

# A Novel Ultrasound-Guided Block: A Promising Alternative for Breast Analgesia

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We read with interest “Breast Augmentation and Augmentation-Mastopexy With Local Anesthesia and Intravenous Sedation,” by Colque and Eisemann.<sup>1</sup> The article prompted us to share with your readers the novel ultrasound-guided anesthetic techniques we use in breast surgery.

The intercostal nerve block (ICNB) is traditionally performed using surface anatomical landmarks. Although it is a “blind” technique, ICNB is technically simple to perform, has a high success rate, and has a relatively low overall complication rate. The use of ultrasonography in regional anesthesia allows for visualization of soft tissues and vessels, which in turn improves the accuracy of needle placement.<sup>2</sup> We have been performing a relatively new regional anesthetic ultrasound-guided technique in patients who undergo major or minor breast surgery, which has led to decreased systemic perioperative pain, lower analgesic requirements, and improved patient satisfaction.<sup>3</sup>

In this letter, we introduce 2 new ultrasound-guided techniques. The first is the pecto-intercostal fascial block (PIFB), which consists of injecting a local anesthetic (LA) between the pectoralis major muscle (PMM) and the external intercostal muscle (EIM), in the interfascial plane where the anterior cutaneous branch emerges from the lateral side of the sternal bone. The second technique, known as the serratus intercostal fascial block (SIFB), involves injecting the LA between the serratus anterior muscle (SAM) and the EIM, near where the lateral cutaneous branch emerges from the intercostal space at the level of the axillary midline.

In our experience, these techniques have proven more beneficial than ICNB. They reduce the amount of LA and the number of punctures needed and minimize accidental and undesirable pleural and vessel puncture. Moreover, compared with ICNB, the new techniques likely decrease LA systemic absorption and are easier to perform. In our experience, they are safe, effective, and provide good analgesic quality after breast surgery.

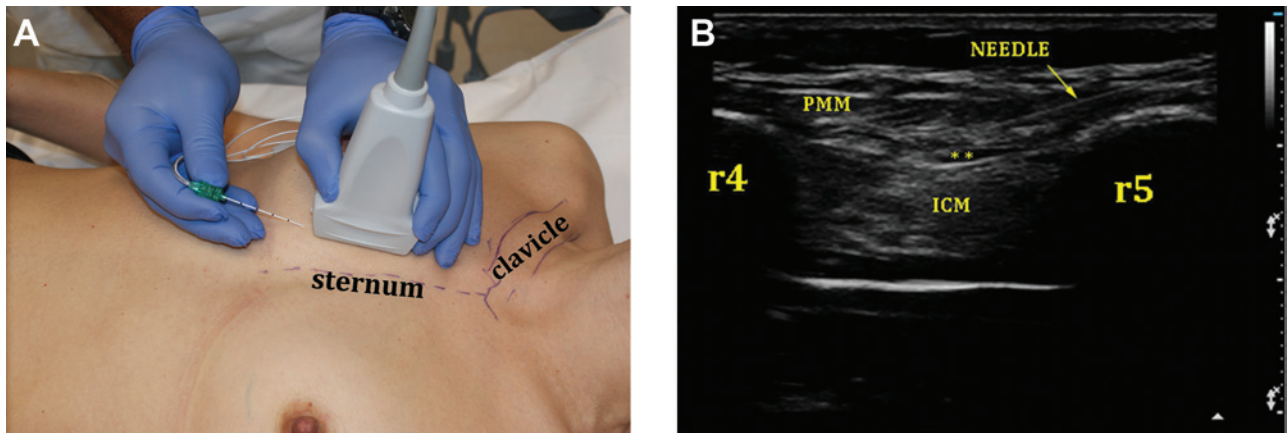
## THE PIFB ULTRASOUND-GUIDED BLOCK TECHNIQUE

With the patient in the decubitus position, we place a 6- to 13-MHz linear transducer 2 or 3 cm parallel to the long axis of the sternal bone. We first identify the ribs in the short axis (as a hyperechoic curved line) and the corresponding acoustic shadow below. We also visualize the pleura (hyperechoic line with gliding action during respiration) in each intercostal space. In the superficial plane, we can view the subcutaneous tissue and the PMM in the intermediate plane, the intercostal muscles (external, internal, and intimate) between the ribs, and, deep within the pleura, the lung.

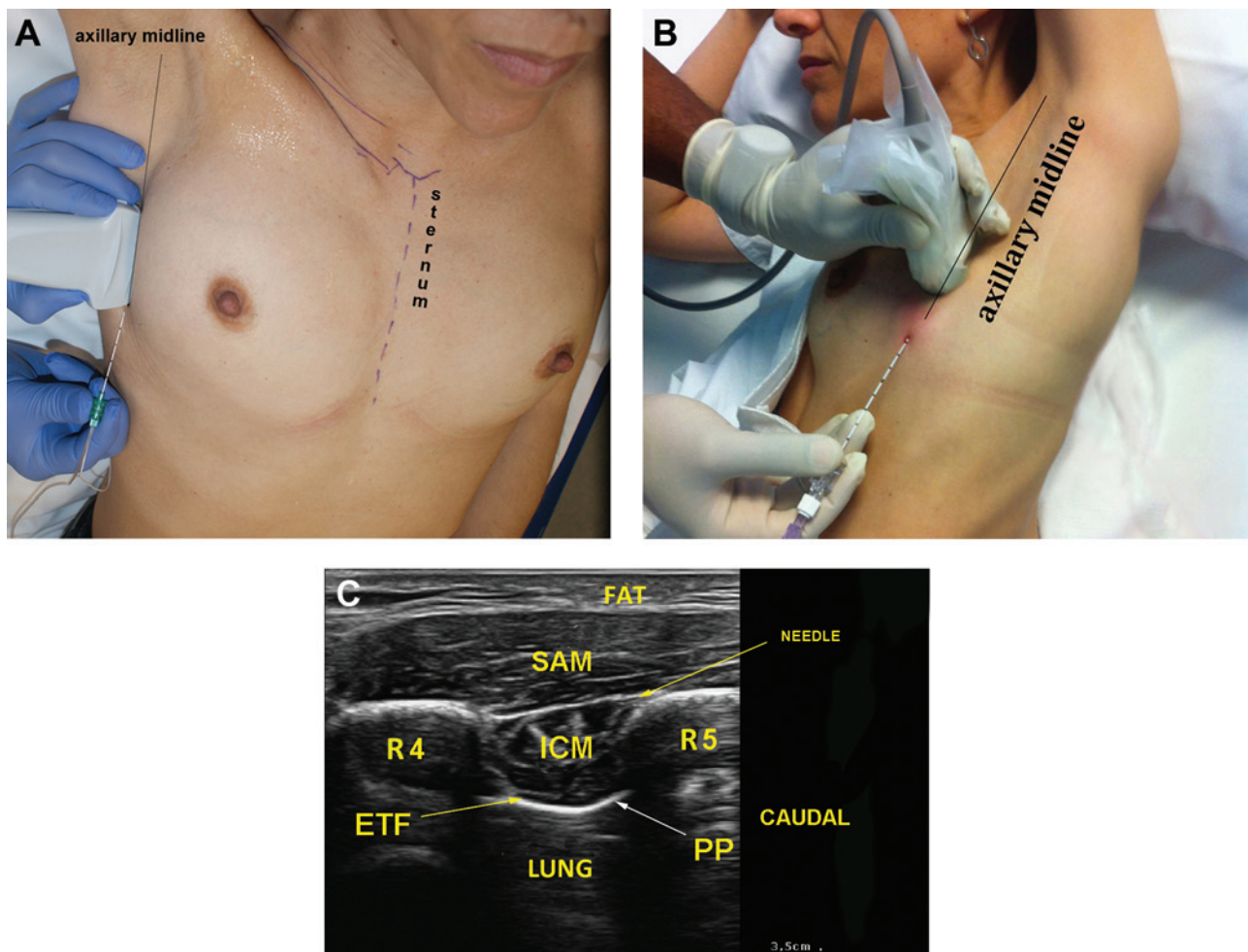
A Locoplex (Vygon, Écouen, France) block needle (17 degrees, 25 gauge, 100 mm) is inserted in-plane with the ultrasound probe, in a caudal-to-cranial direction. The needle is advanced until the tip is positioned in the interfascial plane between the PMM and the EIM. It is then advanced further, and the LA spread is visualized in real time as it is injected (Figure 1). At this point, we recommend using color Doppler ultrasonography to help identify the internal thoracic artery and its branches that pass between the PMM and the EIM. A test bolus of normal saline (2–3 mL) is injected (in real time) to determine that the tip has been placed correctly in the interfascial plane, shown by separation of the fascial layers. The injectate usually consists of a 2- to 3-mL dose of LA (levobupivacaine 0.375% plus adrenaline 1:200 000) to the dermatome. This admixture sufficiently fills the fascial plane and effectively blocks several anterior cutaneous branches of intercostal nerves; toxic effects pose a minimal risk.

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**Figure 1.** This 38-year-old woman received a pecto-intercostal fascial block (PIFB) ultrasound-guided block prior to undergoing mastectomy. (A) Ultrasound probe positioning and needle insertion. (B) Ultrasound image of the anterior thoracic wall showing local anesthetic infiltration (yellow asterisks) of the ribs (r) and pectoralis major muscle (PMM). ICM, intercostal muscle.



**Figure 2.** The same 38-year-old woman (shown in Figure 1) also received a serratus intercostal fascial block (SIFB) ultrasound-guided block technique prior to mastectomy. (A, B) Ultrasound probe positioning and needle insertion along the axillary midline. (C) Ultrasound image of the lateral thoracic wall showing the serratus anterior muscle (SAM), rib (R), endothoracic fascia (ETF), intercostal muscle (ICM), fat (FAT), and parietal pleura (PP, shown with white arrow). The needle insertion is shown with a yellow arrow.

## THE SIFB ULTRASOUND-GUIDED BLOCK TECHNIQUE

This technique can be performed with the patient in the decubitus or lateral decubitus position. A 6-to 13-MHz linear transducer is placed at the axillary midline (Figure 2), where the ribs can be identified at the level of the sixth intercostal space. The key structures to scan are as follows: the SAM, intercostal muscles, and pleura (in the first image plane, which includes subcutaneous tissue and the SAM); the external, internal, and intimate intercostal muscles (in the intermediate plane); and the ribs, pleura, and lung (in the deep plane).

In a caudal-to-cranial direction, in an in-plane approach, the needle is inserted at the sixth intercostal space over the midaxillary line, until the tip is positioned between the SAM and the EIM; the entire spread of LA is visualized in real time as it is injected (Figure 2). Following this, a test bolus of normal saline (2-3 mL) is injected to visualize separation of the fascial layers and to confirm the correct placement of the anesthetic. A 2- to 3-mL dose of LA (levobupivacaine 0.375% plus adrenaline 1:200 000), injected into the dermatome, sufficiently fills the fascial plane and effectively blocks several lateral cutaneous branches of intercostal nerves; toxic effects present minimal risk.

These novel techniques may become widely used analgesic alternatives to the multiple-puncture intercostal block and to epidural and paravertebral blocks in breast

surgery given their low rate of adverse complications and the characteristic single-puncture technique that allows simultaneous blockage of numerous dermatomes. These techniques' other benefits include applicability both for the outpatient setting and for patients who have undergone a neuraxial block. More randomized studies are needed to confirm whether PIFB and SIFB techniques are appropriate for routine clinical practice, but our results thus far have been promising.

## Disclosures

The authors declare no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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