

Clinical Case of Postoperative Anesthesia Using Quadratus Lumborum Block in Child with Severe Abdominal Pathology

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Abstract

A tendency towards an increase of regional anesthesia in children is observed during the recent two decades. Expansion of the practice, from the main neuroaxial methods (caudal and epidural blocks) to spinal anesthesia, peripheral nerve blocks and ganglion blocks, was prompted by many factors, which include wide access to ultrasound (US) navigation in the practice of the anesthesiologist, better understanding of drug toxicity and etc. The intensity of the pain depends not only on the level of injury after the operation, but also on the localization and type of the procedure. Management of pain in children is best done through a multimodal approach: opioids, adjuvant drugs such as non-steroid anti-inflammatory drugs (NSAIDs) and acetaminophen, anti-neuroleptics such as gabapentin, and regional anesthetic methods. Postoperative anesthesia in abdominal surgery is relevant problem nowadays in the practice of anesthesiologist. We want to share an experience of Quadratum lumborum block (QLB) use in postoperative analgesia on the basis of a clinical case. Single-shot bilateral QLB with 0.3 ml/kg bupivacaine was performed under the US guidance. Quality of analgesia was assessed through the measurement of stress markers levels, such blood glucose, cortisol and NIPS pain scale.

Conclusion: The use of QLB has a positive effect on treatment of postoperative pain in patients after complicated abdominal surgical interventions.

Keywords: Postoperative Analgesia; Ketamine; Abdominal Surgical Interventions in Children

Introduction

Pain is an inevitable consequence of surgical interventions in children, which leads to great stress and discomfort not only in patients but also in their parents. The intensity of the pain depends not only on the level of injury after surgery, but also on the localization and nature of the procedure [1]. Postoperative analgesia in abdominal surgery is a relevant problem nowadays in the anesthesiology practice. Inadequate treatment of acute pain is one of the important prerequisites for the development of chronic pain. The purpose of analgesia in the postoperative period is to reduce or eliminate the pain with minimal additional harmful effects and the total cost of the treatment. Adequate postoperative analgesia, especially during the first 48 hours, reduces the stress response of the organism to the surgical procedure, thereby influence the endocrine, metabolic and inflammatory changes. This reduces the frequency of postoperative complications and improves the outcome of surgical treatment [2]. Pain in childhood has many adverse consequences - from psychological, because of the complication of the main disease (prolonged treatment, hospital stay and increased treatment costs) to increased mortality due to the onset of systemic inflammatory reactions [3].

Pain management in children consist of multimodal approach: opioids (patient or staff - controlled analgesia), adjuvant drugs such as non-steroid anti-inflammatory drugs (NSAIDs) and acetaminophen, anti-neuroleptics such as gabapentin, and regional anesthetic techniques (peripheral nerve blocks) [4]. QLB is now performed is performed as one of the intraoperative pain management methods for all generations (pediatric patients, pregnant and adult patients) undergoing surgery on the abdominal cavity [5-9]. Modern literature describes 3 methods of QLB, and authors use a different nomenclature to describe each block. The QL block was first described in 2007 as the Blanco's lateral (TAP) block [5-10]. The QLB is a new block used for somatic and visceral analgesia for both upper and lower abdominal cavity.

Case Report

In this clinical case, we want like to demonstrate the experience of using QLB.

Patient S., 9 months. Was taken to treatment for 48 days with a diagnosis:

Main: Multiple congenital malformations: rectum atresia, non-fistular form. Malrotation syndrome (violation of the second period of intestinal rotation). Meckel's diverticulum. Omphalocele, perforation of the sigmoid colon. Condition after colostomy closure and colon-colon anastomosis.

Complication of the main diagnosis: Diffuse fecal peritonitis. Early postoperative adhesive intestinal obstruction. Abdominal infiltrate. Cicatricial stenosis of the terminal colostomy. Abdominal abscess. Incompetence of colon-colon anastomosis. Suspended enterostoma.

Medical history: The child was born from the first pregnancy, first delivery, the second from the twin. Delivered through Caesarean section due to urgent indications (detachment of the placenta) in the period of gestation of 34 weeks. 7 - 8 Apgar score. Birthweight - 1950g, body length 45 cm. Severe general condition after birth due to the multiple congenital defects. A series of surgical interventions were performed: correction of mid-sized omphalocele, immersion of intestinal loops, and suturing of anterior abdominal wall defect, right-sided transrectal laparotomy, revision of abdominal cavity, separation of embryonic adhesions, Meckel's diverticulum removal, reduction of the rectum, anorectal anastomosis. A Shortly after: relaparotomy for perforation of the sigmoid colon and fecal peritonitis, early postoperative adhesive intestinal obstruction; Sanitation of the abdominal cavity, division of adhesions. Terminal sigmostoma was created at the level of the perforation opening. Child was discharged from hospital after the performed treatment. At the age of 6 months, he was hospitalized with a clinic of partial intestinal obstruction on the background of adhesive abdominal disease, inflammatory infiltration of the abdominal cavity (according to ultrasound examination of the abdominal cavity) and cicatricial narrowing of the terminal colostomy. Defective anemia I st. Bouginage of the stoma was performed together with the antibacterial therapy, which restored the intestinal passage. The SCT was performed - a picture of postoperative changes of the intestine, colostomy, signs of the adhesive process in the abdominal cavity with fragmentary dilatation of the small intestine and the swelling of its cellular tissue. Developmental features of the portal vein, Polysplenism.

Conservative therapy was performed and patient was discharged from hospital to the outpatient treatment. At the age of seven months he was hospitalized again with partial intestinal obstruction (periodic anxiety, difficult passage of feces and gases through the stoma). Stromal orifice was narrowed to 0.4 cm due to the cicatricial changes; laparotomy was performed on that matter with the revision of abdominal cavity, separation of adhesions, completion of colon-colon end-to-end anastomosis. But a number of interventions were performed in the postoperative period due to the set of complications. The operations were the following: incision and drainage of the abscess, left-sided transrectal laparotomy, drainage of the abdominal cavity; then, re-laparotomy for the perforation of the colon due to the anastomosis incompetence, performing of suspended enterostoma (Figure 1). Repeated perforation of the intestine with acute bleeding into the abdominal cavity (we use QLB in operating room before surgical intervention). Intestinal fistulae have opened, which lead to the formation of laparostomy (Figure 2), through which intestinal contain discharged constantly. During the entire period of treatment the patient had large current losses, water-electrolyte disturbances, signs of organ failure.



Figure 1: 12 days of disease.



Figure 2: Formation of laparostomy 35 days.

Performed treatment

Infusion with glucose-saline solutions in volumes corresponding to age, full parenteral nutrition. Antibacterial therapy. Sedation and adaptation to mechanical ventilation - Dexmedetomidine 0.5 - 1 $\mu\text{g}/\text{kg}/\text{h}$.

The method of general anesthesia is TIVA. The induction was performed by using Propofol 1% at a dose 3 mg/kg, myorelaxation by Rocuronium bromide - 0,6 mg/kg. The child intubated by endotracheal tube. Supporting of TIVA is - Propofol 1% - Step down 10-8-6 mg/kg/h.

The patient was given analgesia with an intraoperative, one-time, double-sided QLB using 0.25% bupivacaine in a dose of 0.3 ml/kg. An assessment of the quality of anesthesia was performed by the assessing the level of stress markers, such as blood glucose (Figure 3), blood cortisol (Figure 5) and the assessment of the pain level in the NIPS scale (Figure 4). Blood glucose levels were the highest at 6

hours - 6.2 mmol/L and decreased by 72 hours to a level of 4.2 mmol/L. The level of cortisol in the blood at 6 hours was 982 nmol/l, and progressively decreased to 72 hours to the level of 432 nmol/l (which corresponds to the norm). According to the NIPS scale for 6 hours the pain score was 9 points and dropped to 72 hours to level 6 points.

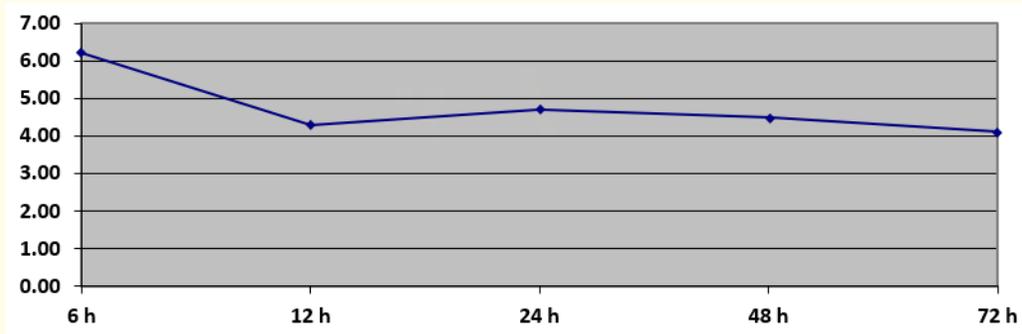


Figure 3: Blood glucose level at 6, 12, 24, 36, 72h.

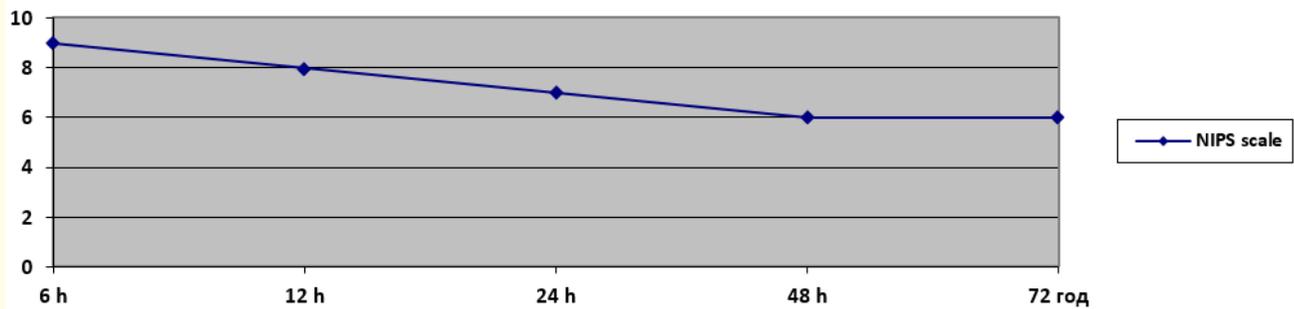


Figure 4: NIPS scale of anesthesia at 6, 12, 24, 36, 72h.

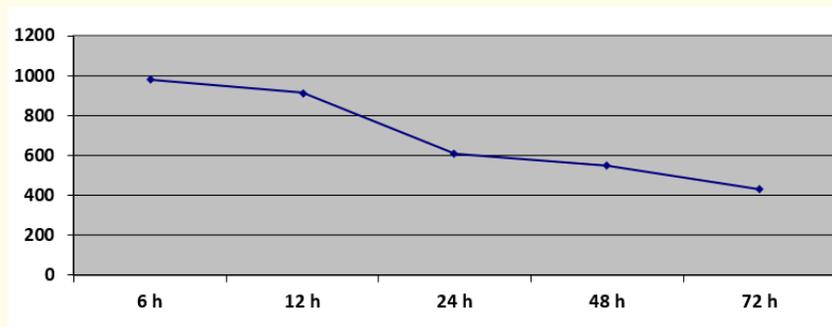


Figure 5: Level of cortisol in the blood at 6, 12, 24, 36, 72h.

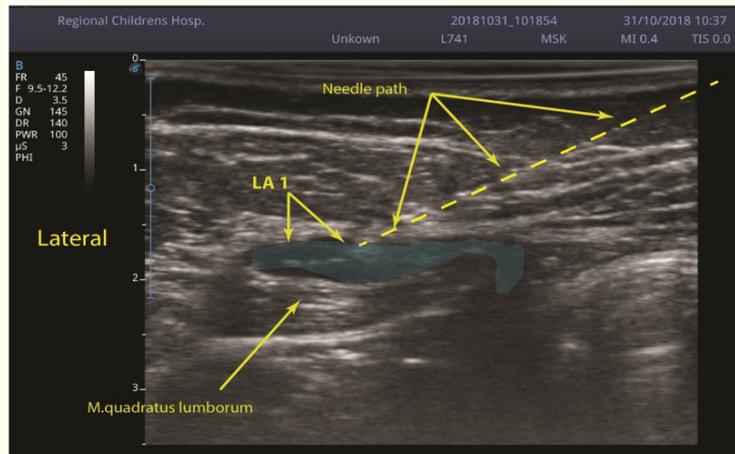


Figure 6: U.S. picture of the execution of a quadratum lumborum block and distribution of a local anesthetic.

Discussion

It is known that prolonged use of narcotic analgesics leads to the development of hyperalgesia and tolerance to them. Opiates are widely used for pain relief and treatment of acute and chronic pain syndromes associated with various diseases. The use of opioids has an adverse effect on the breathing, which is often accompanied by depression of the central nervous system. Opioids can affect the function of immune cells, increase the release of histamine, causing bronchospasm, vasoconstriction, and hypersensitivity reactions. All of the above-mentioned effects have a negative effect on the lung function [11]. Also known opioid - induced hyperalgesia [12,13]. This condition is also characterized by the development of hyperalgesia and allodynia. That is why it is necessary to use adequate methods of analgesia, in which there will be no above described side effects. We assume that the use QLB has a positive effect of treating postoperative pain in patients after severe abdominal surgical interventions and use of QLB reduces the tolerance of the patient to opioid analgesics and the development of hyperalgesia and allodynia.

Conclusion

The use of QLB has a positive effect on treatment of postoperative pain in patients after complicated abdominal surgical interventions.

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