Case Report

Regional Anesthesia for Modified Radical Mastectomy in an Elderly Patient with Atrial Fibrillation: A Case Report

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Breast cancer is the most common invasive cancer in women, and surgical excision under general anesthesia (GA) is the mainstay of treatment. An 81-year-old woman (weight: 43 kg; height: 159 cm; body mass index: 17 kg/m^2) who was diagnosed with breast cancer (tumor size: 4 cm) was scheduled to undergo modified radical mastectomy. Her preoperative electrocardiogram showed paroxysmal atrial fibrillation with rapid ventricular response. As increased levels of sympathetic activity have long been considered detrimental to patients with cardiovascular disease, direct laryngoscopy for tracheal intubation and surgical stimulation could entail the risk of sympatho-excitation, which may be unfavorable for this elderly patient. Therefore, we decided to perform regional anesthesia through incorporating modified pectoral nerve II (Pecs II) block and pecto-intercostal fascia block (PIFB) with propofol sedation for breast surgery. The operation was performed smoothly, and 40 mg of parecoxib was intravenously administered for postoperative analgesia. No perioperative complications associated with nerve block were observed. Postoperatively, the visual analog scale pain score in the post-anesthetic care unit and ward (postoperative day 1) was reported to be 1 – 2. The patient was discharged from the hospital without complications. This case report described the successful use of a modified Pecs II block and PIFB in an elderly patient with atrial fibrillation who underwent breast surgery. Our findings showed that thoracic interfascial nerve block (i.e., modified Pecs II block and PIFB) with intraoperative sedation may be an encouraging alternative to general anesthesia (GA) in cases in which GA is undesirable.

Key words: Pecs II block, pecto-intercostal fascial block, thoracic interfascial nerve block, breast surgery

Introduction

Among invasive cancers in women, breast cancer is the most common cancer, and

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Received: September 19, 2018 Accepted: March 6, 2019
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surgical excision under general anesthesia (GA) is the mainstay of treatment. However, sympathetic responses to tracheal intubation and surgical stimulation may be detrimental to patients with cardiovascular disease. In current literature, several new interfascial injection techniques have been reported to provide surgical anesthesia and analgesia for chest wall surgery.[1] Herein, we describe a novel technique of the combination of modified pectoral nerve II (Pecs II) block and pecto-intercostal fascial block (PIFB) in a patient with atrial fibrillation (AF) who underwent breast surgery, with better outcomes obtained in terms of avoiding complications associated with GA.

Case Report

An 81-year-old woman (weight: 43 kg; height: 159 cm; body mass index: 17 kg/m^2) who was diagnosed with breast cancer (tumor size: 4 cm) was scheduled to undergo modified radical mastectomy. She had a history of hypertension and elevated liver enzyme levels. Her preoperative electrocardiogram (ECG) showed sinus rhythm with ventricular premature contraction. Echocardiography revealed a left ventricular ejection fraction of 76% and moderate mitral regurgitation. Her daily physical activity was more than 4 metabolic equivalents of tasks. In the operating room, routine monitors, including ECG, pulse oximetry, body temperature, end-tidal CO_2, and noninvasive blood pressure, were used. After these monitors were applied, ECG showed paroxysmal AF with rapid ventricular response. Direct laryngoscopy for tracheal intubation and surgery could entail the risk of sympatho-excitation, which may be unfavorable for this elderly patient. Therefore, we decided to perform regional anesthesia.

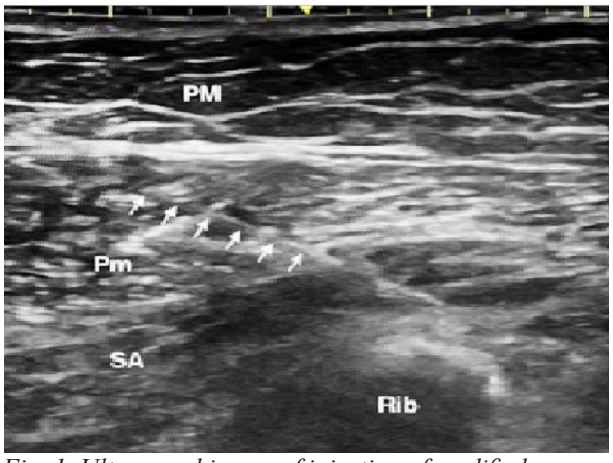

Fig. 1 Ultrasound image of injection of modified pectoral nerve II . PM: pectoralis major; Pm: pectoralis minor; SA: serratus anterior muscle, and third rib are demonstrated. Local anesthetics were injected underneath the Pm. Arrows: needle.

Before regional anesthesia, the patient received analgesia with 50 μg of fentanyl and sedation with propofol (1% Fresfol, Fresenius Kabi GmbH, Graz, Austria) administered intravenously using a target-controlled infusion pump based on Schneider's pharmacokinetic model (Injectomat TIVA Agilia; Fresenius Kabi GmbH). Propofol infusion was started with an initial effect-site concentration of 2 μg/mL and increased by 0.5 μg/mL every 30 s until the patient exhibited no response to verbal command but was still with spontaneous breathing. Supplemental oxygen (6 L/min) was administered through a facemask. Under strict aseptic conditions, a modified Pecs II block (Fig. 1)[2] followed by PIFB (Fig. 2)[3] was conducted using a GE LOGIQ E portable ultrasound machine (GE Healthcare, Milwaukee, WI, USA). In this patient, Pecs I block was not performed. Instead, a modified Pecs II block, which comprises only injecting a local anesthetic between the pectoralis minor (Pm) and serratus anterior muscles (SAM), was performed at the site of surgery. In brief, an ultrasound probe was positioned at the midclavicular level inferolaterally to trace the axillary artery and vein and then moved laterally until the Pm and SAM were identified at the level of the third or fourth rib. After skin infiltration with 2% lidocaine, the needle was advanced in the plane of the probe until it lay in the potential space between the Pm and SAM. A total of 20 mL of local anesthetics (5 mL 1% ropivacaine + 5 mL 2% lidocaine with 1:200,000 adrenaline diluted with normal sa-

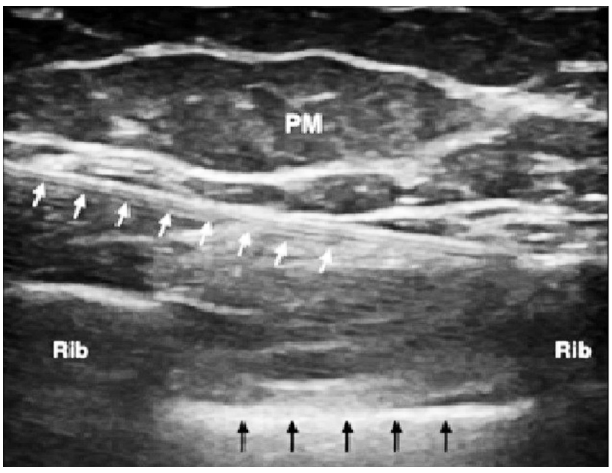

Fig. 2 Ultrasound image of pecto-intercostal fascial block. Pectoralis major (PM) and the third and fourth costal cartilages are demonstrated. The needle (white arrows) was advanced in the cephalad direction while injecting local anesthetics underneath the PM starting from the fourth costal cartilage level. Black arrows: pleura.

line) was deposited in this space.

To perform PIFB, 20 mL of the same local anesthetic mixture was instilled between the pectoralis major (PM) muscle and the external intercostal muscle as previously described.[3] After accomplishment of modified Pecs II block and PIFB, adequacy of anesthesia was verified by sonographic confirmation of local anesthetic spread without conventional dermatomal testing. Preoperatively, 50 μg of fentanyl was intravenously administered, and propofol sedation was used throughout the procedure. The operation was performed smoothly (Fig. 3), and 40 mg of parecoxib was intravenously administered for postoperative analgesia. No perioperative complications associated with nerve block were observed. Postoperatively, the visual analog scale pain score in the post-anesthetic care unit and ward (postoperative day 1) was reported to be 1 – 2. The patient was discharged from the hospital without complictions.

Discussion

AF is the most commonly sustained arrhythmia encountered in clinical practice. Most studies appear to suggest that AF is related to increased mortality. This increase in mortality is speculated to be attributable to the cardiovascular conditions associated with AF. Nevertheless, AF per se was reported to be associated with a 1.5- to 1.9-fold increase in mortality risk, even after modifying for preexisting cardiovascular conditions associated with AF.[4] Meanwhile, a previous study reported that AF is associated with an increase in sympathetic nerve activity.[5] Increased levels of sympathetic activity have long been considered detrimental, particularly in patients with left ventricular dysfunction. In patients with AF who underwent surgery, sympatho-excitation from tracheal intubation and surgical stimulation should be avoided.

The expanding use of ultrasonography to identify fascial layers has led to the development of several new interfascial injection techniques for analgesia of the chest wall. The Pecs I block was intended to anesthetize the medial and lateral pectoral nerves after injection of local anesthetics in the fascial plane between the PM and Pm muscles.[6] In contrast, the Pecs II block, which is an extension of Pecs I block, requires a second injection in the plane between the Pm and SAM to offer blockade of the upper intercostal nerves.[2] The Pecs II block can block the pectoral, intercostobrachial, intercostals III–VI, and long thoracic nerves. A previous study reported that Pecs II block may provide superior postoperative analgesia in comparison to thoracic paravertebral block (TPVB) in patients undergoing modified radical mastectomy.[7] Because the Pecs II technique theoretically blocks the lateral cutaneous branch of the intercostal nerve but not the anterior cutaneous branch, PIFB3 was added to the anesthetic technique for more complete coverage of the entire anterior chest wall in the current report.

Briefly, the Pec II block includes injection of local anesthetics in the fascial plane between the PM and Pm muscles (also known as Pecs

Fig. 3 Operation field after modified radical mastectomy.

I block) and second injection in the plane between the Pm and SAM. In contrast, the modified Pec II block in current report comprises only injecting a local anesthetic between the Pm and SAM. The maximum recommended dose of ropivacaine is 3 mg kg^{-1}, which means that the patient with weight 50 kg should have been given 15 ml of 1% ropivacaine as a maximum. The Pecs I block mainly causes motor blockade;[8] therefore, our adaptation was exclusion of the Pecs I block to avoid unnecessary use of local anesthetics and its potential complications.

A previous study demonstrated that up to 68.8% of patients (i.e., 11/16) required low-dose intraoperative opioid analgesia for the TPVB/Pecs II technique to provide surgical anesthesia for breast surgery.[9] Another study reported the demand for intraoperative opioid analgesics in 24.2% of patients during breast surgery after multilevel paravertebral blocks with propofol sedation.[10] Although our anesthetic technique provided successful surgical anesthesia for breast surgery under propofol sedation, we suggest that some patients require fentanyl for intraoperative analgesia. If major hemodynamic reactions (i.e., increased heart rate or mean arterial pressure over 20% compared to the pre-incisional values) or gross purposeful muscular movements occur intraoperatively, the regional anesthetic technique should be converted to GA. In addition, there is a possibility that tissue infiltrated with large volume of local anesthetics may affecte the tissue dissection or use of electrosurgical units in our patient. Although the surgeon did not complain of technique difficulty during surgery, the surgeon's satisfaction score with this anesthetic technique should be evaluated in a large-scale study.

In conclusion, this case report showed that thoracic interfascial nerve block (i.e., modified Pecs II block and PIFB) with intraoperative sedation may be an encouraging alternative to GA when GA is undesirable.

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