

## Serratus Anterior Nerve Block in Second Degree Burn

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### ABSTRACT

The serratus anterior plane block (SAPB) has gained recognition as an effective regional anaesthesia technique for managing postoperative and traumatic pain associated with procedures involving the chest wall, including breast surgeries, thoracotomies, and rib fractures. It works by anesthetizing the lateral cutaneous branches of the intercostal nerves, offering significant pain relief while minimizing the need for systemic opioids. Although SAPB is widely used in various thoracic and upper abdominal conditions, its application in burn-related pain management remains limited. In this case report, we discuss a case of deep partial thickness burn injury over the chest wall region using SAPB for pain relief. The use of this technique contributed to improved pain control, facilitated respiratory effort, and enhanced overall patient comfort during the acute phase of burn injury management.

### INTRODUCTION

Burns affecting the chest wall are relatively frequent and, in many cases, do not necessitate care in a dedicated burn centre. When such injuries are non-circumferential and do not require surgical management, the primary treatment priorities include ensuring proper fluid resuscitation and managing pain effectively <sup>[1]</sup>. Analgesic regimens typically involve medications like NSAIDs, acetaminophen, opioids, and ketamine <sup>[2]</sup>. Despite the growing use of ultrasound in emergency and acute care, regional anaesthesia techniques are still rarely employed for non-operative burn pain control. However, regional blocks have the potential to provide significant pain relief while minimizing the adverse effects of systemic medications. This gap in practice highlights an opportunity to explore ultrasound-guided nerve blocks as a feasible addition to pain management protocols, particularly in settings where reducing opioid exposure is a priority.

The serratus anterior plane block (SAPB), introduced by Blanco in 2013, offers effective analgesia for the lateral chest wall, specifically targeting dermatomes from T2 to T9 <sup>[3]</sup>. It involves injecting a local anaesthetic—typically around 25–30 mL—into the fascial plane either above or below the serratus anterior muscle, where the lateral cutaneous branches of the intercostal nerves run <sup>[3]</sup>. Initially developed to control postoperative pain after

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procedures such as breast surgery and thoracic operations, SAPB has since been adopted in emergency settings to manage severe pain from rib fractures, herpes zoster, and chest tube insertions. The technique is ultrasound-guided, allowing for bedside application with high precision and a favourable safety profile. In this case, we document the first known instance of bilateral SAPBs in our centre being used to manage pain from a significant, deep partial-thickness burn to the thorax in the emergency department, suggesting a broader role for regional anaesthesia in burn care.

## CASE

A 26-year-old male patient was brought to the emergency department (ED) of our hospital with complaints of severe burning sensation and pain over the chest wall. The patient had suffered burn injury 1 day ago over the chest wall. The patient was initially referred to the burn unit of a prestigious government medical college in the locality but due to severe pain, he came to the emergency for immediate relief. The patient had suffered second degree partial thickness burn over his chest wall 1 day prior while cooking in the kitchen. The patient was initially managed the day earlier with application of silver- nitrate over the burn area and was referred to burn specialist but due to sustained severe chest pain, the patient wanted immediate relief for his burn injury. After counselling of the patient and relatives about the disease process, the patient was planned for local anaesthetic pain relief management.



**Image Courtesy : Department of Emergency Medicine,  
Max Super Speciality Hospital, Shalimar Bagh, New Delhi.  
Patient details kept anonymous on request**

After taking informed consent from the patient and his relatives, he was planned for bilateral serratus anterior plane block. The procedure was carried out as described by Blanco et al <sup>[3]</sup>. Ropivacaine was selected as the preferred medications. The dose was calculated for the patient's body weight (64 kilograms) with a recommended maximum dose of 3 milligrams/kg. The final dose was 20 millilitres of 1% ropivacaine which was then divided into 10 mL per side. An additional 5 mL of 1% lidocaine with epinephrine was added to this mixture to further promote the effect of the nerve block and reduce the systemic elimination of the mixture (as suggested by Karmakar et al <sup>[4]</sup>). Using ultrasound guided (POCUS) technique, the mixture of local anaesthesia was infiltrated into the planes of chest wall. After 10 minutes of the process, the patient felt relief over the right chest wall (which was infiltrated initially) and after 30 minutes of the procedure completion, the patient was pain free. The patient responded to the procedure well. The patient also received additional dose of injection Morphine (2+2 mg total) during the ED stay for 5 hours for his burn pain in the shoulder but did not complain of further chest wall pain. The patient was then referred to burn unit of a prestigious medical college hospital in the locality for further expert management for his skin loss and burn.

## DISCUSSION

The serratus anterior plane block (SAPB) was initially introduced as a regional anaesthesia technique to control pain after breast surgeries, but its utility has since expanded to various thoracic conditions [5]. In emergency settings, physicians are increasingly adopting this method to manage acute pain from chest trauma, especially rib fractures <sup>[2,3,4]</sup>. SAPB provides effective analgesia by targeting the lateral cutaneous branches of the intercostal nerves, which transmit pain signals from the chest wall. Beyond trauma, this block has been used successfully for pain from conditions such as herpes zoster and for interventions like chest tube placement. In burn care, pain control is critical, especially in patients with extensive injuries that may not require transfer to a burn centre. While opioids and ketamine are common pharmacologic agents for such cases, they pose risks like respiratory depression, nausea, hallucinations, and dependence. This case highlights the use of a bilateral ultrasound-guided SAPB as an emergency procedure to alleviate the pain from a deep partial-thickness burn on the thorax. Regional anaesthesia, such as SAPB, can serve as a powerful addition to multimodal pain strategies, reducing reliance on systemic drugs while offering targeted and prolonged relief for chest wall burns <sup>[3]</sup>.

The serratus anterior plane block involves the injection of local anaesthetic into the fascial plane between two key muscles of the chest wall: the serratus anterior and the latissimus dorsi. This approach specifically targets the lateral cutaneous branches of the thoracic intercostal nerves, typically from the third to the ninth thoracic vertebral levels (T3–T9) <sup>[3]</sup>. To perform the block, the patient is usually positioned in the lateral decubitus position, with the arm raised to improve access to the mid-axillary line. Ultrasound guidance is taken to identify anatomical landmarks such as the ribs, latissimus dorsi, and serratus anterior muscles. Once the third rib is visualized in cross-section, the needle is inserted in-plane to reach the fascial space between the serratus anterior and latissimus dorsi. The anaesthetic is then injected, and its spread within the fascial plane is observed in real-time using ultrasound. The anaesthetic agent can be inserted above the serratus anterior muscle (shallow technique) or below the muscle (deep technique). The injection site is generally chosen just above the uppermost level of injury to ensure adequate coverage of the affected dermatomes <sup>[3,4]</sup>. In this particular case, with burns extending from T1 to T5, the injection was placed at the T1 dermatome, above the third rib, to provide effective analgesia across the injured regions without impairing motor function.

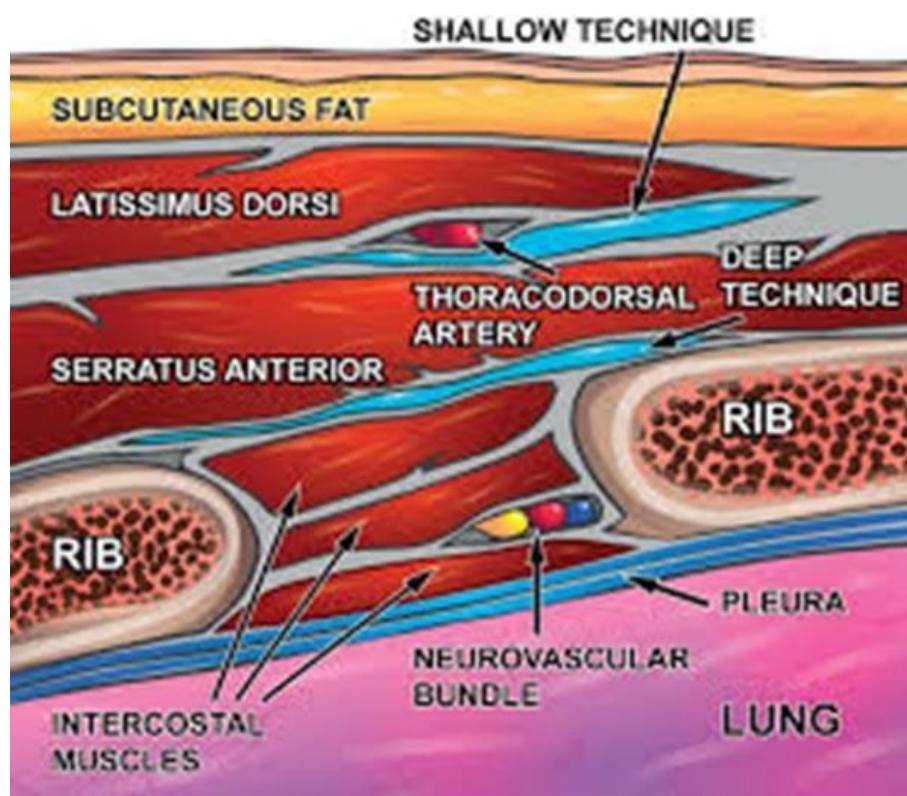


Image Source : Google Search Engine, Blanco R, Parras T, McDonnell JG, Prats-Galino A. Serratus plane block: a novel ultrasound-guided thoracic wall nerve block. *Anaesthesia*. 2013; 68:(11) <https://doi.org/10.1111/anae.12344>

The SAPB offers several advantages as part of a multimodal pain management strategy for patients with thoracic burns.<sup>[6]</sup> It provides localized, long-lasting analgesia—often exceeding 12 hours—without the systemic side effects commonly associated with opioids or ketamine. This can significantly improve patient comfort during wound care, dressing and rehabilitation exercises<sup>[7]</sup>. In this case, ropivacaine was chosen for its extended duration of action and favourable safety profile compared to other local anaesthetics like lidocaine or bupivacaine. Ropivacaine also minimizes motor blockade, allowing patients to retain function while benefiting from effective pain control<sup>[8]</sup>. However, the technique is not without limitations. SAPB is generally less effective for injuries located posterior to the mid-axillary line and has shown limited success in managing posterior rib fractures. Additionally, clinicians must be mindful of the maximum allowable dose of local anaesthetic, particularly in bilateral applications<sup>[7,8]</sup>. Accurate weight-based dosing and the use of dose calculators are essential to prevent toxicity. Overall, while SAPB may not be suitable for every thoracic burn pattern, it represents a valuable tool in emergency pain management—offering targeted relief, reducing opioid use, and enhancing patient outcomes in acute care settings<sup>[9]</sup>.

## CONCLUSION

Thoracic burn injuries present a complex clinical challenge due to the intense pain and potential for impaired respiratory mechanics. Effective pain control is vital not only for patient comfort but also for facilitating essential interventions such as wound care, dressing changes, and physical therapy. This thesis has explored the role of the serratus anterior plane block (SAPB) as a regional anaesthesia technique that can significantly improve pain outcomes

in patients with anterior and lateral chest burns. The SAPB offers the distinct advantage of delivering localized analgesia with minimal systemic effects, reducing reliance on opioids and their associated complications. Administered under ultrasound guidance, the block is both safe and efficient, allowing for real-time visualization of anatomical structures and improved accuracy. While its efficacy may be limited in injuries extending posteriorly, SAPB remains a valuable addition to the multimodal pain management approach in the emergency and acute care setting. Its ability to provide prolonged analgesia without motor impairment makes it particularly suited for thoracic burn patients. Continued investigation into optimal dosing, indications, and long-term outcomes will further define its role. Nonetheless, current evidence supports SAPB as a beneficial and practical tool for enhancing care in patients with chest wall burn injuries.

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