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Discovery of a Pectoral Nerve Neuroma by Procedural Ultrasound Before Breast Reconstruction Surgery: Case Report

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Abstract

Chronic pain from breast surgery seems to be commensurate with and increase the number of breast surgeries. Many improvements have been made in both surgery and anesthesia techniques. These novel techniques have shown promising results in decreasing postoperative pain and opioid use, along with the cascade of undesirable side effects, and even cancer recurrence. Ultrasound may have played an integral part in the development of these analgesic techniques and can further our understanding of relevant anatomy. In the present case, ultrasound was used during the preprocedural analgesia to correctly identify a chronic-pain-causing neuroma. The offending neuroma was subsequently reported to the surgeon before the procedure and was resected under direct vision during the surgical reconstruction. This finding altered the course of the surgery and yielded positive results postoperatively.

INTRODUCTION

Breast reconstructions with multiple variations are commonly performed in the United States. According to the American Society of Plastic Surgeons, breast reconstruction accounted for over 100,000 procedures in 2016 or nearly 2% of all reconstructive procedures.[1] Steady growth of 39% in breast reconstruction has been reported since 2000 with a 3% increase since 2015. One complication from breast implant placement of nearly any kind is the development of chronic pain, defined as prolonged pain for more than 30 days after surgery. Ivica and colleagues reported the incidence of chronic pain after simple breast augmentation at 15%.[2] Brummett reports that the prevalence of chronic pain after noncosmetic breast surgery is between 29% and 47%, with up to 13% of those patients experiencing severe pain.[3] Ultrasound is being used in novel ways across the anesthesia community for needle-guided techniques, and increasingly, for bedside diagnosis and treatment. Multiple disciplines have produced articles inviting anesthesia providers to incorporate ultrasound for procedures such as the FAST (focused assessment with sonography in trauma) examination, bedside transthoracic echocardiography, diagnosis of pneumothorax, and other modalities.

This case report describes a patient in which preprocedural ultrasound was used to correctly identify a pectoral neuroma during the routine placement of regional blockade, with subsequent surgical exposure and debulking.

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REVIEW OF LITERATURE

Ultrasound is gaining interest as an effective, noninvasive, cost-effective, and certainly convenient point-of-care imaging modality for a variety of purposes. The anesthesia community has embraced its value for needle procedures such as vascular access and regional nerve blocks; however, anesthesia providers are also beginning to appreciate its value for critical care diagnostics, as well as for incidental, but significant, findings. This is reflected in applications similar to the case we present. A PubMed (National Library of Medicine) search for subject similarity was conducted. Mostly case reports currently exist regarding the use of ultrasound for neuroma identification and injection for postamputation pain. Additionally, nearly all these articles were reported in journals outside the academic anesthesia community.

In 1999 Jones and colleagues investigated the feasibility of ultrasound for diagnosing Morton's neuroma with good results.[4] In 2003 Ernberg and colleagues reported the use of ultrasound in the detection and treatment of a painful stump neuroma.[5] In 2011 Chen et al presented the use of linear transducer ultrasound for diagnosis and subsequent treatment for postamputation pain.[6] A 40-year-old woman presented with postamputation pain and prosthetic intolerance for a below-elbow incident. They successfully identified the median, ulnar, and radial neuromas and injected each with a steroid solution with significant pain reduction. In 2012 Torres-Claramunt and colleagues reported on the accuracy of ultrasound and magnetic resonance imaging use for diagnosing a Morton's neuroma.[7] In 2012, Currier and team used ultrasound to detect and treat an ilioinguinal neuroma in a young female presenting with persistent pain in the ilioinguinal/iliohypogastric nerve distribution.[8] An ultrasound examination revealed a swelling of the Ilioinguinal nerve, likely from trauma secondary to a Pfannenstiel incision. They further used the same imaging to inject the neuroma with 2 mL bupivacaine and steroid on 2 separate occasions. They reported significant reduction in patient discomfort following both injections. In 2016, Somashekar et al reported impressive findings related to the use of ultrasound for the diagnosis of brachial plexus neuromas in newborns with brachial plexus palsy.[9] In their study, ultrasound imaging correctly identified 21 of 25 cases of upper trunk and middle trunk neuroma involvement with an 84% sensitivity for each. These articles seem to support the notion that ultrasound is being used in novel ways not only to identify and diagnose, but also to provide safe, reliable imaging to direct needle guidance for treatment.

CASE PRESENTATION

A 29-year-old woman presented to the office-based surgical suite, physical status (PS)) class 2, with significant surgical history, including multiple breast reconstructions and mastectomy. She was currently taking opioid pain medication and occasional muscle relaxant medication to manage lingering left-sided, dull, achy chest wall pain that developed shortly after her previous breast implant surgery and subsequent removal. The removal of the implant was at the patient's behest owing to pain. However, the removal of the implants did not improve her pain.

The procedural plan included ultrasound-guided erector spinae blocks, and novel INTRAPEC injection, followed by general anesthesia with laryngeal mask airway (LMA). Following the initial discussion, explanation, and approval, the patient gave informed consent for the anesthetic and surgical procedures, including total revision of the breast reconstruction. She was escorted to the operating room table, positioned comfortably prone, sedated with 2 mg intravenous (IV) midazolam, had monitors placed, and received bilateral ultrasound-guided erector spinae blocks using a Terason 3300 paired with a linear probe (12L5; Terason-Teratech, Burlington, MA). The patient was then assisted into the supine position, preoxygenated, and had an uneventful general anesthesia induction and insertion of #3 LMA. A linear probe (12L5; Terason-Teratech) was covered and placed transverse over the anterior lateral chest in preparation for INTRAPEC injection. The right side was performed according to the original description by Kline, void of abnormal structures.[10] Upon obtaining required imaging for the left side, a notable separation between the pectoralis major and minor was seen. This separation was imaged using several orientations and determined not to be an artificial remnant from a previous surgery. The thoracoacromial artery was then identified by general characteristics and confirmed with the application of the color Doppler mode. The abnormality, which was identified as a separate and distinct entity, was then captured and stored digitally. This anomalous structure was identified as a possible neuroma of the pectoral nerve (Figure 1). The irregular finding was reviewed and discussed with the surgeon before incision. The surgeon planned to visualize the region following dissection and creation of the implant pocket.

Figure 1. Ultrasound image of the pectoral neuroma (shown by arrow).

During the dissection of the left pectoral intramuscular space between the pectoralis major and minor for implant pocket creation, the surgeon obtained direct exposure and visualized the suspected neuroma (Figure 2). The tissue anomaly was then carefully dissected to reveal a portion of the lateral and most of the medial pectoral nerve. The nerves were carefully stripped of tissue irregularities by the surgeon under direct visualization. The specimen was placed on a card and photographed along with the scar excision from previous left and right infra-mammary incisions, as was typical for this surgeon's technical protocol

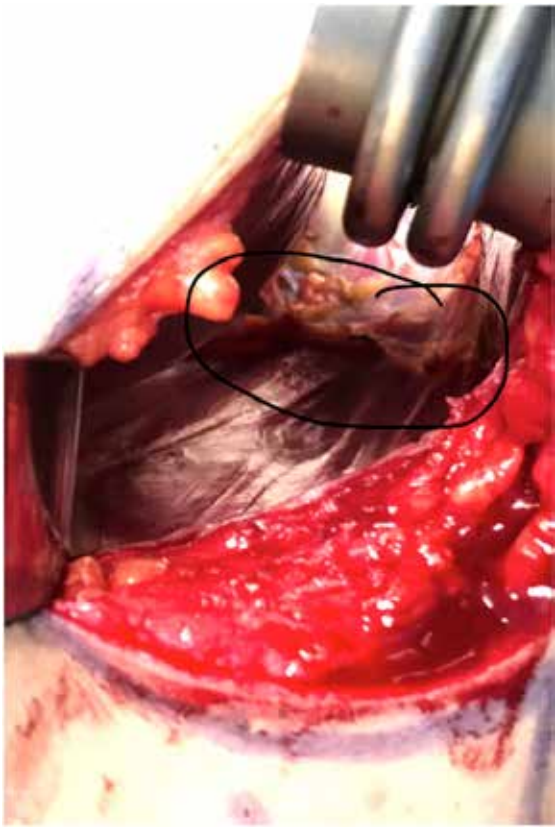

Figure 2. Intraoperative location and confirmation of ultrasound findings of pectoral nerve neuroma. The 2 muscles visible are the dark maroon-colored pectoralis major at the top left portion of the image and the pectoralis minor at the image's center. Note the circled region of tissue representing the large neuroma.

Figure 3. Photo of excised neuroma. The 2 large strings of tissue are from the scar revision caused by previous surgeries. The debulked neuroma tissue appears on the lower right of the card.

(Figure 3). The diagnosis was then confirmed to be neuroma by gross examination by the surgeon. During the case the patient received dexamethasone 10 mg in the block solutions and ketorolac 30 mg IV. Following an uneventful surgical completion of bilateral breast reconstruction and placement of bilateral breast implants, the patient emerged from general anesthesia and was brought to the recovery room where she stated that the chronic pain in her left upper chest wall region had significantly subsided.

DISCUSSION

This was, to our knowledge, the first reported preprocedural scan diagnosis of a pectoral neuroma by ultrasound that resulted in an alteration of the surgical plan and subsequent outcome. It is plausible that the surgical resection of the neuroma is responsible for the dramatic reduction in chronic pain, however there may factors that have influenced this outcome. It is possible, however, that the significant improvement in pain from this chronic irritation can be explained outside the reduction of the neuroma from the medial and lateral pectoral complex. The surgery itself could have disrupted a potential contracture caused by several surgical traumas and alterations in the subpectoral architecture. Alterations in the posterior breast capsule may also have played a role in pain reduction. The regional blockade itself was expected to play a role in postoperative as well as intraoperative pain control, contributing to the relief reported by the patient. The muscle spasm relief described with the INTRAPEC injection, and the IV ketorolac, as part of the multimodal treatment plan, could also have contributed to pain reduction. Although not noted during the injection, the local anesthetic could have contacted the medial and lateral pectoral nerves, also blocking pain from those nerves themselves, although the washing out of the pocket before implant placement would likely have reduced the clinical effect and certainly the duration of pain relief.

CONCLUSION

Ultrasound is a reliable, cost-effective, and safe imaging modality, embraced by many clinical professionals who aim to reduce pain. Its relevance to this case is unparalleled in utility as it provided the guidance required to safely place regional blockade and incidentally located a potential source of chronic pain. The painful neuroma located by this ultrasound scan, performed for an unrelated purpose, suggested that special attention be paid by the surgeon during the surgical course. In this case the abnormality identified by preprocedural ultrasound provided valuable insight to the cause of pain and was subsequently removed. This provided the patient with significant postoperative relief of a chronic pain condition.

REFERENCES

1. American Society of Plastic Surgeons website. http://www.plasticsurgery.org. Accessed March 26,2018.
2. Ivica D, Hesham M, Felder J, Fantus S. Nerve injuries in aesthetic breast surgery: systematic review and treatment options. *Aesthet Surg J*. 2014;34(6):841–856. doi: 10.1177/1090820X14536726.
3. Brummett C. Chronic pain following breast surgery. *Tech Reg Anesth Pain Manage*. 2011;15(3):124-132. https://doi.org/10.1053/j.trap.2011.07.001
4. Jones S, Bygrave CJ, Betts RP, Smith TW. Morton's neuroma: a sonographic-surgical evaluation. *Foot.* 1999;9(4):189-192. https://doi.org/10.1054/foot.1999.0562
5. Ernberg LA, Adler RS, Lane J. Ultrasound in the detection and treatment of a painful stump neuroma. *Skeletal Radiol.* 2003;32(5):306-309. https://doi.org/10.1007/s00256-002-0606-9
6. Chen PJ, Liang HW, Chang KV, Wang TG. Ultrasound-guided injection of steroid in multiple postamputation neuromas. *J Clin Ultrasound.* 2013;41(2):122-124. https://doi.org/10.1002/jcu.21885
7. Torres-Claramunt R, Ginés A, Pidemunt G, Puig L, de Zabala S. MRI and ultrasonography in Morton's neuroma: diagnostic accuracy and correlation. *Indian J Orthop.* 2012;46(3):321-325. https://doi.org/10.4103/0019-5413.96390
8. Currier A, Khayata I. Ultrasound as a modality for detection and treatment of an ilioinguinal neuroma. Anesthesiology and Perioperative Medicine Publications. University of Massachusetts Medical School. https://escholarship.umassmed.edu/anesthesiology_pubs/113?utm_source=escholarship.umassmed.edu%2Fanesthesiology_pubs%2F113&utm_medium=PDF&utm_campaign=PDFCoverPages. Published March 24, 2012. Accessed September 21, 2018.
9. Somashekar DK, Di Pietro MA, Joseph JR, Yang LJ, Parmar HA. Utility of ultrasound in noninvasive preoperative workup of neonatal brachial plexus palsy. *Pediatr Radiol*. 2016;46(5):695-703. https://doi.org/10.1007/s00247-015-3524-4
10. Kline J. Ultrasound guided INTRAPEC injection: a novel solution for surgical field improvement during electrocautery, implantation, and postoperative pain and muscle spasm reduction for breast surgery. *Anesthesia eJournal.* 2018 July;6. https://anesthesiaejournal.com/index.php/aej/article/view/87.