

Bridging Evidence and Clinical Practice: Analgesic Effectiveness of Serratus Posterior Superior Intercostal Plane Block in Mastectomy

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Abstract

Objective: To evaluate the analgesic efficacy of serratus posterior superior intercostal plane block (SPSIPB) for postoperative analgesia and opioid consumption in unilateral mastectomy.

Study design: retrospective observational cohort study

Study Location and Period: Kütahya Evliya Çelebi Training and Research Hospital, Türkiye. January 1 to December 31, 2023.

Methods: Medical records of patients who had undergone unilateral mastectomy during the period of the study are reviewed retrospectively. Patients were allocated into SPSIPB recipients (n=25) and a control group without regional block (n=25) according to routine clinical practice. Postoperative pain data were obtained from medical records and included static and dynamic visual analog scale (VAS) scores at 0, 2, 4, 8, 12, and 24 hours and 24-hour tramadol consumption. Appropriate statistical tests were used to compare between groups.

Results: Demographics and perioperative characteristics were similar between groups. The static and dynamic VAS scores were significantly lower in the SPSIPB group at all postoperative time points ($p < 0.001$). At 24 h, the SPSIPB group had a static VAS score of 1.32 ± 0.47 vs. 2.64 ± 0.48 in the control group, and a dynamic VAS score of 2.36 ± 0.48 vs. 4.16 ± 0.68 , respectively. Median cumulative 24-hour tramadol use was significantly lower in the SPSIPB group [0 mg (IQR: 0–50)] compared to the control group [75 mg (IQR: 50–100)] ($p < 0.001$).

Conclusion: SPSIPB was associated with significantly improved postoperative analgesia and reduced opioid consumption in patients undergoing mastectomy. These findings support its role as part of multimodal analgesia, but prospective randomized studies are needed to confirm its clinical efficacy.

INTRODUCTION

Mastectomy with or without axillary dissection remains one of the most commonly performed surgical procedures for the treatment of breast cancer worldwide. Despite advances in surgical techniques and perioperative care, postoperative pain continues to represent a major clinical challenge. Inadequate pain control has been associated with increased opioid consumption, delayed mobilization, prolonged hospitalization, and development of chronic post-mastectomy pain syndrome. [1, 2]

Therefore, multimodal analgesia strategies incorporating regional anesthesia techniques have become increasingly important in perioperative pain management for breast surgery. Interfascial plane blocks such as pectoral nerve blocks (PECS I–II), serratus anterior plane block (SAPB), and erector spinae plane block (ESPB) have emerged as effective alternatives to thoracic paravertebral block because of their favorable safety profiles and technical simplicity. [3–5] However, variable dermatomal spread and inconsistent analgesic efficacy may limit the utility of these techniques, and the optimal regional analgesic approach for breast surgery remains controversial.

Serratus posterior superior intercostal plane block (SPSIPB) is a relatively novel ultrasound-guided fascial plane block targeting the plane between the serratus posterior superior and intercostal muscles. Tulgar et al. first described the technical aspects and potential dermatomal spread of this block, demonstrating extensive cranio-caudal distribution of local anesthetic.[6] Subsequent case reports and small clinical series suggested that SPSIPB may provide effective postoperative analgesia in various surgical procedures including minimally invasive cardiac surgery and thoracic interventions. [7, 8]

More recently, growing interest in SPSIPB has highlighted its potential role in breast surgery analgesia because of its possible extensive thoracic coverage and opioid-sparing effects. However, despite promising preliminary findings, evidence regarding the effectiveness of SPSIPB in routine perioperative practice remains limited, and its role in standard analgesic protocols for mastectomy has not yet been clearly established.

Therefore, this retrospective cohort study aimed to evaluate the analgesic efficacy of SPSIPB in patients undergoing unilateral mastectomy by comparing postoperative pain scores, rescue opioid consumption, and analgesic requirements between patients who received SPSIPB and those managed without regional anesthesia.

METHODS

This retrospective observational cohort study was approved by the Kütahya Health Sciences University Non-Interventional Clinical Research Ethics Committee (2024/01–33) (January 15, 2024), and conducted in accordance with the Declaration of Helsinki. Because of the retrospective design, the need for informed consent was waived.

Medical records of female patients aged ≥ 18 years who underwent unilateral mastectomy from January 1, 2023 to December 31, 2023 were reviewed. A total of 50 patients underwent unilateral mastectomy during the study period. Eligibility criteria were applied and 50 patients were included in final analysis.

Patients with American Society of Anesthesiologists (ASA) physical status I-III and complete postoperative pain and opioid consumption data were included. Patients with incomplete/missing medical record data, missing visual analog scale (VAS) scores, or missing opioid consumption data were excluded from analysis.

Patients were divided into two groups according to the standard clinical practice: patients who underwent serratus posterior superior intercostal plane block (SPSIPB) as part of perioperative analgesia, and patients who did not receive any regional anesthesia technique. No intervention was performed as a part of the study.

All patients received standardized general anesthesia and postoperative analgesia management according to institutional protocols. However, details of anesthetic techniques and block performance were not controlled for as part of this retrospective analysis.

Postoperative data were collected from medical records, including static and dynamic VAS scores at 0, 2, 4, 8, 12 and 24 hours and cumulative tramadol consumption in the first 24 hours.

SPSS version 25.0 (IBM Corp., Armonk, NY, USA) was used for statistical analyses. The normality of data distribution has been tested using the Shapiro–Wilk test. Continuous variables are presented as mean $\pm$ standard deviation or median (interquartile range), as appropriate. Comparison between groups was performed using the independent samples t-test or Mann–Whitney U test. The chi-square test was used to analyze categorical variables. $p < 0.05$ was considered statistically significant.

RESULTS

A total of 50 female patients were included in the analysis, with 25 patients in each group. Demographic and perioperative variables, including age, body mass index, ASA physical status, and duration of surgery, were comparable between groups. (Table 1)

Table 1
Demographic Characteristics of Patients

Variable	SPSIPB Group (n = 25)	Control Group (n = 25)	P-value
Age (years)	55.9 $\pm$ 12.8	55.8 $\pm$ 11.9	0.97
Body Mass Index (kg/m ²)	26.9 $\pm$ 2.5	27.0 $\pm$ 2.8	0.88
ASA Physical Status (I / II / III)	4 / 8 / 13	4 / 9 / 12	0.99
Surgical duration (min)	106.8 $\pm$ 14.6	103.4 $\pm$ 10.8	0.34

Values are presented as mean $\pm$ standard deviation or number of patients.

Between-group comparisons were performed using the independent samples t-test for continuous variables.

The chi-square test was used to compare categorical variables, including ASA physical status.

A p-value < 0.05 was considered statistically significant.

Static and dynamic VAS scores were significantly lower in the SPSIPB group at all postoperative time points compared with the control group ($p < 0.001$ for all comparisons).

At postoperative 2 hours, static VAS scores were 3.12 ± 0.66 in the SPSIPB group versus 5.92 ± 0.70 in the control group. At 24 hours, static VAS scores decreased to 1.32 ± 0.47 in the SPSIPB group and 2.64 ± 0.48 in the control group.

Dynamic VAS scores followed a similar pattern. At 0 hours, dynamic VAS was 4.08 ± 0.95 in the SPSIPB group compared with 7.32 ± 0.80 in the control group. At 24 hours, dynamic VAS scores were 2.36 ± 0.48 and 4.16 ± 0.68 , respectively (Table 2, Fig. 1).

Table 2
Static and Dynamic VAS Scores

Time Point	SPSIPB Group	Control Group	P-value
Static VAS (0 h)	2.96 (0.78)	5.88 (0.78)	< 0.001
Static VAS (2 h)	3.12 (0.66)	5.92 (0.70)	< 0.001
Static VAS (4 h)	2.68 (0.74)	4.84 (0.80)	< 0.001
Static VAS (8 h)	2.20 (0.64)	4.20 (0.91)	< 0.001
Static VAS (12 h)	1.60 (0.50)	3.84 (0.80)	< 0.001
Static VAS (24 h)	1.32 (0.47)	2.64 (0.48)	< 0.001
Dynamic VAS (0 h)	4.08 (0.95)	7.32 (0.80)	< 0.001
Dynamic VAS (2 h)	3.92 (0.81)	6.12 (0.83)	< 0.001
Dynamic VAS (4 h)	3.36 (0.56)	5.36 (0.63)	< 0.001
Dynamic VAS (8 h)	2.68 (0.47)	5.00 (0.81)	< 0.001
Dynamic VAS (12 h)	2.44 (0.50)	4.36 (0.75)	< 0.001
Dynamic VAS (24 h)	2.36 (0.48)	4.16 (0.68)	< 0.001

Between-group comparisons performed using independent samples t-test.

Cumulative 24-hour tramadol consumption was significantly lower in the SPSIPB group compared with the control group. Since tramadol consumption data were not normally distributed, results were expressed as median (interquartile range), and between-group comparisons were performed using the Mann–Whitney U test. The median tramadol consumption was 0 mg (IQR: 0–50 mg) in the SPSIPB group and 75 mg (IQR: 50–100 mg) in the control group, demonstrating a statistically significant difference between groups ($p < 0.001$). (Table 3).

Table 3
Cumulative Tramadol Consumption

Group	Median (IQR), mg	P-value
SPSIPB Group	0 (0–50)	< 0.001
Control Group	75 (50–100)	

Data are presented as median (interquartile range). Between-group comparisons were performed using the Mann–Whitney U test due to non-normal distribution of tramadol consumption values. A p-value < 0.05 was considered statistically significant.

DISCUSSION

In this retrospective cohort study, SPSIPB was associated with significantly improved postoperative analgesia in patients undergoing unilateral mastectomy. Patients treated with SPSIPB had significantly lower static and dynamic VAS scores at all measured postoperative time points within the first 24 hours and significant reduction in opioid consumption. These results suggest that SPSIPB can be a useful adjunct to multimodal analgesic regimens, leading to improved postoperative comfort and recovery.

The present findings are in agreement with a growing body of literature supporting the analgesic efficacy of SPSIPB in breast surgery. In the first randomized controlled trial examining this technique, Studies showed that SPSIPB significantly decreased opioid requirement, early postoperative pain scores and improved recovery quality [9–10]. These high level data provide strong support for the analgesic potential of SPSIPB and an important framework for interpreting the results of the present study.

Further evidence from case series and observational studies provides additional support for these findings. Balcı et al. reported good analgesic results in patients underwent modified radical mastectomy [11]. Likewise, Gündoğdu et al. reported less analgesic consumption in reduction mammoplasty [12], Kültüroğlu et al. reported good pain control in mastectomy patients without additional opioid administration [13]. Together these studies provide evidence that SPSIPB provides consistent and reproducible analgesia in a variety of clinical settings.

SPSIPB appears to be comparable to other established regional anesthesia techniques like paravertebral block (PVB) and erector spinae plane block (ESPB) with regard to analgesic efficacy, particularly in the early postoperative period. Amr et al. found that both ESPB and PVB significantly decreased postoperative opioid use, with PVB achieving slightly better analgesia but with increased technical complexity [14]. In similar fashion, Elewa et al. found comparable postoperative pain control with ESPB versus PVB [15]. These findings indicate that SPSIPB may represent a potential alternative in the armamentarium of interfascial plane blocks.

A major strength of the present study is that it shows consistent analgesic benefits in routine clinical conditions. Randomized controlled trials are high quality studies in a controlled setting, but may not capture the full range of variation in routine clinical practice. In this scenario, the current results confirm the clinical applicability of SPSIPB and consolidate its position in the current multimodal analgesia protocols.

The opioid-sparing effect observed in this study is of particular clinical relevance. Reducing opioid use may decrease the incidence of opioid-related adverse effects such as nausea, vomiting, sedation and respiratory depression, which may facilitate early mobilization and improve overall recovery [1, 2]. These benefits are particularly relevant in breast surgery, where good pain control is closely related to short-term recovery and long-term outcomes.

Despite the promising results, some limitations should be noted. The retrospective design is subject to potential selection bias and limits the ability to establish causal relationships. Furthermore, the small sample size may limit the generalizability of the results. The analysis was restricted to the first 24

postoperative hours and did not permit assessment of longer term outcomes such as chronic post-mastectomy pain. Furthermore, no direct comparison was made with other regional techniques.

Future prospective randomized controlled trials with larger patient populations are required to validate these findings and to directly compare SPSIPB with other interfascial plane blocks. Moreover, further studies should investigate optimal dosing strategies, the role of adjuvants and the potential of SPSIPB for the prevention of chronic postoperative pain.

Abbreviations

SPSIP

Serratus Posterior Superior Intercostal Plane

VAS

Visual Analog Scale

PCA

Patient-Controlled Analgesia

ASA

American Society of Anesthesiologists

Declarations

Ethics approval and consent to participate

This retrospective study was approved by the Kütahya Health Sciences University Non-Interventional Clinical Research Ethics Committee (2024/01-33) , affiliated with Kütahya Health Sciences University. The requirement for informed consent was waived due to the retrospective nature of the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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The authors received no financial support for this study.

Authors' contributions

BK designed the study and wrote the manuscript.

EO and RK collected the data.

RK performed the statistical analyses and prepared the tables.

CB contributed to manuscript revision and scientific supervision.

All authors read and approved the final manuscript.

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Figures

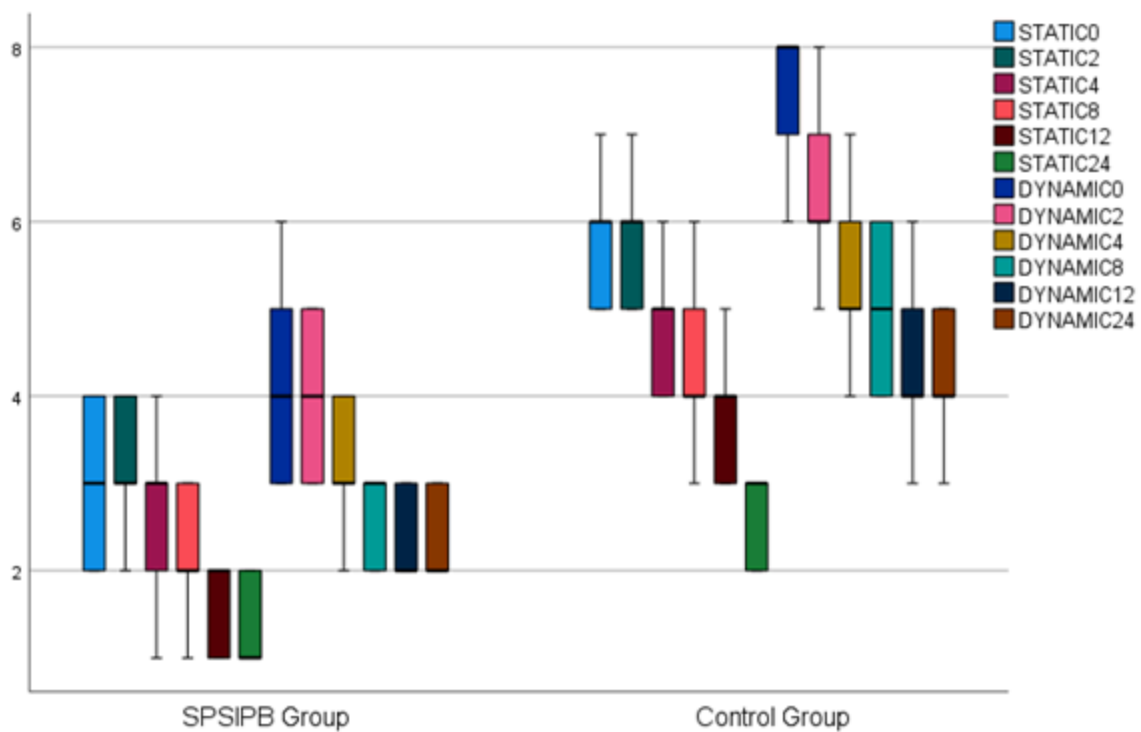


Figure 1

Static and Dynamic VAS Scores Figures