


CASE REPORT

Serratus anterior plane block and postoperative pain control in obese patients undergoing S-ICD implantation: A case series and literature analysis

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Key Clinical Message

We report five case series of obese patients with severe left ventricular ejection fraction impairment undergoing Serratus Anterior Plane Block during S-ICD Implantation. This anesthesia approach has a reduced impact on the patient's hemodynamics and adequately manages postprocedural pain.

Abstract

Subcutaneous implantable cardioverter-defibrillator (S-ICD) procedures are frequently performed under analgosedation or general anesthesia, leading to prolonged postoperative hospital stays and increased costs. This anesthetic technique may also have a greater hemodynamic impact, particularly in obese and cardiac patients. However, an alternative anesthetic technique can be employed: ultrasound-guided serratus anterior plane block (US-SAPB). We analyzed the anesthetic clinical course in 5 patients, 3 males and 2 females, who were obese (BMI ≥ 30) and underwent S-ICD implantation for primary prevention using a two-incision intermuscular technique and ultrasound-guided serratus anterior plane block. All patients had a left ventricular ejection fraction less than or equal to 35%. It significantly facilitated pain control during the procedure and, especially, in the postoperative phase. However, the data available in the literature are mostly derived from case reports and small comparative studies. Therefore, further studies with a larger sample size and direct comparison with general anesthesia or deep sedation are needed.

KEYWORDS

obese patient, postoperative pain control, serratus block, S-ICD implantation

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1 | BACKGROUND

The traditional implantation technique involves three incisions for electrode and device pocket placement, the latter being in a subcutaneous pocket near the mid-axillary line.¹ However, this approach has been associated with a significant rate of complications such as skin erosions and infections, although not systemic.^{2,3} Therefore, alternative implantation techniques have been proposed to offer advantages both aesthetically and procedurally, such as the two-incision technique, the submuscular technique, and the intermuscular technique.⁴ In the intermuscular technique, the presence of anatomical landmarks allows for proper device positioning even in obese patients. Moreover, the positioning of the device closer to the rib cage may improve sensing capabilities.^{5,6} Recent experiences suggest that the two-incision intermuscular technique allows for excellent performance in terms of efficacy and safety.⁷ Historically, one of the limitations of S-ICD implantation has been the need to perform the procedure under general anesthesia or deep sedation. The implantation requires more extensive tissue dissection compared to transvenous defibrillators (TV-ICD), in a richly innervated area, resulting in considerable postoperative pain. This type of anesthesia, besides not being universally practiced in all centers that implant defibrillators, can lead to hemodynamic instability or worsen the respiratory condition of obese patients. Consequently, anesthetic strategies have been explored to overcome these limitations.^{8,9} Deep sedation is commonly used in clinical practice for S-ICD implantation¹⁰; however, it exposes patients to the risk of oversedation and conversion to general anesthesia in the absence of proper airway preparation, thus increasing morbidity and mortality. Moreover, the anesthetics/sedatives used (opioids, benzodiazepines, and propofol) may increase the risk of respiratory complications and hypotension.¹¹ The serratus anterior plane block is an ultrasound-guided technique that involves administering a long-acting local anesthetic at the level of the superficial or deep fascia of the serratus anterior muscle (Figure 1). This provides intraoperative and postoperative analgesia, covering up to 12 h by intercepting the lateral thoracic nerves (T2–T9) and their cutaneous branches,¹² the same technique used for pain management in rib fractures in thoracic trauma.¹³ It is performed at the level of the fifth rib on the mid-axillary line, while the patient is seated or supine. Ultrasound guidance can be used to identify the latissimus dorsi and serratus anterior muscles.¹⁴



FIGURE 1 Ultrasound vision Serratus Anterior Plane Block.

2 | METHODS

The study was conducted in accordance with the Helsinki Declaration and the Good Clinical Practice guidelines. We analyzed the anesthetic clinical course in 5 patients, 3 males and 2 females, who were obese (BMI ≤ 30) and underwent S-ICD implantation for primary prevention using a two-incision intermuscular technique and ultrasound-guided serratus anterior plane block. All patients had a left ventricular ejection fraction less than or equal to 35%. The patients presented an American Society of Anesthesiologists (ASA) anesthetic risk of 3. All patients provided written informed consent for the procedure. The mean age of the patients was 51 years. Pain was assessed using the Numeric Rating Scale (NRS) at the time of surgical incision, performed 30 min after the block, and at 6 and 12 h after the procedure. The need for sedatives/opioids during the procedure, episodes of desaturation and/or hypotension, and bradycardia were recorded. The potential need for a rescue dose after the procedure (Paracetamol 1 g + ketorolac 30 mg) was considered. For each block, a standard local anesthetic mixture of Ropivacaine 0.5% + Dexamethasone 4 mg (total 20 mL) was administered. The SAPB provides anesthesia for long duration of action (480 min) to the lateral branches of the intercostal nerves (T2–T9). It used 90–120 mm needle (21–22 gauge) and ultrasound probe (US) linear and high frequency. With the patient in position supine, the latissimus dorsi muscles (superficial and posterior), large round (upper) and tight (deep and inferior) are therefore easily identifiable by ultrasound above the fifth rib in the midaxillary line. The anesthetic solution must be injected into—superficial interfascial plane between the serratus anterior muscle and the latissimus dorsi muscle—a deeper lock between tightened anterior and plane of the ribs.

3 | RESULTS

All patients tolerated the procedure well. At the skin incision, all patients reported an NRS of 0, with only a tactile stimulus sensation reported. The average NRS at 6 h after the procedure was 1.8, and the average NRS at 12 h was 2.6. No patient required a rescue dose of analgesics. The average duration of device placement was 45 min. None of the patients showed hemodynamic instability, and the average mean arterial pressure was 85.4 mmHg. No episodes of desaturation or bradycardia were recorded. There were no complications such as pneumothorax, hematomas, infections, or anesthesia-related toxicity.

4 | DISCUSSION AND CONCLUSIONS

In our experience, the two-incision transmuscular S-ICD implantation with the anesthetic serratus anterior block proved to be safe and effective. It significantly facilitated pain control during the procedure and, especially, in the postoperative phase. This implantation technique represents an excellent alternative to general anesthesia or deep sedation, particularly in obese patients. Obese patients have increased risk factors, and a well-planned anesthetic approach increases the likelihood of positive outcomes.¹⁵ The use of serratus anterior block in S-ICD implants is a recent practice. The experience of a single center in the Netherlands describes it as safe and associated with a reduction in the need for postoperative opioids. Cases of young patients who underwent transversus thoracis muscle plane block for S-ICD implantation with a favorable outcome have been reported. Several studies propose its effectiveness in wall block for ICD implantation,^{16–19} also reducing the implantation procedure time.²⁰ Cases of the use of this technique in the pediatric setting with a favorable outcome are described.²¹ A case of implantation using a wall block in a patient with pectus excavatum, also with a favorable outcome, has been reported.²² An overview of the literature reveals that wall block offers numerous advantages compared to deep sedation. The positive effects include a lower hemodynamic impact, reduced opioid administration, and better patient compliance with the procedure. However, the data available in the literature are mostly derived from case reports and small comparative studies.²³ Therefore, further studies with a larger sample size and direct comparison with general anesthesia or deep sedation are needed.

AUTHOR CONTRIBUTIONS

Francesco Coletta: Formal analysis; supervision; conceptualization. **Francesca Schettino:** Conceptualization;

data curation; formal analysis; writing – original draft. **Antonio Tomasello:** Conceptualization; project administration; resources; writing – review and editing. **Crescenzo Sala:** Software; visualization. **Massimo Pisanti:** Supervision; validation; visualization. **Romolo Villani:** Supervision; validation; visualization; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from Cardarelli Hospital, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Cardarelli Hospital.

CONSENT

Written informed consent was obtained from the patients to publish this report in accordance with the journal's patient consent policy.

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