

# Single-shot lamina technique of paravertebral block as an adjunct to general anesthesia for modified radical mastectomy

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## Abstract

Thoracic paravertebral block can be employed as an alternative or an adjunct to general anesthesia (GA) for breast cancer surgery. There is no report of this new lamina technique for catheter placement in our environment. In low-resource settings, potent opioids are lacking and the extended postoperative analgesia it provides makes this regional block an invaluable addition to an anesthetist's armamentarium. We describe this single-shot, but titratable technique used as an adjunct to GA for modified radical mastectomy with axillary dissection for breast cancer. The total intraoperative opioid analgesic 50 mg pethidine was received at induction. The patient's vital signs remained stable throughout surgery that lasted 115 min. Pain score charted every 10 min in the postanesthesia care unit using the verbal rating scale was 0. The time to the first request for rescue analgesic was 18 h after surgery for which paracetamol 1 g was adequate.

**Key words:** Adjunct, anesthesia, breast surgery, paravertebral

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## Introduction

Modified radical mastectomy with axillary dissection is usually performed for breast cancer. This is the preferred treatment modality in many parts of the world, especially in low resource countries like Nigeria. A 10-year review of mastectomies in our center revealed a predominant use of general anesthesia (GA) (83%).<sup>[1]</sup> To the best of our knowledge, thoracic paravertebral block (TPVB) has not been used for breast cancer surgery in Nigeria despite its advantages such as improved quality of recovery, shortened postanesthesia care unit (PACU) stay, reduced postoperative pain, reduced opioid consumption and shorter period of hospitalization.<sup>[1-3]</sup> We describe the use of single-shot lamina technique of TPVB as an adjunct to GA for modified radical mastectomy with axillary dissection. Verbal consent was obtained from the patient for publication of this report.

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## Case Report

A 61-year-old female, trader, American Society of Anesthesiologist physical status 1, presented for modified radical mastectomy of the right breast with axillary clearance. A biopsy of the lump in her right breast revealed on histology an invasive ductal carcinoma, grade 2. A diagnosis of right breast carcinoma (TxNoMo) was made, hence the decision for surgical treatment.

She had a left nephrectomy for a renal tumor 4-year ago under GA, which was uneventful. Hematological and serum biochemistry laboratory results were normal. Chest X-ray and electrocardiogram were normal. She weighed 60 kg and was 160 cm tall. Patient was counseled for

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GA with a right TPVB and consent was obtained for the procedure. The patient was instructed on the verbal rating scale (VRS) in vernacular (Yoruba language) validated by Soyannwo *et al.* as the pain assessment tool; 0 = no pain (ko si irora), 1 = mild pain (irora die), 2 = discomforting pain (irora ti o nini lara), 3 = distressing pain (irora ti o bani lokan je), 4 = horrible pain (irora ti o ga), 5 = excruciating pain (irora ti o koja ifarada).<sup>[4]</sup>

In the operating room, intravenous (IV) access was established with an 18G cannula on the left arm and 500 ml of normal saline solution setup. Monitoring consisted of noninvasive blood pressure, electrocardiography, pulse oximetry and the heart rate using the Classic-120 Multiparameter® monitor (Health-Care Equipment and Supplies Co. Ltd, Egham, Surrey, UK). The patient's baseline vital signs were a heart rate of 86 bpm, blood pressure 130/70 mmHg and arterial oxygen saturation (SaO<sub>2</sub>) of 98% breathing room air. Premedication consisted of dexamethasone 4 mg IV as per our protocol for antiemetic prophylaxis.

A right TPVB using the lamina technique described by Jüttner *et al.* was performed.<sup>[3]</sup> The patient was placed in a sitting position on the trolley and C7-T6 vertebral spinous processes were palpated and marked. The scapular spine was palpated and identified as a landmark for T3 vertebral spinous process, 1.5 cm from the midline on the right side was marked as the needle entry point. Skin preparation was done with 10% povidone iodine solution and draped. This injection site was infiltrated with 2-3 ml 2% lidocaine with 1:200,000 epinephrine and an 18G Tuohy needle (Perifix, B. Braun, Melsungen, Germany) was inserted and advanced in a paramedian sagittal plane at 45° to the skin in the cranial direction until contact was made with the vertebral lamina at a depth of 5 cm. After negative aspiration of air, cerebrospinal fluid or blood, 6 ml 2% lidocaine with 1:200,000 epinephrine was injected, followed by the insertion of 20G catheter (Perifix, B. Braun, Melsungen, Germany) 3.0 cm beyond the needle tip. After securing the catheter, 5 ml 2% lidocaine with 1:200,000 epinephrine was administered as a test dose while monitoring the patient's pulse rate, blood pressure and consciousness to exclude epidural or subarachnoid injection or pneumothorax. Thereafter, 20 ml 0.5% isobaric bupivacaine with 1:400,000 epinephrine was injected over 20 min in aliquots of 5 ml every 5 min. We did not wait to test the block because the anesthetists and surgeon had decided to use TPVB as an adjunct to GA, and waiting would have made the patient unduly anxious. The patient was then transferred to the operating table and placed supine.

General anesthesia was induced with IV pethidine 50 mg and sodium thiopental 250 mg, and tracheal intubation was facilitated by pancuronium 8 mg. Anesthesia was maintained with isoflurane 1.0-1.5% in oxygen and

mechanical ventilation. The patient's vital signs remained stable throughout surgery with pulse rate of 78-86 bpm, and blood pressure of 118/70-136/87 mmHg. Surgery lasted for 115 min. Blood loss was 160 ml. Fluid given intraoperatively was 950 ml of normal saline.

At the completion of surgery, residual neuromuscular blockade was reversed with neostigmine 2.5 mg and glycopyrrolate 0.4 mg. The patient recovered fully from anesthesia and was transferred to the PACU for observation for 1-h. Pain score charted every 10 min in the PACU using the VRS was 0. Her vital signs were blood pressure 128/82, pulse rate 86 bpm, respiratory rate 18 breaths/min and SaO<sub>2</sub> 100% on 3 l/min oxygen through nasal prongs. The paravertebral catheter was removed just before she was transferred from PACU to the ward. The time to the first request of analgesia on the ward was 18 h after surgery, specifically to treat a sore back for which IV paracetamol 1 g was administered. The VRS charted at 2 h, 4 h, 6 h, 8 h and 12 h was 0; 1 at 24 h, 36 h, 48 h, 60 h and 0 at 72 h. The patient described the anesthesia and pain control as completely satisfactory. She was discharged home on the 8<sup>th</sup> day.

## Discussion

This case report demonstrates the safety and adequacy of a single-shot preincisional paravertebral lamina technique as an adjunct to GA for radical mastectomy with axillary dissection for breast cancer. This technique was first described by Pfeiffer *et al.* in 2006 and modified 4-year later by Jüttner *et al.* as highly effective, easy to adopt and much safer than the classic landmark technique.<sup>[3,5]</sup>

Studies have established that TPVB alone is adequate for surgical procedures of the breast, and deep sedation can suffice for patient comfort.<sup>[6-8]</sup> However, in this case report, the surgeon expressed preference for GA; which is understandable since we had no prior experience with TPVB in our center. Intercostal nerves block combined with the blockade of the supraclavicular branches of the superficial cervical plexus was reported at Ilorin for simple mastectomy in two patients with advanced breast cancer and significant pulmonary compromise.<sup>[9]</sup> They reported multi-level blocks (T2-T7), infraclavicular and subcutaneous injections; apart from being more labor-intensive, their time to the first request for rescue analgesic was 5 h. Our time of 18 h following single-shot TPVB is consistent with improved and extended analgesia earlier described whose mechanism remains unclear.<sup>[7,10,11]</sup> Since the duration exceeds that of any known local anesthetic agent, one postulate is the effect of local anesthetic-induced sympathectomy on postoperative pain.<sup>[12,13]</sup> Not only was paracetamol adequate for postoperative pain control, the patient was spared opioid-related side effects such as nausea, vomiting, sedation, constipation, and respiratory depression.

Our patient did not receive an additional opioid analgesic after intubation and the fact that her physiological parameters such as heart rate and blood pressure remained normal indicate adequate intraoperative pain relief. This finding is important in our practice environment where potent opioids such as alfentanil, sufentanil, remifentanil are unavailable and the supply of fentanyl, morphine and pethidine are erratic. There is no doubt that TPVB would be an invaluable addition to the armamentarium of anesthetists in Nigeria.

The technique of TPVB involves injecting local anesthetic agent adjacent to the thoracic vertebrae to soak the spinal nerves as they emerge from the intervertebral foramina. This produces an ipsilateral somatic and sympathetic nerve blockade at the injection site as well as multiple contiguous thoracic dermatomes above and below it.<sup>[14,15]</sup> They cause less cardio respiratory side-effects, especially when administered for unilateral surgical procedures.<sup>[3,16]</sup> The classic landmark technique with more lateral needle entry point from the midline is associated with considerable rates of accidental pleural puncture and pneumothorax, whereas the lamina approach is as effective, but safer.<sup>[3,5]</sup> We did not encounter any difficulty threading 20G epidural catheter after making contact with the vertebral lamina of T3 contrary to Jüttner *et al.* suggestion that a large caliber catheter was probably better.<sup>[3]</sup> Secondly, our local anesthetic volume of 25 ml provided sufficient cranio-caudal spread and a larger volume might engender more risk of toxicity. Our test case did not experience complications either due to needle puncture or the local anesthetic agent, such as, vascular puncture, intravascular injection, pleural puncture, paresthesia, pneumothorax, epidural spread and systemic toxicity.

We conclude that single-shot lamina technique TPVB may be an effective adjuvant to GA and the extended postoperative analgesia produced can be invaluable in patients scheduled for breast cancer surgery, especially in low resource hospitals. We thus encourage its use by anesthetists

in order to obtain additional data to demonstrate its effectiveness or otherwise in our environment.

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