

Study of Analgesic Efficacy of Bilateral Superficial Cervical Plexus Block Administered Before Thyroid Surgery under General Anesthesia

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Received: 01-06-2026 / Revised: 15-07-2026 / Accepted: 21-08-2026

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Conflict of interest: Nil

Abstract

Background: It is suggested that using a bilateral superficial cervical plexus block (BSCPB) might influence the pattern of immediate postoperative pain and analgesic consumption. Hence, the efficacy of BSCPB is a novel technique.

Method: 90 (ninety) patients were selected for BSCPB with a saline group P (n = 40 patients). Ropivacaine 0.487% = Group R (n = 30 patients). Ropivacaine 0.487% plus 10 µg/mL and 5 µg/mL = group RC (n = 10 patients). Sufentanil was given during the intraoperative period for a 20% increase in arterial mean pressure or heart rate in patients with a bispectral index between 40 and 60. All patients received 4 gm of acetaminophen during the first 24 hours after surgery. The pain score was checked every 4 hours, and nefopam was given to reduce pain with scores >4 on a numeric pain scale.

Results: The comparison of the mean values of demographic characteristics, age, height, and duration of surgery (minutes) remains insignificant (p>0.001), thus indicating all groups have similar parameters. In the comparison of SBP at the end of resection, incision, and extubation, there was a significant p-value (p<0.001). In comparison and operative requirement, sufentanil (mg/kg) had a significant p-value (p<0.001) pain score in PACU; a pain score >6 was observed in group P.

Conclusion: It is proved that group RC (Ropivacaine + Clonidine) was significantly effective in the management of pain reduction and ideal as an anesthetic agent to maintain hemodynamic status.

Keywords: Post-Anesthesia Care Unit (PACU), Visual Analgesic Scale, Thyroidectomy, Clonidine, Ropivacaine.

DOI: 10.25258/ijcpr.18.9.83

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Introduction

Thyroid surgery is a leading endocrine surgery worldwide. Despite the huge implications, the analgesic efficacy of bilateral superficial cervical plexus block for thyroid surgery is a novel method. It is strongly suggested that pain severity and perception have significant differences among the patients [1]. Bilateral superficial cervical plexus block (BSCPB) may reduce the analgesic requirement. This technique consists of bilateral injection of local anesthetic behind the lateral border of the sternocleidomastoid muscle, producing surface anesthesia of the neck [2]. A two- or three-point injection technique can be used. Unlike the two-point technique, the three-point technique allows blockade of the transverse cervical branches of the plexus. However, the effectiveness of this technique in decreasing levels of pain after thyroidectomy is debated [3]. It is also

reported that it decreases the pain score and rescue analgesic requirement [4]. Hence, to minimize the opioid-related adverse outcomes and cost. Hence, an attempt is made to evaluate the efficacy of bilateral superficial cervical plexus block (BSCPB) administered before thyroid surgery.

Material and Method

90 (ninth) adult patients admitted to PSP Medical College, Hospital and Research Centre, Oragadam, Panruti Sriperumburam (Taluk), Kanchipuram (Dist)-631604, Tamil Nadu, were studied.

Inclusive Criteria: ASA physical status I–II patients undergoing elective thyroid surgery under general anaesthesia who gave their consent in writing were selected for the study.

Exclusion Criteria: Patients with allergies to opioid or non-opioid analgesics, corticosteroids or non-steroidal anti-inflammatory drugs, coagulation disorders, pregnancy, age below 18 years, and refusal for general anaesthesia were excluded from the study.

Method: Out of 90 (ninety) patients, they were classified into three groups by the lottery system: group P received isotonic sodium chloride, and group R received 0.487% ropivacaine.

In group RC, ropivacaine 0.487 plus clonidine 50 µg. Sufentanil was given during the intra-operative period for a 20% increase in arterial mean pressure or heart rate in patients with a bispectral index between 40 and 60. All patients received 4 gm of acetaminophen during the first 24 hours after the operation. The pain score was checked every 4 hours, and neopam was given for a pain score >4 on the numeric pain scale.

Anaesthesia was standardised. Patients were pre-medicated with hydroxyzine (1.5 mg/kg orally) 2 hours before the surgery. General anaesthesia was induced using propofol (2–3 mg/kg) and sufentanil (0.3 µg/kg).

Tracheal intubation was facilitated by the administration of atracurium 0.5 mg kg⁻¹. General anaesthesia was maintained with sevoflurane (0.5–1.8%) in an oxygen/nitrous oxide mixture (60/40%).

The sevoflurane was adjusted to maintain a bispectral index (BIS: Aspect Medical Systems, Newton, MA, USA) between 40 and 60. Additional doses of sufentanil (0.15 µg/kg) were administered for variations of systolic blood pressure (SBP) and heart rate (HR) of more than 20% when compared with the values measured before operation. All the patients were admitted to PACU (post-anaesthetic care unit).

BSC PB (bilateral superficial cervical plexus block) was performed under general anaesthesia before incision using a three-point injection technique. 10 ml of the prepared mixture were injected into each side using the same puncture orifice.

A 23-gauge SC short bevelled needle was inserted 2 cm above the clavicle along the posterior border of the clavicular head of the sternocleidomastoid muscle. After an aspiration test, an S.C. injection of 6 ml of the prepared mixture was performed in the cephalic direction.

Then the needle was reoriented in the medial direction above the sternocleidomastoid muscle, and 3 ml of the prepared mixture was injected. These first two injections allow anaesthesia of the greater auricular and transverse cervical nerves. Finally, 1 ml of the mixture was injected S.C. at the

point of puncture to block supraclavicular nerves. The depth of the mixture injection was not >5 mm. In order to prevent blockage of the phrenic nerve or recurrent laryngeal nerve, a postoperative laryngoscopy was performed to evaluate laryngeal palsy before the transfer of the patient to PACU. Intra-operatively, SBP and HR were recorded by the monitor at induction, incision, the end of resection, and extubation. The duration of surgery and sufentanil requirements were also recorded. The postoperative pain score in PACU and the number of patients who had a pain score >6 was also recorded.

The duration of the study was June 2005 – June 2026.

Statistical Analysis: The mean value of characteristics of patients from different groups and the comparison of SBP in different groups were compared with an ANOVA test, and significant values were noted. Intraoperative and postoperative pain scores were compared with an ANOVA test, and significant values were noted. The statistical analysis was carried out in SPSS software. The ratio of males and females was 1:2.

Observation and Results

Table 1: Comparison of demographic characters—Age (year), Height (cm), and Duration of surgery had an insignificant p-value ($p > 0.656$).

Table 2: Comparative study of blood pressure (systolic) recorded (SBP) mm/Hg (median range) at induction incision end of resection and extubation,

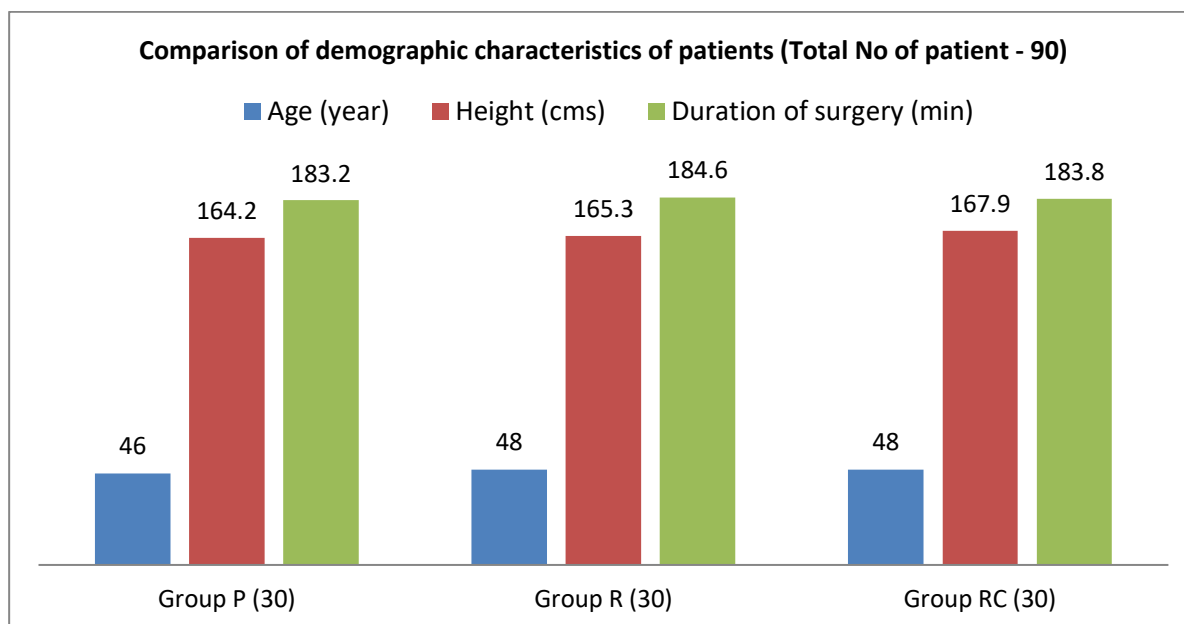
- Induction: 159 (± 10) in group P, 152 (± 9) in group R, 152 (± 9) in group RC, F value 5.61, and $p < 0.001$.
- Incision: 119 (± 5) in group P, 118 (± 8) in group R, 113 (± 6) in group RC, F value 7.44, and $p < 0.001$.
- End of resection: 148 (± 9) in group P, 138 (± 7) in group R, 128 (± 10) in group RC, F value 35, and $p < 0.001$.
- Extubation: 162 (± 14) in group P, 152 (± 8) in group R, 143 (± 9) in group RC, F value 23.8.

Table 3: Comparative study of intraoperative and postoperative requirements and pain score

- Intraoperative supplementary sufentanil (μkg^{-1}): 0.616 (± 0.02) in group P, 0.476 (± 0.06) in group R, 0.328 (± 0.05) in group RC, F value 287.1, and $p < 0.001$.
- Pain Score in PACU: 5 (0-8) in group P, 333 (0-12) in group R, 3 (0-9) in group RC.
- Number of patients who had a pain score >6: 7 (23.3%) in group P, 5 (16.6%) in group R, and 3 (10%) in group RC. The mean pain score was 4 (0-11) in PACU.

Table 1: Comparison of demographic characteristics of patients (Total No of patient - 90)

characteristics	Group P (30)	Group R (30)	Group RC (30)	F Value	p-value
Age (year)	46 (± 10.5)	48 (± 9.8)	48 (± 8.8)	0.423	P>0.656
Height (cms)	164.2 (± 8.2)	165.3 (± 8.3)	167.9 (± 8.4)	1.57	P>0.213
Duration of surgery (min)	183.2 (± 11.5)	184.6 (± 8.4)	183.8 (± 7.5)	0.174	P>0.841

**Figure 1: Comparison of demographic characteristics of patients (Total No of patient - 90)****Table 2: Comparative study of Systolic Blood Pressure (SBP) mm / Hg (median range) recorded at induction, incision, end of resection and extubation (Total No of patient - 90)**

Details	Group P (30)	Group R (30)	Group RC (30)	F Value	p-value
Induction	159 (± 10)	152 (± 9)	152 (± 9)	5.611	P<0.001
Incision	119 (± 5)	118 (± 8)	113 (± 6)	7.44	P<0.001
End of resection	148 (± 9)	138 (± 7)	128 (± 12)	35.0	P<0.001
Extubation	162 (± 14)	152 (± 8)	143 (± 9)	23.8	P<0.001

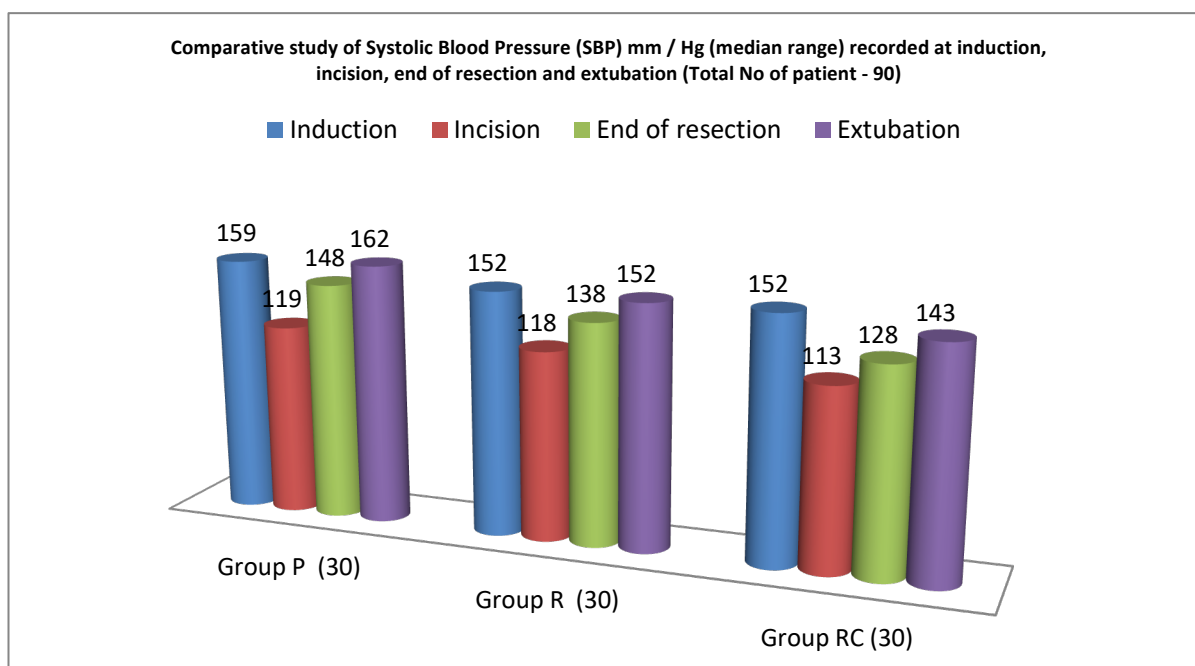
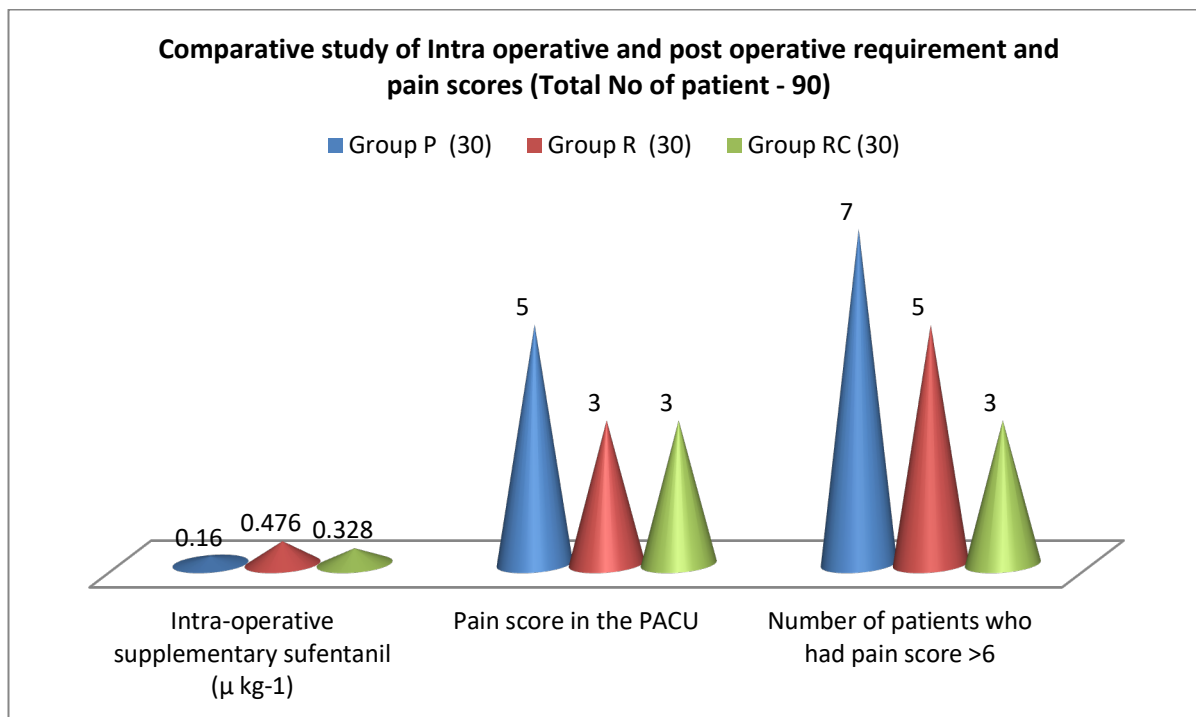
**Figure 2: Comparative study of Systolic Blood Pressure (SBP) mm / Hg (median range) recorded at induction, incision, end of resection and extubation (Total No of patient - 90)**

Table 3: Comparative study of Intra operative and post-operative requirement and pain scores (Total No of patient - 90)

Details	Group P (30)	Group R (30)	Group RC (30)	F Value	p-value
Intra-operative supplementary sufentanil ($\mu\text{ kg}^{-1}$)	0.616 (± 0.02)	0.476 (± 0.06)	0.328 (± 0.05)	287.1	$P < 0.001$
Pain score in the PACU	5(0-8)	3(0.12)	3 (0-9)	--	--
Number of patients who had pain score >6	7 (23.3%)	5 (16.3%)	3 (10%)	--	--

Mean pain score 4(0-11) in PACU

**Figure 3: Comparative study of Intra operative and post operative requirement and pain scores (Total No of patient - 90)**

Discussion

Present study of the analgesic efficacy of a bilateral superficial cervical plexus administered before thyroid surgeries under general anesthesia. In a comparative study of mean values of demographic characteristics of patients of different groups, they were more or less the same; hence, the p-value was insignificant ($p > 0.82$) (Table-1). In a comparative study of systolic blood pressure (SBP) mm/Hg (median, range) at the induction, incision, end of resection, and extubation in three groups, there was a significant p-value ($p < 0.001$) (Table-2). In the comparison study of intraoperative supplementary sufentanil (mg/kg), which had a significant p-value ($p < 0.001$), the pain score was 6 (0-8) in group P, 3 (0-12) in group R, and 3 (0-9) in group RC. Then the number of patients who had a pain score >6 was 7 (23.3%) in group P, 6 (16.6%) in group R, and 3 (10%) in group RC (Table 3). These findings are more or less in agreement with previous studies [5,6,7]. This study confirmed that BSCPB with general anesthesia reduced postoperative pain and analgesic consumption in patients who underwent thyroid surgery. Compared to those who received

only general anesthesia [8]. VAS was considerably reduced in BSC PB patients during intraoperation and post-surgery. The efficacy of post-thyroidectomy BSC PB in opioid consumption is a matter of debate. This study also found the block group required less sufentanil than the general anesthetic group [9].

Severe postoperative pain control increases the level of stress hormones and the rate of perioperative complications; hence, general anesthesia alone is often insufficient, as postoperative analgesia and additional doses can manage the postoperative pain.

It is also reported that PSCP significantly reduces nausea and vomiting in the postoperative period [10]. Hence, in the present study, not a single case of nausea and vomiting is reported. It is suggested that BSCPB did not provide optimal pain treatment for postoperative analgesia, but general anesthesia was prolonged to manage to reduce the VAS score, or pain score [11].

For the successful blockage, injecting superficially on the superior brachial plexus is recommended in previous studies [12], as in the present, a three-point blockade was performed to get satisfactory results during intraoperative and postoperative management of the pain score.

Summary and Conclusion: Present study of the analgesic efficacy of BSC PB under general anesthesia. The patients were administered ropivacaine, and clonidine had improved intraoperative analgesia.

These combinations were quite efficient in managing the VAS score by reducing the analgesic requirement after thyroid surgery. The present study demands that such clinical trials have to conduct on a larger number of patients to combat the adverse effects and validate the significant findings of the present study.

Limitation of study: Owing to remote locations of the research center, small number of patients, and lack of latest techniques, we have limited findings and results.

This research paper is approved by the Ethical Committee of PSP Medical College, Hospital and Research Institute, Oragadam, Kanchipuram (Dist)-631604, Tamil Nadu, India.

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