Turk J Anaesthesiol Reanim 2017; 45: 112-5 DOI: 10.5152/TJAR.2017.43815

Case Report / Olgu Sunumu

Ultrasound-Guided Continuous Interpectoral Block for Patient Undergoing Mastectomy and Axillary Clearance

Mastektomi ve Aksiller Klerens Uygulanan Hastada Ultrason Eşliğinde Devamlı İnterpektoral Blok

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Abstract / Öz

Using a single dose of local anaesthetics has some disadvantages and provides limited analgesia depending on the pharmacokinetic characteristics of the local anaesthetic used. Nevertheless, the use of continuous perineural infusions allows sustained pain control. Ultrasound-guided interpectoral block followed by the placement of catheters in patients undergoing mastectomies with or without lymph node axillary dissections can result in sufficient pain control. We present a case of a 58-year-old woman undergoing mastectomy and axillary clearance who received ultrasound-guided continuous interpectoral block for postoperative analgesia. After the induction of general anaesthesia, interpectoral ultrasound block was performed and levobupivacaine was administered through a catheter placed between the pectoralis minor and pectoralis major muscles using an ultrasound-guided technique. We used an elastomeric pump containing the 0.125% levobupivacaine anaesthetic solution, with an infusion rate of 5 mL h^{-1} for 48 h. Excellent postoperative pain control was observed. Local anaesthetic- and catheter-related side-effects were not observed. The ideal infusion rate for interpectoral block in patients under mastectomy has not been determined. More randomised studies are needed to confirm whether interpectoral techniques are appropriate for routine clinical practice.

Keywords: Mastectomy and axillary clearance, continuous interpectoral block, pain control

Tek doz bir lokal anestetik kullanımının bazı dezavantajları vardır ve kullanılan lokal anestetiğin farmakokinetik özelliklerine bağlı olarak sınırlı analjezi sağlar. Bununla birlikte, devamlı perinöral infüzyonların kullanımı uzun süreli ağrı kontrolüne olanak sağlar. Lenf nodu aksiller disseksiyonu ile veya olmadan mastektomi uygulanan hastalarda, kateter yerleştirilmesinin izlediği ultrason eşliğinde interpektoral blok yeterli ağrı kontrolü ile sonuçlanabilir. Bu vaka çalışmasında mastektomi ve aksiller klerens uygulanan ve postoperatif analjezi için ultrason eşliğinde devamlı interpektoral blok alan 58 yaşında bir kadın hasta sunulmaktadır. Genel anestezi indüksiyonundan sonra interpektoral ultrason gerçekleştirildi ve levobupivakain ultrason eşliğinde pektoral minör ve pektoral majör kasları arasına yerleştirilen bir kateterden uygulandı. 48 saat boyunca 5 mL $saat^{-1}$ infüzyon hızında, %0,125 levobupivakain içeren elastomerik pompa kullanıldı. Mükemmel postoperatif ağrı kontrolü izlendi. Lokal anestetik ve kateterle ilişkili yan etkiler görülmedi. Mastektomi altındaki hastalarda interpektoral blok için ideal infüzyon hızı belirlenmemiştir. İnterpektoral tekniklerin rutin klinik uygulama için uygun olup olmadığını teyit etmek için daha fazla sayıda randomize çalışmaya ihtiyaç vardır.

Anahtar Sözcükler: Mastektomi ve aksiller klerens, devamlı interpektoral blok, ağrı kontrolü

Introduction

The local anaesthetic (LA) injected between pectoral muscles spreads between the clavipectoral fascia and the deep layer of the pectoral fascia towards the axilla because the pectoralis major muscle (PMM) and pectoralis minor muscle (pmm) are part of the anterior axillary wall, effectively blocking the axilla (1). Ultrasound-guided pectoral nerve block (Pecs) is a novel interfascial plane block that has recently been introduced in clinical practice to provide analgesia to patients after reconstructive breast surgery. A recent study compared paravertebral block (PVB) with a combination of PVB and Pecs block in reconstructive breast surgery (2, 3). Here we present a case of continuous interpectoral block for postoperative analgesia after mastectomy and axillary clearance.

Case Presentation

Informed written consent was obtained for the continuous interpectoral block procedure. In addition, permission for publication of this report was obtained from the patient, who was a 58-year-old woman scheduled for right mastectomy and axillary clearance with an unremarkable medical history. After inducing anaesthesia, we placed a 6–13-MHz linear transducer (Mindray M7 Shenzhen, China) below the outer third of the clavicle, transverse to the axis of the body. In the superficial plane,

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Received / Geliş Tarihi : 04.12.2016
Accepted / Kabul Tarihi : 20.01.2017

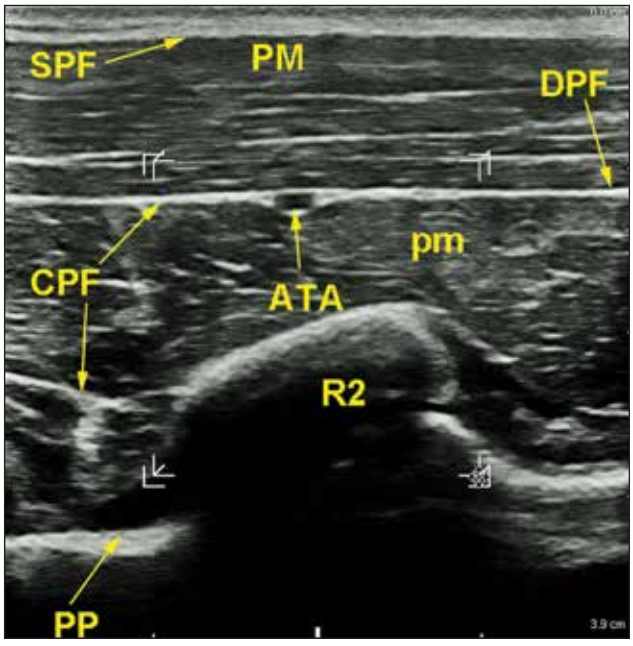

Figure 1. Ultrasound image of the anterior thoracic wall shows the pectoralis major muscle (PMM), pectoralis minor muscle (pmm), superficial pectoral fascia (SPF), acromiothoracic artery (ATA), clavipectoral fascia (CPF), parietal plaeura (PP), lateral pectoral nerve, intercostal muscle (ICM) and ribs (R)

we identified fatty tissue. The intermediate plane was formed by the superficial pectoral fascia (SPF), PMM, deep pectoral fascia (DPF) and pmm surrounded by the claviculopectoral fascia. We visualised the thoracoacromial artery (ATA) and cephalic vein between the muscular planes and the deep plane occupied by the intercostal muscles, pleura and lung (Figure 1). The Tuohy needle (Vygon; Ecouen, France 18 G) wasintroduced using the in-plane approach from the medial to lateral direction, maintaining distance from structures like the pleura and blood vessels. The needle was advanced until the tip was positioned into the interfascial plane between PMM and pmm. A test dose was injected to determine that the tip had been placed correctly in the interfascial plane, shown by the separation of the fascial layers. It was then advanced further, and 10 mL of 0.25% levobupivacaine plus 1.200,000 adrenaline was injected to perform hydrodissection of the interfascial plane. LA spread was visualised as it was injected. We recommended using colour Doppler ultrasonography to help identify ATA between PMM and pmm. A 20-G Thouy catheter (Vygon; Ecouen, France) was advanced 5 cm beyond the needle tip. After negative aspiration, 10 mL of LA was injected through the catheter while observing the displacement of the interfascial plane and was finally connected to an elastomeric pump (Dosi-fuser, Leventon, Izasa Hospital) containing 0.125% levobupivacaine, with the infusion rate of 5 mL h^{-1} (Figure 2a-c). After surgery, pain was rated on a 10-point visual analog scale (VAS; 0, no pain; 10, the worst pain imaginable). The VAS score was evaluated as 2/10. After discharge from the Post Anestesia Care Unit (PACU), the VAS score was rated as 1/10. The following morning, the pa-

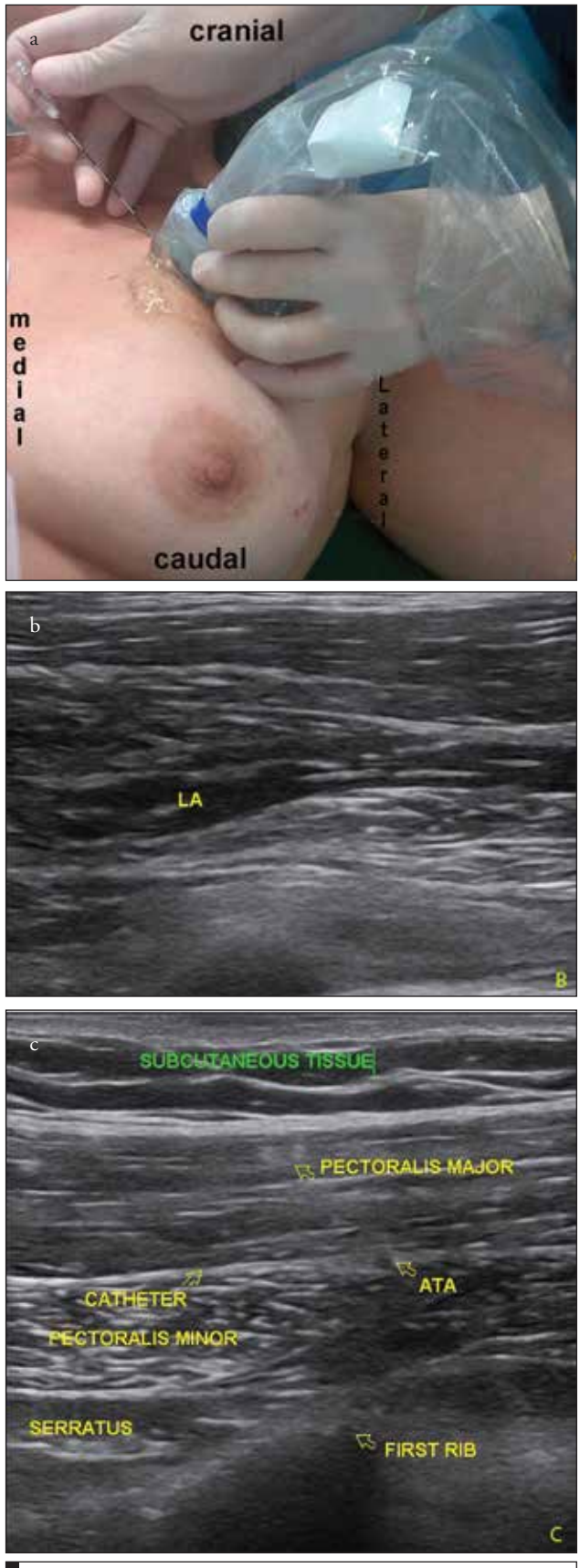

Figure 2. a-c. (a) Ultrasound image shows probe placement and needle insertion. (b) Local anaesthetic (LA) (c) Ultrasound image of the anterior thoracic wall shows the pectoralis major muscle (PMM), pectoralis minor muscle (pmm) and catheter

tient was much more comfortable (VAS score 0–1/10), stable and free of intravenous opiodes. The pain was controlled by 25 mg oral ketoprophen and 1 g acetaminophen every 8 h for pain relief. The catheter was removed 48 h after the surgery.

Discussion

Using single-dose LA has some disadvantages and provides limited analgesia depending on the pharmacokinetic characteristics of LA usage. Nevertheless, the usage of continuous perineural infusions allows sustained pain control and facilitates patients' mobilisation, early rehabilitation and hospital discharge (4). In the past years, our group has been performing ultrasound-guided interpectoral block followed by the placement of catheters with the infusion of 0.0625%–0.125% levobupivacaine at a rate of 5–10 mL h^{-1} in patients undergoing mastectomies with/without lymph node axillary dissections, mastopexia, mammaplasty and subpectoral prostheses. We obtained excellent results such as a decrease in systemic perioperative analgesic requirement, improvement in patient satisfaction, facilitation of patients' mobilisation and early rehabilitation and hospital discharge. We kept the catheters from 2 to 7 days depending on the surgery.

In 1840, Cooper described mammary branches from the 2nd to 6th intercostal nerves (4, 5). The pectoral fascia originates from the clavicle and sternum, covers PMM, continues inferiorly with the fascia of the abdominal wall to cover the rectus abdominis muscle and external oblique muscle and continues laterally with the fascia of the back to cover the serratus anterior muscle (SAM) (6-8). Jinde in his cadaveric study found numerous thin fibrous bundles from the upper pectoral fascia attached to the deep layer of the superficial fascia of the breast (9, 10). In the upper breast near the 2nd rib, the pectoral fascia tightly connects with the superficial fascia of the breast. At the level of the fourth intercostal space, a dense horizontal septum connects the pectoral fascia and nipple; this septum extends medially and laterally to merge into the medial and lateral ligaments of the breast (9). A dense connective tissue connects the skin of the inframammary crease and the pectoral fascia. Lin found that the pectoral fascial thickness varies from 0.2 to 1.14 mm and differs in different sites of the fascia; the lower fascia is thicker than the upper fascia and the lateral fascia is thicker than the upper and medial fascia. The lateral branches from the 2nd to 6th intercostal nerves pass through SAM, PMM and the pectoral fascia along the lateral edge of PMM into the breast. The anterior branches of the intercostal nerves emerge beside the sternum from PMM and the pectoral fascia into the breast (9). In our practice, we use a different approach from that of Blanco (2). We place the ultrasound probe below the outer third of the clavicle, identifying PMM and pmm, ATA and cephalic vein before introducing the needle in-plane from the medial to lateral direction, staying as far away from structures such as the pleura and blood vessels as possible. We believe that our approach has the following advantages compared with the coracoid level approach: Firstly, the insertion of the needle from the medial to lateral direction inadvertently reduces the risk of puncturing the cephalic vein, ATA or pleura. Secondly, collision with bony structures does not limit needle insertion. Thirdly, identification of the lateral border of pmm and the suspensory ligament of the axilla is easier than that in the approach of Blanco (2) Finally, the placement of catheters between PMM and pmm or within the suspensor ligament could be possible with our approach. Continuous interpectoral block provides analgesia to the lateral and medial pectoral nerves combined with several cutaneous branches of the intercostal nerves (11, 12). Continuous interpectoral block could become a safe alternative to PVB for breast surgery in some patients when this or other regional techniques cannot be performed.

Conclusion

This technique can be safely performed in an anaesthetised patient. In contrast to neuroaxial blocks (epidural and PVB), it requires an awake, cooperative patient. Possible indications of these techniques are mastectomies with/without lymph node axillary dissections, mastopexia, mammaplasty, subpectoral prosthesis, breast augmentation or prosthesis, pacemaker and pain in the anterior shoulder. These techniques are easy to understand and they provide a low complication rate, high success rate, systemic decrease in perioperative analgesic requirement, improvement in patient satisfaction, facilitation of patients' mobilisation and early rehabilitation and hospital discharge. The other benefits of these techniques include applicability to the outpatient setting and to patients with neuraxial block. The ideal infusion rate for interpectoral block has not been determined. However, we used the infusion rate between 5-10 mL h^{-1} and obtained good results. More randomised studies are needed to confirm whether interpectoral techniques are appropriate for routine clinical practice, but our results have been promising to date.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – M.F.P.; Design – M.F.P., E.Y.A.; Supervision – M.F.P., E.Y.A., J.G.M., B.Q.G.; Resources – E.Y.A., M.F.P., B.Q.G., J.G.M.; Materials – M.F.P.; Data Collection and/or Processing – M.F.P., J.G.M., E.Y.A., B.Q.G.; Analysis and/or Interpretation – M.F.P., E.Y.A., J.G.M., B.Q.G.; Literature Search – M.F.P., E.Y.A.; Writing Manuscript – M.F.P., E.Y.A.; Critical Review – M.F.P., J.G.M., E.Y.A., B.Q.G.; Other – M.F.P., J.G.M., E.Y.A., B.Q.G.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

Hasta Onamı: Yazılı hasta onamı bu olguya katılan hastadan alınmıştır.

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir – M.F.P.; Tasarım – M.F.P., E.Y.A.; Denetleme – M.F.P., E.Y.A., J.G.M., B.Q.G.; Kaynaklar – E.Y.A., M.F.P., B.Q.G., J.G.M.; Malzemeler – M.F.P.; Veri Toplanması ve/veya İşlemesi – M.F.P., J.G.M., E.Y.A., B.Q.G.; Analiz ve/veya Yorum – M.F.P., E.Y.A., J.G.M., B.Q.G.; Literatür Taraması – M.F.P., E.Y.A.; Yazıyı Yazan – M.F.P., E.Y.A.; Eleştirel İnceleme – M.F.P., J.G.M., E.Y.A., B.Q.G.; Diğer – M.F.P., J.G.M., E.Y.A., B.Q.G.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

References

1. Perez MF, Duany O, de la Torre PA. Redefining PECS Blocks for Postmastectomy Analgesia. Reg Anesth Pain Med 2015; 40: 729-30. [CrossRef]
2. Blanco R. The 'pecs block': a novel technique for providing analgesia after breast surgery. Anaesthesia 2011; 66: 847-8. [CrossRef]
3. Sopena-Zubiria LA, Fernandez-Mere LA, Valdes Arias C, Munoz Gonzalez F, Sanchez Asheras J, Ibanez Ernandez C. Thoracic paravertebral block compared to thoracic paravertebral block plus pectoral nerve block in reconstructive breast surgery. Rev Esp Anestesiol Reanim 2012; 59: 12-7. [CrossRef]
4. Sarhadi NS, Shaw Dunn J, Lee FD, Soutar DS. An anatomical study of the nerve supply of the breast, including the nipple and areola. Br J Plast Surg 1996; 49: 156-64. [CrossRef]
5. Sarhadi NS, Shaw-Dunn J, Soutar DS. Nerve supply of the breast with special reference to the nipple and areola: Sir Astley Cooper revisited. Clin Anat 1997; 10: 283-8. [CrossRef]
6. Hwang K, Kim DJ. Anatomy of pectoral fascia in relation to subfascial mammary augmentation. Ann Plast Surg 2005; 55: 576-9. [CrossRef]
7. Sebastien C, Regnier M, Lantieri L, Petoin S, Guerin-Surville H. Anterolateral thoracic fascia: an anatomic and surgical entity. Surg Radiol Anat 1993; 15: 79-83. [CrossRef]
8. Stecco C, Porzionato A, Macchi V, Stecco A, Vigato E, Parenti A, et al. The expansions of the pectoral girdle muscles onto the brachial fascia: morphological aspects and spatial disposition. Cells Tissues Organs 2008; 188: 320-9. [CrossRef]
9. Jinde L, Jianliang S, Xiaoping C, Xiaoyan T, Jiaqing L, Qun M, et al. Anatomy and clinical significance of pectoral fascia. Plast Reconstr Surg 2006; 118: 1557-60. [CrossRef]
10. Stecco A, Macchi V, Masiero S, Porzionato A, Tiengo C, Stecco C, et al. Pectoral and femoral fasciae: common aspects and regional specializations. Surg Radiol Anat 2009; 31: 35-42. [CrossRef]
11. Fajardo Pérez M, Paniagua Montes MA, García Miguel FJ. Bloqueo continuo de los nervios pectorales para cirugía de mama. Cir May Amb 2011; 16: 191-2.
12. Porzionato A, Macchi V, Stecco C, Loukas M, Tubbs RS, De Caro R. Surgical anatomy of the pectoral nerves and the pectoral musculature. Clin Anat 2012; 25: 559-75.[CrossRef]