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Original Research Article

Utility of bilateral superficial cervical plexus block in thyroidectomy patients for post-operative analgesia

Parth M. Shah[1], Divya N. Kheskani[2]*

[1]Department of Anaesthesia, Dr. M. K. Shah Medical College, Hospital and Research Centre, Ahmedabad, Gujarat, India
[2]Department of Anaesthesia, GCS Medical College, Hospital and Research Centre, Ahmedabad Gujarat, India

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***Correspondence:**
Dr. Divya N. Kheskani,
E-mail: divya.kheskani@gmail.com

ABSTRACT

Background: Thyroidectomy is painful procedure hence multimodal analgesia is required. Superficial cervical plexus block can be used for analgesia in thyroid surgeries. USG guided cervical plexus block administration is safe and latest technique as a part of multimodal analgesia for thyroid surgery.
Methods: After obtaining consent 60 ASA grade I-II adult patients undergoing elective thyroid surgery were included and randomly divided into two groups (group B)-0.25% bupivacaine and (group S)-normal saline. Induction and maintenance under general anesthesia carried out as per standard protocol. After Induction USG guided block was administered with the drug solution as per allocated group. After surgery, patients were extubated and shifted to recovery room. Vital parameters were monitored. Patients were asked about their pain based on the 11-point numerical rating scales (NRS) score. The NRS score and other variables were documented at 3rd hour, 6th hour, 12th hour, and 24th hour at wards after the end of surgery. Time since the end of surgery to the first analgesia request was documented together with total analgesia consumed in the first 24 hours. If NRS score was ≥4 inj. Tramadol iv in incremental doses of 25 mg was given until pain relieved.
Results: Time to first dose of analgesia was higher in group B compared to group S. Total analgesic dose of tramadol during first 24 hours was lower in group B compared to group S
Conclusions: bilateral superficial cervical plexus block can be used as a part of multi-modal analgesia in patients of thyroidectoy.

Keywords: Superficial cervical plexus block, Thyroidectomy, Bupivacaine

INTRODUCTION

Now-days many patients undergo planned thyroidectomy due to latest advances in surgical and medical field. Thyroidectomy is painful and commonly done endocrine surgeries now a days.[1] Following factors contribute to perioperative pain which is moderate in intensity-surgical incision, hyperextension position during surgery.

General anaesthesia solely does not suffice to control pain. Hence, multimodal analgesia approach that includes aadministration of opioids, nonsteroidal anti-inflammatory drugs, local anesthesia, or regional anesthesia is needed for such surgeries.[2]

Moreover, there is increase in stress hormones and other complications due to pain. Hence adequate analgesia is a must.

Superficial cervical plexus block is commonly preferred peripheral nerve block that can be performed bilaterally for analgesia in thyroid surgeries. Also, by reducing

analgesic requirements, the block yields stable operative conditions compared to general anesthesia alone.[2]

superficial cervical plexus (SCP), is a sensory neural plexus formed from the ventral rami of the first four cervical nerves (C1-C4). It emerges behind posterior border of sternomastoid muscle and supplies the skin overlying the neck, ear, angle of the mandible, shoulder, and clavicle.[3]

The cervical plexus includes also deep branches to the neck muscles and the phrenic nerve (C3, C4, and C5) in addition to communicating branches to the superior cervical sympathetic ganglion, hypoglossal, and spinal accessory nerves.[4]

Nausea, vomiting are common postoperative complications following thyroid surgery. Superficial cervical plexus block aids in reduction of use of narcotic analgesia perioperatively in such patients USG guided approach of cervical plexus block administration is the latest preferred technique.[5]

The aim of this study is to assess the efficacy of USG guided bilateral cervical plexus block for thyroid surgeries as a part of multimodal analgesia and its analgesic efficacy in need of postoperative analgesia dosage.

METHODS

It is a randomized prospective triple blind study as the anaesthesiologist not involved in the study filled the drug for the block as per the group allocation, the pain score and analgesic requirements were observed by another anaesthetist and the 3rd anaesthetist performed the block.

The study was conducted at Dr. M. K. Shah medical college, hospital and research centre (SMS multispecialty hospital) from June 2019 to June 2021.

After obtaining written and informed consent and institutional ethical approval, we studied 60 patients undergoing elective thyroid surgeries.

The inclusion criteria were patients with ASA status I-II, adults of either sex belonging to age 18 to 65 years undergoing elective thyroid surgery with euthyroid status confirmed with thyroid function tests (TSH, Free Triiodothyronine and thyroxine) under general anaesthesia.

Patients excluded for the study were those with refusal of consent, ASA 3, 4, H/o allergy to local anaesthetics, infection at puncture site, pregnancy, altered coagulopathy, previous cervical surgery and those who had intolerance due to chronic increases consumption of opioid.

Owing to limited sensory territory blocked by the bilateral superficial cervical plexus block, patients having substernal goitres or requiring thyroidectomy with lymph node dissection were also excluded from the study.

They were randomly divided by computer-generated tables into two groups to receive 0.25% bupivacaine 15 ml (group B) and normal saline 15 ml (group S) as control respectively.

All patients were pre operatively evaluated, optimized so as to achieve euthyroid status and on obtaining written and informed consent were kept nil by mouth.

In order to secure blinding, an independent anesthesiologist not participating in this study or data collection was made to read the number contained in the envelope and instructed to prepare the anaesthetic cocktail according to the assigned group.

Another anesthesiologist managed the anaesthesia to patients participating in the study.

Before induction of general anesthesia, standard monitors were attached.

Induction of general anesthesia was carried out as per routine protocol, premedicated with inj glycopyrollate 0.04 mg/kg iv, inj ondansetron 0.1 mg/kg iv, inj. Midazolam 1mg iv, inj. Fentanyl 2 mcg/kg iv propofol 1-2 mg/kg as induction agent, succinylcholine 2 mg/kg iv for intubation with appropriate sized cuffed endotracheal tube, neuromuscular blockade with loading dose of atracurium 0.5 mg/kg and intermittent dosage at regular intervals 0.1 mg/kg v, and fentanyl 1 mcg/kg. Maintenance with mixture of oxygen, N_2O and sevoflurane as inhalational agent.

Immediately after confirmation of proper placement of endotracheal tube and its fixation, the block was administered with the drug solution as per allocated group.

Group B: 0.25% bupivacaine 15 ml solution and group S: 0.9% normal saline 15 ml solution. The bilateral superficial cervical plexus block was performed in a supine position, with head turned to either side for the bilateral block. The ultrasound screen was positioned on contralateral side to the clinician, and transducer directional marker is medial. Under complete aseptic and antiseptic technique, a high-frequency linear transducer (6-13 MHz) to be placed in transverse plane on the anterior neck at the level of the midpoint of the line connecting the mastoid process with the insertion of the sternal head of sternocleidomastoid muscle (SCM). The goal was to guide the needle tip from lateral to medial just under tapering posterolateral edge of the SCM to the fascial plane under the SCM just above the levator scapulae muscle. After confirmatory of the aspiration

test, the LA injection was injected according to the group under visualization.[6]

Time of block administration was noted in minutes on completion of surgery, patients were extubated on regain of consciousness and reflexes and shifted to recovery room vital parameters were monitored.

patients were then asked about their pain based on the 11-point NRS score as soon as the patient responded to verbal command. The NRS score and other variables were documented at 3rd hour, 6th hour, 12th hour, and 24th hour at wards after the end of surgery. Time since the end of surgery to the first analgesia request was documented together with total analgesia consumed in the first 24 hours.

If NRS score was ≥4 or if baseline parameters rise >20% in recovery room inj. tramadol iv in incremental doses of 25 mg was given gradually until pain relieved.

Statistical analysis was done using the SPSS version 20 software. Comparison of numerical data among both groups was done using unpaired student t test and Man Whitney test. Categorical variables were described and the statistical difference between groups was tested using the chi-square test. A value<0.05 with a power of 80% was considered statistically significant.

RESULTS

A total of 60 patients (30 on each group) were included in the study. There was no statistical difference between two groups with respect to demographic variables.

Table 1: Demographic data, (n=30).

Variables	Group B	Group S	P value
Age (years)	34	36	>0.05
Height (cm)	163.4	166.2	>0.05
Weight (kg)	71.4	72.7	>0.05
Sex (M:F)	18:12	16:14	>0.05
Duration of surgery	181.4	183.5	>0.05
ASA 1: 2	16:14	18:12	>0.05

Table 2: NRS score, (n=30).

Variables	Group B	Group S	P value
At recovery	3	5	<0.05
At 3rd post-op hour	2	5	
At 6th post-op hour	2	5	
At 12th post-op hour	1	3	
At 24th post-op hour	1	3	

The median and interquartile range between groups, the median NRS score was low in group B at recovery room, 3rd, 6th, 12th, and 24th hour. The Mann-Whitney test was applied and significant statistical difference was noted at all time between block and control groups.

Table 3: Time to first rescue analgesia, (n=30).

Variable	Group B	Group S	P value
Time to first rescue analgesia, (min)	340 (510)	160 (280)	<0.0001

There median time to first dose of rescue analgesia was higher in group B as compared to group S with p<0.0001 (highly statistically significant).

Table 4: Total analgesia consumption within 24 hours, (n=30).

Variables	Group B	Group S	P value
Tramadol mg (IV)	0 (50)	75 (25-150)	<0.0001
Diclofenac mg (IM)	75 (75)	75 (75)	0.78

The total analgesic dose of tramadol during first 24 hours was lower in group B as compared to group S with p<0.0001. However, the diclofenac consumption was quite similar in both groups

DISCUSSION

In our study, we demonstrated USG guided bilateral superficial cervical plexus block, performed immediately after the induction of general anaesthesia in patients undergoing thyroid surgery.

In our study we performed bilateral superficial cervical plexus block prior to the incision and after intubation to act as both intraoperative and postoperative analgesia

Performing the block post-surgery increases the analgesic requirement in the postoperative recovery unit due to the slow-acting nature (>20 min) of bupivacaine. Hence timing of block administration in our study is prior to incision.

The demographic variables in both the group were comparable (Table 1) with no significant difference between them.

In our study the median pain score (NRS) at frequent and regular time intervals in postoperative period was significantly lower in group B (block group) as compared to group S. Pain score was observed at 3rd ,6th, 12th and 24th postoperative hour and the p value at all times was <0.05 (statistically significant) (Table 2).

This proves the potency of 0.25% bupivacaine administered under USG guided Superficial cervical plexus block as analgesic agent.

Our study results are in concurrence with the research carried out by Winstanley et al in France where the block group with 0.487% ropivacaine had lower pain score as compared to the control group. In this study we did not notice a significant difference in the immediate recovery room (PACU) pain score difference due to the difference in drug (ropivacaine) used as compared to ours.[7]

Aweke et al in their study entitled "Effectiveness of Bilateral Superficial Cervical Plexus Block as Part of Postoperative Analgesia for Patients Undergoing Thyroidectomy used 0.25% bupivacaine as sole agent and concluded that median postoperative pain score (NRS) was 3 and 5 in block and control group respectively. Statistically significant difference at 6th, 12th, and 24th hour in the bilateral superficial cervical plexus block group compared to the control group was observed.[9]

Time to first rescue analgesia was calculated from the time of completion of surgery to the time of administration of first dose of analgesia. The median time in group B is 340 (170-700) mins as compared to group S 160 (60-340) mins with $p<0.001$ (highly statistically significant).

Aweke et al similar to our study used 0.25% bupivacaine had similar observations where the median time to request of first dose of rescue analgesia (IQR) is 360 min (190-720) versus 180 (65-360) between block and control groups, respectively.[9]

Hsieh et al studied "bilateral superficial cervical plexus block combined with general anaesthesia administered in thyroid operations," and found median time of 410.1 (15-1050) minutes in the treatment group with levobupivacaine and 360.8 (15-870) minutes in the treatment group with bupivacaine 0.5% in comparison to the placebo group with NS was 82.1 (15-259) minutes.[10]

Delayed time to first dose of rescue analgesia and lower pain scores in block group patients can help to justify that Superficial cervical plexus block is quite sufficient for analgesia for thyroid surgery.

Total analgesic consumption in both groups during postoperative period was studied. The median (IQR) injection tramadol was 0 (0-50) mg in group B (block group) compared to 75 (25-150) mg in the control group (group S) during first 24 hours postoperatively with $p<0.0001$ (highly significant).

However, we also observed that the median (IQR) diclofenac consumption during first 24 hours post-operatively was not statistically significant among both groups.

Aweke et al in his study results mentioned that the median (IQR) tramadol was 0 (0-50) mg in the block group compared to 100 (25-150) mg in control group.[9]

Research undertaken in Turkey shows that median tramadol consumption was lower in the treatment group compared to the control group, 0 (0-50) versus 40 (0-180) mg, respectively.[10]

In our study we administered tramadol as analgesic agent. Moreover, the opioid conversion factor suggested in several studies, a 100 mg of tramadol could deliver equal analgesic potency as 10 mg of morphine. Hence our study has an overall generalised comparable result.[11,12]

Bilateral superficial cervical plexus block was preferred in this present study as it provides an efficient analgesia and can be applied bilaterally. None of the common complications, such as hematoma, nerve damage, or infection, were observed in the patients.

Above all advantages emphasize the fact that superficial cervical plexus block is a low-risk technique with least complications.[13] In conclusion, USG guided superficial cervical plexus block decreases the analgesic requirement in patients during and following thyroid surgery as it provides real-time visualization of anatomical structures and needle movement and has decreased the complication rates.[14-17]

The limitations of our study were that we couldn't study the impact of the block on intraoperative analgesia and anesthetic requirements.

CONCLUSION

In a nut shell it can be stated that bilateral superficial cervical plexus block significantly reduces pain scores, total postoperative analgesic consumption and prolongs the time to rescue analgesia.

Hence, USG guided bilateral superficial cervical plexus block is simple, effective regional block that can be administered with 0.25% bupivacaine for pain management as a part of multi-modal analgesia in the first 24 post-operative hours. The USG guided cervical plexus block with 0.25%bupivcaine reduces the performance time, and complications related to vascular puncture and provides faster onset, longer duration of the analgesia.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Mayhew D. Analgesic efficacy of bilateral superficial cervical plexus block for thyroid surgery:

meta-analysis and systematic review. Bri J Anaesthesia. 2018;120(2):241-51.
2. Shih ML, Duh QY, Hsieh CB. Bilateral superficial cervical plexus block combined with general anesthesia administered in thyroid operations. World J Surg. 2010;34(10):2338-43.
3. Cousins MJ, Bridenbaugh PO. Neural Blockade in Clinical Anesthesia and Management of Pain. 3rd ed. Pheladelphia, New York: Lippincott-Raven. 1998.
4. Singh SK. The cervical plexus: Anatomy and ultrasound guided blocks. Anaesth Pain Intensive Care. 2015;19:323-32.
5. Elmaddawy AE, Mazy AE. Ultrasound-guided bilateral superficial cervical plexus block for thyroid surgery: The effect of dexmedetomidine addition to bupivacaine-epinephrine. Saudi J Anaesth. 2018;12:412-8.
6. Herring AA, Stone MB, Frenkel O, Chipman A, Nagdev AD. The ultrasound-guided superficial cervical plexus block for anesthesia and analgesia in emergency care settings. Am J Emerg Med. 2012;30:1263-7.
7. Winstanley S, Parkinson F, Rassam SS, Scott-Coombes D, Stechman MJ. Comparison of local anaesthetic wound infiltration and bilateral superficial cervical plexus block for thyroid and parathyroid surgery: 2AP2-7. Euro J Anaesthesiol. 2012;29:35.
8. Marhofer ZP, Schrögendorfer K, Wallner T, Koinig H, Mayer N, Kapral S et al. Ultrasonographic guidance reduces the amount of local anesthetic for 3-in-1 blocks. Reg Anesth Pain Med. 1998;23:584-8.
9. Aweke Z, Sahile WA, Abiy S, Ayalew N, Kassa AA. Effectiveness of Bilateral Superficial Cervical Plexus Block as Part of Postoperative Analgesia for Patients Undergoing Thyroidectomy in Empress Zewditu Memorial Hospital, Addis Ababa, Ethiopia. Anesthesiol Res Practice. 2018;6107674:6.
10. Shih ML, Duh QY, Hsieh CB, Liu YC, Lu CH, Wong CS et al. Bilateral superficial cervical plexus block combined with general anesthesia administered in thyroid operations. World J Surg. 2010;34(10):2338-43.
11. Çanakçı E, Taş N, Yağan O, Genç T. Effect of bilateral superficial cervical block on postoperative analgesia in thyroid surgery performed under general anesthesia. Ege J Med. 2015;54(4):182-6.
12. Dieudonne N, Gomola A, Bonnichon P, Ozier Y. Prevention of postoperative pain after thyroid surgery: a double-blind randomized study of bilateral superficial cervical plexus blocks. Anesthesia Analgesia. 2001;92:6:1538-42.
13. Eastern Metropolitian Region Palliative Care Consortium (Victoria), Opioid Conversion Ratios-Guide to Palliative Care Practice. 2016. Available at: http://www.emrpcc.org.au. Accessed on 25 March 2021.
14. Gurkan Y, Tas Z, Toker K, Solak M. Ultrasound guided bilateral cervical plexus block reduces postoperative opioid consumption following thyroid surgery. J Clin Monit Comput. 2015;29(5):579-84.
15. Marhofer P, Chan VW. Ultrasound-guided regional anesthesia: current concepts and future trend. Anesth Analg. 2007;104(5):1265-9.
16. Kessler J, Gray AT. Ultrasound guidance for regional anesthesia. In: Miller RD, Cohen NH, Eriksson LI, editors. Miller's Anesthesia. 8th ed. Philadelphia: Elsevier. 2015;1752-66.
17. Gurkan Y, Tas Z, Toker K, Solak M. Ultrasound guided bilateral cervical plexus block reduces postoperative opioid consumption following thyroid surgery. J Clin Monit Comput. 2015;29(5):579-84.
18. Urmey WF, Stanton J. Inability to consistently elicit a motor response following sensory paresthesia during interscalene block administration. Anesthesiology. 2002;96:552-4.
19. Abrahams MS, Aziz MF, Fu RF, Horn JL. Ultrasound guidance compared with electrical neurostimulation for peripheral nerve block: A systematic review and meta-analysis of randomized controlled trials. Br J Anaesth. 2009;102:408-17.

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