



International Journal of Medical Anesthesiology

E-ISSN: 2664-3774
P-ISSN: 2664-3766
www.anesthesiologypaper.com
IJMA 2023; 6(3): 43-47
Received: 12-05-2023
Accepted: 15-06-2023

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Thoracic interfascial plane block versus thoracic erector spinae plane block after modified radical mastectomy

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DOI: <https://doi.org/10.33545/26643766.2023.v6.i3a.413>

Abstract

In a radical mastectomy, the whole axillary lymph nodes, nipple, breast and pectoralis muscles are excised. Mastectomy requires general anesthesia or an advanced regional block with sedation like: erector spinae plane block (ESPB) or interfascial plane block (SIFB). ESPB can be done by single-injection or via catheter placement and can be carried out by deep or superficial needle technique. When carried out at T 4-5 level for breast surgeries, ESP block provides efficient postoperative analgesia. SIFB is described as anesthesia of the anterolateral chest wall through blockage of the intercostobrachial nerve. It may be single injection or continuous with catheter insertion unilateral or bilateral. 3 mL of LA per dermatome was a sufficient blockage of the lateral and anterior intercostal branches, inducing complete breast sensory loss. The complications of ESPB are very rare. But there are some complications for SIFB as pneumothorax secondary to the proximity of the pleura, intravascular injection, local anesthetic systemic toxicity, hematoma, inadequate or failed block, infection, hemothorax, nerve injury. There are technical and clinical advantages of ESPB and SIFB. Also, there are absolute and relative contraindications for both blocks.

Keywords: Assess refers to process of the critical analysis and valuation and judgement of the status or quality regarding prevention and home care management of chickenpox in children

Introduction

Breast cancer represents one of the most prevalent causes of fatalities due to cancer in females. One of the most often used techniques in the surgical management of breast cancer is the modified radical mastectomy (MRM). Wide incisions are used during this procedure, which results in moderate to severe postoperative discomfort. In addition, 25-60% of patients have reported having persistent discomfort after surgery. Due to the physical restrictions and psychological anguish, it generates, chronic pain has a significant negative influence on life quality^[1].

There is also proof that the acute pain experienced just after surgery is directly connected to the chronic pain felt in the months that follow. Therefore, it's critical to effectively manage postoperative pain both in the immediate aftermath of surgery and to avoid persistent pain that lasts for weeks or longer^[2]. Alternatives to neuraxial procedures have been identified as US-guided facial plane blocks^[3].

Opioid analgesics are double edged weapons where large doses to obtain good analgesia and blunt the stress and metabolic responses during surgery have many major side effects, recently opioid-sparing analgesia practices have been encouraged for enhanced recovery after surgery (ERAS) programs include using multimodal analgesic regimen including either central nerve blockades (epidural) or truncal blockades and interfascial plane blocks^[4].

A recently discovered interfascial plane block called the erector spinae block (ESB) offers several benefits over traditional neuraxial blocks that are carried out near to the spinal cord. ESB is a simple approach to use since it allows for the display of transverse process of the vertebrae by the US probe is very simple and it is a very superficial block compared to thoracic paravertebral block (TPVB) & thoracic epidural block (TEB). Also, the technique has a lower incidence of complications. Critical structures that might sustain damage include the spinal cord, pleura, and major blood vessels^[5].

The caudal and cranial spread of the LA along the length of neighboring vertebrae and being penetrated into the costotransverse foramina and impact on the ventral and dorsal rami through epidural and paravertebral spread encouraging that ESB possesses analgesic impact on somatic and visceral pain were observed in a cadaveric study [6].

The serratus-intercostal plane block (SIPB) and pecto-intercostal fascial plane block (PIFB), also referred to as the sub-serratus plane, is an anaesthetic technique for ribcage anesthesia that has not been previously documented in the context of critical care. Similar anesthetic techniques have shown effective pain management following breast and abdominal surgeries [7].

These dermatomes were discovered to be covered by the

inter-fascial plane blocks that were previously reported for chest analgesia, and they looked to be useful for post-breast surgery perioperative analgesia. Numerous writers have researched the use of these more recent inter-fascial plane blocks in breast operations since they were first described. [8].

Erector Spinae Plane Block (ESPB)

May be carried out with just one injection, a catheter, and a deep or superficial needle technique. [9]. Figure 1

Mechanism of action of ESPB: The local anaesthetic (LA) is injected into the fascial plane deeper compared to the ESM at the transverse process' tip of the spine for performing the ESPB [10].

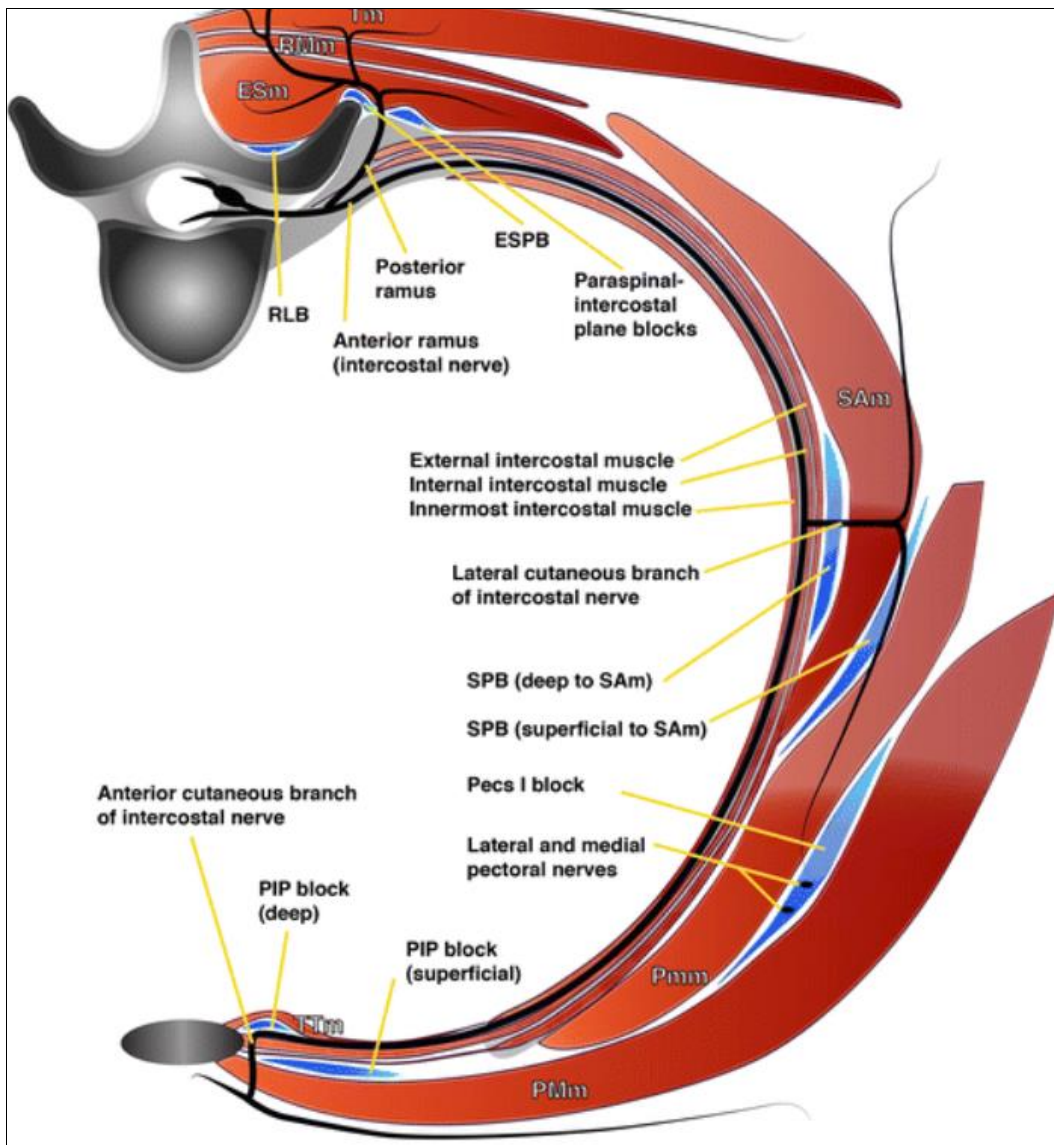


Fig 1: Nerve distribution in fascial plane of ESPB [11]

The level and type of ESPB may be single injection or continuous with catheter insertion unilateral or bilateral. When carried out at T 4-5 level for breast surgeries, ESPB provides efficient analgesia following surgery. For mastectomy and axillary dissection blocks should be performed at each level or at T1, T3, and T5 [12, 13].

There are variations in the LA's distribution in thoracic usages. Distribution of ESPB injection reveals 3 definitive

patterns [14]

- Cephalad-caudad distribution along the transverse process.
- Anteriorly to paravertebral space.
- Lateral spread along intercostal.

Block performance: The patient may be in a lateral, prone, or sitting posture for landmark-guided ESPB. Rhomboid

major, Trapezius, and erector spinae muscles may be seen as three distinct layers superficial to the transverse processes at higher thoracic levels, for example, above T5. Once the transverse process has been confirmed, introduce the needle till the needle tip makes contact with the transverse process by moving the needle within the plane from the cranial to caudal orientation. Add 1-3 mL of local anaesthetic to the needle. Add 20-30 mL of local anaesthetic for the completion of the nerve block. ^[15] Figure 2

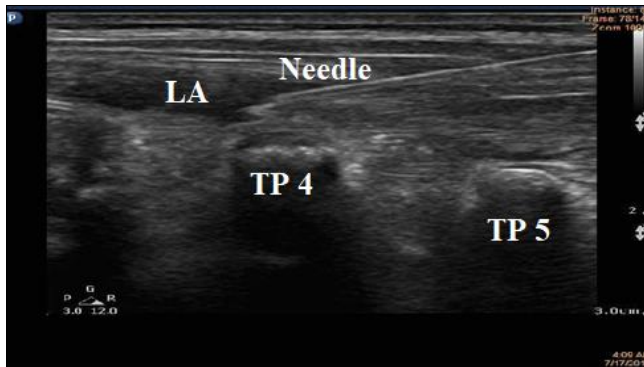


Fig 2: Needle visualization during ESPB at TP4, 5. Abbreviation: LA: Local anaesthesia, TP: Transverse process ^[16]

Advantages of ESPB

- 1. Technical advantages:** Is that technically easier and faster procedure than thoracic epidural anesthesia (TEA). The needle-tip of ESPB is not closer to pleura and spinal nerve roots than that of TEA ^[17].
- 2. Clinical advantages:** Single injection produces multi-dermatomal nerve block. ESPB has been demonstrated to lessen persistent discomfort after breast and thoracic surgeries. ^[18].

Surgical management

- 1. Thoracic surgery** ^[19]
 - Breast surgery
 - Video assisted thoroscopic surgery (VATS).
 - Thoracotomy
- 2. Abdominal surgery** ^[19]
 - Renal surgery
 - Hernia operations
 - Laparoscopic Cholecystectomy
 - Bariatric surgery
- 3. Spine, hip and upper femur surgeries** ^[20]

Non-surgical management

- 1. Fractured ribs:** Has been shown to minimise lingering pain following breast and thoracic procedures. ESPB single shot or catheter provide analgesia ^[21].
- 2. Post herpetic neuralgia, chronic pain:** Chronic low back pain, lower cervical myofascial pain, and interscapular myofascial pain have all been treated with bilateral ESPB. ^[14].

Complications of erector spinae plane block: Due to the location of the injection being far from the pleura, significant blood arteries, and the spinal cord, they are extremely uncommon. ^[22].

Contraindications

- **Absolute:** Refuse by the patient, local anaesthetic allergy, and infection at the injection site. ^[23].
- **Relative:** Coagulation disorder or the use of

anticoagulant but not above the therapeutic range INR < 3 and difficult anatomy and previous spine surgery (operator dependent) ^[24].

Thoracic Inter fascial Plane Block

It is recently described for anesthesia and analgesia of the antero-lateral chest wall through blockage of the intercostobrachial nerve ^[25].

Mechanism of action: Local anesthetic diffuses through the muscles that surround it and its corresponding fascia, which might have a local impact on peripheral nociceptors, as well as inside the fascial plane of injections that reaches nerves passing within the plane. ^[26].

The level and type of SIFB: May be single injection or continuous with catheter insertion unilateral or bilateral. Revealed to be efficient in a variety of abdominal, breast, and thoracic operations according to level and plane we block it ^[25].

Clinical indications of chest wall blocks

- Anterolateral chest wall and axillary region ^[27].
- Anteromedial chest wall ^[27].
- Posterior chest wall paraspinous plane ^[27].

Dermatomal spread of LA in SIFB was shown to be associated with LA volume reported that 3 mL of LA per dermatome was sufficient to block both the lateral and anterior intercostal branches whenever SIFB had been carried out from the eighth rib to the inter-fascial plane among the intercostal muscles and serratus anterior, causing sensory loss throughout the entire breast and dispersing both posteriorly and anteriorly underneath the ribcage, achieving the posterior axillary line ^[28].

Block performance: On order to recognise the pectoralis muscles, the toracho-achromial artery, and the cephalic vein that reside between them on the surface plane, SIFB is placed beneath the external 3rd of the clavicle. The needle's tip is then positioned between the External Intercostal muscle and the SAM at the level of the 2nd rib after being inserted in-plane from medial to lateral. ^[29] Figure 3

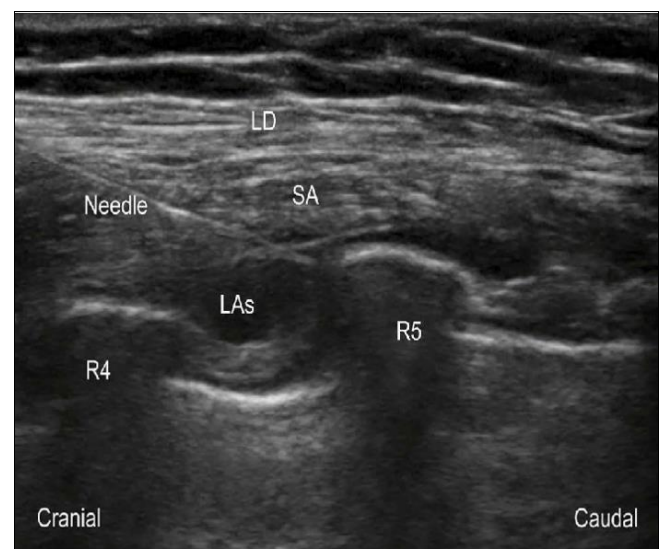


Fig 3: Ultrasound image for the serratus intercostal plane at T6, T5. Abbreviations: LD, latissimus dorsi muscle, SA, serratus anterior, LA: Local anaesthesia, R4: Rib 4, R5: Rib 5 ^[30]

Advantages of SIFB

- **Technical advantages:** improve safe, effective, efficient and inexpensive peri-operative pain management [27].
- **Clinical advantages:** One injection produces dermatomal nerve block in spite multiple intercostal nerve block, hypotension is less and It has been shown to reduce chronic pain [27].

Complications: Pneumothorax secondary to the proximity of the pleura, US can help to confirm lung sliding immediately after the procedure, intravascular injection, local anesthetic systemic toxicity, hematoma, inadequate or failed block, infection, hemothorax, nerve injury [31].

Contraindications

- **Absolute:** Allergy to local anesthetic medications or soft tissue infection in the procedure [32].
- **Relative:** Scarring and fibrosis due to prior thoracic surgery [32].

Role of SIFB in breast surgeries

Kim *et al.* [33] concluded that following a lumpectomy, SIFB lowers the need for opioids while improving the satisfaction of individuals with pain management following surgery. Following a lumpectomy, SIFB is helpful for multimodal analgesia.

Conflict of Interest

Not available

Financial Support

Not available

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How to Cite This Article

Ghalwash AK, Abdelraheem TM, Yousef NK, Amin SM, Barrima MA. Thoracic interfascial plane block versus thoracic erector spinae plane block after modified radical mastectomy. *International Journal of Medical Anesthesiology.* 2023;6(3):43-47.

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