

COMPARISON OF ULTRA SOUND GUIDED SUPERFICIAL VS INTERMEDIATE CERVICAL PLEXUS BLOCK FOR POSTOPERATIVE ANALGESIA IN PATIENTS UNDERGOING THYROID SURGERIES

Selvi Annie Geeta¹, J.Bridgit Merlin², N Raja Sekar³

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Corresponding Author:

Dr. Selvi Annie Geeta,
Email: anniegeetha26@gmail.com

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¹Associate Professor, Department of Anaesthesiology, Kanyakumari Government Medical College, Tamilnadu, India.

²Associate Professor, Department of Anaesthesiology, Thoothukudi Government Medical College, Tamilnadu, India.

³Senior Resident, Department of Anaesthesiology, Kanyakumari Government Medical College, Asaripallam, Nagercoil, Kanyakumari District, Tamilnadu, India.

Abstract

Background: The cervical plexus block (CPB) is one such block used to provide effective post-operative analgesia for surgery in the head and neck region. While superficial cervical plexus block is safe and easy to perform, intermediate cervical plexus block is thought to provide more profound analgesia particularly for deep structures that may have an autonomic sympathetic or 'visceral' distribution of pain. The aim of this study to compare the analgesic efficacy of ultrasound-guided superficial cervical plexus block vs ultrasound-guided intermediate cervical plexus block after thyroid surgery. **Materials and Methods:** Randomised, double-blinded, prospective analysis conducted on Patients awaiting elective Thyroid surgery with age between 20-60 yrs with ASA physical status I, II, III at Government kanyakumari Medical College Hospital. After obtaining written informed consent Patients were randomized by sealed envelope technique into 2 following groups of 35 participants each. Group A-superficial cervical plexus block group, Group B-intermediate cervical plexus block group. 24 hours analgesic requirements, adverse events in each group were noted. **Result:** Differences between patients receiving the superficial cervical plexus block and the intermediate cervical plexus block with respect to continuous variables (Age, ASA physical status, BMI, Time taken to complete the block, duration of analgesia) were tested using a Independent Groups T-Test for independent samples. No statistical significance with respect to Age, BMI and ASA physical status noted. Time taken to perform superficial cervical plexus block (mean =13.03 min, SD=3.38) is less than the time taken to perform intermediate cervical plexus block (mean = 19.69 min, SD=3.75) with a p value of <0.0001, which is statistically significant. The duration of analgesia for group A is around 8 hrs and for group B it is 14hrs. The p values for first 12 hrs are <0.05 which is statistically significant. The incidence of adverse events were nil for group A and minimal for group B which is statistically insignificant. **Conclusion:** The result of our study is supportive in proving that ultrasound guided intermediate cervical plexus block is better than superficial cervical plexus block for providing analgesia in thyroid surgeries, with reduced post operative pain scores, lesser rescue analgesic requirement with no side effects.

INTRODUCTION

Pain management an integral component of perioperative care and the advances in anaesthesia has made it much easier with greater emphasis on the use of regional techniques for providing analgesia post operatively. The cervical plexus

block (CPB) is one such block used to provide effective post-operative analgesia for surgery in the head and neck region.^[1-4]

Blocks given between the investing layer of the deep cervical fascia and the prevertebral fascia, is an intermediate cervical plexus nerve block. Blocks given above this superficial layer of deep cervical fascia are named as superficial cervical plexus

block. Blocks below the prevertebral fascia are termed as deep cervical plexus block of which we are not concerned about.^[5-8]

While superficial cervical plexus block is safe and easy to perform, intermediate cervical plexus block is thought to provide more profound analgesia particularly for deep structures that may have an autonomic sympathetic or 'visceral' distribution of pain. The risk of complications such as phrenic nerve palsy, Horner's syndrome, subarachnoid or epidural injection is also very less with intermediate blocks compared to deep blocks.^[9,10]

Aim of study: The aim of this study to compare the analgesic efficacy of ultrasound-guided superficial cervical plexus block vs ultrasound-guided intermediate cervical plexus block after thyroid surgery.

MATERIALS AND METHODS

This is a randomised, double-blinded, prospective analysis conducted on Patients awaiting elective Thyroid surgery at Government Kanyakumari Medical College Hospital during period from May 2021 to January 2023.

After obtaining written informed consent from all subjects after explaining the procedure, advantages and risks of the procedure. Patients were randomized by sealed envelope technique into 2 following groups.

Group A (35 subjects)-superficial cervical plexus block group

Group B (35 subjects)-intermediate cervical plexus block group

Inclusion Criteria:

Age: 20 -60 yrs., ASA PS class I, II or III, Elective thyroid surgery

Exclusion Criteria:

Patient who refuse to participate, BMI more than 35 kg/m², Previous neck surgeries/Burns injury to neck/ contractures in neck, Known seizure disorder, History of radiation exposure on neck, Known allergy to Local Anaesthetics, Known bleeding diathesis / on anticoagulants, Chronic respiratory diseases

Parameters Monitored:

Demographic data: Age, weight, height, ASA-PS

Performance of block: Starting time, ending time

Adverse events monitored: Bleeding, LAST

Duration of surgery – Defined as the time taken from the incision to completion of skin closure

Post-operative pain core to be assessed by V AS score – visual analogue score

(1-2= no pain, 3-4= mild pain, 5-6 = moderate pain, 7-8 = severe pain and 9-10= intolerable pain)

Time to request for first rescue analgesia: rescue analgesia given when VAS ≥ 4 , Total dose of Tramadol consumed in the first 24 hours.

Post-operative complications: Phrenic nerve palsy, Horner's syndrome

After induction of general anesthesia by routine institutional protocol, patients in group A received USG guided superficial cervical plexus block & Group B received USG guided intermediate cervical plexus block. The patients in two groups received same formulation that is a total of 20 mL of 0.5% bupivacaine.

After surgery 1 gm intravenous paracetamol 8th hourly and tramadol were used as rescue analgesia if VAS score is ≥ 4 . Patients were monitored for VAS scores, postoperative total tramadol consumption and duration of postoperative analgesia from the time of giving block for a 24-hour period in a high dependency unit. Patients were assessed hourly for the first 8 hrs. and then 2 hrly till 24 hrs. post op using the visual analogue score.

RESULTS

Differences between patients receiving the superficial cervical plexus block and the intermediate cervical plexus block with respect to continuous variables (Age, ASA physical status, BMI, Time taken to complete the block, duration of analgesia) were tested using a Independent Groups T-Test for independent samples. Analysis of variance (One way ANOVA) with Tukey multiple comparisons test was used to evaluate the time taken to perform block and duration of postoperative analgesia between the groups.

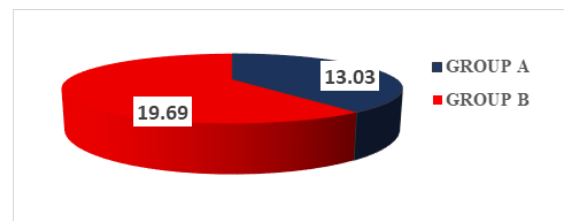


Figure 1: Time taken to perform block between two groups

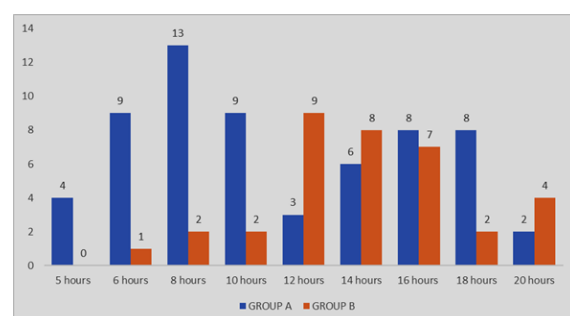


Figure 2: Comparison of Duration of Analgesia between two groups

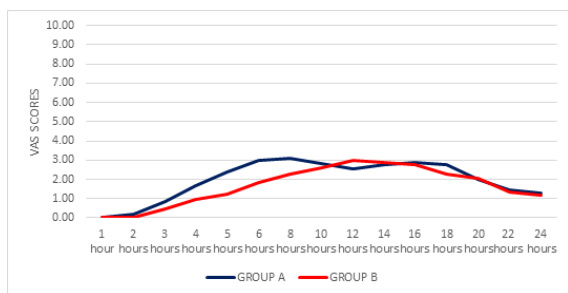


Figure 3: Comparison of pain score between two group

The distribution of age among Group A (superficial cervical plexus block) and Group B (intermediate cervical plexus block) are similar. There was no statistically significant difference in relation to age distribution between group A (mean = 41.74 SD= 15.11) and group B (mean =41.49 SD=13.85) with a p value of >0.05. There is no statistically significant difference in relation to BMI distribution between group A (mean= 22.30, SD =2.50) and group B (mean=21.34 SD= 1.99) with a p value of >0.05.

There is no statistically significant variation in distribution of sex and ASA physical status among the 2 groups.

[Figure 1] shows the Time taken to perform superficial cervical plexus block (mean =13.03 min, SD=3.38) is less than the time taken to perform intermediate cervical plexus block (mean = 19.69 min, SD=3.75) with a p value of <0.0001, which is statistically significant.

The duration of analgesia for group A is around 8 hrs and for group B it is 14hrs. The p values for first 12 hrs are <0.05 which is statistically significant shown in [Figure 2].

[Figure 3] shows that the postoperative pain scores are higher for Group A at 4,5,6,8 hrs are less for group B compared to group A with p value <0.0001 which is statistically significant.

The incidence of adverse events were nil for group A and minimal for group B which is statistically insignificant. P value > 0.05 shown in [Table 1].

Table 1: Adverse events in each groups.

		Group		Total	P value	
		Group A	Group B			
ADVERSE EVENTS	YES	Count	0	3	0.077	
		% within GROUP	0.0%	8.6%		4.3%
	NO	Count	35	32		67
		% within GROUP	100.0%	91.4%		95.7%
Total		Count	35	35	70	
		% within GROUP	100.0%	100.0%	100.0%	

DISCUSSION

The main finding in our study is that the ultrasound guided intermediate CPB is more effective than the superficial or subcutaneous block given outside the investing fascia. The postoperative pain scores were significantly lower in intermediate CPB than the superficial one.

Our results support the theory proposed by Pandit and colleagues that the injections placed below the investing fascia of the neck penetrate to the deep cervical space and therefore block nerves at their roots, which presumably results in denser, more reliable analgesia.^[9] While injections placed subcutaneously cannot permeate through the investing layer and thereby subcutaneous infiltration would need to block each nerve branch of the superficial cervical plexus to achieve the same effect and this seems less likely.

However, this is in contrast to the theory proposed by Nash,^[5] and colleagues that the investing fascial layer is incomplete, so subcutaneous cervical plexus block should be clinically as effective as an intermediate block. Ramachandran and colleagues in 2011 compared the efficacy of superficial cervical vs intermediate block in carotid endarterectomy patients and found both these blocks to be equally effective in terms of pain scores and surgeons as well as patient's satisfaction score.^[11] A possible explanation for these conflicting results can be

attributed to the fact that Zhang⁵ and Nash have given anatomical evidence while Pandit and colleagues have given functional evidence. The structure, arrangement and density of the skin ligaments vary greatly through the body and can mimic the behaviour of fascia as well. So it may be possible to achieve the functional result predicted by Pandit et al despite the anatomical absence of the proper fascia.^[9]

Even if we go by the description of Nash et al and consider the investing layer to be incomplete or porous then also a subcutaneous injection would require much larger volume of LA to penetrate to the deeper layer to produce the clinically same effect. Secondly, in the study by Ramachandran¹ and colleagues, they have given blind subcutaneous as well as intermediate blocks, wherein the depth of needle insertion cannot be certainly established. It might be possible that some of the subcutaneous injections may have penetrated to the intermediate level. Apart from this, the surgery in their study does not involve significant tissue trauma and thus, has low pain scores, which may have led to confounding results.^[11]

CONCLUSION

Based on the above description, we can thereby justify our results that injections placed below the investing layer result in better analgesic efficacy

compared to subcutaneous ones. We thus recommend ultrasound guided intermediate block over subcutaneous injections as the reported complications are very rare and comparable to subcutaneous/superficial block yet analgesic efficacy appears better than the superficial block.

In our study we did not encounter any complication with respect to intermediate CPB which might be because of slow diffusion of local anaesthetic into the deep space.

Superficial cervical plexus block is safe and easy to master, yet intermediate cervical plexus block may provide another safe alternative to superficial blocks with better analgesic efficacy.

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