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A COMPARATIVE STUDY TO KNOW THE EFFICACY OF BILATERAL SUPERFICIAL CERVICAL PLEXUS BLOCK FOR INTRA-OPERATIVE AND POST-OPERATIVE ANALGESIA IN ELECTIVE THYROID SURGERY

Anaesthesiology

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ABSTRACT

Background: Thyroidectomy is associated with moderate to severe postoperative pain, often necessitating opioid analgesia, which may cause adverse effects. Bilateral superficial cervical plexus block (BSCPB) provides targeted analgesia with minimal systemic toxicity, reduces anesthetic requirements, and minimizes opioid-related side effects. **Aim:** To determine the efficacy and safety of bilateral superficial cervical plexus block as an adjunct to general anesthesia for intra-operative and postoperative analgesia in thyroid surgery. **Methods:** In this comparative interventional study, 36 ASA I–III patients aged 18–65 years undergoing elective thyroid surgery were divided into two groups (n = 18) by simple random sampling technique. Group A received general anesthesia plus BSCPB with 0.5% ropivacaine (20 mL) and buprenorphine (3 mcg/kg), while Group B received general anesthesia alone. Hemodynamic parameters were recorded pre-, intra-, and post-operatively. Postoperative pain was assessed using Visual Analogue Scale (VAS) scores, and analgesic requirements and complications were documented. Statistical analysis used Student's t-test, Chi-square, or Fisher's exact test, with $p \leq 0.05$ considered significant. **Results:** Group A showed significantly lower intra-operative anesthetic requirements, better hemodynamic stability, reduced postoperative pain scores, prolonged analgesia, and decreased need for rescue analgesics compared to Group B ($p \leq 0.05$). No major block-related complications were observed. **Conclusion:** Bilateral superficial cervical plexus block is a safe and effective adjunct to general anesthesia for thyroidectomy, providing superior intra- and post-operative analgesia with minimal complications.

KEYWORDS

INTRODUCTION

Thyroid disorders are among the most common endocrine diseases worldwide, and their prevalence has steadily increased over the past few decades [1]. Surgical management, including partial and total thyroidectomy, remains a cornerstone of treatment for various benign and malignant thyroid conditions [2]. Despite being a relatively short and superficially located procedure, thyroidectomy is associated with moderate to severe postoperative pain, particularly within the first 24 hours following surgery. Effective pain control is essential to improve patient comfort, facilitate early mobilization, and enhance recovery [3,4].

Traditionally, systemic analgesics such as opioids and non-steroidal anti-inflammatory drugs (NSAIDs) have been used for post-thyroidectomy pain management. However, these medications are often associated with undesirable side effects such as nausea, vomiting, respiratory depression, sedation, and delayed recovery [5]. Consequently, emphasis has shifted toward multimodal analgesia, which combines different classes of analgesics and techniques to achieve optimal pain control while minimizing opioid consumption and related complications [6].

In recent years, regional anesthesia techniques, particularly peripheral nerve blocks, have gained prominence as valuable components of multimodal analgesia. Bilateral superficial cervical plexus block (BSCPB) has emerged as a promising method for pain control following thyroid surgery [7].

The cervical plexus arises from the ventral rami of C2–C4 spinal nerves and provides sensory innervation to the skin and superficial structures of the anterolateral neck, clavicle, and auricular region [8]. The superficial branches—transverse cervical, supraclavicular, greater auricular, and lesser occipital nerves emerge at the midpoint of the posterior border of the sternocleidomastoid muscle. Administration of a superficial cervical plexus block at this landmark effectively anesthetizes the surgical field during thyroid surgery and provides prolonged postoperative analgesia [9]. Although ultrasound guidance improves the accuracy of regional anesthesia, its availability remains limited in many centres due to restrictions under India's PCPNDT Act. Landmark-guided BSCPB is a safe, effective, and practical alternative in such settings, providing reliable postoperative analgesia without specialized equipment.

Ropivacaine, an S-enantiomer amide local anesthetic, is widely used for regional anesthesia and postoperative analgesia. Compared with bupivacaine, it is less cardiotoxic and produces less motor blockade while maintaining effective analgesia [10].

Several randomized controlled trials have investigated the role of BSCPB in perioperative pain management for thyroid surgery. Many studies have demonstrated that BSCPB is well tolerated, provides superior analgesia compared with systemic analgesics alone, and reduces opioid requirements [11,12]. Nevertheless, the literature remains divided regarding its efficacy in controlling intraoperative discomfort and its overall impact on postoperative recovery, possibly due to variations in block technique, local anesthetic dose, and use of ultrasound guidance.

Given these uncertainties, further research is warranted to assess the efficacy, safety, and clinical advantages of bilateral superficial cervical plexus block in patients undergoing thyroid surgery. Understanding its role within a multimodal analgesic regimen may help optimize perioperative care, reduce opioid use, and enhance postoperative recovery [6,11].

We conducted a comparative study to evaluate the efficacy of landmark-guided bilateral superficial cervical plexus block (BSCPB) for intraoperative and postoperative analgesia in thyroid surgery.

AIMS AND OBJECTIVES

Aim:

To determine the efficacy of bilateral superficial cervical plexus block (BSCPB) for intra-operative and postoperative analgesia in patients undergoing thyroid surgery.

Primary Objectives:

1. To determine the total duration of analgesia achieved.
2. To record the time required to first rescue analgesic.

Secondary Objectives:

1. Assessment of intra- and post-operative hemodynamic parameters.
2. Evaluation of side effects and complications.

MATERIALS AND METHODS:

Study Design: Comparative interventional study

Study Period: 3 months
Study Population: Patients with age group of 18-65 years posted for elective thyroid surgery.

Inclusion Criteria:
- ASA grade I–lll
- Age 18–65 years
- Elective total thyroidectomy

Exclusion Criteria:
- Denial of consent
- Infection at the site of injection
- Patient with Retrosternal goitre
- Patient with Coagulation disorders

Methodology

The study was conducted in a tertiary care hospital after obtaining approval from the institutional ethical committee, written informed consent was obtained from all participants. This comparative interventional study included 36 patients, aged 18–65 years, classified as ASA I, II or III, who were scheduled for elective thyroid surgery under general anesthesia.

All patients underwent a detailed pre-anesthetic evaluation, including history, physical examination, and appropriate investigations. The study protocol and the use of the Visual Analogue Scale (VAS) for pain assessment were explained, and written informed consent was obtained. Patients were instructed to fast for 8 hours prior to surgery.

Patients were randomly allocated into two groups of 18 each by simple random sampling technique.
- Group A: Received general anesthesia combined with bilateral superficial cervical plexus block (BSCPB).
- Group B: Received general anesthesia alone.

Upon arrival in the operating theatre, standard monitors were attached, including non-invasive blood pressure (NIBP), ECG, pulse oximetry, and respiratory rate measurement. Baseline hemodynamic parameters—heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), oxygen saturation (SpO_2), and respiratory rate—were recorded. Intravenous access was established, and patients were premedicated with ondansetron 0.08 mg/kg IV and preloaded with Ringer Lactate 10 mL/kg. Glycopyrrolate 0.004 mg/kg, Midazolam 0.03 mg/kg, and Nalbuphine 1 mg/kg were administered intravenously. Patients were preoxygenated with 100% O_2 via facemask.

Anesthesia was induced with thiopentone 3 mg/kg IV, followed by succinylcholine 1 mg/kg for facilitation of endotracheal intubation. Appropriate-size endotracheal tubes were placed under laryngoscopic guidance. Anesthesia was maintained with O_2, N_2O, and isoflurane, and incremental doses of vecuronium 0.01 mg/kg were administered as needed.

For patients in Group A, BSCPB was performed after induction. The neck was turned to one side, and the posterior border of the sternocleidomastoid (SCM) muscle was palpated. A line from the mastoid process to the C6 vertebra transverse process was drawn along the posterior border of the SCM, and the midpoint was marked as the injection site. Using a three-point injection technique, a total of 20 mL of 0.5% ropivacaine with 90 µg buprenorphine was injected, 10 mL per side. The procedure was repeated on the contralateral side. Group B patients received only general anesthesia without BSCPB. At the end of surgery, neuromuscular blockade was reversed with glycopyrrolate 0.008 mg/kg and neostigmine 0.05 mg/kg IV. Intraoperative hemodynamic parameters (HR, SBP, DBP, MAP, SpO_2, respiratory rate) were monitored continuously, and no additional analgesics were administered. Postoperative pain was assessed using the VAS every 2 hours, and hemodynamic parameters were recorded at the same intervals until recovery. Any complications postoperatively was noted.

Statistical Analysis
- Software: SPSS version 22.0
- Continuous variables: Student's t-test
- Categorical variables: Chi-square or Fisher's exact test
- $p \leq 0.05$ was considered statistically significant

RESULTS AND OBSERVATIONS:

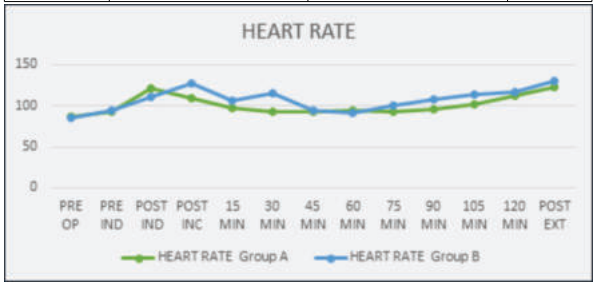
Table 1: Demographic Data

Demographic variable	Group A	Group B
AGE	49.11±10.72	50.833±11.15
ASA	1.77±0.64	1.88±0.67
SEX		
Female	15	16
Male	3	2

Table 2: Intra- Operative Hemodynamic Data

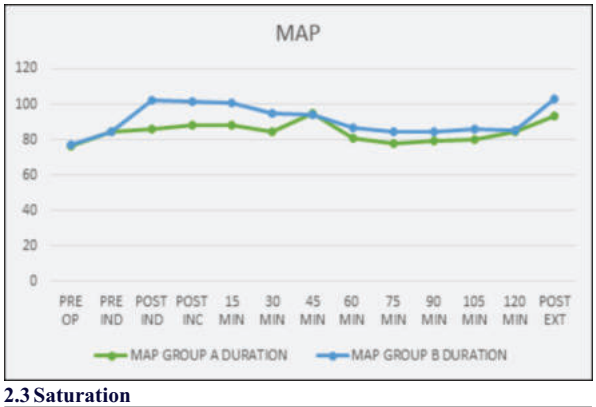
2.1 Heart Rate

Duration	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
PRE-OP	87.11 ± 10.9	85.33 ± 17.02	0.4116
PRE IND	92.61 ± 10.72	94.94 ± 13.58	0.7584
POST IND	121.44 ± 14.7	110.5 ± 13.24	0.0053
POST INC	109.88 ± 9.16	127.88 ± 9.59	< 0.0001
15 MIN	98 ± 11.3	106.27 ± 11.99	0.0419
30 MIN	93.27 ± 8.6	115.83 ± 10.24	< 0.0001
45 MIN	93.61 ± 8.09	94.66 ± 10.14	0.7267
60 MIN	94.55 ± 8.5	91.16 ± 8.3	0.0041
75 MIN	92.94 ± 6.12	100.83 ± 12.23	0.0036
90 MIN	95.72 ± 10.77	108.5 ± 6.61	0.0005
105 MIN	101.5 ± 4.31	114.56 ± 5.73	< 0.0001
120 MIN	112.22 ± 12.65	116.89 ± 7.37	0.3261
POST EXT	122.94 ± 8.59	130.94 ± 6.68	0.0009



2.2 Mean Arterial Pressure

Duration	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
PRE-OP	76.44 ± 6.33	77.27 ± 4.41	0.9778
PRE IND	84.83 ± 9.25	84.72 ± 6.45	0.3917
POST IND	85.88 ± 6.72	102.05 ± 7.08	< 0.0001
POST INC	88.05 ± 6.65	101.83 ± 11.78	0.0003
15 MIN	87.88 ± 5.86	100.44 ± 6.4	< 0.0001
30 MIN	84.44 ± 3.03	94.94 ± 10.5	< 0.0001
45 MIN	95.11 ± 15.30	93.88 ± 11.13	0.9046
60 MIN	80.83 ± 4.06	86.38 ± 6.18	0.0026
75 MIN	77.83 ± 4.01	84.22 ± 4.97	0.0007
90 MIN	79.33 ± 4.41	84.83 ± 3.01	< 0.0002
105 MIN	80.22 ± 3.60	86.22 ± 8.39	0.0176
120 MIN	84.83 ± 4.97	85.0 ± 6.02	0.7289
POST EXT	93.05 ± 7.09	102.88 ± 5.9	0.0003



2.3 Saturation

Duration	Group A (Mean ± SD)	Group B (Mean ± SD)	P-Value
PRE-OP	97.33 ± 1.97	98.22 ± 1.55	0.0567
PRE IND	98.05 ± 10.83	98.27 ± 1.22	0.9123
POST IND	99.77 ± 0.42	99.72 ± 0.46	0.6618
POST INC	100 ± 0.00	99.72 ± 0.46	0.0015
15 MIN	99.16 ± 0.51	99.77 ± 0.54	< 0.05
30 MIN	99.77 ± 0.54	99.72 ± 0.66	0.7493
45 MIN	99.77 ± 0.42	99.72 ± 0.57	0.7003
60 MIN	100 ± 0.00	99.66 ± 0.48	< 0.05
75 MIN	99.77 ± 0.54	99.61 ± 0.77	0.3553

90 MIN	99.94 ± 0.23	99.44 ± 0.51	<0.05
105 MIN	99.88 ± 0.32	99.61 ± 0.69	0.0567
120 MIN	99.77 ± 0.54	99.77 ± 0.42	1
POST EXT	98.44 ± 1.14	98.50 ± 1.24	0.846

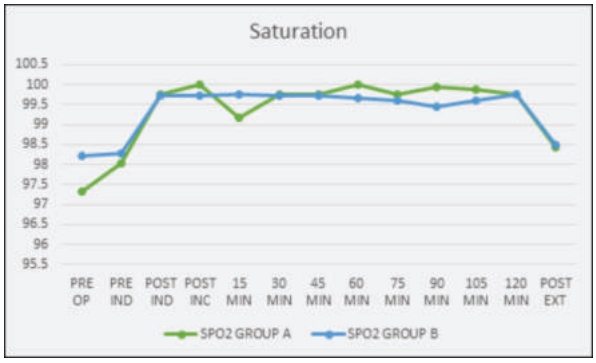


Table 3: VAS Score

Time	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
IMME	2.94 ± 0.99	3.94 ± 1.21	0.2826
4HRS	3.22 ± 0.94	5.33 ± 0.84	< 0.05
8 HRS	3.88 ± 0.83	6.77 ± 0.80	< 0.05
12 HRS	5.55 ± 0.61	7.72 ± 0.46	< 0.05

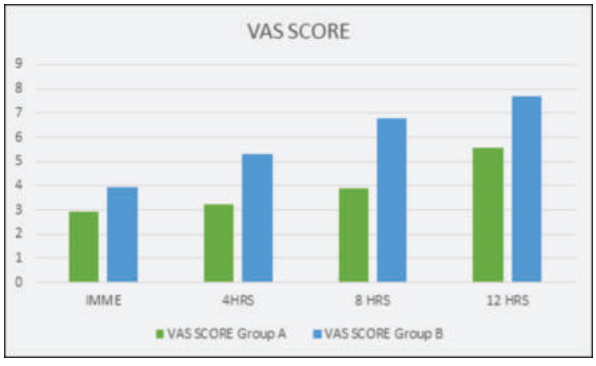


Table 4: Variables

VARIABLE	Group A	Group B
Duration of anaesthesia	127.38 ±4.79	129.5±6.27
Duration of surgery	107.05±4.81	119±8.13
Duration of BSCPB	270.38±21.4	NA
Time for rescue analgesia	242.77±17.14	42.11±7

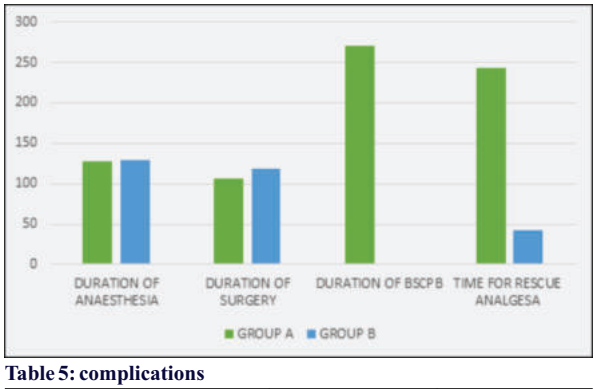


Table 5: complications

Complication	Group A (n=18)	Group B (n=18)
Respiratory Depression	0	0
LAST	0	0
Hoarseness of Voice	1	1
Hematoma	0	0

- No significant difference was seen in age wise distribution among patients in both the group as observed p value was P- 0.9203 which was >0.05.
- No significant difference was seen in gender wise distribution among patients in both the group as observed p value was p-0.4256 which was >0.05.
- No significant difference was seen in the distribution of ASA grade among patients in both the groups.
- Baseline hemodynamic parameters, including HR and MAP, were similar between the BSCPB and control groups ($p > 0.05$)
- No significant difference was seen in the mean baseline heart rate among patients in both the group as observed p value which was >0.05. Post-induction and post-incision, Group B demonstrated significantly higher HR ($p = 0.0053$ and $p < 0.0001$).
- MAP was significantly lower in the BSCPB group immediately after incision ($p = 0.0003$) and throughout the first 90 minutes of surgery.
- Immediate postoperative pain scores were similar ($p = 0.2826$); however, at 4, 8, and 12 hours postoperatively, Group A reported significantly lower VAS scores ($p < 0.0001$).
- No significant difference was seen in mean SPO2 among patients in both groups.
- Oxygen saturation remained stable in both groups. No significant difference was seen in mean SPO2 among patients in both group in entire intra-operative and postoperative period with p value >0.05.
- No major complications occurred, with minor complications being rare and comparable. Overall, Group A provided better postoperative pain control and more stable hemodynamics while maintaining safety.

DISCUSSION

In the present study, "A Comparative Study to Evaluate the Efficacy of Bilateral Superficial Cervical Plexus Block (BSCPB) for Intra-operative and Post-operative Analgesia in Elective Thyroid Surgeries," we assessed the efficacy and safety of BSCPB as an adjunct to general anesthesia in patients undergoing Elective Thyroid surgery. The landmark-based bilateral superficial cervical plexus block is a simple and practical technique that offers significant advantages in thyroid surgery. By relying on easily identifiable surface landmarks, it can be performed quickly without the need for specialized equipment, making it especially useful in resource-limited settings, since ultrasound guidance is not universally available due to legal and regulatory limitations in some regions.

The primary objectives were to evaluate intra-operative hemodynamic responses, postoperative analgesic quality, analgesic duration, rescue analgesic requirements, and any associated complications.

In this study, 36 patients were enrolled and equally divided into two groups. Demographic parameters, including age, sex, and ASA physical status, were comparable between the two groups. The mean age was 49.11 ± 10.72 years in Group A and 50.83 ± 11.15 years in Group B, with no statistically significant difference ($p = 0.9203$). Gender distribution was also similar (Group A: 3 males, 15 females; Group B: 2 males, 16 females; $p = 0.4256$) this difference was not statistically significant and ASA grades were comparable. Overall, these demographic variables were evenly matched, indicating that baseline characteristics were unlikely to influence study outcomes.

Baseline hemodynamic parameters, including HR and MAP, were similar between the BSCPB and control groups ($p > 0.05$), suggesting appropriate randomization and minimizing the influence of preoperative factors. Following induction of anesthesia and particularly after surgical incision, the BSCPB group exhibited significantly lower HR and MAP compared to the control group. Post-induction HR in the BSCPB group was lower (121.44 ± 14.7 bpm) compared to the control group (110.5 ± 13.24 bpm, $p = 0.0053$), and MAP was significantly lower in the BSCPB group immediately after incision (88.05 ± 6.65 mmHg vs. 101.83 ± 11.78 mmHg, $p = 0.0003$) and throughout the first 90 minutes of surgery. These decreases are clinically relevant, reflecting effective analgesia and reduced nociceptive transmission from the operative field [13]. BSCPB likely diminished afferent pain signals from the C2–C4 dermatomes, thereby attenuating the neuroendocrine stress response [11]. This hemodynamic stability contributes to smoother intraoperative management and may reduce the need for additional anesthetic or opioid supplementation. Similar findings have been reported in previous clinical trials, supporting the reproducibility of these outcomes.

Postoperative pain assessment using the Visual Analog Scale (VAS) revealed a clear advantage for patients receiving BSCPB [14]. Immediate postoperative VAS scores did not differ significantly between groups, likely due to residual effects of general anesthesia and intraoperative opioids. However, at 4, 8, and 12 hours postoperatively (4 hours: 3.22 vs. 5.33, $p < 0.001$; 8 hours: 3.88 vs. 6.77, $p < 0.001$; 12

hours: 5.55 vs. 7.72, $p < 0.001$), the BSCPB group demonstrated significantly lower VAS scores ($p < 0.001$), indicating sustained analgesic benefit. This prolonged pain relief not only reduces the intensity of discomfort but also delays the need for rescue analgesia, enhancing patient satisfaction and comfort. Improved pain control at these time points also reduces postoperative opioid requirements, facilitates early mobilization, and minimizes opioid-related adverse effects such as nausea, vomiting, and sedation. The prolonged analgesic effect aligns with pharmacological expectations, particularly when long-acting local anesthetics are used for BSCPB.

Regarding safety, oxygen saturation remained stable throughout the study, and no major complications related to the block were observed. Potential adverse events, such as hematoma, local anesthetic systemic toxicity, diaphragmatic paresis, or nerve injury, did not occur. The superficial nature of BSCPB, combined with anatomical familiarity in thyroid surgery, likely contributes to its low complication rate [15]. This safety profile is consistent with published literature, which reports that BSCPB is generally well-tolerated with minimal adverse effects when administered correctly.

The findings of the present study are consistent with previous investigations, which have demonstrated reduced intraoperative opioid consumption, better hemodynamic stability during surgical stimulation, and lower postoperative pain scores with delayed requirement for rescue analgesia. These results reinforce the growing body of evidence supporting the integration of BSCPB into standard anesthesia protocols for thyroidectomy.

Given its safety, simplicity, and significant analgesic benefits, BSCPB can be recommended as part of multimodal analgesia for thyroid surgeries. Its use may improve overall patient experience, shorten PACU stay, reduce opioid consumption, and enhance postoperative recovery pathways.

The block was well tolerated, with no major complications such as respiratory depression, diaphragmatic paresis, or nerve injury. Minor complications, including hoarseness of voice, hematoma, and one case of local anesthetic systemic toxicity, were rare and comparable between groups, reinforcing the favorable safety profile of BSCPB when performed by experienced clinicians.

CONCLUSION

Bilateral superficial cervical plexus block (BSCPB) is a safe and effective adjunct to general anesthesia in thyroid surgery. It provides superior intra- and postoperative analgesia, stabilizes hemodynamics, reduces analgesic requirements, and has minimal complications, supporting its routine use in multimodal analgesia protocols.

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