

**Preemptive Bilateral Superficial Cervical Plexus Block and Perioperative Requirement of Inhalational agents and Opioids in Thyroid Surgery- A Randomized Comparative Study.**

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**Abstract**

**Background and Aim:** Bilateral superficial cervical plexus block (BSCPb) is an effortless and uncomplicated technique that provides excellent analgesia as well as reduces perioperative requirement of anesthetic agents. We evaluated the effects of BSCPb with 0.5% levo bupivacaine and clonidine on perioperative consumption of inhalational agents and opioids in patients undergoing thyroid surgeries.

**Materials and Methods:** In this prospective comparative study, fifty-two adult patients of age between 28-60 years and ASA grade I and II undergoing thyroid surgeries were randomized into two equal groups, group L received BSCPb with 0.5% levo bupivacaine (19ml) and clonidine as an adjuvant and group F received iv fentanyl

2µg/kg before induction of anaesthesia. Intraoperative consumption of sevoflurane (Vol%), BIS for depth of anaesthesia, post - operative visual analogue scale (VAS) and peri - operative consumption of opioids were recorded.

**Results:** There was significantly reduced requirement of sevoflurane (Vol %) in BSCPb group at 15, 30, 60 and 120 min ( $p < 0.001$ ) and opioids during intra-operative period (0vs.  $94.23 \pm 38.28$  µg;  $p < 0.001$ ) as well as during post-operative period ( $153.85 \pm 76$  vs.  $253.84 \pm 50.84$  mg;  $p < 0.001$ ). Patients of BSCPb group had longer duration of analgesia ( $1001.54 \pm 525.75$  vs.  $636.92 \pm 310.65$  min;  $p = 0.004$ ) and higher patient satisfaction score (8 [7-9] vs. 6 [5-6];  $p < 0.001$ ).

Hemodynamic stability was comparable in both the groups. There were no complications or adverse effects noted in any group.

**Conclusion:** BSCPb reduces the intra operative requirement of inhalational agents and opioids and provides longer duration with better quality of post operative analgesia in patients undergoing thyroid surgeries.

**Keywords:** Bilateral superficial cervical plexus block, thyroid surgery, levobupivacaine, clonidine

### **Introduction**

Thyroid disorders are among the commonest endocrine disorders worldwide with incidence of about 42 million in India.<sup>[1]</sup> Pain after thyroid surgery is of moderate intensity and occurs mostly within first twenty - four hours of surgery. NSAIDs and opioids, commonly used analgesics, have many cons such as gastric bleeding, increased risk of renal insufficiency and undue sedation with risk of respiratory depression.<sup>[2-3]</sup>

Preemptive Bilateral superficial cervical plexus block (BSCPb) provides an ideal alternative to opioids and other analgesics used during perioperative period.<sup>[4,5]</sup> Both landmark and USG guided BSCPb have been widely studied with bupivacaine and ropivacaine but there is paucity of literature with use of levobupivacaine and clonidine as adjuvant. Therefore, we aimed to evaluate the efficacy of landmark guided BSCPb on perioperative requirement of inhalational agents and opioids. The secondary objectives were to note the duration of post operative analgesia and adverse effects or complications during first twenty-four hours after surgery.

### **Materials and methods**

After approval from Institutional Ethical Committee (No: F. 29(Acad)SPMC/2022/4371) and CTRI registration (No. CTRI/ 2022/ 10/ 046497) study was conducted at tertiary level hospital. Sample size was calculated using the prevalence of morphine consumption in PACU in

group receiving bilateral superficial and deep cervical plexus block in a study conducted by Moussa et al. Fifty-two patients of age group 18-60 years belonging to ASA grade I and II scheduled for thyroid surgeries were enrolled for this prospective, randomised, comparative study. Written informed consent was obtained from all the patients and their relatives.

Exclusion criteria included those who refused to give consent, history of allergy to local anaesthetics, infection at the site of injection and any bleeding disorder. Patients were randomised with the help of computer-generated random numbers into two groups. A thorough pre-anaesthetic check-up was done a day before surgery. The entire procedure and visual analogue scale (VAS) were explained to all the patients.

On arrival in operation theatre, after confirmation of fasting status, multipara monitor was attached and pre induction vitals were noted. An I.V. line was secured with 18G cannula, Ringer's lactate solution at the rate of 10ml/ kg/ hr was started. Premedication was done with inj.

glycopyrrolate 4µg/kg and inj. Midazolam 0.02mg/kg. Patients in Group F received inj. Fentanyl 2mcg/kg and Group L received BSCPb with 0.5% levobupivacaine (19ml) and clonidine (1mcg/kg) (total volume 20ml) before induction of general anaesthesia. BSCPb was performed using landmark technique with 3-point sub facial plane. A 5cm long 23G needle was inserted at the midpoint of the posterior border of the clavicular head of sternocleidomastoid muscle. After negative aspiration for blood, 4 ml local Anaesthetic was deposited at the needle insertion point just below the platysma, followed by 6 ml injected subcutaneously in a caudal and cephalad direction along the posterior border of the sternocleidomastoid muscle. Safety was ensured by restricting the advancement of needle not more than 5mm in depth.

Patients in both the groups were preoxygenated with 100% oxygen for 3 minutes and then induced with injection propofol 2 mg/kg I.V. followed by injection succinyl choline 1.5- 2 mg/kg I.V. after the loss of eyelashes reflex and intubated using appropriately sized armored endotracheal tube. Anaesthesia was maintained with 50% nitrous oxide and oxygen and sevoflurane and injection vecuronium 0.08 mg/ kg. The initial fresh gas flow was set to 4L/min, and the sevoflurane concentration was set to 2% and then sevoflurane concentration was reduced accordingly. Neuromuscular blockade was assessed using train of four which was maintained below count of 2 and depth of anesthesia was monitored using Bispectral (BIS) index which was kept between 50-55. Hemodynamic parameters were recorded throughout the surgery. Intraoperatively if systolic blood pressure and heart rate varied >20% from the baseline, first the inspired concentration of sevoflurane was increased and if these variations persisted additional doses of 50µg fentanyl were administered I.V. The amount of sevoflurane (vol. Percentage) and fentanyl consumed were noted.

At the end of surgery, neuromuscular blockade was reversed with injection neostigmine 0.05 mg/kg I.V. and injection glycopyrrolate 0.01 mg/kg I. V .and patients were extubated after complete recovery assessed by clinical observation and neuromuscular monitoring. Both groups received Inj. Ondansetron 4mg I.V. The patients were shifted to post-operative ward when hemo dynamically stable and responsive.

In postop period VAS score was noted at 30 min, 1h, 2 h, 4h, 6 h, 8h, 12 h and 24 h post-operatively. Inj. Tramadol (2 mg/kg) IV was used as a rescue analgesic when VAS score was ≥4 or when patient demanded rescue analgesia and postoperative total consumption of opioids was noted. The duration of analgesia was recorded from the

time of extubation till the first analgesic request by the patient. Side effects such as nausea, vomiting, respiratory distress, Horner’s syndrome, hoarseness of voice were noted and treated accordingly.

According to the findings reported by Moussa et al,<sup>[6]</sup> sample size of fifty-two was calculated using Kelsey formula assuming alpha error of 5% and power of study to be 80%. Data was entered and coded in a MS Excel spreadsheet. Data was analysed using SPSS Version 20.0. Continuous variables were expressed as means and standard deviation if normally distributed and as median and interquartile range if not normally distributed. Categorical variables were expressed as percentages and compared using Chi-square test. Comparison of continuous variables between the two groups was done using independent t-test and more than two groups was done using one-way ANOVA.

Comparison between two groups of continuous non-parametric variables was done using Mann-Whitney test. P-value < 0.05 was statistically significant.

**Results**

Table1: Comparison of demographic data of both the groups. (n = 52)

Baseline parameters	Mean (SD)		p-value
	Group L (n = 26)	Group F (n = 26)	
Age (years)*	38.11 (13.23)	42.53 (14.81)	0.262
Weight(Kg)*	56.3 (4.12)	55.88 (5.17)	0.746
Gender**	Number of cases (%)		p-value
	Group L (n = 26)	Group F (n = 26)	
Male	5	3	0.442
Female	21	23	

\*Independent t-test\*\*Chi-square test Demographic data was comparable across both groups [Table 1].

Table 2: Comparison of intraoperative end-tidal sevoflurane consumption (Vol%) between the two groups. (n = 52)

SEVO (%)	Mean (SD)		p-value
	Group L (n = 26)	Group F (n = 26)	
0min (after intubation)	1.46 (0.15)	1.56 (0.22)	0.058
15 min	1.42 (0.17)	1.78 (0.26)	0.001
30 min	1.34 (0.24)	1.93 (0.22)	0.001
60 min	1.20 (0.22)	1.97 (0.27)	0.001
120 min	1.21 (0.21)	1.98 (0.17)	0.001

Independent t-test

Intraoperative sevoflurane consumption (Vol%) was significantly lower in Group L at all time points after induction [Table 2]. Intraoperative opioid consumption was nil in Group L whereas it was 94.23±38.28µg in Group F and the difference was statistically significant (p<0.001).

Table 3: Comparison of intraoperative, post-operative opioid consumption and duration of post-op analgesia between the two groups. (n = 52)

Opioid consumption	Mean (SD)		p-value
	Group L (n = 26)	Group F (n = 26)	
Intraoperative(µg)	0 (0)	94.23 (38.28)	<0.001
Post operative (mg) in first 24hrs	153.85 (76.06)	253.84 (50.84)	<0.001
Total duration of post-op analgesia (min)	1001.54 (525.75)	636.92 (310.65)	0.004

Independent t-test

The mean duration of post-operative analgesia was longer (1001.54±525.75 min) in Group L with the

difference being statistically significant. Mean post-operative opioids consumption was higher in Group F with the difference being statistically significant [Table 3]. There were no complications or adverse effects.

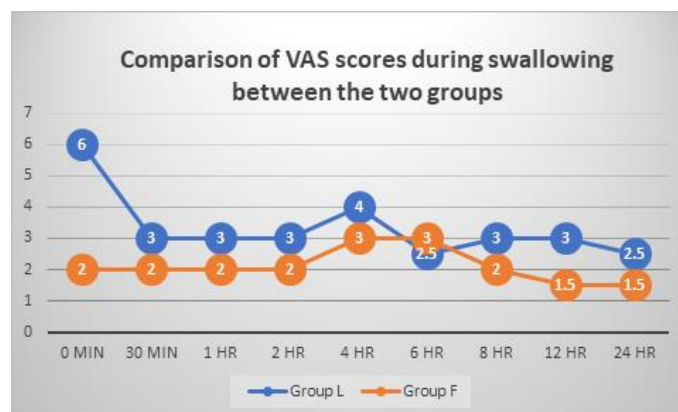
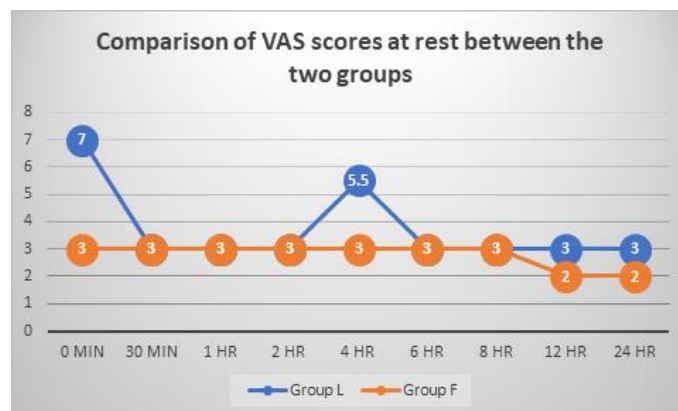


Fig 1: comparison of VAS scores between the two groups. The two groups differ significantly in terms of VAS score at rest at 0 min, 30min, 1h, 2h, 4h, 8h, 12h, and 24h and during swallowing at 0min, 4h, 12h, and 24h and the difference was statistically significant [figure 1].

**Discussion**

Preemptive BSCPb along with general anaesthesia for thyroid surgery is associated with a significant decrease in perioperative requirement of opioids and inhalational Anaesthetic agents and added the advantage of better patient satisfaction post-operatively.

We observed that there was a significant decrease in end-tidal sevoflurane concentration (Vol%) in BSCPb group. A study evaluated the effect of BSCPb on sevoflurane consumption in patients (n=50) undergoing elective

thyroid surgery and observed that mean end-tidal sevoflurane concentration was significantly lower in block group.<sup>[7]</sup> Sensory supply of antero-lateral neck is by the branches of superficial cervical plexus viz. Lesser occipital, greater auricular, transverse cutaneous and supra clavicular nerves.<sup>[8-10]</sup> According to Afferentation theory, tonic sensory and muscle spindle maintains a state of wakefulness and thereby, a decrease in tonic afferent input from anterolateral region of neck through BSCPb, could lead to decrease in level of consciousness and thereby, increasing susceptibility to Anaesthetic agents. This could also be the reason why neural blockade decreases Anaesthetic consumption.<sup>[11-12]</sup>

In our study, intraoperative consumption of opioids was significantly lower in BSCPb group as compared to fentanyl group. A study done by Moussa et al, also observed that intraoperative consumption of opioids was lower in block group.<sup>[6]</sup> BSCPb was given before induction, thus providing the benefit of pre-emptive analgesia that prevents the establishment of central sensitization caused by incisional pain, thereby, reducing the requirement of opioids.

We used landmark guided technique as pre-surgical blocks are technically easier and less time consuming unless there is a very large thyroid mass. USG cannot be available at every setup. An Egyptian study compared landmark and ultrasound guided technique and found no differences in effectiveness and safety.<sup>[13]</sup> Senapathi et al, compared the effectiveness of ultrasound-guided vs Land-Mark technique as for BSCPb (0.25% bupivacaine) and observed that the need for intraoperative opioids was significantly lower in ultrasound group.<sup>[14]</sup> However, in our study, the need for intraoperative rescue opioids was nil in BSCPb group and the reason could be that we used clonidine as adjuvant to improve the quality of block.

The duration of post-operative analgesia in our study was significantly longer in BSCPb group. Shih et al studied analgesic efficacy of BSCPb and observed that duration of analgesia was longer with levobupivacaine 0.5% as compared to bupivacaine 0.5%.<sup>[5]</sup>

The reason for prolonged duration may be because we used clonidine as an adjuvant which has prolonged the duration of analgesia. Andrieu et al had also demonstrated the effect of clonidine in improving post-operative analgesia.<sup>[2]</sup> Alpha-2 agonists enhance pain relief after peripheral nerve block via two mechanisms either by facilitation of C fiber blockade, by local vasoconstriction or through direct action on local nerve fibers.<sup>[15]</sup>

The post-operative VAS scores were significantly lower in BSCPb group ( $p = 0.0001$ ). Andrieu G et al, also observed that patients with BSCPb have better-quality of analgesia than those managed with conventional systemic analgesics only.<sup>[2]</sup>

The post-operative rescue analgesic demand was significantly lower in group L as compared to group F ( $P < 0.001$ ). Canakci E et al, observed that median tramadol consumption was significantly lower in BSCPb group ( $p < 0.05$ ).<sup>[16]</sup> Suh et al, found that BSCPb to be more effective than either combined or deep blocks, in reducing incisional pain, headache and posterior neck pain following thyroid surgery. It implies that post-thyroidectomy pain has primarily a superficial component.<sup>[17]</sup> There were no complications or adverse effects noted in any patient.

Our study had few limitations. This was a single center study and we used landmark-guided rather than ultrasound guided approach because SCPb is a purely sensory block and easy to learn and practice.

### **Conclusion**

Preinduction BSCPb with 0.5% Levobupivacaine and clonidine ( $1\mu/kg$ ) reduces the perioperative requirement

of opioids, intraoperative consumption of sevo flurane (Vol%) and provides longer duration and better quality of analgesia with no significant adverse effects.

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