ABSTRACT

Breast surgery operations are generally performed by general anesthesia. In order to decrease postoperative pain, regional anesthesia is usually combined with general anesthesia. Pectoral nerve blocks is a novel technique to provide perioperative and postoperative pain control for patients underwent breast surgery. We performed pectoral nerve block I and pectoral nerve block II as a sole anesthetic technique with sedation by dexmedetomidine for modified radical mastectomy, for a 75-year-old female patient with multiple diseases. Pectoral nerve blocks with sedation could be a good technique for breast surgery than general anesthesia in comorbid patients.

Case Report. A 75-year-old female (height 160 cm, weight 102 kg and American Society of Anesthesiologists [ASA] was III) diagnosed with invasive ductal carcinoma was due to undergo a right side modified radical mastectomy with axillary lymph node dissection at the Hacettepe University Medical Faculty Hospital, Ankara, Turkey. She had type II diabetes mellitus, hypertension, atrial fibrillation, coronary artery disease, congestive heart failure with an ejection fraction (EF) of 40%, and moderate chronic obstructive pulmonary disease. She also had a cardiac resynchronization therapy defibrillator (CRT-D) device implanted when she was 66 years old.

Clinical findings. Monitoring with pulse oximetry, electrocardiography, and non-invasive blood pressure tests revealed that she had a baseline heart rate of 96 beats/min, blood pressure of 140/85 mmHg, and an
oxygen saturation of 89% upon arrival to the operating theatre (Table 1).

As she had various comorbidities, we were reluctant to administer GA and decided to instead administer PECs I and II blocks combined with sedation.

**Diagnostic assessment.** In this case; to identify the muscle groups, ribs, and to visualize the needle placement and the local anesthetic spread an ultrasound has been used.

**Therapeutic intervention.** Supplemental oxygen was administered by nasal oxygen at 4 l/min following a premedication of 1.5 mg of intravenous midazolam was given. We subsequently induced a loading dose of dexmedetomidine (1µg/kg over 10 minutes), followed by 0.2 µg/kg/hour as a maintenance dose for sedation.

When a score of 5 had been achieved on the Ramsey sedation scale, the right chest wall and the right axillary region were cleaned using iodine. A high frequency (4-12 MHz) linear probe (GE Healthcare, USA) was placed inferior to the right clavicle to identify the pectoral muscles with axillary vessels; the probe was moved caudally to identify the 3rd and 4th ribs and

**Table 1 - Timeline of medical history, vital signs, evaluations and interventions.**

| Dates       | Medical history                                                                 |
|-------------|---------------------------------------------------------------------------------|
| 2000        | Diagnosed as hypertension, diabetic mellitus and coronary artery disease        |
| 2010        | VVI pacemaker implantation                                                       |
| 2015        | Congestive heart failure                                                        |
|             | CRT-D device placement (left chest wall)                                        |
|             | Diagnosed as moderate chronic obstructive pulmonary disease, discharged with    |
|             | home type oxygen concentrator                                                     |
| August 2018 | Right breast mass                                                                |
|             | Tru cut biopsy                                                                   |
| September 2018 | Invasive ductal carcinoma grade 3                                                |
| October 2018 | FDG-PET CT: Metastasis in abdominal and sacral region                             |
| January 2019 | Neoadjuvant chemotherapy: Letrozole                                               |
|             | Preparations for modified radical mastectomy                                      |

| Dates       | Summary from initial and follow up visits                                         |
|-------------|----------------------------------------------------------------------------------|
| 31/1/2019   | Preoperation for surgery                                                         |
| 1/2/2019 (08:30-08:40 a.m.) | Preparation and monitoring the patient for operation in operation theatre         |
| 1/2/2019 (08:50 a.m)    | Preparation for Pec I and II Blocks. Right chest wall and axillary region cleaned |
| 1/2/2019 (08:50-09:00 a.m.) | Screening the right chest wall by ultrasound                                   |
| 1/2/2019 (09:01 a.m.)   | Identification the 3rd and 4th rib                                              |
| 1/2/2019 (09:04 a.m.)   | Pec II performed                                                                 |
| 1/2/2019 (09:25 a.m.)   | Evaluation sensory block by cold test                                             |
| 1/2/2019 (09:35 a.m.)   | Surgery started                                                                  |
| 1/2/2019 (11:00 a.m.)   | Patient felt pain by the placement of the drains                                 |
| 1/2/2019 (11:25 a.m.)   | The surgery was completed                                                         |
| 1/2/2019 (11:35 a.m.)   | The patient had no PONV, VAS was 2                                               |
| 1/2/2019 (12:30 p.m.)   | Transferred to PACU                                                              |
| 1/2/2019 (12:40 p.m.)   | VAS was 2, vital signs were stabil                                               |
| 1/2/2019 (02:35 p.m.)   | VAS was 6                                                                         |
| 2/2/2019        | Transferred to ward                                                              |
| 5/2/2019        | Discharged from hospital                                                         |

**Interventions**

- nasal oxygen 4 l/min
- 1.5 IV midazolam
- loading dose dexmedetomidine 1µg/kg
- maintenance dose dexmedetomidine 0.2µg/kg/h
- skin infiltration by 1 ml (20% prilocaine)
- Injecting 20 ml (5% bupivacaine)
- Injecting 10 ml (5% bupivacaine)
- Patient felt pain by the placement of the drains
- The surgery was completed
- The patient had no PONV, VAS was 2
- Transferred to PACU
- VAS was 2, vital signs were stable
- VAS was 6
- Transferred to ward
- Discharged from hospital

**CRT-D - cardiac resynchronization therapy defibrillator, FDG-PET CT - Positron Emission tomography, CBC - complete blood count, ECHO - echocardiogram, CXR - chest xray, ECG - electrocardiogram, BP - non invasive blood pressure, HR - heart rate, Spo2 - peripheral capillary oxygen saturation, PONV - post operative nausea and vomiting, VAS - visual analog scale, PACU - post-anesthesia care unit**

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after the oblique rotation of the probe, the skin was infiltrated with 2% prilocaine (Figure 1). Initially, the PECs II block was performed using a 10 mm 22G regional block (UniPlex, PAJUNK, Germany) needle, which was inserted using the in-plane technique into the tissue between the serratus anterior muscle and the pectoralis minor muscle. A total of 20 ml of a local anesthetic agent (bupivacaine 0.5%) was injected (Figure 2). To administer the PECs I block, the needle was withdrawn and subsequently inserted between the pectoralis major and minor muscles, and 10 ml of the local anesthetic (bupivacaine 0.5%) was injected between these 2 muscles (Figure 3). The whole procedure took approximately 10 minutes. Twenty minutes after performing the block, a cold test was used to evaluate the effectiveness of the sensory block. Surgery proceeded after a further 10 minutes. She was draped in the standard sterile manner. An elliptical incision was made, and the flaps were dissected laterally from the latissimus muscle superiorly to the clavicle. The breast was dissected from the pectoralis major muscle. The interpectoral lymph nodes and fat were removed along with the specimen.

Following the axillary dissection, the en bloc resection technique was applied to remove the axillary lymph nodes and adipose tissue. The long thoracic and thoracodorsal nerves were identified and were carefully preserved. While the 2 surgical drains were being placed, she felt pain, and an additional 100 mg of prilocaine was administered to the site where the drains were located. The whole operating time was 110 minutes and 34 x 32 x 6 cm (2830 g) of breast tissue was excised. She was hemodynamically stable throughout the surgery.

**Follow-up and outcomes.** During the postoperative period, the vital signs were stable; there was no postoperative nausea and vomiting (PONV) with no additional need for analgesics. The visual analogue score (VAS) was 2. Analgesia was required for the first time 6 hours after the surgery had begun. She was discharged after 5 days without complications.
Discussion. Pectoral nerve blocks are a well known technique, similar to thoracic paravertebral and thoracic epidural blocks, that provide analgesia for patients undergoing breast cancer surgery. The thoracic paravertebral block is still recognized as the gold standard analgesic procedure for breast surgery. However, there can be consequential complications such as unintentional vascular injection, hypotension, intrathecal spread, epidural hematoma and nerve damage, which makes this procedure unsuitable for ambulatory breast surgery. Compared to other regional anesthetic techniques, the PECs blocks can be performed in the supine position, away from vital organs such as the spinal cord and pleura. If the patient is under GA, these blocks are easy, comfortable, and less complicated.

The medial and lateral branches of pectoral nerves are anesthetizes by PECs I block that innervate these 2 muscles. The PECs I technique provides analgesia to pectoral muscles and is mainly used in breast expander and subpectoral breast prostheses operations. The PECs II block anesthetizes the thoracodorsal and long thoracic nerve, as well as the lateral branches of the intercostal nerves from T2-T6. In addition to the region under the pectoralis minor muscle, PECs II also provides analgesia to mammary glands and the skin from the T2-T6 dermatomes extending into the mid-axillary line by blocking the lateral intercostal nerves.

Under extreme circumstances, a PECs block can be performed to provide postoperative analgesia under GA. In a recent study, GA without a PECs block and GA with a PECs block was compared. They found that the patients with a PECs block had less nausea, vomiting, and pain. Fewer patients have had PECs blocks as the sole anesthetic technique. Moon et al. reported a successful breast surgery performed under PECs I and II blocks when a patient refused GA. Hong et al. reported on a pregnant women who refused GA for breast surgery.

Campos et al. reported that a patient with several comorbidities and a high surgical risk, underwent a PECs II block as the exclusive anesthetic technique, similar to our patient. In the absence of visceral pain throughout the thoracic wall surgery, this block may be an effective and adequate option instead of GA. Our patient had an excellent anesthesia period; we only used local anesthesia for drain incision at the end of the procedure.

The main reason for selecting dexmedetomidine for sedation is that dexmedetomidine provides sedation without respiratory depression. However, bradycardia and hypotension are common side effects of dexmedetomidine. During the procedure, the patient was hemodynamically stable without any bradycardia or hypotension. We started the induction of dexmedetomidine with a loading dose (1 µg/kg over 10 minutes), followed by 0.2 µg/kg/hour as a maintenance dose to maintain sedation without delayed recovery.

The potential benefits of RA and analgesia on long-term oncological outcomes are exciting. Regional anesthesia may reduce cancer progression by attenuating the surgical stress response, producing better analgesia, reducing opioid usage, and inhibiting cell migration. We need to have more robust and well conducted prospective randomized trials for studying the impact of RA on cancer recurrence and metastases in breast cancer surgeries.

If adequate analgesia can be provided during breast surgery by RA, the occurrence of persistent breast cancer pain syndrome and phantom breast pain could be reduced. A meta-analysis and Cochrane review on persistent pain following breast surgery revealed that pre-operative regional blocks were effective at reducing subsequent chronic pain.

Furthermore, high-quality studies are warranted to assess the impact of RA and analgesia on breast cancer surgery, not only on post-operative pain as the primary outcome, but also on other important outcomes such as chronic pain, phantom breast pain, nausea, and vomiting; this would potentially help in formulating plans for perioperative care of patients undergoing breast cancer surgeries. Ongoing randomized controlled trials to determine the impact of RA on oncological outcomes will provide definitive guidance in the future.

In conclusion, the use of a PECs block as the sole anesthetic in patients with multiple comorbidities may provide better analgesia, lesser side effects, reduced hemodynamic instability, and would be a safer option when compared to GA.

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