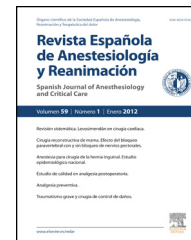




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CONTINUING EDUCATION

Ultrasound guided nerve block for breast surgery[☆]

P. Diéguez^{a,*}, P. Casas^a, S. López^a, M. Fajardo^b

^a Servicio de Anestesiología, Hospital Abente y Lago, Complejo Hospitalario Universitario de A Coruña, A Coruña, Spain

^b Servicio de Anestesiología, Hospital Universitario de Móstoles, Madrid, Spain

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KEYWORDS

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Abstract The breast surgery has undergone changes in recent years, encouraging new initiatives for the anaesthetic management of these patients in order to achieve maximum quality and rapid recovery. The fundamental tool that has allowed a significant improvement in the progress of regional anaesthesia for breast disease has been ultrasound, boosting the description and introduction into clinical practice of interfascial chest wall blocks, although the reference standard is still the paravertebral block. It is very likely that these blocks will change the protocols in the coming years. A review is presented of the anatomy of the breast region, description of nerve blocks and techniques, as well as their indications, all according to published articles and the opinion of the authors based on their experience.

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PALABRAS CLAVE

Mastectomía;
Ultrasonografía;
Dolor postoperatorio;
Bloqueo nervioso

Bloqueos guiados por ultrasonidos para cirugía mamaria

Resumen La cirugía mamaria ha experimentado cambios en los últimos años motivando nuevas iniciativas para el manejo anestésico de estos pacientes, en aras de lograr la mayor calidad y una rápida recuperación. La herramienta fundamental que ha permitido una mejora significativa en los avances de la anestesia regional para enfermedad mamaria ha sido la ultrasonografía, impulsando la descripción e incorporación a la práctica clínica de los bloqueos interfasciales de la pared torácica, pese a que todavía el *gold standard* siga considerándose el bloqueo paravertebral. Es muy probable que estos bloqueos produzcan cambios en los protocolos de actuación en los próximos años. Se realiza una revisión de la anatomía de la región mamaria,

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* Corresponding author.

E-mail address: pauladieiguez@yahoo.com (P. Diéguez).

descripción de los bloqueos y técnicas de realización, así como sus indicaciones, todo ello según los artículos disponibles y la opinión de los autores en función de su experiencia.

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Introduction

Recent advances in breast surgery have aimed at conserving the breast without causing deformities. This new approach has generalised the use of techniques such as oncoplastic breast surgery or mastectomy with breast reconstruction. Anaesthetic management during these less invasive procedures focuses on specific objectives: optimal anaesthesia, early recovery, overall satisfaction before, during and after surgery, minimal postoperative complications, and early hospital discharge. Regional anaesthesia is important in helping anaesthetists achieve these goals: it provides excellent analgesia, facilitates early recovery, and reduces the number of postoperative complications, such as cardiovascular and pulmonary problems, among others. Patients receiving regional anaesthesia are usually discharged earlier and are more satisfied with their surgery.

The regional anaesthesia of choice in thoracic surgery is still thoracic paravertebral block.^{1,2} Nevertheless, the 2011 study published by Blanco et al.³⁻⁶ ushered in a number of ultrasound-guided nerve blocks using a peripheral approach. These new techniques are equally effective as the peripheral block, but are associated with fewer complications.

These new approaches consist in the administration of a local anaesthetic (LA) between 2 interfascial planes, thus blocking innervation of the entire breast area. The primary aim is to achieve blockade of the pectoral nerves, and then of the intercostal nerves. Fajardo et al.⁷ reported their experience in blockade of the lateral (LCB) and anterior (ACB) branches of the intercostal nerves.

Nevertheless, some clinicians are still unsure of the technique and new concerns have been raised. A detailed literature search, a review of anaesthesia techniques used in breast surgery, an in-depth study of the anatomy of the anterior thorax (including dissection of cadavers and magnetic resonance imaging with contrast agents) and advanced ultrasound techniques, has shown the feasibility of a peripheral approach to block the cutaneous branches of the 2nd to 6th intercostal nerves as an alternative to neuroaxial blockade. This leads to the description of the intercostal branches block in the midaxillary line (BRILMA, in its Spanish acronym),^{8,9} which consists in administration of LA between the anterior serratus and external intercostal muscles in the midaxillary line. In a parallel development, another study described serratus plane blockade¹⁰ in 4 healthy volunteers, involving administration of LA between the anterior serratus and latissimus dorsi muscles.

Following reports in the literature of excellent results in small series,⁹⁻¹² efforts are now focussed on developing clinical trials that would confirm the effectiveness and safety of these new approaches vs the paravertebral block.

These novel techniques have not been limited to breast surgery, but have also been used in critically ill patients with

thoracic injuries.¹³⁻¹⁵ Delivery of LA via a catheter for continuous nerve block has also been described.⁶ Use of these novel interfascial nerve block techniques is spreading, and the proliferation of studies using different nomenclature has created a certain amount of confusion. The aim of this article is to explain the technique, clearly define the site of the LA infusion, and clarify the indications for each of these procedures. There are major methodological shortcomings in the studies published to date, and the type of nerve block chosen in some cases does not seem the most appropriate for the procedure undertaken.

Clinical trials comparing the new chest wall interfascial blocks with the more traditional paravertebral technique will no doubt throw light on the subject. These new approaches have several advantages over neuroaxial blocks, including absence of sympathetic blockade, which reduces incidence of anaesthesia-induced arterial hypotension (reported to range from 4% to 21% in some series^{16,17}) and the high rate (up to 24%) of failure due to catheter migration.^{18,19} In free-flap reconstruction surgery in the thoracic region using, for example, the latissimus dorsi muscle, sympathetic block, which optimises analgesia perfusion through vasodilation, is an important factor.

Overview of regional anatomy

The mammary glands situated in the anterior chest wall are bounded by structures that are key to anaesthesia and analgesia techniques. The glands extend vertically from the 2nd to the 6th rib, and horizontally from the sternum (parasternal line) to the midaxillary line. The breast lies on the pectoralis major muscle. The lateral border overlies the anterior serratus and the inferior border overlies the superior portion of the external oblique muscle of the abdomen. The glandular tissue is denser in the superior-lateral quadrant of the breast, and extends towards the axilla (Spence's tail).

The axilla is a pyramidal space, situated between the arm and the chest wall. The base is formed by the skin of the axilla and the inferior border is formed by the clavipectoral fascia or aponeurosis, which is called the suspensory ligament of axilla, or Gerdy's ligament. The base of the axilla is innervated by the intercostobrachial nerve, which anastomoses with the medial cutaneous brachial nerve to innervate the skin of the axilla and the interior of the upper arm. These nerves can be damaged during surgical dissection of the axilla. The axilla is bordered anteriorly by the clavicle, posteriorly by the scapula, and medially by the first rib, forming the cervicoaxillary canal. The anterior wall comprises 3 muscles: the subclavian, pectoralis major and pectoralis minor, and has 2 layers: superficial and deep. The superficial layer, formed by the pectoralis major, is covered by the clavipectoral fascia. The deep layer lies posterior to

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