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Bilateral superficial cervical plexus block with conscious sedation for thyroid surgery

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Article Info

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Abstract

Total thyroidectomy can safely be performed by bilateral superficial cervical plexus blockade which is a regional anesthetic technique to anaesthetize superficial branches of the anterior primary rami of cervical 3-5 spinal nerves. Conscious sedation with this anesthetic technique enhance safe and faster recovery compared to general anesthesia (GA) with endotracheal intubation which is traditionally employed technique for thyroidectomy. This randomized active control trial was conducted in the department of Anaesthesia, Analgesia and Intensive care medicine, Bangabandhu Sheikh Mujib Medical University from January to December 2018 to compare perioperative outcome between bilateral superficial cervical plexus blockade and GA technique during total thyroidectomy. Total 60 patients of American Society of Anesthesiologists Classification grade I and II who were selected for thyroidectomy were randomly divided into Group-A(n=30) and Group-B (n=30). Group A received with 0.5% bupivacaine and 1% lignocaine; and group B received general anesthesia during total thyroidectomy. Heart rate, systolic blood pressure, diastolic blood pressure mean arterial blood pressure , oxygen saturation (SPO2) were recorded and compared between the groups. Operative site bleeding, surgeon's satisfaction & post operative pain were measured with Boezaart Scoring system, Likert scale & visual analogue scale repectively; and compared between two groups. During induction, systolic and diastolic blood pressure were high in group B and reduced in group A which were statistically significant. Systolic and diastolic blood pressure was significantly reduced in Group-A in comparison to Group-B after 5 minutes, 30 minutes, 45 minutes and at the end of operation. Bilateral superficial cervical plexus blockade reduced pain more effectively than GA group & it was statistically significant. Mean value of bleeding score were also statistically significant in Group-A. Regarding surgeons' satisfaction, there was no statistically significant difference between the groups. Bilateral superficial cervical plexus block with conscious sedation provided better outcome in terms of perioperative hemodynamics, pain and surgical site bleeding compared to general anaesthesia.

Introduction

Thyroid surgery is the commonest endocrine surgical procedure being carried out throughout the globe.[1] General anaesthesia (GA) is commonly used for thyroid surgery. Bilateral superficial cervical plexus block (BSCPB) is adequate to produce anaesthesia for procedures on anterolateral aspect of neck. The advantages of regional anaesthesia (LA) with monitored anaesthesia care (MAC) are faster post-anaesthesia recovery, no throat or vocal cord irritation and potential avoidance of the adverse effects of GA[2]. Bilaterally superficial cervical plexus block (BSCPB) consists of a bilateral injection of local anesthetic behind the lateral border of the sternocleidomastoid muscle producing surface anaesthesia of the neck.[3] The patient is maintained in a state of conscious sedation. Conscious sedation can be achieved via increments of midazolam or a Target controlled infusion (TCI) of Propofol.[4] Research work also recommended that close monitoring of haemodynamics, respiratory rate and level blockade is required [5] Paul Lo Gerfo was a notable pioneer of the use of cervical plexus block in thyroid and parathyroid surgeries.[3] In this study the effectiveness of bilateral cervical plexus block with conscious sedation was observed in comparison to general anaesthesia.

Methods

This randomized active control trial were conducted in the department of Anaesthesia Analgesia and Intensive care medicine, Bangabandhu Sheikh Mujib Medical University from January 2018 to December 2018. A total of sixty (N=60) patients who were selected for thyroidectomy were included. The patients were divided into two groups (Group-A and Group-B), each group consist of thirty (30) patients.

Group A received bilateral superficial cervical plexus block with 0.5% bupivacaine and 1% lignocaine. Conscious sedation was maintained by propofol 1% at the dose of 2mg/kg/hr and fentanyl 2mgm/kg mixed with 0.9% normal saline drip. Conscious sedation was maintained at a constant level by using Ramsay sedation scale[7] level 6. All the patients were administered oxygen 5 l/min through nasal cannula. Effectiveness of superficial cervical plexus block was assessed by mechanical, touch and pinprick after performing the bilateral superficial cervical plexus block.[8] Group B received general anaesthesia using thiopental sodium and fentanyl as induction agents; & intubated by succinylcholine. General anaesthesia was maintained by halothane, nitrous oxide, oxygen and vecuronium bromide. For superficial cervical plexus block, midpoint of the posterior border of the sternocleidomastoid was identified. From this point, 12-15ml of the local anesthetic (a mixture of 20ml 0.5% bupivacaine + 10ml 1% lignocaine) was infiltrated along the border of the muscle 3cm cephalad and caudal. A further 3-5ml of the solution was also infiltrated superficially above the muscle to block the transverse cervical branch of the plexus. The block was performed on both sides of the neck using a size 21-gauge hypodermic needle.

Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) and heart rate (HR) were monitored at 5 minutes interval by using sphygmomanometer and pulse oximeter. Data were recorded at 5 minutes interval for statistical analysis. Operative site bleeding was measured with Boezaart Scoring system.[9] The Boezaart scoring system is a scale assigning a numerical value from 0 to 5. Surgeon's satisfaction was measured by using Likert scale.[10] A 5-point likert scale was used to assess surgeons' satisfaction. Postoperative pain was assessed by visual analogue scale (VAS).[10]

Results

The groups were similar with respect to age, gender, height, weight, body mass index, American Society of Anesthesiology physical status, heart rate, duration of anesthesia, and procedure, mean arterial pressure and end-tidal carbon dioxide. Total study population (N=60) were divided into two groups. Both groups were almost similar in respect to age, weight, height, BMI. Mean age of the patients in group-A was 27.9±3.90 and group-B was 28.1±3.85. Among them maximum age was 37 years and minimum age was 22 years in group-A and 35 years and 22 years in group-B respectively. Age distribution had no clinical impact on the outcome.

Table-I

Comparison of socio-demographic characteristics of the study patients between two groups (n=60)

Variables		Group A (n=30) No. (%)	Group B (n=30) No. (%)	p value
Age group				
	20-25 yrs	8(26.7%)	8(26.7%)	0.842ns
	26-30 yrs	14(46.7%)	12(40.0%)	
	> 30 yrs	8(26.7%)	10(33.3%)	
	Mean±SD	27.9±3.90	28.1±3.85	
Sex				
	Male	1 (3.3%)	2(6.7%)	0.554ns
	Female	29(96.7%)	28(93.3%)	
BMI				
Normal weight (18.5-24.9kg/m2)		7 (23.3%)	7 (23.3%)	1.000ns
Overweight (30-39.9kg/m2)		23(76.7%)	23(76.7%)	
Occupation				
	Housewife	26(86.7%)	28(93.3%)	0.389ns
	Service	4(13.3%)	2(6.7%)	
Socioeconomic status				
	Lower class	0(0.0%)	0(0.0%)	--
	Middle class	30(100.0%)	30(100.0%)	
ASA class				
	Class I	29(96.7%)	25(83.3%)	0.085ns
	Class II	1 (3.3%)	5(16.7%)	

Chi-square was performed to see the association between two groups, ns = not significant, Unpaired student t-test was performed to compare mean age between two groups, ns = not significant.

The maximum weight was 68kg and minimum weight was 58 kg in group-A and group-B. BMIof the study population between the two groups were not statistically significant(p=1.000) (Table-I).

The mean value of baseline systolic blood pressure (SBP) was 118.7±6.8 in group A and 118.3±6.3 in group B, baseline diastolic blood pressure (DBP) was 78.8±3.0 in group A and 78.8±3.0 in group B, and baseline mean arterial blood pressure

Table-II

Comparison of socio-demographic characteristics of the study patients between two groups (n=60)

Preoperartive haemodynamics findings	Variables	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	p value
Baseline	SBP	118.7±6.8	118.3±6.3	0.906 ns
	DBP	78.8±3.0	78.8±3.0	1.000ns
	MAP	92.1±3.7	92.0±3.5	0.906 ns
	HR	74.8±4.4	74.9±4.4	0.930 ns
	SPO2	97.0±.00	97.0±.00	1.000 ns
15 minutes before	SBP	123.5±5.8	122.7±5.9	0.585 ns
	DBP	84.5±2.0	84.5±2.0	1.000ns
	MAP	97.5±2.8	97.2±2.7	0.697 ns
	HR	79.2±4.3	79.5±4.1	0.759 ns
	SPO2	97.0±.00	97.0±.00	1.000 ns
Just before induction	SBP	125.7±4.5	125.6±4.4	0.167 ns
	DBP	84.8±3.9	84.5±3.8	1.000ns
	MAP	98.4±2.9	98.2±2.8	0.751 ns
	HR	76.6±8.1	76.2±8.0	0.861ns
	SPO2	98.5±0.5	98.5±0.5	1.000ns

Data were expressed as frequency and percentage and mean±SD
Unpaired student t-test was performed to compare between two groups
*significant, ns = not significant

(MAP) of group A was 92.1±3.7 and group B was 92.0±3.5. Different values of both groups were not statistically significant (p=0.906,1.00 and 0.906) (Table-II).

The mean value of peroperative systolic blood pressure (SBP) of all the patients of both group at induction 113.4±24.4 vs 136.8±21.6 (Mean ± SD), 5 minutes after induction 109.2±19.5 vs 125.2±20.6 (Mean ± SD), 10 minutes after induction 109.4±16.2 vs 121.8±15.3 (Mean ± SD), 15 minutes after induction 107.4±10.3 vs 116.4±10.1 (Mean ± SD) and at the end of operation 09.1±10.8 vs 115.3±11.5 (Mean ± SD). The changes between the groups were statistically significant(p<0.001). Mean value of diastolic blood pressure of all the patients of group A at induction 75.4±13.6(Mean ± SD), 5 minutes after induction73.6±12.5(Mean ± SD), 10 minutes after induction72.0±9.4(Mean ± SD), 15 minutes after induction 70.5±8.8(Mean ± SD), and at the end of operation 69.7±6.5(Mean ± SD). For group B the mean value was respectively 91.5±12.3, 86.7±12.2, 83.6±8.3, 79.7±8.2, 76.0±4.2(Mean ± SD) Changes of Diastolic blood pressure (DBP) between two group was significant(p<0.001). Peroperative Mean arterial blood pressure (MAP) of all the patients of both groups recorded at induction 88.0±16.9 vs 106.6±15.0(Mean ± SD), 5 minutes after induction 85.5±14.6

Table-III

Comparison of peroperative haemodynamic findings between two groups (N=60)

Peroperative haemodynamic findings	Variables	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P value
Induction	SBP	113.4±24.4	136.8±21.6	<0.001*
	DBP	75.4±13.6	91.5±12.3	<0.001*
	MAP	88.0±16.9	106.6±15.0	<0.001*
	HR	80.1±11.0	83.6±15.9	0.326 ns
	SPO2	98.6±0.5	98.4±0.5	0.203 ns
After 5 minutes	SBP	109.2±19.5	125.2±20.6	0.003*
	DBP	73.6±12.5	86.7±12.2	<0.001*
	MAP	85.5±14.6	99.5±14.7	<0.001*
	HR	83.4±8.8	83.5±10.7	0.969 ns
	SPO2	99.0±0.0	99.0±0.0	1.000 ns
After 10 minutes	SBP	109.4±16.2	121.8±15.3	0.003*
	DBP	72.0±9.4	83.6±8.3	<0.001*
	MAP	84.5±10.8	96.3±10.3	<0.001*
	HR	78.0±6.3	80.5±10.0	0.256
	SPO2	99.0±0.0	99.0±0.0	1.000 ns
After 15 minutes	SBP	107.4±10.3	116.4±10.1	0.001*
	DBP	70.5±8.8	79.7±8.2	<0.001*
	MAP	82.8±9.1	91.9±8.4	<0.001*
	HR	76.0±7.1	75.4±9.3	0.804 ns
	SPO2	99.0±0.0	99.0±0.0	1.000 ns
Endo of OT	SBP	109.1±10.8	115.3±11.5	0.035*
	DBP	69.7±6.5	76.0±4.2	<0.001*
	MAP	82.8±7.4	89.1±5.9	0.001*
	HR	79.2±6.3	81.8±5.1	0.076
	SPO2	99.0±0.0	99.0±0.0	1.000 ns

Data were expressed as frequency and percentage and Mean±SD
Unpaired student t-test was performed to compare between two groups
*significant, ns = not significant

vs 99.5±14.7(Mean ± SD), 10 minutes after induction 84.5±10.8 vs 96.3±10.3(Mean ± SD), 15 minutes after induction 82.8±9.1 vs 91.9±8.4(Mean ± SD) and at the end of operation 82.8±7.4 vs 89.1±5.9(Mean ± SD). There was significant change observed between the groups (p <0.001). (Table-III)

Surgical field assessed by bleeding score. Bleeding score is obtained during intraoperative period. It was found 2.1±0.76

Table-IV

Comparison of VAS, bleeding score and Ramsay scale between two groups (N=60)

Variables	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P value
VAS 3.23±1.65	4.13±1.47	0.030*	
Bleeding score	2.1±0.76	2.63±0.85	0.013*
Ramsay sedation score	6.0±0.0	not evaluated	

Data were expressed as frequency and percentage and mean±SD
Unpaired student t-test was performed to compare between two groups
*significant, ns = not significant

(Mean ± SD) in group A and 2.63±0.85 (Mean ± SD) in group B. This change was statistically significant (p<0.013). Post-operative pain was assessed by Visual Analogue Score (VAS) in recovery room.

Table-V

Comparison of surgeon's satisfaction between two group

Surgeons Satisfaction	Group A (n=30) Mean±SD	Group B (n=30) Mean±SD	P value
Patients score	4.0±0.0	4.0±0.0	1.000 ns

Data were expressed as frequency and percentage and mean±SD
Unpaired student t-test was performed to compare between two groups
*significant, ns = not significant

Among group A we found 3.23±1.65 and4.13±1.47 in group B. This change was statistically significant(p=0.030). (Table -IV)

Regarding surgeon's satisfaction both groups showed same score. That means in both group surgeon was satisfied. This result was not significant (p= 1.00) (Table -V).

Recovery status was measured by three parameters Modified Aldrete Score[5], Recall of any pain, pressure or noise and others adverse effect. Regarding the Modified Aldrete Score 25 patients scored 10 out of 10 and only 5 patients scored 9 out of 10 in group A. In group B 21 patients scored 8, 9 patients scored 9 out of 10. In group A only 3 patients recalled about pressure and noise during operation. In group B 2 patients recalled about pain during operation time. There was no other adverse effect observed during operation in both groups. (TableVI)

Table-VI

Comparison of recovery status between two group

Tools	Group A	Group B
Modified Aldrete Score	9.9 (average)	8.4 (average)
Recall (number of patients)	3	2
Other adverse effect	2	5

Discussion

Thyroid surgery is commonest endocrine surgical procedure being carried out throught the throughout the globe.[1] General anaesthesia is commonly used for thyroid surgery, Bilateral superficial cervical plexus block(BSCPB) is adequate to produce anaesthesia for procedures on anterolateral aspect of the neck.The advantage of regional anaesthesia (LA) with monitored anaesthesia care(MAC) are faster post operative recovery and potential avoidance of adverse effect of GA.

In this study total population (N=60) selected for thyroidectomy was divided into two groups. Group A: received bilateral superficial cervical plexus block with conscious sedation and group Group B: received general anaesthesia. General anaesthesia is commonly used for thyroidectomy. But now a days bilateral superficial cervical plexus block is being accepted in many parts of the world[3]. William B. Inabnet et al also used local/ regional anaesthesia with conscious sedation for thyroid surgery.[11`] In this current study, it was observed that, almost 96.7 % patients in group A and 83.3 % in group B classified as ASA-I which was almost same between two groups there was no statiscally significant.

Preoperative haemodynamics were measured at baseline, 15 minutes before induction and just before induction. It was not statistically significant in both groups. During induction SBP and DBP was measured in group A and group B. There was high SBP and DBP during induction due to Intubation reflex in group B.This value was statistically significant where p value was<0.001. At the same time group A patients showed reduced SBP and DBP due the effect of BSCPB and conscious sedation.The changes was statistically significant where pvalue was <0.001. Moreover, SBP and DBP was observed after 5 minutes, 15 minutes, 30 minutes, 45 minutes and at the end of operation in group A and group B. All the times SBP and DBP were reduced in group A than in group B and the changes were statistically significant. It was observed that there was minimal or no change of MAP in group A and more fluctuation in group B. This changes were statistically significant. During recovery period SBP, DBP and MAP was measured just after recovery, at 15 minutes, at 30 minutes, at 45 minutes and at 60 minutes interval. There was minimal change in group A and significant fluctuation in group B. Postoperative pain and discomfort was minimized in group A due to effect of bilateral superficial cervical plexus block. Similar type of observation was found by Santosh U P et al.[12]

In this study it was observed that bleeding score was mild in group A and provide better surgical condition in comparison

to group B. In group A 50% patient showed mild bleeding 1, 33% patient showed mild bleeding 2 and 12% patient showed mild bleeding 3. On the contrary 66.7% patient showed mild bleeding 3 and 15% patient showed moderate bleeding during operation in group B. This changes were statistically significant. So bilateral superficial cervical plexus block reduces blood loss and provide better surgical condition in comparison to general anaesthesia. Guay J found similar observation.[13]

Regarding for post-operative pain assessment by VAS (Visual Analogue Scale)[6] this study showed VAS score was 1 in 80% cases of group A. On the other hand, VAS score was 5 in 80% cases of group B. This indicate bilateral superficial cervical plexus block reduces post-operative pain more effectively than general anaesthesia as this change was statistically significant where p value was<0.013.Comparisom with other study showed that Shukla V K et al observed in their study the post-operative requirement of analgesic was much less in the local anaesthesia group than general anaesthesia.[14]

Conclusion

It was concluded that bilateral superficial cervical plexus block with conscious sedation provide better outcome in terms of peroperative haemodynamics, surgeons satisfaction, reduce per operative surgical site bleeding for thyroidectomy patients in comparison to general anaesthesia

Conflict of interest: Authors declared no conflict of interest.

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