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Postoperative Analgesia for Breast Surgery : Interest of Trunk Blocks

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Abstract

Objective: To evaluate the place of locoregional anesthesia techniques in the analgesic management of patients after breast surgery.

Material and method: Prospective, descriptive, and analytical study conducted at the anesthesia-intensive care departments of the Saint Louis regional hospital center over 11 months. Inclusion: all breast surgeries. Collection of clinical data, locoregional anesthesia techniques, and postoperative pain.

Results: A total of 20 patients collected. Average age 41.5 years. Indications for breast surgery were infiltrating ductal carcinoma of the breast in 45% of cases, nodules of the breast in 6% of patients and unspecified tumor pathologies of the breast in 25% of cases. The paravertebral block was performed in 8 patients (40%), serratus plane block associated with para-sternal infiltration in 9 patients (45%), and block of the erector spinal muscles in 3 patients (15%). Intraoperative morphine consumption averaged 197.5 µg, with extremes of 250 µg and 150 µg. Mastectomy with axillary courage was performed in 14 patients (70%) and nodulectomy in 6 (30%). The mean VAS score at 6 hours post-op was 3.65 (extremes: 6 and 2) and the mean VAS score at 24 hours post-op was 1.3 (extremes: 4 and 0). Postoperative morphine consumption averaged 1.4 mg in 24 hours (extremes: 4 and 0). All our patients had a favourable outcome, with an average hospital stay of 3 days (extremes: 2 and 5 days).

Conclusion: Our study demonstrated a reduction in acute postoperative pain when a locoregional anesthesia technique is performed.

Keywords: Analgesia; Locoregional Anesthesia; Postoperative Pain; Breast Surgery Conflicts of Interest

Introduction

Breast surgery is performed for therapeutic reasons, ranging from simple lumpectomy to mastectomy with or without axillary recess. It is also performed for procedures such as breast implants, either post-mastectomy or for purely aesthetic reasons. Post-operative pain after breast surgery can be intense, requiring morphine analgesia in the absence of associated locoregional anesthesia. Analgesia after breast surgery is a subject of interest, as it helps to ensure good pain control in the aftermath of this surgery, which has a significant psychological impact. This study aimed to evaluate the role of locoregional anesthesia techniques in the analgesic management of patients after breast surgery.

Materials and method

We conducted a prospective, descriptive, and analytical study in the anesthesia and intensive care departments of the Saint Louis regional hospital. The study period was 11 months, from December 1, 2021, to December 31, 2022. We included all patients admitted to the operating theatre for breast surgery for all indications. We excluded patients who did not consent to the local anesthetic procedure. For each patient, we collected clinical and anamnestic data, surgical indications, locoregional an aesthesia technique used, neuroendocrine reactions per operatively, postoperative pain scores, morphine requirements per and postoperatively, and evolutionary data. Data was collected on an Excel file and analyzed using XLS STAT software. A descriptive and correlational analysis was performed, and a relationship was considered statistically significant if the p-value was < 0.05.

Results

We enrolled a total of 20 patients. The average age was 41.5 years with extremes of 65 and 19 years, multiparity history was noted in 7 patients and arterial hypertension was objectified in 1 patient. Preoperative evaluation revealed an ASA 3 score in 3

patients, an ASA 2 score in 7 patients and obesity with BMI > 35 kg/m2 in 2 patients. Preoperative biology was unremarkable in our population, and evaluation by preoperative echocardiography was necessary in one patient. Indications for breast surgery were infiltrating ductal carcinomas of the breast in 9 patients (45%), nodules of the breast in 6 patients (30%) and unspecified tumour pathologies of the breast in 5 patients (25%). Preoperative chemotherapy was performed on 10 patients (50%). General anaesthesia with Oro-tracheal intubation was used in 16 patients (32%) and general Anesthesia with laryngeal mask in 4 patients (20%).

All locoregional anesthesia techniques were performed under ultrasound guidance: paravertebral block performed in 8 patients (40%), serratus plane block associated with para-sternal infiltration performed in 9 patients (45%), erector spinae muscle block performed in 3 patients (15%). Table 1 shows the types of blocks performed according to the surgical indications. The anesthetic used was isobaric bupivacaine at a concentration of 2.5 mg/ml, and a sensory level of T4 -T6 was obtained in all our patients before induction. Intraoperative neuroendocrine reactions such as tachycardia at the incision were observed in 3 patients (15%). Intraoperative morphine consumption averaged 197.5 µg, with extremes of 250 µg and 150 µg. Intraoperative hemodynamics were stable in all our patients. Respiratory pressures (plateau pressure) averaged 17.5 mmHg (extremes: 14 and 26 mmHg).

Table 1: Distribution of Locoregional Anesthesia (LRA) Techniques According to Surgical Indications.

LRA Techniques	Indications	Number (%)
	Infiltrating Ductal Carcinoma: 6	8 (40%)
Paravertebral Block	Unspecified Breast Tumor: 2	
	Infiltrating Ductal Carcinoma: 1	
Serratus Plane Block + Para-Sternal Infiltration	Breast Nodule: 7	9 (45%)
	Unspecified Breast Tumor: 1	
	Infiltrating Ductal Carcinoma: 2	
Block of Erector Spinae Muscles	Breast Nodule: 1	3 (15%)

The procedures performed were mastectomy with axillary courage for 14 patients (70%) and nodulectomy for 6 patients (30%). No intraoperative incidents were identified, and the average duration of anesthesia was 114.9 minutes (extremes: 185 and 45 minutes). All patients were awakened on the operating table without incident. Postoperative pain assessment showed a mean VAS score of 3.65 at 6 hours postoperatively (extremes: 6 and 2) and a mean VAS score of 1.3 at 24 hours postoperatively (extremes: 4 and 0). All our patients consumed an average of 1.4 mg of morphine over 24 hours postoperatively (extremes: 0 and 4). All our patients progressed favorably, with an average hospital stay of 3 days (extremes: 2 and 5 days). Correlational analysis revealed that the 3 patients with an intraoperative neuroendocrine reaction had benefited from a paravertebral block, and VAS at 6 h post-op were higher in patients with an intraoperative neuroendocrine reaction. However, these relationships were not statistically significant (Table 1).

Discussion

Acute pain after minor breast surgery is moderate (VAS ≤ 3) and rarely requires morphine. It is usually treated with non-morphine analgesia: paracetamol ± NSAIDs ± weak opioids (level 2). In major surgery, postoperative pain can be intense (VAS > 3), requiring morphine analgesia in the absence of associated locoregional anesthesia [1]. Our study aims to assess the prevalence of postoperative pain after breast surgery for all indications. For breast cancer, surgical treatment includes lumpectomy or complete mastectomy, combined with removal of the sentinel lymph node or axillary curage. Breast reconstruction may also be performed. Intense postoperative pain is common. Their incidence can exceed 50%. Risk factors for acute postoperative pain (APPD) are essentially represented by preoperative anxiety, and the aggressiveness of the surgical procedure (lymph node courage and mastectomy) [2].

The incidence of chronic postoperative pain (CPOP) can be as high as 50%. The risk factors for DCPO are mainly the severity of DAPO and lymph node courage [3,4]. In this context, locoregional anesthesia (LRA) is of interest for two reasons. Firstly, to improve immediate postoperative management and reduce the incidence of DAPO. Secondly, to prevent the onset of PCOD. Various techniques of locoregional anesthesia for breast surgery have been evaluated in several studies. Paravertebral block (PVB) involves injecting a local anesthetic solution into the paravertebral space. Diffusion takes place at several metameric levels. In cardiological breast surgery, the dermatomes concerned range from the second to the sixth thoracic root. At this level, the paravertebral space is a space delimited posteriorly by the transverse process, rib, and costo-transverse ligaments, medially by the spine and anteriorly, by the pleura and lung [5]. One study showed that echo guidance increased the success rate of BPV, and the number of dermatomes blocked compared with the blind tracing technique [6].

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It is therefore recommended to perform this block under ultrasound guidance. In some countries (USA), staged injections are performed, which increases the risk of puncture complications and is probably more uncomfortable for patients. A prospective, randomized study comparing BPV with a single injection of 25 ml AL at T3-T4 to 5 injections of 5 ml AL from T1 to T5 showed no difference in terms of metameric extension [7]. Several ultrasound-guided approaches have been described (sagittal, transverse, in-plane or out-of-plane ultrasound). There is no evidence in the literature to support one approach over the other. It should simply be noted that when using a sagittal approach in the ultrasound plane, the size of the transverse processes may make it difficult to route the needle tip into the paravertebral space.

For transverse approaches in the ultrasound plane, it may be advisable to keep the transverse process in the ultrasound plane. Indeed, an inter-apophyseal approach in the ultrasound plane increases the risk of being too close to the foramen magnum, with diffusion of the LA and/or catheter placement in the epidural space [8]. Our study did not reveal any complications related to the main complications of BPV, which are associated with the passage of LA into the epidural space (arterial hypotension, contralateral block, Claude-Bernard-Horner syndrome, etc.) [9]. Ultrasound detection, which was the rule in our study, probably reduced the incidence of pneumothorax but did not eliminate this risk. A recent study of echo guided BPV with a sagittal puncture in the plane of ultrasound assessed this risk at 1 per 1000 blocks [CI95% = 0.1-3.3/1000] [10]. Numerous studies have confirmed its value for analgesia after carcinological breast surgery. In the meta-analysis by Marret et al, BPV improved analgesia in the first 12 postoperative hours compared with placebo [11].

This advantage is maintained up to the 24th hour [12]. As a result, morphine use is reduced during this period, lowering the risk of postoperative nausea and/or vomiting by 62%. The benefit in terms of chronic pain prevention, was evaluated in a meta-analysis in 2013 with an NNT (number needed to treat) equal to 5 [13]. Recently a prospective, randomized study demonstrated that performing a BPV reduced the risk of pain 6 months after surgery (RR = 0.52 [IC95% = 0.28-0.96]) [14]. This benefit was most pronounced in patients who had undergone mastectomy and in those with a BMI < 25 kg/m2. In our study, however, chronic pain was not assessed. BPV therefore remains a reference technique for analgesia after carcinological breast surgery, particularly in the context of mastectomy with or without axillary curage. Ultrasound-guided erector spinae block (ESPB) is an interfacial plane block, first described by Forero et al [15] in 2016, used in the treatment of thoracic neuropathic pain. It has subsequently been reported in the treatment of post-operative pain due to surgical procedures, ranging from shoulder to hip surgery [16,17].

Technique, level of application, concentration, local anesthetic (LA) volume, descriptive patient characteristics and several other factors affect the success rate of ESPB and its coverage area [18]. This interfacial block has shown promise as an alternative to neuraxial block for a variety of surgeries. In addition, the block presents a reduced risk of direct spinal cord injury, epidural hematoma, and central infection [19]. Despite its novelty in regional anesthesia, ESPB appears to be an effective alternative to other nerve blocks such as paravertebral. The ESPB technique is relatively simple given the anatomical landmarks, which has contributed to a rapid increase in its adoption. Before ESPB was described, paravertebral and neuraxial blocks were the preferred regional anesthesia techniques for posterior thoracic blocks. Paravertebral blocks are useful but carry risks of subarachnoid injection or pneumothorax and are also technically difficult to perform. Compared with neuraxial blocks, ESPB avoids certain risks such as dural puncture or the potential need for bladder catheterization [20].

In our study, the erector spinae block was performed in 15% of cases, and no complications were associated with it. Alongside BPV and ESPB other blocks are described in the literature. Indeed, Blanco reported an injection of local anesthetic (LA) between the pectoralis major and minor muscle [21]. An MRI study in volunteers confirmed that saline injection between the pectoralis major and minor muscles did not diffuse to the lateral cutaneous branches of the intercostal nerves (personal data). Two recent studies have confirmed that interpectoral block (PEC I) was associated with a significant motor block of the pectoral muscles, with no change in sensitivity at the level of the dermatomes [22] and that this block alone did not improve analgesia after carcinological breast surgery [23]. Subsequently, Blanco et al demonstrated that a sensory block of the superior-lateral part of the breast was obtained when a second injection (in addition to the interpectoral injection) of local anesthetic was performed between the small pectoral and serratus muscles [24].

This block, awkwardly called Pecs II (because of 2 injections), allowed anesthesia of the lateral cutaneous branches of the intercostal nerves that run along the superficial face of the serratus muscle. To cover the inferior branches (notably those arising from the 5th and 6th intercostal nerves) required for mastectomies, it was proposed to inject the local anesthetic more caudally opposite the 5th rib at the level of the middle axillary line, between the serratus muscle and the latissimus dorsi muscle [25]. This block is known as the Serratus Plane Block. Here again, the local anesthetic is injected on the surface of the serratus, but on its lateral surface. In summary, analgesia for breast surgery requires blocking the intercostal nerves. Injecting the local anesthetic on the surface of the serratus, either anteriorly (between the serratus and pectoralis minor muscles) or laterally at the level of the middle axillary line, amounts to injecting the local anesthetic in the same plane of diffusion (but using different entry points) and makes it possible to block the lateral cutaneous branches of the intercostal nerves.

We should therefore avoid talking about Pecs blocks (a concept to be reserved for interpectoral blocks) in this case and instead refer to superficial serratus blocks [26]. For the deep serratus, the

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cadaveric study by Mayes et al shows that the lateral cutaneous branches of the intercostal nerves can be blocked by injecting local anesthetic deep into the serratus muscle [27]. Illustrates the course of the nerves of the serratus muscle. The advantage of deep injection, between the serratus muscle and the ribs or intercostal muscles, is that it avoids blocking the long thoracic and thoracodorsal nerves, unlike the superficial approach. In some centres, breast surgeons use neurostimulation to confirm the identification of these nerves during dissections.

Furthermore, the diffusion of LA during injection under the serratus muscle takes place in a different plane to that used by the surgeon to locate and remove the sentinel lymph node or the entire lymph node chain during axillary curage. In our study, the Serratus plane block was easy to perform under ultrasound guidance in a supine patient and was performed in 45% of cases, with no associated complications. All in all, our study, in line with the literature, demonstrated a reduction in acute postoperative pain when a locoregional anesthesia technique is used. However, further comparative studies are needed to compare the analgesic efficacy of these different blocks (Figure 1, 2).

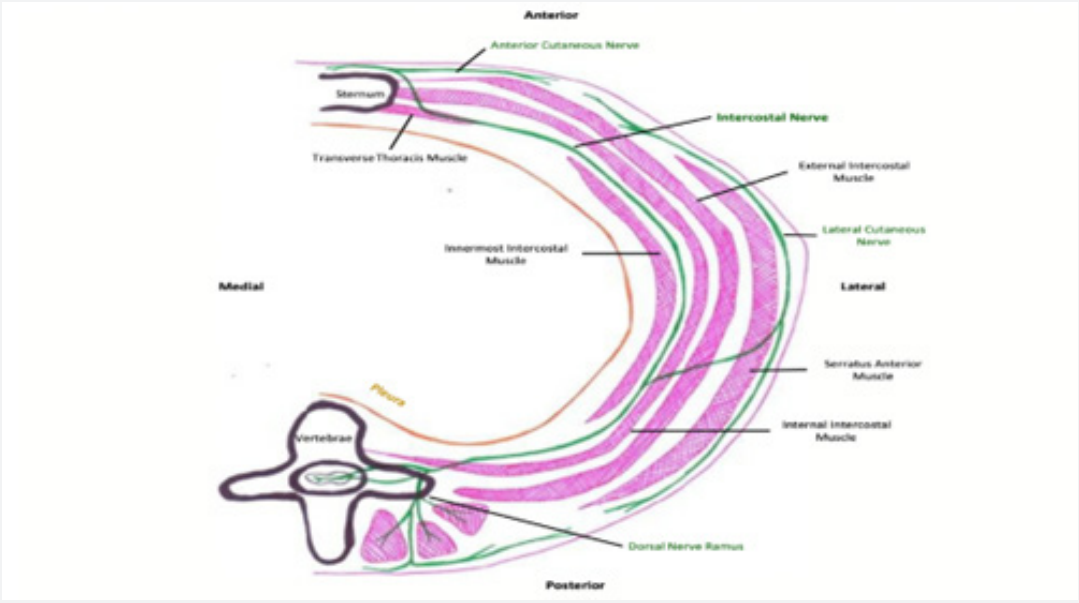

Figure 1: Diagram Showing the Course of the Intercostal Nerves and Their Relationship to the Serratus Muscle [27].

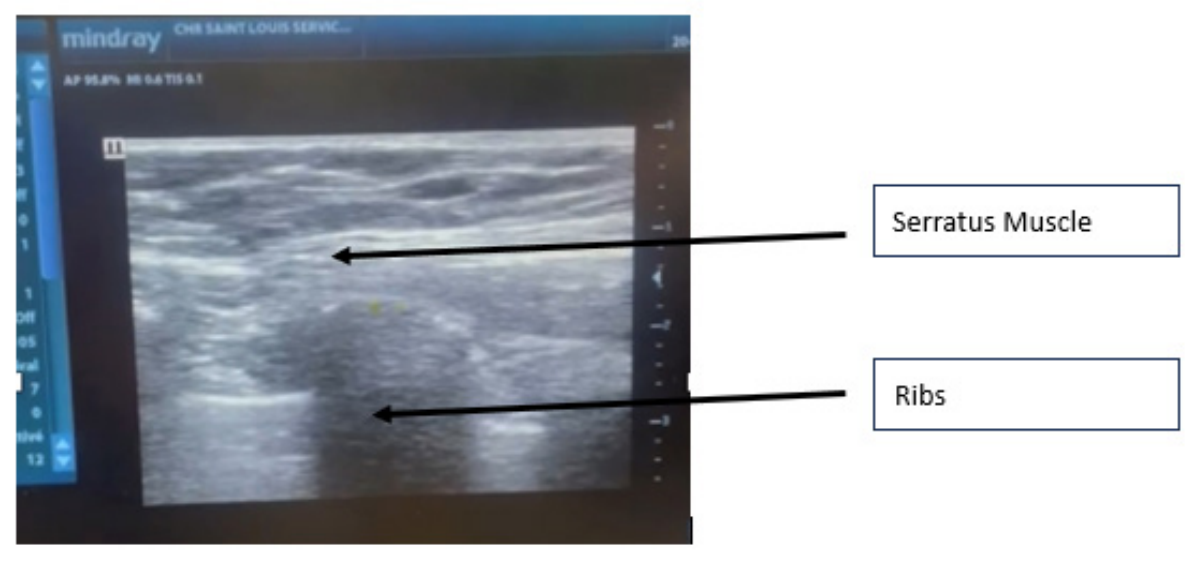

Figure 2: Serratus Muscle Block Under Ultrasound Guidance.

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Conclusion

In line with the literature, our study has demonstrated a reduction in acute postoperative pain when a locoregional anesthesia technique is used. However, given the diversity of techniques described for the breast, further comparative studies are needed to compare the analgesic efficacy of these different blocks.

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