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CLINICAL INFORMATION

Ultrasound guided erector spinae plane block for postoperative analgesia after augmentation mammoplasty: case series

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Analgesia;
Augmentation mammoplasty;
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Postoperative pain;
Peripheral block

Abstract
Augmentation mammoplasty is the third most frequently performed esthetic surgical procedure worldwide. Breast augmentation with prosthetic implants requires the insertion of an implant under breast tissue, which causes severe pain due to tissue extension and surgical trauma to separated tissues. In this case series, we present the successful pain management of six patients with ultrasound-guided Erector Spinae Plane block after augmentation mammoplasty. In the operating room, all patients received standard monitoring. While the patients were sitting, the anesthesiologist performed bilateral ultrasound-guided erector spinae plane block at the level of T5. Bupivacaine (0.25%, 20 mL) was injected deep to the erector spinae muscle. Then, induction of anesthesia was performed with propofol, fentanyl, and rocuronium bromide. All patients received intravenous dexketoprofen trometamol for analgesia. The mean operation time was 72.5°±6 min and none of the patients received additional fentanyl. The mean pain scores of the patients were 1, 2, 2, and 2 at the postoperative 5th, 30th, 60th and 120th minutes, respectively. At the postoperative 24th hour, the mean Numerical Rating Scale score was 1. The mean intravenous tramadol consumption was 70.8±15.3 mg in the first 24 h. None of the patients had any complications related to erector spinae plane block.

PALAVRAS-CHAVE
Analgesia;
Mamoplastia de aumento;
Bloqueio do plano eretor da espinha;

Bloqueio do plano eretor da espinha guiado por ultrassom para analgesia pós-operatória em mamoplastia de aumento: série de casos

Resumo
A mamoplastia de aumento é o terceiro procedimento cirúrgico estético mais realizado em todo o mundo. A cirurgia com implantes protéticos requer a inserção de um implante sob o tecido mamário, o que causa dor intensa devido à extensão do tecido e trauma cirúrgico

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Dor pós-operatória;
Bloqueio periférico

aos tecidos separados. Nesta série de casos, apresentamos o manejo bem-sucedido da dor em seis pacientes com bloqueio do plano eretor da espinha guiado por ultrassom (US-ESP) após mamoplastia de aumento. Na sala de cirurgia, todas os pacientes receberam monitoramento padrão. Enquanto as pacientes estavam sentadas, o anestesiologista fez o bloqueio US-ESP bilateral no nível de T5. Bupivacaína (0,25%, 20 mL) foi injetada entre os músculos romboide maior e eretor da espinha. Em seguida, a indução anestésica foi feita com propofol, fentanil e rocurônio. Todas as pacientes receberam dexcetoprofeno trometamol por via venosa para analgesia. O tempo médio de operação foi de 72,5 ± 6 minutos e nenhuma das pacientes recebeu fentanil adicional. Os escores médios de dor das pacientes foram 1, 2, 2 e 2 no 5°, 30°, 60° e 120° minutos de pós-operatório, respectivamente. No 24° dia de pós-operatório, o escore médio da Escala de Avaliação Numérica (NRS) foi 1. O consumo médio de tramadol foi de 40 ± 33,4 mg nas primeiras 24 horas. Nenhuma das pacientes apresentou complicações relacionadas ao bloqueio US-ESP.

Introduction

Augmentation mammoplasty with breast prosthesis is the third most frequently performed esthetic surgical procedure worldwide. An implant is inserted under breast tissue in this procedure. There are three implant insertion approaches according to the level of pectoralis major muscle; subglandular insertion, subpectoral insertion, and dual plane. Subpectoral insertion causes extension of breast tissue and the pectoralis major muscle and leads to damage of the separated tissue. Consequently, severe pain is seen in the postoperative period.[1]

To date, different postoperative pain management techniques, including modified pectoral blocks,[2] paravertebral block[3] or intercostal blocks[1] have been reported after breast surgery. However, there is still no consensus on the optimum approach.

In this case series, we present the successful pain management of six patients with Ultrasound-guided Erector Spinae Plane (US-ESP) block after augmentation mammoplasty with the subpectoral insertion approach.

Case reports

We selected six patients who were American Society of Anesthesiologists Grade 1 or 2, aged between 29 and 41 years, and scheduled for an augmentation mammoplasty with prosthetic implants. Written informed consent was obtained from all participants to report the cases. In the operating room, all patients received standard monitoring including electrocardiography, non-invasive blood pressure, peripheral oxygen saturation, and bi-spectral index monitoring. After the placement of a 22 gauge intravenous line, all patients received 0.05 mg.kg^{-1} midazolam for sedation. While the patients were sitting, the anesthesiologist placed a high-frequency ultrasound probe in longitudinal orientation at the level of T5 spinous process and 3 cm laterally from the midline to the side involved in the surgery (Fig. 1).

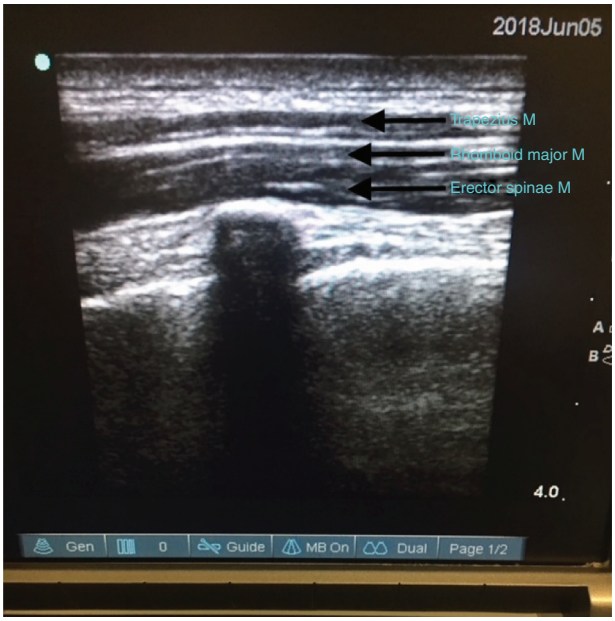

Figure 1 High-frequency ultrasound probe in longitudinal orientation.

Under aseptic conditions, an 80 mm 21 gauge block needle was inserted in-plane in the cranial-to-caudal direction until the tip contacted the T5 transverse process (Fig. 2). After the hydrodissection with 2–3 mL of isotonic saline solution, 25 mL of 0.25% bupivacaine was injected deep to the erector spinae muscle (Fig. 3). The same procedure was repeated with 25 ml of 0.25% bupivacaine at the contralateral side. The patients were then placed in the supine position and the anesthesiologist performed induction of general anesthesia with 2–3 mg.kg^{-1} propofol, 1 mcg.kg^{-1} fentanyl and 0.6 mg.kg^{-1} rocuronium bromide. After the BIS score of each patient was between 40 and 60, the patients were intubated. We used 4%–6% desflurane in a 40% oxygen 60% N_2O

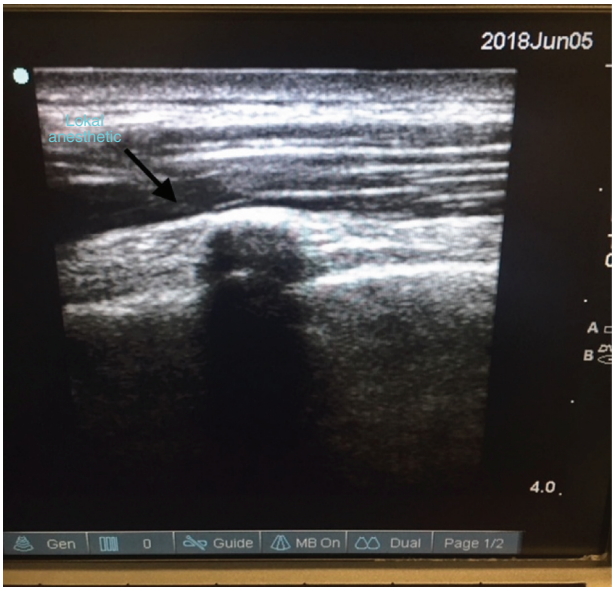

Figure 2 Lokal anesthetic.

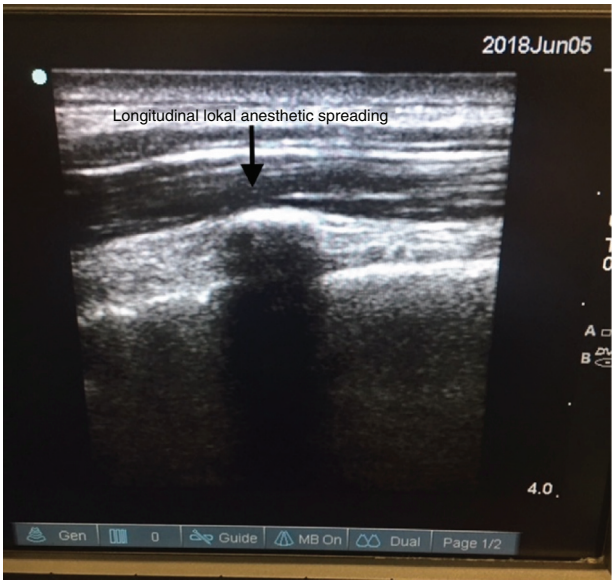

Figure 3 Bupivacaine was injected deep to the erector spinae muscle.

mixture. All patients received intravenous 4 mg ondansetron for postoperative nausea and intravenous 75 mg dexketoprofen trometamol for analgesia. At the end of the operation, patients were sent to the recovery room where they were assessed for postoperative pain using a Numeric Rating Scale (NRS). In the recovery room, the patients received a Patient-Controlled Analgesia (PCA) device for postoperative analgesia (10 mg bolus dose with a 20 min lock-time and no basal infusion). After 30 min, they were sent to the surgical ward. The pain assessment of the patients was performed during movement at the postoperative 1st hour, 2nd hour, 6th hour, 12th hour, and 24th hour using the NRS in the surgical ward. When the NRS score during coughing was $\geq$4, the patients were planned to receive intravenous morphine 4 mg as rescue analgesic.

The mean operation time was 72.5 $\pm$ 6 min and none of the patients received additional fentanyl during the operation. The mean pain scores of the patients were 1.2 (min. 0, max. 2), 1.6 $\pm$ 1 (min. 0, max. 3), 2 $\pm$ 0.9 (min. 1, max. 3) and 2.3 $\pm$ 0.5 (min. 2, max. 3) at the postoperative 5^{th,} 30th, 60th, and 120th minutes, respectively. At the postoperative 12th hour, the mean NRS score was 3.1 $\pm$ 0.7 (min. 2, max. 4) and at the 24th hour 0.8 $\pm$ 0.7 (min. 0, max. 2). The mean intravenous tramadol consumption was 70.8$\pm$15.3 mg in the first 24 h. None of the patients required rescue analgesia in the first 24 h and no complications related to US-ESP block were seen.

Discussion

US-ESP block is a myofascial plane block that provides analgesia of the thoracic or abdominal segmental innervations depending on the level of injection site.[4] US-ESP block has been reported to successfully reduce postoperative pain after modified radical mastectomy.[5] However, there are no data in the current literature about its effectiveness after augmentation mammoplasty. After injection from the level of T5 transverse process, local anesthetic spreads in a craniocaudal pattern over several levels. Local anesthetic is also known to penetrate anteriorly through the costotransverse foramina and enter the thoracic paravertebral space where it can block the ventral and dorsal rami of spinal nerves and also the rami communicantes. Therefore, it can be described as an indirect paravertebral block with the advantage of simple identification of the ultrasound landmarks, and potentially a safer procedure.[6]

In our patients, preoperative US-ESP block managed to attenuate postoperative pain. The mean tramadol consumption in the postoperative first 24 h was only 40 mg. However, the pain scores of some patients was 3 in the early postoperative period. Innervation of the breast is provided by branches of the thoracic, humeral, and intercostal nerves. Intercostal nerves from the second to the sixth supply branches to the breast. The nerve supply to the nipple and areola is a deep branch from the anterior division of the fourth lateral cutaneous nerve. It passes through the subdermal tissue of the areola to form a plexus underneath it. The skin innervation of breast is provided by peripheral nervous system originating from dorsal root ganglia.[7] In a recent cadaveric study, Ivanusic et al.[8] performed US-ESP block with 20 mL of 0.25% methylene blue dye and assessed the spread of dye. The authors reported that the dye spread laterally deep to the iliocostalis muscle in 75%–80% of cases. However, the dye spread did not involve the ventral rami or the paravertebral space. Similarly, Ueshima et al.[9] documented two cases of inadequate analgesia after breast cancer surgery. They reported that the block did not reach the anterior branches of T2–T6. The lack of local anesthetic spreading to the ventral branches is likely to be the reason of postoperative pain in our patients. Beside its analgesic efficacy, US-ESP is also believed to have less potential risk of complications due to the injection site. However, Ueshima et al. also reported a patient with pneumothorax after unilateral US-ESP.[10] Although none of our patients experienced

any complications after the intervention, patients should be closely followed up after surgery.

Modified Pectoral Nerve Block (PECS) is another popular analgesic approach for analgesia after augmentation mammoplasty. Karaca et al. assessed the efficacy of Ultrasound guided-PECS I and II blocks for analgesia after augmentation mammoplasty and reported that PECS block was superior than no-intervention group.[11] Besides, Ultrasound-guided PECS block has the advantage of being performed after the induction of anesthesia. However, US-ESP is mostly performed in the sitting position before the induction of anesthesia, which may cause a stress effect on patients. Recently, we compared the effectiveness of PECS block and US-ESP block for postoperative analgesia of radical mastectomy surgery in a randomized-controlled study.[12] We found that PECS block reduced postoperative pain scores and tramadol consumption more significantly then US-ESP block. On the other hand, anesthesiologists tend to inject a larger volume of local anesthetic agent during Ultrasound-guided PECS block. A total of 60 mL (30 mL local anesthetic agent + 30 mL saline mixture) is applied during PECS block, and 40 mL (20 mL local anesthetic agent + 20 mL saline solution) is applied during US-ESP block. Besides, US-ESP block is performed away from the surgical site. The technique is easy and safe. However, larger sizes of breasts may cause difficulty in ultrasound imaging and block technique during PECS block. In the end, both peripheral blocks appear to be effective in providing analgesia after augmentation mammoplasty.

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Conflicts of interest

The authors declare no conflicts of interest.

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