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OLGU SUNUMU / CASE REPORT

Ultrasound-guided thoracic paravertebral block in a premature neonate with congenital oesophageal atresia with a tracheo-oesophageal fistula: a case report

Konjenital özofageal atresili, trakeo-özofajal fistül olan prematür yenidoğanda ultrason-eşliğinde torasik paravertebral blok: bir olgu sunumu

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Abstract

Ultrasound-guided thoracic paravertebral block (TPVB) is a promising new technique for use in children of various ages. In this case report, a successful ultrasound (USG) guided TPVB procedure in premature neonate is described. A 3-day-old 1600-g neonate, born at 32 weeks of gestation, was underwent thoracostomy for esophageal atresia with esophageal fistula repair. At the end of the surgery, USG-guided TPVB were successfully performed using a linear probe in the paramedian position. USG-guided TPVB could be an alternative method for providing effective analgesia in a premature neonates in the future.

Keywords:. Analgesia; neonate; ultrasonography, interventional; tracheoesophageal fistula.

Öz

Ultrason eşliğinde torasik paravertebral blok (TPVB), çeşitli yaşlardaki çocuklarda kullanım için umut verici yeni bir tekniktir. Bu vaka raporunda prematüre yenidoğanda başarılı bir ultrason (USG) eşliğinde TPVB prosedürü anlatılmaktadır. 32. gebelik haftasında doğan 3 günlük 1600 gr bebeğe özofagus fistül onarımı ve özofagus atrezisi nedeniyle torakostomi uygulandı. Ameliyatın sonunda, USG eşliğinde TPVB, paramedian pozisyonda lineer prob kullanılarak paravertebral erişim başarılı bir şekilde gerçekleştirildi. USG eşliğinde TPVB, gelecekte prematüre yenidoğanda etkili analjezi sağlamak için alternatif bir yöntem olabilir.

Anahtar kelimeler: Analjezi; yenidoğan; ultrasonografi, girişimsel; trakeoözofageal fistül

INTRODUCTION

Anesthetic management of patients with congenital esophageal atresia (OA) with tracheoesophageal fistula (TOF) often focuses on the airway and accompanying anomalies; however, postoperative pain treatment may sometimes be required. The fact that tracheoesophageal fistula surgery includes thoracotomy results along with problems related to hemodynamics, ventilation, and naturally postoperative pain. Thoracic paravertebral block is an alternative to classic analgesia methods such as intravenous analgesia and epidural block. Paravertebral block (PVB) has been used for postoperative analgesia in children since 1992[1,2]. However, it can be extremely difficult in neonates due to their low weight and small anatomic structure, and the proximity of the surgical incision and chest tube to the block injection site[3]. In addition, PVB can be used to provide adequate analgesia and respiratory rehabilitation to avoid the adverse effects of the central block in patients using anticoagulants[4]. In this case report, we present our ultrasonography (USG)-guided TPVB experience in a premature neonate patient who underwent TOF repair under general anesthesia with a single dose of local anesthetic. Although USG-TPVB has been reported in newborns in the literature, USG-guided TPVB was

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first described in our case at 1600-g and 32 weeks of gestation.

CASE

A 3-day-old 1600-g neonate, born at 32 weeks of gestation, was transferred to the operating room from the neonatal intensive care unit (NICU) to undergo thoracostomy for esophageal atresia with esophageal fistula repair. The non-invasive blood pressure was 78/38 mmHg, pulse oximetry was 98%, and heart rate was 128/min. Sevoflurane 5-6% anesthesia was administered via a mask. In addition to venous access to the umbilical cord, peripheral vascular access was also provided. After induction was achieved using propofol 3 mg.kg-1, fentanyl 1 mg.kg-1 and rocuronium 1 mg.kg-1, intubation was performed using a 3 mm endotracheal tube. The endotracheal tube location was adjusted and fixed between the fistula and the carina. Acetaminophen 15 mg.kg-1 IV bolus was administered, and remifentanil (1 mcg.kg-1) infusion was started, and the patient, who was hemodynamically stable during the surgery, was maintained with sevoflurane 3.2% + 40% oxygen / 60% air and rocuronium. A thoracotomy incision was made at the tip of the right scapula. Esophageal atresia and fistula repair were performed. A chest tube was inserted. At the end of the surgery, which lasted 150 min, the patient's left lateral position was maintained for USG-guided TPVB with continued endotracheal intubation (Figure 1). The T7 level was estimated by palpation between the spine level of the C7 spinous process and the caudal region. For USG-guided TPVB, paravertebral access was provided using a 6-13-MHz linear probe (Esaote My Lab 30 US, Florence, Italy) in the paramedian position and with a Stimplex 50-mm 22-G needle (Stimuplex® Ultra 360, B. Braun Melsungen, Germany) at the T5-6 level. Intercostal ligaments, seashore signs, pleura, and pleural space were observed. Aspiration was performed after the participant entered the target area. The block was then performed by administering 0.5 mL.kg-1 bupivacaine (0.25%). Meanwhile, the 'step mark' indicating the collapse of the pleura was observed, even if only a little, with the paravertebral cavity expanded with USG-guided fluid (Figure 2). After the block, the patient was transferred to the neonatal care unit and intubated.

Figure 1. Performance of ultrasound-guided thoracal paravertebral block in a patient esophageal atresia with trachea oesophageal fistula.

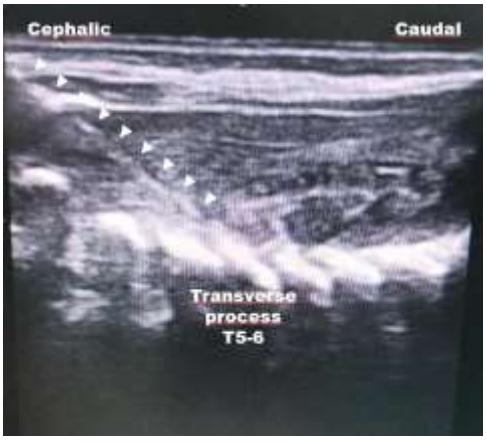

Figure 2. Ultrasound image of paravertebral block showing the needle (arrow head) on top of the transverse process of T5-6.

Sedation and pain follow-up was performed in the neonatal care unit using the Neonatal Pain, Agitatio and Sedation Scale (N-PASS). Acetaminophen 15 mg.kg-1 was administered every 6 h. In patients with fistula repair, fentanyl was administered as an opioid for sedation because full immobility was desired for the first 48 hours. In this case, we administered the infusion dose of fentanyl by reducing it by 0.1 mg.kg-1. There was no need for additional muscle relaxants. Extubation was successfully performed on the second postoperative day.

DISCUSSION

The thoracic paravertebral space is a wedge-shaped area containing the anterior and posterior branches of the thoracic nerves and sympathetic trunk. The posterior wall is formed by the upper costotransverse ligament, medial wall by the vertebral body and intervertebral disc, and by the parietal pleura, which continues with the intercostal space in the anterolateral wall. In PVB, the anterior branch of the nerve roots, gray and white communicating branches, and the sympathetic chain are easily affected by local anesthetics and blocked[5,6]. A paravertebral block was performed using the traditional loss-of-resistance technique. However, its use in children is limited compared to that in adults because it is difficult to predict the pleural distance and loss of resistance in children, especially during thoracic paravertebral block administration. Recently, USG-guided TPVB administration has been frequently reported in children[7,8].

A PVB study by Berta et al. in 2008 reported that a paravertebral block resistance loss technique without the use of USG in patients followed for 12 hours, and they found that 41.7% of patients did not require additional analgesics for 10 hours postoperatively[9]. The first report of USG-guided TPVB catheter placement in a pediatric patient was a case report by Visoiu et al. in 2011 in a 16-year-old patient[10]. In a report in 2013, single-shot USG-guided TPVB implantation using the intercostal approach was described in 15 infants aged 1-11 months who underwent thoracotomy [11]. In another report from 2013, Boretsky et al. demonstrated that single-injection PVB reduced postoperative pain in children after 12-hour renal surgery[8]. Kandia et al. reported a case of successful USG-guided TPVB catheter placement in a 5-week-old baby in whom local anesthetic was infused for 72 hours[12].

The N-PASS was designed as a clinically useful scale for pain and sedation in all infants in the neonatal intensive care unit [13]. The scale was evaluated in five categories: quality of crying, behavioral status, facial expression, tone of extremities, and vital signs (heart rate, respiratory rate, blood pressure, and oxygen saturation). It is graded as 0, 1, or 2 for pain/sedation and 0, 1, or 2 for sedation. A higher pain/sedation score indicates more frequent or intense behaviors, and a lower sedation score indicates a reduced response to stimulation or a deeper level of sedation. In this case, N-PASS levels were -4, -4, -4, -3, -2, -1 and -1 at postoperative 1st, 3rd, 6th, 12th, 24th, 36th and 48th hours, respectively.

Some complications such as pneumothorax, pleural puncture, hypotension, and vascular injury are possible in thoracic paravertebral block procedures, but the use of USG makes this block more effective and safer for use in children [6]. No complications were observed in this case.

In conclusion, USG-guided thoracic paravertebral block may be an alternative option for improved pain control by reducing opioid consumption after TOF surgery in premature neonates.

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REFERENCES

1. Lönnqvist PA. Continuous paravertebral block in children: initial experience. Anaesthesia. 1992;47:607–9.
2. Eng J, Sabanathan S. Continuous paravertebral block for post-thoracotomy analgesia in children. J Pediatr Surg. 1992;27:556–7.
3. Bairdain S, Dodson B, Zurakowski D, Waisel DB, Jennings RW, Boretsky KR. Paravertebral nerve block catheters using chloroprocaine in infants with prolonged mechanical ventilation for treatment of long-gap esophageal atresia. Paediatr Anaesth. 2015;25:1151–7.

4. Kendigelen P, Ozcan R, Emre S. Ultrasound-guided thoracic paravertebral block experience in a child. Turk J Anaesth Reanim. 2016;44:57-8.
5. Chelly JE. Paravertebral blocks. Anesthesiol Clin. 2012;30:75-90.
6. Renes SH, Bruhn J, Gielen MJ, Scheffer GJ, van Geffen GJ. In-plane ultrasound-guided thoracic paravertebral block: a preliminary report of 36 cases with radiologic confirmation of catheter position. Reg Anesth Pain Med. 2010;35:212-6.
7. Ali MA, Akbar AS. Report of a case of ultrasound-guided continuous thoracic paravertebral block for post-thoracotomy analgesia in a child. Middle East J Anaesthesiol. 2013;22:107-8.
8. Boretsky K, Visoiu M, Bigeleisen P. Ultrasound-guided approach to the paravertebral space for catheter insertion in infants and children. Paediatr Anesth. 2013;23:1193-8.
9. Berta E, Spanhel J, Smakal O, Smolka V, Gabrhelik T, lönnqvist PA. Single-injection paravertebral block for renal surgery in children. Paediatr Anesth. 2008;18:593-7.
10. Visoiu M, Yang C. Ultrasound-guided bilateral paravertebral continuous nerve blocks for a mildly coagulopathic patient undergoing exploratory laparotomy for bowel resection. Paediatr Anesth. 2011;21:459-62.
11. Turkoz A, Balci ST, Guner MC, Ulugol H, Vuran C, Ozker E, et al. Anesthesia management with single injection paravertebral block for aorta coarctation in infant. Paediatr Anesth. 2013;23:1078-83.
12. Kandia N, Walker K, Boretsky K. Ultrasound-guided paravertebral block facilitated tracheal extubation in a 5-week old infant with rib fractures and respiratory failure. Anesth Analg Case Rep. 2014;2:131-2.
13. American Academy of Pediatrics and Canadian Paediatric Society, Batton DG, Barrington KJ, Wallman C. Prevention and management of pain in the neonate: an update. Pediatrics. 2006;118: 2231–41.