of stress and improvement of compliance.

It was also noted that the patients of the second group reacted less negatively to medical examination and manipulations, were more active in communicating with the staff of the department, more willingly performed breathing exercises and positively related to early mobilization in the postoperative period.

We have not detected any complications or side effects when inserting an epidural catheter and performing epidural analgesia by continuous administration of a local anesthetic. Decreasing of BP by 15–20%, probably related to the introduction of local anesthetic epidural, was noted in three patients of the second group (25%), but this did not require the introduction of vasopressors and inotropes, and did not cause discomfort of patients. Before the start of the infusion of anesthetic, a test for sensitivity to the local anesthetic and for the correct placement of the catheter was performed by inserting a test dose of lidocaine. Then the method of permanent infusion of 0.25% (according to the instructions and recommendations of the manufacturer) or 0.125% solution of bupivacaine in the age-related dosage with a syringe pump (infusomat) was used. Diluting the 0.25% solution in half to a concentration of 0.125% gave an opportunity to increase the rate of solution delivery to cover more dermatomes and expand the analgesia zone. This method gave good analgesia without increasing the dose of anesthetic and retained the motor activity of the child. This concentration can be considered minimal for achieving analgesia and as safe as possible from the side effects point of view.

Table 1. ***The variability of hemodynamic parameters in children in the early post-operative period***

Group / index		1st day	2nd day	3d day
1 group	ΔSBP, mm Hg. Art.	23,2±11,01	20,88±7,68	18,75±11,19
	ΔHR, BPM	20,9±15,5	21,3±8,4	17,0±7,8
2 group	ΔSBP, mm Hg. Art.	11,14±3,8*	8,14±2,54*	13,14±8,37
	ΔHR, BPM	9,14±4,52*	15,14±5,61	12,42±7,27

**- the difference is reliable (p<0,05).*

Besides analgesia antibiotic therapy with wide spectrum antibiotics, infusion therapy with correction of electrolyte disorders, parenteral nutrition, symptomatic treatment according to indications was carried out in both groups in the early postoperative period.

After 3 days, analgesia in both groups was performed by intravenous injection of paracetamol with an age-related dosage every 6 hours or be non-steroid anti-inflammatory drugs.

CONCLUSIONS

1. Prolonged epidural analgesia has advantages over the use of opioids, providing more reliable and effective analgesia in children.
2. Prolonged epidural anesthesia, with the correct technique of catheter placement and strict dosing of local anesthetic, does not have clinically significant side effects in children, and can be recommended for postoperative analgesia after extensive surgical interventions on abdominal organs in children.

Conflict of interests is absent.

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ОСОБЛИВОСТІ ПООПЕРАЦІЙНОГО ЗНЕБОЛЮВАННЯ ПІСЛЯ ВЕЛИКИХ ХІРУРГІЧНИХ ВТРУЧАНЬ У ДІТЕЙ

Вступ. Післяопераційний больовий синдром є актуальною проблемою в дитячій хірургії та анестезіології. Сьогодні в ранній післяопераційний період дедалі ширше застосовується епідуральна аналгезія, яка забезпечує ліпший контроль болю порівняно з використанням опіоїдів.

Мета роботи – оцінити ефективність і безпеку епідуральної аналгезії після великих хірургічних втручань на органах черевної порожнини у дітей.

Матеріали та методи. До дослідження включено 22 дитини віком 1–17 років. До групи 1 увійшли діти, які отримували опіоїдні анальгетики як післяопераційне знеболювання (n=10), до групи 2 – пацієнти, у яких застосовували метод подовженої епідуральної анестезії шляхом введення розчинів бупівакаїну або ропівакаїну в епідуральний катетер (n=12).

Результати та обговорення. Суб'єктивне сприйняття болю за візуальноаналоговою шкалою у пацієнтів другої групи було менш вираженим. За результатами дослідження показників варіативності артеріального тиску та ЧСС протягом доби як маркера больового синдрому виявлено, що у дітей першої групи ці коливання були вірогідно більш вираженими, ніж у другій групі, надто в першу добу по операції. Перистальтика у хворих першої групи з'являлася через 54,61 ± 9,66 год., у другій – через 14,22 ± 6,89 год. Випорожнення в хворих першої групи відзначено через 60,88 ± 6,88 год., у хворих другої групи – через 43,3 ± 20,28 год. Після розведення 0,25% розчину анестетику до концентрації 0,125% досягалася можливість збільшити швидкість подачі розчину для охоплення більшої кількості дерматомів і розширення зони аналгезії.

Висновки. Подовжена епідуральна анальгезія має переваги перед використанням опіоїдів, забезпечуючи надійнішу та ефективнішу анальгезію у дітей. Подовжена епідуральна аналгезія за умов правильної техніки встановлення

катетера та ретельного дозування анестетику не має клінічно значущих побічних ефектів і може бути рекомендованою для післяопераційного знеболювання після великих хірургічних втручань у дітей.

Ключові слова: *діти, післяопераційне знеболювання, епідуральна аналгезія.*

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ОСОБЕННОСТИ ПОСЛЕОПЕРАЦИОННОГО ОБЕЗБОЛИВАНИЯ ПОСЛЕ ОБШИРНЫХ ХИРУРГИЧЕСКИХ ВМЕШАТЕЛЬСТВ У ДЕТЕЙ

Введение. Послеоперационный болевой синдром является актуальной проблемой в детской хирургии и анестезиологии. В настоящее время в ранний послеоперационный период все шире применяется эпидуральная анальгезия, которая обеспечивает лучший контроль боли по сравнению с использованием опиоидов.

Цель работы – оценить эффективность и безопасность эпидуральной анальгезии после обширных хирургических вмешательств на органах брюшной полости у детей.

Материалы и методы. В исследование включено 22 ребенка возрастом от 1 года до 17 лет. В группу 1 вошли дети, получавшие опиоидные анальгетики в качестве послеоперационного обезболивания (n=10), в группу 2 – пациенты, у которых применяли метод продленной эпидуральной анестезии (n=12).

Результаты и их обсуждение. При исследовании показателей вари-абельности артериального давления и ЧСС в течение суток как маркера болевого синдрома выявлено, что у детей первой группы эти колебания были достоверно более выраженными, чем во второй группе. Перистальтика у больных первой группы появлялась через 54,61 ± 9,66 часа, второй – через 14,22 ± 6,89 часа после операции. При разведении 0,25% раствора анестетика до концентрации 0,125% достигалась возможность увеличить скорость подачи раствора для охвата большего количества дерматомов и расширения зоны анальгезии.

Выводы. Продленная эпидуральная анальгезия имеет преимущества перед использованием опиоидов, обеспечивая более надежную и эффективную анальгезию у детей. Продленная эпидуральная анестезия при правильной технике постановки катетера и строгом дозировании местного анестетика не имеет клинически значимых побочных эффектов в детском возрасте и может быть рекомендована для послеоперационного обезболивания после обширных хирургических вмешательств на органах брюшной полости у детей.

Ключевые слова: *дети, послеоперационное обезболивание, эпидуральная анальгезия.*