SAS Journal of Surgery
Abbreviated Key Title: SAS J Surg
ISSN 2454-5104
Journal homepage: https://www.saspublishers.com

OPEN ACCESS

Anaesthesia

Bilateral Superficial Cervical Plexus Block for Partial Thyroidectomy

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DOI: https://doi.org/10.36347/sasjs.2026.v12i01.004 | **Received:** 01.11.2025 | **Accepted:** 08.01.2026 | **Published:** 12.01.2026

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Abstract **Original Research Article**

Background: Effective pain management after thyroidectomy is essential to enhance recovery and minimize opioid-related adverse effects. Regional anesthesia techniques such as bilateral superficial cervical plexus block (BSCPB) may improve perioperative analgesia. This study aimed to evaluate the analgesic efficacy and safety of BSCPB as an adjunct to general anesthesia in patients undergoing partial thyroidectomy. ***Methods:*** This randomized controlled trial included 100 adult patients scheduled for elective partial thyroidectomy. Patients were allocated to receive either general anesthesia with BSCPB (Group A) or general anesthesia alone (Group B). Intraoperative hemodynamic parameters, opioid consumption, postoperative pain scores, analgesic requirements, adverse events and patient satisfaction were assessed. ***Results:*** Baseline demographic and surgical characteristics were comparable between groups. Group A demonstrated significantly lower intraoperative peak heart rate (85.1 ± 6.7 vs. 93.8 ± 7.2 beats/min) and mean arterial pressure (89.2 ± 6.3 vs. 95.6 ± 7.1 mmHg), alongside reduced fentanyl consumption (55.2 ± 10.3 vs. 88.5 ± 12.7 µg; $p < 0.001$). Postoperative VAS pain scores were significantly lower at all assessed intervals up to 24 hours ($p < 0.01$). Total tramadol consumption was reduced (68.2 ± 15.7 vs. 116.5 ± 21.4 mg) and time to first rescue analgesic was prolonged (435 ± 88 vs. 212 ± 66 minutes). Patient satisfaction scores were higher in Group A, with no significant increase in adverse events. ***Conclusion:*** BSCPB significantly improves perioperative analgesia, reduces opioid requirements and enhances patient satisfaction following partial thyroidectomy without compromising safety.

Keywords: Bilateral superficial cervical plexus block, partial thyroidectomy, regional anesthesia.

INTRODUCTION

Thyroid surgery is one of the most frequently performed endocrine procedures worldwide, with a steadily increasing incidence due to improved diagnostic practices and rising detection of thyroid nodules and malignancies [1]. Although thyroidectomy is generally associated with mild to moderate postoperative pain, inadequate analgesia may lead to delayed recovery, increased opioid consumption, postoperative nausea and vomiting and reduced patient satisfaction [2,3]. Optimizing perioperative pain management remains a central component of enhanced recovery pathways in thyroid surgery.

Conventional analgesic strategies following thyroidectomy primarily rely on systemic opioids and non-opioid analgesics. However, opioids are associated with well-documented adverse effects, including nausea, vomiting, respiratory depression and delayed mobilization [4]. These concerns have driven increasing interest in regional anesthetic techniques that provide effective analgesia while minimizing opioid exposure [5].

The cervical plexus block, particularly the bilateral superficial cervical plexus block (BSCPB), has emerged as a valuable adjunct for thyroid surgery performed under general anesthesia. By targeting the superficial branches of the cervical plexus, BSCPB provides analgesia to the anterolateral neck and surgical field without significant motor blockade [6]. Multiple studies have demonstrated that BSCPB reduces postoperative pain scores, opioid requirements and perioperative stress responses [7,8].

Ultrasound guidance has further enhanced the safety and efficacy of cervical plexus blocks; however, landmark-based techniques continue to be widely practiced, especially in resource-limited settings [9]. Comparative studies suggest that even landmark-guided

BSCPB can offer significant analgesic benefits when performed by experienced clinicians [10]. Moreover, BSCPB has been shown to improve intraoperative hemodynamic stability and postoperative quality of recovery [11,12].

Despite growing evidence supporting BSCPB, variability persists in study designs, block techniques, anesthetic regimens and outcome measures. In particular, data from South Asian populations remain limited and few randomized controlled trials have evaluated the impact of BSCPB on both intraoperative and postoperative outcomes in partial thyroidectomy [13,14]. Addressing this gap is important given regional differences in patient characteristics, surgical practices and perioperative care.

Therefore, this randomized controlled trial was designed to evaluate the analgesic efficacy and safety of bilateral superficial cervical plexus block as an adjunct to general anesthesia in patients undergoing elective partial thyroidectomy. The study aimed to assess intraoperative hemodynamic responses, postoperative pain scores, analgesic requirements, adverse events and patient satisfaction. By providing context-specific evidence, this study seeks to inform clinical practice and contribute to optimized perioperative pain management strategies for thyroid surgery.

Materials & Methods

This randomized controlled trial was conducted at the Department of Anaesthesiology, 300-bedded Hospital, Khanpur, Narayanganj and selected private hospitals in Narayanganj, Bangladesh, from June 2024 to July 2025. The study included 100 adult patients scheduled for elective partial thyroidectomy under general anesthesia.

Selection Criteria

Inclusion Criteria

- Adults aged 18–60 years
- ASA physical status I or II
- Scheduled for elective unilateral or partial thyroidectomy

Exclusion Criteria

- Known allergy to local anesthetics
- Coagulopathy or anticoagulant therapy
- Local infection or anatomical neck deformity
- Severe cardiopulmonary or neurological disease

Data Collection Procedure

After obtaining institutional ethical approval and written informed consent, eligible patients were randomly allocated into two equal groups (n = 50 each) using a computer-generated randomization sequence with sealed opaque envelopes to ensure allocation concealment. Group A received bilateral superficial cervical plexus block with 10 mL of 0.25% bupivacaine on each side following induction of general anesthesia, while Group B received standard general anesthesia without regional block.

Standardized anesthetic protocols were followed for all patients, including induction, maintenance and monitoring. Intraoperative heart rate, mean arterial pressure and opioid requirements were recorded. Postoperative pain was assessed using the Visual Analogue Scale at 1, 4, 8, 12 and 24 hours. Rescue analgesia was administered according to a predefined protocol and total consumption was recorded. Adverse events were monitored systematically. Data confidentiality was maintained throughout and all assessments were performed by blinded observers to minimize bias.

Statistical Analysis

Data were analyzed using SPSS version 25.0. Continuous variables were expressed as mean ± standard deviation and compared using independent t-tests. Categorical variables were analyzed using the chi-square test. A p-value < 0.05 was considered statistically significant.

Results

Table 1: Baseline Characteristics of the Study Population (n=100)

Variables		Group A (n=50)	Group B (n=50)	p-value
Age (years, Mean ± SD)		39.4 ± 9.8	40.6 ± 10.2	0.55
Gender	Male	8 (16%)	10 (20%)	0.61
	Female	42 (84%)	40 (80%)	
BMI (kg/m², Mean ± SD)		24.8 ± 3.1	25.1 ± 3.3	0.64
ASA Physical Status	I	31 (62%)	29 (58%)	0.69
	II	19 (38%)	21 (42%)	
Duration of Surgery (min, Mean ± SD)		72.5 ± 11.4	74.2 ± 12.1	0.47

Table 1 presents the demographic profiles and perioperative variables of the study population. The mean age, gender distribution, body mass index, ASA physical status and duration of surgery were comparable between Group A and Group B, with no statistically significant differences observed ($p > 0.05$ for all variables). These findings indicate appropriate

randomization and baseline homogeneity between the two groups.

Table 2: Intraoperative Hemodynamic Parameters

Parameters	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
Baseline HR (beats/min)	78.6 ± 7.9	79.4 ± 8.3	0.62
Intraoperative Peak HR (beats/min)	85.1 ± 6.7	93.8 ± 7.2	<0.001
Mean Arterial Pressure (mmHg)	89.2 ± 6.3	95.6 ± 7.1	0.002
Intraoperative Fentanyl Requirement (µg)	55.2 ± 10.3	88.5 ± 12.7	<0.001

Table 2 describes intraoperative hemodynamic responses and fentanyl requirements. Group A demonstrated significantly lower intraoperative peak heart rate and mean arterial pressure compared with Group B ($p < 0.01$). Intraoperative fentanyl consumption was also significantly reduced in Group A, indicating improved analgesic control during surgery.

Table 3: Postoperative Pain Scores (Visual Analogue Scale, 0–10)

Time Interval	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
At 1 hour	2.4 ± 1.1	4.8 ± 1.3	<0.001
At 4 hours	3.0 ± 1.2	5.2 ± 1.5	<0.001
At 8 hours	3.6 ± 1.0	5.6 ± 1.4	<0.001
At 12 hours	4.1 ± 1.2	5.8 ± 1.3	0.002
At 24 hours	3.9 ± 1.3	5.2 ± 1.5	<0.001

Table 3 shows postoperative pain scores measured at predefined intervals over 24 hours. Group A consistently reported significantly lower pain scores at all assessed time points compared with Group B ($p < 0.01$), demonstrating sustained postoperative analgesic efficacy of BSCPB.

Table 4: Postoperative Analgesic Requirements and Adverse Events

Outcomes	Group A (n=50)	Group B (n=50)	p-value
Total Tramadol Consumption (mg, Mean ± SD)	68.2 ± 15.7	116.5 ± 21.4	<0.001
Time to First Rescue Analgesic (min, Mean ± SD)	435 ± 88	212 ± 66	<0.001
Nausea/Vomiting	4 (8%)	6 (12%)	0.51
Transient Hoarseness	2 (4%)	3 (6%)	0.64
Wound Hematoma	0 (0%)	1 (2%)	0.31
Patient Satisfaction (VAS 0–10)	8.6 ± 0.9	7.2 ± 1.1	<0.001

Table 4 summarizes postoperative analgesic requirements, adverse events and patient satisfaction. Total tramadol consumption was significantly lower and time to first rescue analgesic was significantly longer in Group A ($p < 0.001$). The incidence of postoperative nausea, vomiting, transient hoarseness and wound hematoma was comparable between groups. Patient satisfaction scores were significantly higher in Group A.

DISCUSSION

The present randomized controlled trial demonstrates that bilateral superficial cervical plexus block (BSCPB) used as an adjunct to general anesthesia provides superior perioperative analgesia for patients undergoing partial thyroidectomy. Patients receiving BSCPB experienced improved intraoperative hemodynamic stability, reduced opioid consumption, lower postoperative pain scores across all time intervals, delayed need for rescue analgesia and higher overall satisfaction, without an increase in procedure-related complications.

Intraoperatively, the significantly lower peak heart rate and mean arterial pressure observed in the BSCPB group reflect effective attenuation of nociceptive stimuli. Similar hemodynamic benefits have been reported by Gurkan *et al.,* who demonstrated reduced sympathetic responses and opioid requirements in thyroid surgery patients receiving BSCPB [7]. Senapathi *et al.,* also showed that BSCPB significantly reduces anesthetic and opioid consumption during thyroidectomy, supporting the present findings [15]. Reduced intraoperative fentanyl use in the BSCPB group further underscores the block's opioid-sparing effect, which is clinically relevant given the adverse profile of perioperative opioids [4].

Postoperative pain scores were consistently and significantly lower in the BSCPB group throughout the first 24 hours. This sustained analgesic benefit aligns with findings from Mayhew *et al.,* whose meta-analysis concluded that BSCPB significantly decreases early postoperative pain following thyroid surgery [8]. Similar reductions in visual analogue scale scores have been

reported in randomized trials by Karakış *et al.,* and Shah and Kheskani, both of whom emphasized the effectiveness of BSCPB in improving postoperative comfort [13,16]. The persistence of analgesia up to 24 hours in the current study may be attributed to preemptive blockade of cervical plexus sensory pathways, limiting central sensitization.

Total postoperative tramadol consumption was significantly lower and time to first rescue analgesic was prolonged in the BSCPB group. These findings are consistent with observations by Veena et al. and Ozgun *et al.,* who demonstrated substantial reductions in rescue analgesic requirements with BSCPB [12,17]. Reduced analgesic demand not only reflects improved pain control but also contributes to enhanced recovery and reduced opioid-related adverse effects, an increasingly important goal in modern perioperative care [5].

The safety profile observed in this study further supports the clinical utility of BSCPB. The incidence of postoperative nausea and vomiting, transient hoarseness and wound hematoma did not differ significantly between groups. Similar safety outcomes have been reported by Hassan and Hashim as well as Hoh *et al.,* indicating that BSCPB does not increase procedure-related morbidity when performed correctly [9,10]. The low incidence of complications reinforces the suitability of BSCPB in routine thyroid surgery, particularly in settings where ultrasound guidance may not be universally available.

Patient satisfaction scores were significantly higher in the BSCPB group, reflecting the cumulative benefits of improved analgesia, reduced opioid exposure and smoother postoperative recovery. Enhanced patient-reported outcomes following BSCPB have also been highlighted by Yao *et al.,* who demonstrated improved quality of recovery scores in thyroidectomy patients receiving cervical plexus block [11]. Such findings align with contemporary emphasis on patient-centered outcomes in anesthesia research [18].

Overall, the present study adds region-specific evidence supporting the analgesic efficacy and safety of BSCPB in partial thyroidectomy. By demonstrating consistent benefits across intraoperative and postoperative parameters, these findings reinforce existing literature and support the integration of BSCPB into multimodal analgesic protocols for thyroid surgery, particularly in resource-constrained environments where effective, low-cost regional techniques are essential.

Limitations and recommendations

The study was limited by a single-region setting and absence of ultrasound guidance. Larger multicenter trials incorporating long-term recovery outcomes and quality-of-recovery scales are recommended to further validate these findings.

Conclusion

Bilateral superficial cervical plexus block significantly enhances perioperative analgesia in patients undergoing partial thyroidectomy under general anesthesia. Its use results in improved intraoperative hemodynamic stability, reduced opioid consumption, lower postoperative pain scores, delayed rescue analgesic requirements and higher patient satisfaction, without increasing adverse events. BSCPB represents an effective and safe component of multimodal analgesia for thyroid surgery.

Funding: No funding sources

Conflicts of interest: There are no conflicts of interest.

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