

Postoperative Analgesia after Modified Radical Mastectomy with Focus on the Serratus Anterior Plane Block: Review Article

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ABSTRACT

Background: One of the most frequent procedures that may cause significant early postoperative discomfort in breast surgery is the modified radical mastectomy (MRM). Local anaesthetics techniques (Long-Acting Local Analgesia in Breast Surgery providing pain sensitization immediately after surgery and at 48 h but not at 12, and 24 h) and regional analgesic techniques [Pectoral (Pecs), Serratus Anterior Block (SAPB), and Erector Spinae Plane (ESP) Block] were used for the management of post-operative pain (MPP). The ultrasound guided SAPB is a preferable option to opiate analgesia, especially for senior patients, in the therapy of lateral chest wall discomfort, particularly in the context of severe rib fractures.

Objective: This review article aimed to throw highlights on post-operative analgesic modalities after modified radical mastectomy especially the serratus anterior plane block.

Methods: The following keywords were used to search PubMed, Google Scholar, and Google: MRM, SAPB, ESP, and pain management. The authors additionally screened references from the relevant literature, which included all of the identified research and reviews, but only the most current or full study was included.

Conclusion: The SAPB can be utilised to give post-operative analgesia in cases undergoing modified radical mastectomy with a decreased incidence of adverse effects when compared to other analgesic modalities.

Keywords: MRM, SAPB, ESP, Management of pain.

INTRODUCTION

One of the most popular procedures, the MRM, has the potential to cause severe immediate postoperative discomfort in breast surgery ⁽¹⁾.

An independent risk factor for the emergence of persistent post-mastectomy pain is acute postoperative discomfort ⁽²⁾.

Pain's alerting effect elicits defensive reactions and works to minimise tissue damage. The ability to feel pain serves a protective purpose. A series of modifications take place in the peripheral and CNS that control pain perception if tissue damage is unavoidable ⁽³⁾.

A complicated experience, pain includes elements that are physiological, sensory, emotional, cognitive, and behavioural. The interconnections of physical, psychological, cultural, and spiritual elements affect how strongly pain is perceived by an individual ⁽⁴⁾.

Postoperative pain

A persistent painful input, such as continuous inflammation, may produce postoperative chronic pain, or it may develop independently with no temporal relationship to the initiating reason. Chronic pain suggests more than simply length of time. It is a crippling condition that drastically lowers patient's quality of life ⁽⁵⁾. Recommendations for the use of intraoperative local anaesthesia, nerve blocks, and multimodal pain management reduce the need for postoperative IV opioids. When oral painkillers are not well tolerated or helpful for breakthrough pain, IV ketorolac should be explored as first-line treatment, followed by IV narcotics ⁽⁶⁾.

Management of post-operative pain (MPP)

Treatment methods

MPP options are many and include both systemic (i.e., opioid and non-opioid) analgesics as well as regional (i.e., neuraxial and peripheral) analgesic approaches. For each patient, the doctor can tailor the postoperative analgesic regimen ⁽⁷⁾.

● Systemic analgesic techniques

▪ Opioids

The effectiveness of opioids as an analgesic is often constrained by the onset of tolerance or opioid-related adverse effects such physical dependency or respiratory depression. Opioids may be delivered intramuscularly, transcutaneously, mucosally, or subcutaneously, however oral and intravenous administration are the most typical methods for administering postoperative systemic opioid analgesics. Additionally, opioids may be injected into particular anatomic locations as the intrathecal or epidural area ⁽⁸⁾.

▪ NSAIDs

NSAIDs are also frequently used in conjunction with opioids to treat moderate to severe pain. NSAIDs are particularly helpful as parts because they induce analgesia through a different mechanism than do opioids or local anaesthetics. They can be administered parenterally or orally ⁽⁹⁾. Even when used in supratherapeutic dosages, NSAIDs have modest platelet inhibition and may temporarily reduce renal function in individuals with normal preoperative renal function in the early postoperative period ⁽¹⁰⁾.

- **Local Anesthetics**

- **Breast Surgery: Long-acting local analgesia**

Along with surgical analgesia, local anaesthetics may help prevent neuronal inflammation and pain sensitivity. It has been demonstrated that post-incision infiltration of a long-acting local anaesthetic such as ropivacaine reduces postoperative pain ratings both right away after surgery and at 48 h. However, a meta-analysis revealed that while ropivacaine or bupivacaine reduced postoperative pain right away, they had no effect on pain at 12, and 24 hours later ⁽¹¹⁾.

- **Regional analgesic techniques**

For the successful MPP, a number of neuraxial (mainly epidural) and peripheral regional analgesic procedures (like quadratus lumborum and transversus abdominis plane blocks) may be performed. In general, systemic opioid analgesia is inferior to that supplied by epidural and peripheral procedures (especially when local anaesthetics are applied), and the use of these techniques may even lower morbidity and mortality. However, as with any strategies, the risks and advantages should be weighed, particularly in light of the disagreements around the use of these procedures when using a variety of anticoagulants ⁽¹²⁾.

- **Nerve Blocks**

Any multimodal-analgesic-regimen for breast surgery patients should take regional analgesia into account. After breast surgery, the incidence of persistent pain can be reduced by immediately administering strong, sustained analgesia ⁽¹³⁾.

A well-known localised analgesic method, thoracic epidural analgesia has been found to enhance analgesia, increase patient satisfaction, and shorten hospital stays.

The procedure most strongly supported by research is the paravertebral block (PVB), which allows for more specific regional analgesia by unilateral regional blocks. Paravertebral blocks lessen postoperative nausea and vomiting, reduce the need for opioids, and enhance the quality of recovery ⁽¹⁴⁾. Although paravertebral blocks are widely available, their effect on the prevalence of chronic pain is unknown ⁽¹⁵⁾.

As alternate regional analgesic treatments for breast surgery, more contemporary interfascial plane blocks guided by ultrasonography. The little data for these blocks points to better pain management with decreased opioid usage. When PVB is not an option or is contraindicated for major breast surgery, they can be thought of as suitable alternatives ^(15, 16). Compared to no block at all, each kind of block lowers opioid use ⁽¹⁷⁾.

Serratus Anterior Block

Rib fractures are seen in around 10% of wounded individuals who visit the Emergency Department (ED). Particularly in the elderly, rib fractures are linked with considerable morbidity and death. When respiratory function is disrupted as a result of pain two or three days after the injury, pulmonary consequences, including pneumonia, frequently manifest. Therefore, adequate analgesia is a crucial part of managing rib fractures. Although an essential component of treatment, intravenous opioids can have negative side effects, such as respiratory depression, a suppressed cough reflex, and delirium in the elderly. Due to its effectiveness, convenience of use, and minimal side-effect profile, the SAPB has gained popularity as a substitute ⁽¹⁸⁾.

Contraindications

Allergy to local anaesthetic drugs or soft tissue infection during the surgery are absolute contraindications to the SAPB. Any anatomical difference that makes sonographic visualisation of landmarks challenging is a relative contraindication. These include fibrosis and scarring from previous thoracic surgeries ^(19, 20).

Technique

The fifth rib should be the level of a high-frequency linear transducer, which should be positioned on the patient's midaxillary line in the transverse plane with the indicator towards the operator's left. A little amount of local anaesthetic can be used to numb the skin once the rib, pleural line, and overlying serratus anterior and latissimus dorsi muscles have been seen. The needle is then moved in-plane at an angle of around 45 degrees towards the fifth rib under ultrasound guidance. The local anaesthetic is administered anteriorly to the serratus anterior for the superficial SAPB ⁽¹⁹⁾.

The local anaesthetic is administered deep into the serratus anterior and anterior to the rib for the deep SAPB. Throughout the process, the entire needle should be seen, and any vessels should be avoided as the needle travels through soft tissue. A tiny aliquot of 1 to 3 mL of local anaesthetic should be administered to confirm placement, hydro-dissect the fascial layers, and open the prospective space once the needle tip has been seen in the correct plane. A higher volume of diluted local anaesthetic, such as 30 to 40 mL of 0.25% bupivacaine, should be progressively delivered once the fascial plane has been opened. Between fascial layers, the local anaesthetic will appear as an expanding anechoic stripe. The needle should be taken out and covered with adhesive dressing or sterile gauze. Approximately five minutes after the block is finished, reevaluate the patient's pain level to see if it has decreased (Figure 1) ⁽²¹⁾.

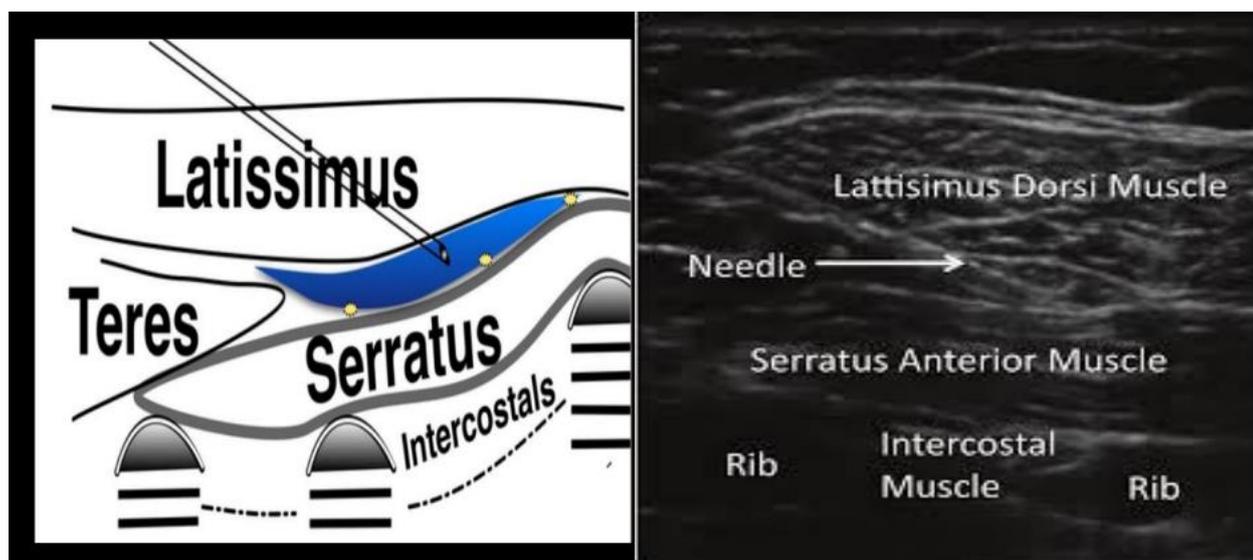


Figure 1: Serratus Anterior Block ⁽²²⁾

Complications

The analgesia brought on by bupivacaine normally lasts for six hours, thus rebound discomfort is a possibility. Regional anaesthesia may result in a condition called local anaesthetic systemic toxicity (LAST). Due to this, diluted anaesthetic is employed, with a recommended maximum dosage of 2 mg/kg of bupivacaine. Ultrasound can assist in confirming lung slide immediately following the surgery if pneumothorax is suspected. Given that the needle is not directed directly at the nerves but rather towards the plane through which the nerves flow, nerve damage is improbable ⁽¹⁸⁾.

Clinical significance

A desired substitute for opiate analgesia, especially in the elderly, the US guided SAPB offers an efficient method for the management of lateral chest wall pain, particularly in the context of traumatic rib fractures ⁽²³⁾.

CONCLUSION

The SAPB can be utilised to give post-operative analgesia in cases undergoing modified radical mastectomy with a decreased incidence of adverse effects when compared to other analgesic modalities.

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