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Research article

Efficacy of postsurgical ultrasound guided serratus intercostal plane block and wound infiltration on postoperative analgesia after female breast surgeries. A comparative study

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ABSTRACT

Objective: The serratus intercostal plane block is successfully performed for pain management after breast surgeries. To assess the efficacy and safety of serratus intercostals plane block in comparison with local wound infiltration in women under-going breast surgery.

Methods: This prospective study was conducted on 46 female patients undergoing breast surgeries. Patients were divided into two groups: serratus block (SB) group (n = 23): patients received induction with serratus intercostal plane block with 0.4 ml/kg bupivacaine 0.25% plus fentanyl 20 μg, infiltration group (n = 23) received induction with the borders of the surgical wound were infiltrated with 0.4 ml/kg of bupivacaine 0.25% and 20 μg fentanyl at the end of surgery.

VAS pain scores, postoperative patient satisfaction score, time to the first analgesic requirement, total dose of rescue analgesic and the incidence of postoperative complications as vomiting were all recorded.

Results: Intraoperative pain scores and postoperative patient satisfaction scores were significantly lower in group SB compared with infiltration group. Total dose of rescue analgesic was significantly lower in SB group compared with Infiltration group. Significant difference between the study groups regarding the incidence of vomiting. Time to the first analgesic dose was significantly longer in group SB compared to Infiltration group.

Conclusion: There is considerable evidence that serratus intercostal plane block in addition to general anesthesia provide better postoperative pain control with little adverse effects compared with wound infiltration, indicating that a perioperative serratus intercostal plane block is a feasible and effective method for an improved postoperative pain treatment after breast surgery.

1. Introduction

Breast surgery is one of the most common procedures so thousands of patients undergo surgery in the region of the breast and axilla. Breast surgery result in increased incidence of acute and chronic pain in 25–60% of patients and is frequently associated with nausea and vomiting [1]. Regional anesthesia techniques may provide better postoperative analgesia for patients undergoing breast surgery.

Blockade of the lateral cutaneous branches of the thoracic intercostal nerves (T2–T12) will provide analgesia to the anterolateral chest wall in this patient population [2]. Patients undergoing other surgical procedures of the chest wall as anterior thoracotomy, may also benefit from nerve blockade of the anterior chest wall to reduce postoperative pain [1].

This novel technique become popular analgesic alternative to multiple puncture intercostals block, epidural and paravertebral block in breast surgery given decreased incidence of adverse events and has the advantage of simultaneous blockade of multiple dermatomes, it is easy to do and decrease rate of local anesthetic absorption [3].

The aim of this study was to assess the efficacy and safety of serratus intercostal plane block in comparison with local wound infiltration in women undergoing breast surgery.

2. Methods

After the approval of medical ethical committee of Ain Shams University, this prospective parallel group study was conducted

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over 46 female patients between the age of 40–56 years old, ASA physical status I and II, undergoing breast surgeries at Ain Shams University hospitals in 2015–2016, after obtaining written informed consents from all patients. Refusal to participate, Morbid obesity (body mass index >40 kg/m^2), renal insufficiency (creatinine >1.5 mg/dL), current chronic analgesic therapy (daily use >4 weeks), a history of opioid dependence, pregnancy, inability to communicate with the investigators or hospital staff, American Society of Anesthesia (ASA) III-IV were excluded.

Preanesthetic check was done at night of surgery, in the induction room the anesthesiologist secured an 18 gauge cannula and gave midazolam 0.05 mg/kg i.v. to all patients before transfer to the operating room where standard monitoring devices as ECG, Non invasive blood pressure and pulse oximetry were placed.

A conventional balanced general anesthesia was administered. The induction protocol was standard for all patients and consisted of intravenous administration of fentanyl (2 μg/kg), thiopentone sodium (3–5 mg/kg), Atracurium (0.5 mg/kg). Anesthesia was maintained with oxygen 100%, isoflurane and supplements of Atracurium. Volume controlled ventilation (tidal volume 8–10 ml/kg) was adjusted to maintain end-tidal carbon dioxide between 35 and 40 mmHg. At the end of the procedure, those patients who were randomly allocated by sealed envelope method to group SB (n = 23) received induction with serratus intercostal plane block which was performed under ultrasound guidance (S-Nerve; SonoSite Iberica S.L, Madrid, Spain), with a linear ultrasound transducer (10–12 MHz) on the same side of surgery. The patients were placed in the supine position, we counted the ribs inferiorly and laterally till we identified the fifth rib in midaxillary line, the latissimus dorsi (superficial and posterior), teres major (superior) and serrates muscles (deep and inferior) were easily identified by ultrasound at level of fifth rib then we moved the probe in the mid-axillary line to level of the sixth intercostal space. In the upper plane we identified the subcutaneous tissue and serratus muscle and in the intermediate plane the intercostal muscles (external, internal and intimate) and in the deep plane the lung, ribs and pleura could be identified.

The block was performed with needle (22-G, 50-mm 'Stimuplex A'; BBraun, Melsung, Germany) introduced in-plane with the ultrasound probe, from caudal to cranial till the tip of the needle was placed between serratus anterior muscle and intercostal muscles (IEM) and the local anesthetic (LA) injection was visualized in real-time (Fig. 1), the injection usually consisted of 0.4 ml/kg of bupivacaine 0.25% plus 20 μg fentanyl was injected after negative aspiration then LA injection was visualized in real-time. In infiltration group (n = 23), the borders of the surgical wound were infiltrated with 0.4 ml/kg of bupivacaine 0.25% and 20 μg fentanyl. This was performed by the same surgeon. Anesthesia was discontinued and neuromuscular blockade was reversed with neostigmine (0.05 mg/kg) IV and Glycopyrrolate IV (0.004 mg/kg). Patients were extubated and shifted to the post-anesthesia care unit.

Before induction of anesthesia patients were teached how to use a 100 cm visual analog scale (VAS-0 with end-point labeled "no pain" and 100 to "worst conceivable pain") [4]. The degree of postoperative pain was assessed at 2, 6, 10, 12, 18, 24 h using the

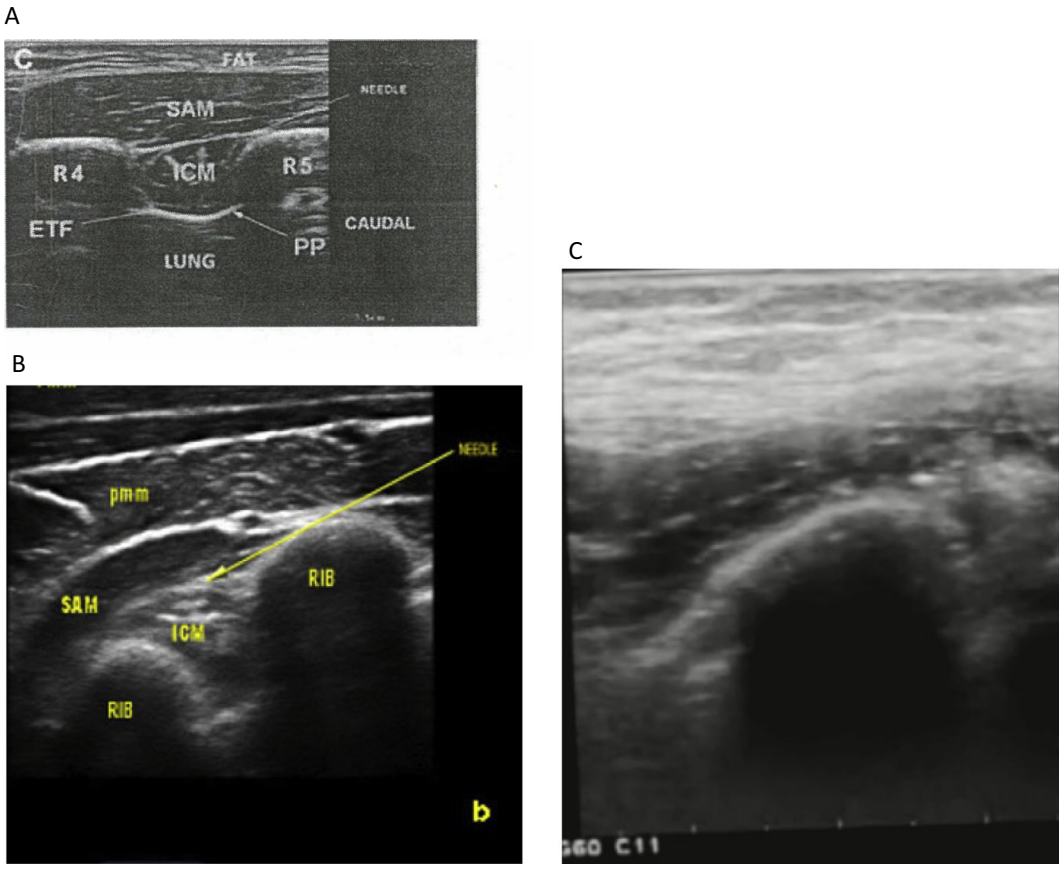

Figure 1. Position of the needle during injection.