The Breast Block: A New Regional Block to Facilitate Ultrasound-Guided Vacuum-Assisted Breast Procedures with Minimal Anatomic Distortion

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Citation

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Abstract

Here we describe a new technique for a regional block under ultrasound visualization that provides excellent anesthesia without causing anatomic distortion. Relevant sonographic anatomy, the anesthetics used, and the technique of application of the block are presented. This technique provides good local analgesia for the patient undergoing an ultrasound-guided vacuum-assisted breast procedure without distortion of the sonographically visualized anatomy.

INTRODUCTION

Physicians who treat breast disease are rapidly adopting ultrasound-guided vacuum-assisted breast biopsy over fine-needle aspiration, and core-needle biopsy techniques. Improved accuracy, and excisional capability are driving this trend.[1,2]

Vacuum-assisted techniques require that significantly higher volumes of local anesthetic agents be infused locally to provide adequate analgesia when compared to the anesthetic requirements of fine-needle aspirations, or core biopsies. This local infusion often distorts sonographic visualization of the local anatomy, making the procedure more difficult, and possibly resulting in incomplete excision.

Regional blocks offer the advantage of good anesthesia, without anatomic distortion. Regional blocks have been used by anesthesiologists to facilitate breast resections, up to, and including mastectomy.[3,4]

In this article, we describe a new type of regional block, performed under ultrasound, that is safe and not technically difficult to perform. In our experience, this technique results in excellent analgesia. Local anatomic structures are easily visualized, facilitating completion of the procedure.

VISUALIZATION OF THE SONOGRAPHIC BREAST ANATOMY

The sonographic anatomy of the breast has been previously described.[5] Beginning at the most superficial level, the dermis is highly echogenic, and variable in thickness. Underlying the dermis are the subcutaneous tissues. These are hypoechoic, and are traversed at irregular intervals by Cooper's ligaments.

The breast parenchyma is immediately beneath the subcutaneous tissues. It is variably echogenic, with visible ductal structures. Breast lesions occur within the parenchyma, but can extend either superficially or deep to it.

Deep to the parenchyma is the retromammary space, which contains loose areolar tissue. Perforating neurovascular bundles traverse this space between the chest wall, and the overlying parenchyma.

Next, the pectoralis major muscle is identified below the retromammary space. The longitudinal fibers are easily visualized. The pectoralis blends with the underlying intercostal muscles. Finally, the pleura, and the ribs are brightly echogenic.

The key anatomic structures to identify for performing the block are the subcutaneous space, and the retromammary space. Depending on the size of the patient, they can vary in thickness. In very thin patients, the retromammary space, in particular, may be difficult to identify.

MATERIALS AND METHODS

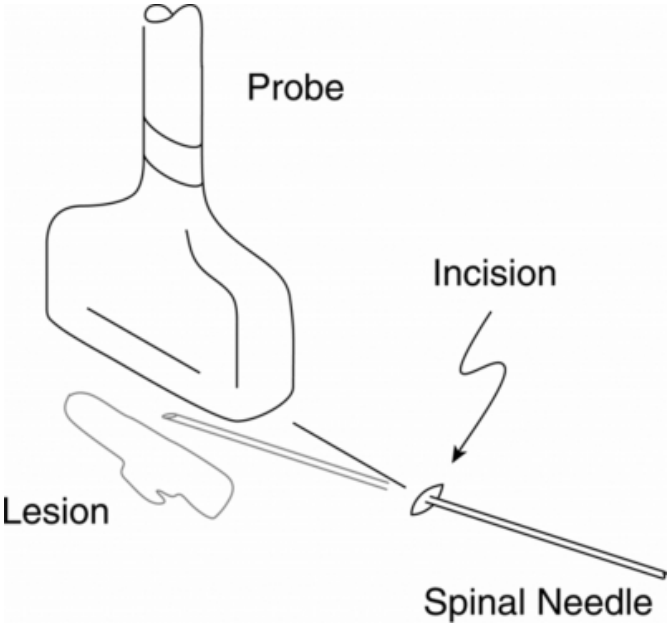
The patient receives oral conscious sedation with 10mg diazepam and 5/325mg hydrocodone/acetominophen one hour prior to the procedure. She is prepped and draped using

sterile technique in the supine position with her arm extended.

A sterile coupling gel is applied to the breast, and lesion is then visualized sonographically. The lesion is centered in the ultrasound beam. An intradermal infusion of 1% xylocaine is performed at a point along the continuation of the major axis of the ultrasound probe (figure 1). A 3-4mm incision is made with a number 11 blade through the dermis at this point.

Figure 1

Figure 1: Method of Local Anesthetic Infusion under Sonographic Guidance.

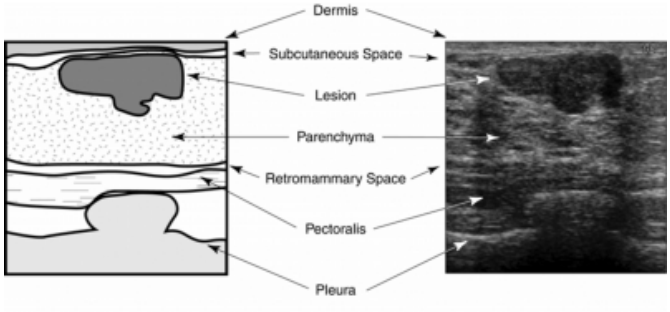


An 18ga. Spinal needle is placed under ultrasound guidance in the subcutaneous tissues over the lesion, and 5-10cc of 1% xylocaine with epinephrine is infused. The spinal needle is then withdrawn, and repositioned to the retromammary space between the breast parenchyma, and the pectoralis major muscle. This plane must be carefully identified. Sonographically, the tip of the needle is positioned within this space. Correct needle position may be confirmed by loss of resistance to injection. An additional 10cc of 1% xylocaine with epinephrine is infused in the retromammary space. The anesthetic can then be visualized within both the subcutaneous, and retromammary locations. The block is now complete, and the vacuum assisted procedure is immediately performed.

Example: The patient is a 26 year-old female with a 2.5cm superficial and palpable solid mass in the upper, outer quadrant. Diagnostic radiographic work-up revealed suspicious features, including an irregular posterior margin, as well as some internal echogenicity. Figure 2 shows the pre-biopsy sonographic anatomy.

Figure 2

Figure 2: Visualized Sonographic Anatomy in theExample Case - A 26 year-old Female with a Parenchymal Breast Lesion.



Initially subcutaneous infusion of local dissects the lesion away from the skin (figure 3), and then diffuses into the subcutaneous fat. Subsequently, the spinal needle is placed in the retromammary space, and additional local is infused (figure 4).

Figure 3

Figure 3: Infusion of Xylocaine with Epinephrine within the Subcutaneous Space.

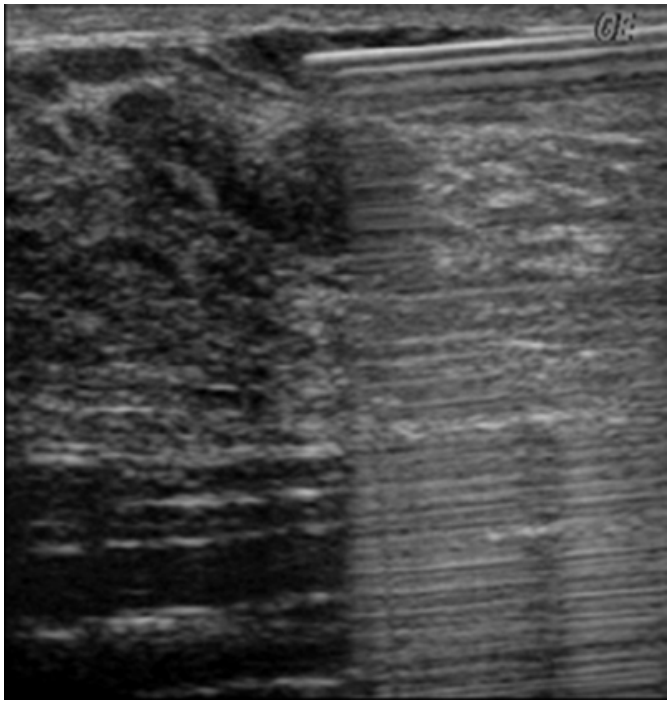


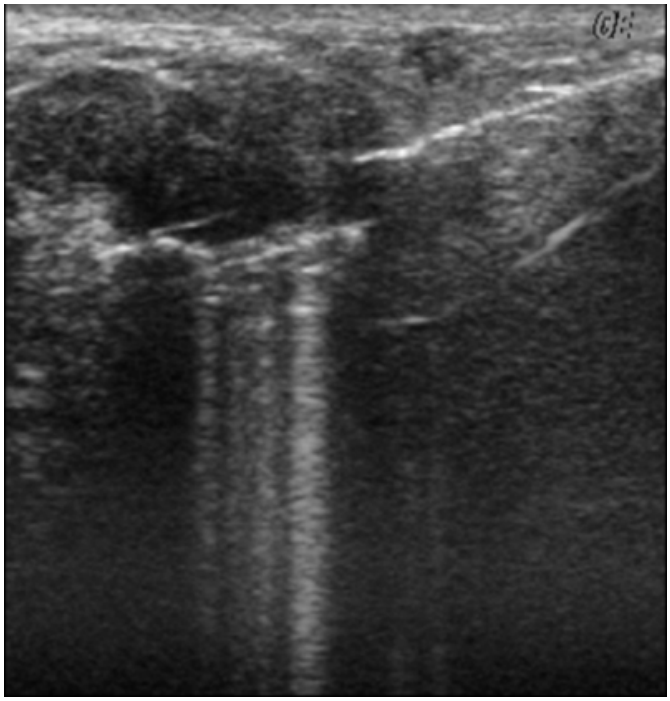
Figure 4

Figure 4: Infusion of Xylocaine with Epinephrine within the Retromammary Space.

Following infusion, local anesthetic can be seen in both spaces. The lesion itself remains well visualized. Complete percutaneous excision of the lesion is then performed using an 8ga. vacuum-assisted instrument (Mammotome, Ethicon Endosurgery Corp., Cincinnati, OH) (figure 5), leaving no visible remaining evidence of the lesion. Pathology revealed a benign fibroadenoma.

Figure 5

Figure 5: Ulrasound-Guided Vacuum-Assisted Percutaneous Excision of the Parenchymal Lesion Immediately Following Administration of the Block.



DISCUSSION

This technique is essentially a three-dimensional field block, and is easy to perform. Patients experience excellent analgesia, and the breast parenchyma is easily visualized after completion of the block.

We developed the block after noticing, incidentally, that women with lesions close to the chest wall experienced less discomfort if their local infusion diffused out into the retromammary space prior to their biopsy. Subsequently, we noticed that patients with superficial lesions had less discomfort when there was pooling of local under the skin overlying the lesion.

An added benefit of this technique occurs in women with very superficial or deep lesions. The infusion increases the distance between these lesions and either the skin, or the chest wall, minimizing the risk of injury to these structures.

CONCLUSION

This technique provides good local analgesia for the patient undergoing an ultrasound-guided vacuum-assisted breast procedure without distortion of the sonographically visualized anatomy.

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