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CLINICAL INFORMATION

Erector spinae plane block as a multiple catheter technique for open esophagectomy: a case report

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KEYWORDS
Erector spinae plane block;
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Abstract
Background and objective: Erector spinae plane block is a valid technique to provide simultaneously analgesia for combined thoracic and abdominal surgery.
Case report: A patient underwent open esophagectomy followed by reconstructive esophagogastroplasty but refused thoracic epidural analgesia; a multi-modal analgesia with a multiple erector spinae plane block was then planned. Three erector spinae plane catheters (T5 and T10 on the right side and T9 on the left side) for continuous analgesia were placed before surgery. During the first 48 h pain was never reported in the thoracic area but the patient reported multiple times to feel a pain well localized in epigastrium, but never localized in any other abdominal quadrant.
Discussion: Erector spinae plane block is a valid technique to provide analgesia simultaneously for combined thoracic and abdominal surgery and could be a valid alternative strategy if the use of epidural analgesia is contraindicated.

PALAVRAS-CHAVE
Bloqueio do plano do eretor da espinha;
Anestesia regional;
Esofagectomia

Bloqueio do plano do eretor da espinha com técnica de múltiplos cateteres para esofagectomia aberta: relato de caso

Resumo
Justificativa e objetivo: O bloqueio do plano do eretor da espinha é uma técnica válida para fornecer analgesia em cirurgias combinadas, torácica e abdominal, de modo simultâneo.
Relato de caso: Um paciente foi submetido à esofagectomia aberta seguida de esofagogastroplastia reconstrutiva, mas recusou analgesia peridural torácica; uma analgesia multimodal com o bloqueio dos múltiplos segmentos do eretor da espinha foi então planejada. Três cateteres foram colocados no plano do eretor da espinha (T5 e T10 no lado direito e T9 no lado esquerdo)

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para analgesia contínua antes da cirurgia. Durante as primeiras 48 horas, não houve queixa de dor na área torácica, mas várias vezes o paciente relatou sentir uma dor bem localizada no epigástrio, mas nunca localizada em nenhum outro quadrante abdominal.

Discussão: O bloqueio do plano do eretor da espinha é uma técnica válida para fornecer analgesia de modo simultâneo em cirurgias combinadas — torácica e abdominal — e pode ser uma estratégia alternativa também válida nos casos em que o uso de analgesia peridural for contraindicado.

Background and objectives

Erector spinae plane (ESP) block is a novel fascial block for treating thoracic pain, and it was firstly described by Forero in 2016.[1] More specifically, local anesthetic is injected in the plane between the erector spinae muscle and the transverse process of the underlying vertebra. This technique has many interesting aspects that make it a viable alternative to more invasive procedures, such as epidural and paravertebral anesthesia.[1] Previous studies indicate that its site of action is likely at the dorsal and ventral rami of the thoracic spinal nerves. To the actual knowledge, however, also the spread into the paravertebral space also has an important role.[2] To date, there are many reports of clinical uses of the ESP block, ranging from radical mastectomy[3] to neuropathic pain therapy.[1] However, it has never been used as a multiple catheter technique to simultaneously provide analgesia for combined thoracic and abdominal surgery. We would like to report here the case of a patient who underwent open esophagogastroplasty with a multiple continuous ESP block as analgesic strategy.

Case report

We report here the case of 66 years old, 115 kg male patient who presented for esophagus cancer with indication to thoracotomic and laparotomic esophagectomy followed by reconstructive esophagogastroplasty. The patient had a history of type 2 diabetes, was an active mild smoker (5–7 cigarettes/die) and had multiple sclerosis resulting in chronic paresthesias of the feet at the time of the surgery. Preoperative laboratory findings were normal. The patient refused epidural anesthesia due to the fear that this technique could interfere with or worsen the symptoms of multiple sclerosis and therefore multi-modal analgesia with a multiple ESP block was planned.

On admission to the operatory room, the patient was monitored and his vitals were stable. An intravenous line was started. General anesthesia was induced with fentanyl 2 mcg.kg^{-1}, propofol 2 mg.kg^{-1} and rocuronium 1.2 mg.kg^{-1}. The patient was then placed in left lateral recumbent position. We planned to place: two catheters on the right side (first one at T5 level for right thoracotomic incision and second one at T10 level for midline laparotomic incision) and one catheter on the left side at T9 level for midline laparotomic incision. For each level, a linear probe was placed transversal on the spinous process of the vertebra, then, with a lateral movement of the probe, the transverse process was visualized and centered; then, after a 90° rotation, a Thouy needle (Pajunk, Geisingen, Germany) was used to place a catheter on the erector spinae plane. To check the position of the three catheters a 10 mL bolus of 0.5% lidocaine was injected in each catheter, while observing interfascial spread of anesthetic (Fig. 1); every catheter was inserted for 3 cm inside the erector spinae plane and was subcutaneously tunnelized (Figs. 2 and 3). Anesthesia was maintained with remifentanil (mean dose 0.15 mcg.kg^{-1}.min^{-1}), desflurane (0.9 MAC) and rocuronium (TOF-guided). No local anesthetic was infused via ESP catheters during surgery. Surgery lasted 6 h underwent uneventful and the patient was extubated immediately after the end of the procedure. Twenty minutes before extubation 10 mL of 0.125% ropivacaine were injected in each EPS catheter (total 37.5 mg of ropivacaine). A continuous infusion of ropivacaine 0.125% 5 mL.h^{-1} was then started in

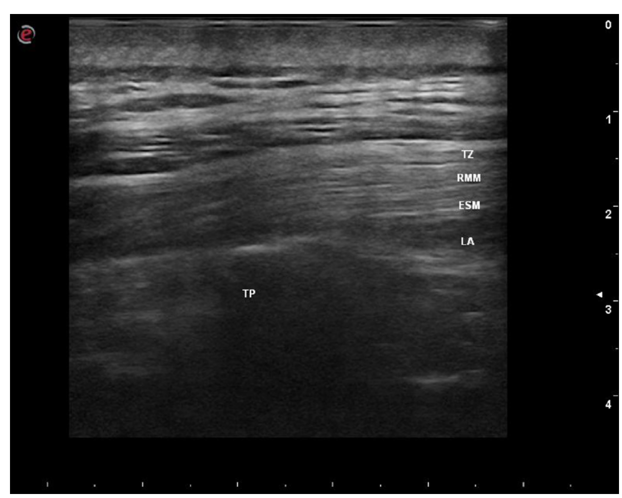

Figure 1 Post-injection view showing transverse process (TP) and overlying layers of erector spinae muscle (ESM), rhomboid major muscle (RMM), and trapezius (TZ) and linear spread of local anesthetic (LA) in the muscular-fascial plane between erector spinae muscle and transverse process.

Figure 2 Abdominal T9 and T10 EPS block catheters.

Figure 3 Thoracic T5 EPS block catheter.

thoracic catheter while in abdominal catheters a continuous infusion of ropivacaine 0.125% 2.5 $mL.h^{-1}$ was used; infusions lasted 48 h.

The first NRS score obtained 25 min after extubation was 0, but at the next NRS score check at admission to the ICU (about an hour after extubation) the patient referred pain described as ''stomach ache'' localized in the epigastric area; no pain was reported in any other area. Formal testing of the distribution of cutaneous sensory block showed loss of cold sensation from T3 to T10 over the right side and from T8 to T10 over the left side; however, skin corresponding to T8 dermatome appeared to have only partial loss of cold sensation on both sides. An NRS evaluation was obtained from the patient every four hours during the first 48 h. Pain was never reported in the thoracic area, neither coughing nor breathing were painful but the patient reported multiple times to feel a pain well localized in epigastrium (NRS ranging from 1 to 9), but never localized in any other abdominal quadrant. To treat epigastric pain the patient asked three times for an analgesic rescue dose, receiving a total of 15 mg of morphine and 100 mcg of fentanyl in the first postoperative 48 h. Patient approved reporting the case.

Discussion

ESP block is a fascial block with multiple advantages over other procedures: first of all, it is performed well away from the neuraxis and the patient is not exposed to the typical complications of neuraxial anesthesia, such as spinal/epidural hematoma, nerve injury, and central nervous system infection. It is simple to execute and to date no complications or side effects have been reported; moreover, this technique could probably be executed also when coagulation is sub-optimal.

Optimal management of postprocedure pain has invariably been shown to reduce the incidence of major postoperative complications and to improve recovery; from this perspective it is important to underline that esophagectomy is a highly stressful and painful procedure. Adequate analgesia after an esophagectomy could be challenging, especially when both laparotomic and thoracotomic approaches are used. In this situation patients could benefit from a thoracic epidural catheter,[4] but in some cases epidural anesthesia may be contraindicated, as in coagulopathies, platelet disturbances, patient refusal, infection at the site, spine abnormalities, etc. In our case, despite adequate reassurance by the anesthesiological team, the patient refused epidural anesthesia.

The pain caused by an open esophagectomy is multifactorial and we can recognize a visceral pain, a thoracotomic somatic pain and laparotomic somatic pain. Visceral pain is caused by resection, traction and surgical manipulation of viscera (in this case, mainly of stomach and esophagus). The thoracic and upper abdominal viscera are primarily innervated by the vagus and spinal thoracolumbar outflows, but pain sensation is primarily transmitted by spinal afferents, while vagal afferents deliver non-painful sensations (as nausea, hunger or fullness).[5] We have to distinguish between the 'true' visceral pain (characterized by a diffuse, difficult to localize and poorly defined sensation, usually associated with autonomic signs) and the referred pain, which is better localized and is caused by viscerosomatic convergence. 'True' esophageal pain is transmitted by spinal afferents from T1 to T10 via the cervical, thoracic and celiac sympathetic ganglia, while 'true' stomach pain is vehiculated by celiac plexus, entering the spine at T6–T9. Esophageal pain is usually referred to left arm, while thoracotomy pain is usually referred to ipsilateral shoulder.[5]

Thoracotomy somatic pain is caused by surgical incision, transection and retraction of ribs and intercostal nerves and injury to parietal pleura (T6–T10); similarly laparotomic somatic pain is caused by skin and peritoneum incision and traction (T7–L1); both nociceptive stimuli are conveyed to the ipsilateral dorsal horn of the spinal cord.

The ''stomach ache'' referred by the patient was well localized in the epigastric area with no autonomic signs associated. Moreover formal testing of the distribution of cutaneous sensory block showed only partial loss of cold sensation at T8 level on both sides. Given the above, we may infer that the origin of the pain could have been both a visceral and a somatic one, but the absence of autonomic signs and of referred pain and the well-defined localization of the pain only in epigastric area let us believe in a clear prevalence of somatic component.

In our opinion there are several learning points from this case. Firstly, it shows and confirms that ESP block is effective in providing extensive analgesia both at the thoracic and the abdominal level. The sites of action of ESP block are both dorsal and ventral rami of the thoracic spinal nerves[1] and paravertebral space[2] and it requires a relative large volume of local anesthetic to provide an extensive dermatome coverage. Based on the work by Ueshima,[2] we estimated that 3 mL of anesthetic should cover one dermatome, but other studies are needed to understand whether this proportion is correct and to which degree the local anesthetic spreads during a continuous infusion. It is also difficult to infer whether a higher continuous infusion speed or a higher anesthetic concentration could have led to a better analgesic result.

A further consideration has to be made about anesthetic toxicity while using a multiple catheter technique. Although our patient's weight was permissive for a high local anesthetic dosage (maximal safe dose: $3\,mg.kg^{-1}$ of ropivacaine), we cautiously decided to use a low infusion speed through the abdominal catheters, in order to limit the total daily dose of ropivacaine to 300 mg. We can presume that a higher volume could have led to a wider spread of the block and could have lowered or abolished the epigastric pain.

In conclusion, we cannot recommend the use of multiple ESP blocks as a routine practice in open esophageal surgery, since this approach does not guarantee a complete analgesic coverage. Nevertheless, we strongly believe that multiple ESP blocks could be a valid alternative strategy if the use of epidural analgesia is contraindicated.

Conflicts of interest

The authors declare no conflicts of interest.

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