
CASE REPORT

Local Anesthetic Systemic Toxicity After Thoracal Paravertebral, Pectoralis I, and Serratus Anterior Plane Block in Modified Radical Mastectomy

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ABSTRACT

Background: Breast cancer is the most common cancer in woman worldwide. Local Anaesthetic Systemic Toxicity (LAST) is one of the complication in Anesthetic block technique for modified radical mastectomy. Local anesthetic systemic toxicity is rare, but once a LAST occurs, it can be fatal, even if the patient is left untreated. Because of the potential dangers that occur as a result of LAST, an anesthesiologist must understand the mechanism of LAST and good management in handling LAST. Thoracal Paravertebral, Pectoralis I, and Serratus Anterior Plane Block offers complete unilateral block and has long term analgesic effect can be used as an anesthetic technique in Modified Radical Mastectomy.

Case Illustration: A 39-year old woman with invasive ductal carcinoma underwent modified radical mastectomy with multiple injection Thoracic paravertebral block (TPVB), Pectoralis 1 (PECS 1), and Serratus Anterior Plane (SAP) Block as a sole anesthesia regiment for this surgery. First anesthetic Peripheral Nerve Block (PNB) is TPVB followed by SAP Block than PECS 1 block. LAST symptom was shown suddenly after the PECS 1 Local Anesthetic (LA) block injection. Previously, repeated aspiration was performed before administering the drug with no blood results. We give Lipid solution to treat the symptom of LAST and the seizure stops within 30 seconds. During surgery, the patient was sedated with titrated dexmedetomidine. Hemodynamic was stable during intraoperative phase. The postoperative pain level is low and there was no complication such as pulmonary and neurological complications.

Conclusion: LAST can be performed after Anesthesia block technique. Thoracic paravertebral block, Pectoralis I, and Serratus Anterior Plane Block are enough to covered anesthetic and pain management in modified radical mastectomy.

Keywords : Block anesthesia technique; Complication; LAST.

INTRODUCTION

There are two kind of anesthetic technique that are General and Regional. One of the regional technique is Peripheral Nerve Block. The best anesthetic technique for thoracic surgery, chest wall and breast surgery or pain management for rib fracture is Thoracic Paravertebral Block (TPVB). Ultrasound (USG) guidance is used to help identify the paravertebral space (PVS) and placement of block needles to see local anesthetic distribution. The technique is used to increase success rate and safety of the technique¹.

Local anesthetic systemic toxicity (LAST) is a life threatening adverse event associated with the increasingly prevalent utilization of local anesthetic (LA) techniques throughout various health care settings, with an incidence currently estimated to be 0.03%, or 0.27 episodes per 1,000 peripheral nerve blocks². This study to identify potential risk factors of local anesthetic and to treat the emerge of LAST by quickly identified the symptom and update on the use of Intravenous Lipid Emulsion (ILE).

CASE ILLUSTRATION

A 39-year old woman with a diagnosis of invasive ductal carcinoma

was hospitalized due to Modified Radical Mastectomy surgery (MRM).



Figure 1. Patient with invasive ductal carcinoma

Preoperative examination show that patient was diagnosed as an ASA 2 with malignancy. Physical status are clear, no difficult airway dan no problem in blood coagulation.

The patient was planned to undergo surgery under regional anesthesia using multiple injection TPVB, PECS 1 and SAP Block as a sole anesthesia regiment to cover the surgical incision area. The anesthetic plan was communicated with the patient and family, and informed consent was obtained at the preoperative visit and the patient fasted 8 hours before the scheduled surgery.

On the day of surgery, patient's preparation in the operating room includes the installation of standard monitors, tools and materials for peripheral nerve blocks to general anesthesia with intubation and emergency drugs including lipid emulsions for the management of LAST.

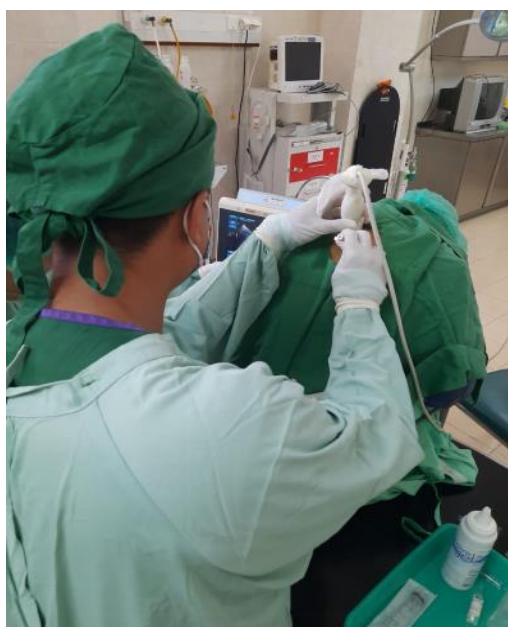


Figure 2. Patient positioning sitting during TPVB procedure

The patient was positioned sitting when performed TPVB and supine when performed PECS I and SAP Block, puncture was performed under ultrasound guidance using a sterile (7-13 MHz) linear transducer. The ultrasound probe is placed in a transverse position to obtain an image of the spinous process at the desired vertebral height. Then the probe is placed in longitudinal position to obtain

a parasagittal view and moved laterally to visualize the transverse process, which appears as a hypoechoic image with an acoustic shadow underneath.



Figure 3. Visualization guiding usg in TPVB Block

LAST shown after the PECS 1 local anesthetic regimen injected. Previously, repeated aspiration was performed before administering the drug with no blood results. When TPVB and SAP local anesthetic was give, there was no LAST symptom. We give Lipid solution when the seizure stops within 30 seconds. During surgery, the patient was sedated with titrated dexmedetomidine. The duration of surgery was 2 hours. Hemodynamic was stable during intraoperative phase without pain. The postoperative pain level is low and there was no complication such

as pulmonary and neurological complications. For postoperative pain, the patient received paracetamol 1 gram intravenously. Pain evaluation was carried out at 2 and 12 and 24 hours, with NRS values 3, 2, 2 at the corresponding hours. The patient was then discharged 48 hours postoperatively.

DISCUSSION

In women, breast cancer takes first the most common malignant neoplasms. This surgery procedures are characterized by moderate and severe pain³.

The TPVB is defined as the gold standard analgesic method for breast surgeries. In the last decade, various ultrasound (US) guided thoracic wall blocks TPVB, PECS I, PECS II nerve block, modified PECS II block, serratus plane block (SPB) have been developed to provide reliable analgesia in patients undergoing breast surgery³.

SAP block is easier to perform than TPVB with lesser chances of complications and results in faster onset. TPVB and SAP group provide equivalent analgesia in patients undergoing mastectomies. PECS I block is inferior to TPVB and SAP block in providing analgesia for breast surgeries⁴.

Recently ultrasound guided (USG), less invasive thoracic wall interfascial plane blocks have been described as an alternative to paravertebral block⁴. After conduct of the block, spread of local anesthetic was seen with help of US and area of the sensory blockade was marked. The onset to block was noted for both sensations by evaluating after every 1 min of the block⁴. With the development of ultrasound technology, peripheral nerve blocks are widely used in perioperative analgesia⁵.

Reportedly, the incidence of local anesthetic systemic toxicity (LAST) in peripheral nerve blocks is about 0.03% (Gitman M, et al., 2018). TPVB is the injection of local anesthetics into the thoracic paravertebral space⁵.

Central nervous system (CNS) symptoms often precede the cardiovascular system when the patient has local anesthetic intoxication. This is because the CNS is more sensitive to local anesthetics. And seizure is the most common symptom of the CNS. Another special feature was that our patient experienced seizure symptoms 30 minutes after TPVB instead of immediately. This suggested the bupivacaine was not injected directly into the blood, but slowly absorbed

into the blood attributed to the puncture of the blood vessel during the puncture process, and eventually the plasma concentration reached the threshold toxicity 30 minutes after the injection of bupivacaine⁵. Prevention should be the priority for reducing the frequency and severity of LAST. No single intervention eliminates the risk, and therefore, prevention is a multifactorial process².

Ultrasound has been shown to reduce the risk of LAST by 60%–65% as compared to peripheral nervous stimulation alone. There are several explanations for this risk reduction. Increased accuracy of delivery permits reduction in volume and, therefore, dose of LA; the incidence of vascular puncture may be reduced; and visual cues signaling intravascular injection allow termination of injection before a significant dose is delivered².

Restricting the drug dosage may contribute to LAST risk reduction. Inject volume of LA <5 ml and pausing 30-45 second every injection and gently aspiration before in every injection².

All patients receiving injections of LA in doses sufficient to cause LAST should have oxygen, standard monitoring, and intravenous access

applied. Monitoring should continue for at least 30 minutes after completion of injection, as delayed presentations are increasingly occurring².

First, stop LA injection and call for help. The immediate priority is to manage the airway, breathing, and circulation². Convergence of the different administration regimes between the American Society of Regional Anesthesia and Pain Medicine and the Association of Anesthetists of Great Britain and Ireland guidance has led to increased consistency in therapeutic protocols. An initial bolus of 100 mL should be administered over 2–3 minutes (1.5 mL/kg if the lean body weight is <70 kg). This is then to be followed by a 20% lipid emulsion infusion of 200–250 mL over 15–20 minutes (0.25 mL·kg⁻¹/min if the lean body weight is <70 kg). . If circulatory stability is not attained, rebolusing up to two further times or increasing the infusion to 0.5 mL/kg/min is suggested. The maximum recommended dose of 20% lipid emulsion is 12 mL/kg².

CONCLUSION

Local Anaesthetic Systemic Toxicity is a life-threatening adverse event, and recent advances in understanding the pathophysiological

basis of the condition and its therapy will improve patient safety. It is imperative that practitioners who use LA in their clinical practice are cognizant of the mechanisms, risk factors, prevention, and therapeutic modalities. Surgery can be performed safely after LAST event if hemodynamic stable after treatment and tight supervised during surgery.

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