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CLINICAL INFORMATION

Ultrasound-guided paravertebral block for pyloromyotomy in 3 neonates with congenital hypertrophic pyloric stenosis

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Pyloromyotomy;
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Abstract
Background and objectives: Hypertrophic pyloric stenosis is a relatively common affection of gastrointestinal tract in childhood that results in symptoms, such as projectile vomiting and metabolic disorders that imply a high risk of aspiration during anesthetic induction. In this way, the carrying out of a technique with general anesthesia and intravenous rapid sequence induction, preoxygenation and cricoid pressure are recommended. After the correction of systemic metabolic alkalosis and pH normalization, cerebrospinal fluid can keep a state of metabolic alkalosis. This circumstance, in addition to the residual effect of neuromuscular blocking agents, inhalant anesthetics and opioids could increase the risk of postoperative apnea after a general anesthesia.
Case report: We present the successful management in 3 neonates in those a pyloromyotomy was carried out because they had presented congenital hypertrophic pyloric stenosis. This procedure was done under general anesthesia with orotracheal intubation and rapid sequence induction. Then, ultrasound-guided paravertebral block was performed as analgesic method without the need for administrating opioids within intraoperative period and keeping an appropriate analgesic level.
Conclusions: Local anesthesia has demonstrated to be safe and effective in pediatric practice. We consider the ultrasound-guided paravertebral block with one dose as a possible alternative for other local techniques described, avoiding the use of opioids and neuromuscular blocking agents during general anesthesia, and reducing the risk of central apnea within postoperative period.

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PALAVRAS-CHAVE
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Ultrasound-guided paravertebral block for pyloromyotomy in 3 neonates with congenital hypertrophic pyloric stenosis

Resumo
Justificativa e objetivos: A estenose hipertrófica do piloro é uma condição relativamente comum do trato gastrintestinal na infância, que causa um quadro de vômitos em jato e alterações metabólicas que envolvem um alto risco de aspiração durante a indução da anestesia. Assim, recomenda-se a realização de uma técnica sob anestesia geral e indução intravenosa de sequência rápida, pré-oxigenação e pressão cricoide. Após a correção da alcalose metabólica sistêmica e normalização do pH, o líquido cerebrospinal pode manter um estado de alcalose metabólica. Isto, juntamente com os efeitos residuais de agentes bloqueadores neuromusculares, anestésicos e opioides, pode aumentar o risco de apneia pós-operatória após anestesia geral.
Casos clínicos: Apresentamos o manejo bem sucedido em 3 recém-nascidos que foram submetidos a piloroplastia por apresentar estenose hipertrófica do piloro congênita. O procedimento foi realizado sob anestesia geral com intubação orotraqueal e indução de sequência rápida. Em seguida, realizou-se um bloqueio paravertebral guiado por ultrassonografia como método analgésico sem a necessidade de administração de opioides durante o período intraoperatório e mantendo o nível analgésico adequado.
Conclusões: A anestesia regional é comprovadamente segura e eficaz na prática pediátrica. Consideramos o bloqueio paravertebral guiado por ultrassom com dose única como uma possível alternativa a outras técnicas regionais descritas, evitando o uso de opioides e bloqueadores neuromusculares durante a anestesia geral e reduzindo o risco de apneia central no pós-operatório.

Introduction

Hypertrophic pyloric stenosis (HPS) is a gastrointestinal disorder inherent to childhood, with an incidence of 0.9 to 5.1/1.000 cases,[1] an average age of presentation of 5 weeks and an average weight of 4 kg^{-1}. The classic clinical picture is characterized by projectile vomiting, malnutrition, dehydration and electrolyte and metabolic disturbances.[1] The treatment of this condition consists of the performance of pyloromyotomy under general anesthesia and orotracheal intubation,[2] which is a challenge for anesthesiologists given the risk of bronchopulmonary aspiration,[3,4] and frequent metabolic alterations in the context of a general anesthesia by hyperventilation[3,4] or administration of opioids and neuromuscular blockers may increase the risk of central apnea. An operation under general anesthesia combined with locoregional techniques could reduce the risk of apnea and postoperative complications.[3,5]

Case reports

We report 3 infants undergoing pyloromyotomy due to HPS of 30, 34 and 42 days of age and weights of 3500; 3200; and 4 kg respectively. On arrival at the operating room they were monitored by noninvasive blood pressure, electrocardiogram, and pulse oximetry with peripheral vein channeling under sedation with sevoflorane 5%. Intravenous atropine 0.02 mg/kg^{-1} was given as premedication and intravenous propofol induction was performed at a dose of 4 mg/kg^{-1} until reaching optimal conditions for endotracheal intubation with rapid sequence induction and cricoid pressure, with subsequent checking of correct placement of endotracheal tube by capnography and volume controlled mechanical ventilation. Anesthesia was maintained with sevoflorane at 1 CAM.

The paravertebral technique was performed after induction of anesthesia in the left lateral decubitus position, keeping the right side accessible for the procedure to be carried out. The material used consisted of a Toshiba Nemio XG® ultrasound device with transducer model PLM-1202S and a 23 G hypodermic needle of 25 mm of length. T8 level was identified by placing the probe transversely and lateral to the spinous process at this level, with costal hyperechoic acoustic shadowing being located and, subsequently, being slightly shifted cranially until identifying the pleura as a hyperechoic line in the intervertebral space with posterior echo with comet tail shape; above it, an isoechogenic image corresponding to the external and medial intercostal muscle, and out of this, a hyperechoic line that served to mark the boundaries of the paravertebral space. Having identified these structures the needle (Fig. 1) was introduced under sterile conditions, lateral and medial to the probe with the tip of the probe being located at all times until reaching the paravertebral space infiltrating it with 0.25 mL/kg^{-1} bupivacaine 0.25% in a single bolus and after prior suction to rule out intravascular injection (Fig. 2).

Surgery in the 3 cases took place with no incidents, with no adjunctive administration of opioids and muscle relaxants being needed, and keeping an adequate hemodynamic stability and analgesic level that allowed early extubation after completion of the surgical procedure.