



Original Researcher Article

COMPARATIVE STUDY OF POST OPERATIVE ANALGESIC EFFICACY OF BILATERAL SUPERFICIAL CERVICAL PLEXUS BLOCK USING BUPIVACAINE 0.25% VS BUPIVACAINE 0.25% WITH DEXAMETHASONE 4MG FOR ELECTIVE THYROID SURGERY UNDER GENERAL ANESTHESIA

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Abstracts: Introduction: Bilateral superficial cervical plexus block can reduce intra- and postoperative pain. Bilateral superficial cervical plexus block is a popular regional anesthesia used in thyroidectomy. Dexamethasone is a systemic glucocorticoid commonly used to reduce postoperative nausea, vomiting and pain and to improve the quality of recovery after surgery. For the purpose of increasing the duration of peripheral single-shot nerve blocks, dexamethasone is useful. This study was done to compare the effectiveness of dexamethasone to bupivacaine and bupivacaine plain in bilateral superficial cervical plexus block for thyroid surgeries in prolonging the duration of first rescue analgesia during postoperative period.

Aim and objective: To compare the effectiveness of dexamethasone to bupivacaine and bupivacaine plain in bilateral superficial cervical plexus block for thyroid surgeries in prolonging the duration of first rescue analgesia during postoperative period.

Material and Methods: This was a prospective comparative study conducted among 60 patients. American Society of Anesthesiologists (ASA) grade 1 and 2 patients, age group between 18-60 years of both gender with BMI <30kg/sq.m undergoing elective thyroidectomy surgeries were included in this study. In the Group D patients, Dexamethasone 4 mg (1ml) + 0.25% bupivacaine (19ml) was administered bilaterally to block the branches of the plexus (10 ml on each side) and in Group P patients, normal saline (1ml) + 0.25% Bupivacaine (19ml) (10 ml on each side) was administered. Heart rate and MAP are recorded in the different times intervals. Post-operative pain was assessed by using the VAS scale. Data was analyzed by descriptive statistics and chi-square test.

Result: As the post-operative period progresses from 5 minutes to 45 minutes, the mean heart rate (HR) decreases and then remains within the normal values. Mean Arterial pressure (MAP) variation also within the normal and maintained stable in the intra operative and post-operative periods. Patients in the Dexamethasone (D) group required less number of analgesic doses as compared that of patients in the Normal saline (P) group for the treatment of post operative pain and it was found to be

statistically significant ($p < 0.001$). The occurrence of post-operative pain was less among patients was in the dexamethasone group.

Conclusion: The administration of Dexamethasone along with bupivacaine for bilateral superficial cervical plexus block is useful in reducing the post operative pain following the thyroid surgery.

Keywords: Superficial cervical plexus block. Dexamethasone, bupivacaine, General anesthesia, Thyroid surgery

INTRODUCTION

Thyroid disease is one of the major public health problems in India for that thyroidectomy done which is a common and painful procedure demanding analgesia¹. Pain after thyroid surgery is regarded as being of moderate intensity and short duration². However, during the first 24 h after surgery, some patients require opioid and nonopioid analgesics.

Bilateral superficial cervical plexus block can reduce intra- and postoperative pain. Bilateral superficial cervical plexus block is a popular regional anesthesia used in thyroidectomy, because of its feasibility and efficacy. The procedures can be facilitated by ultrasound guidance or the conventional landmark (LM) technique. Ultrasound (US) guidance provides real-time visualization of anatomical structures, reduced volumes of local anesthetics, and needle movement and has decreased the complication rate. Owing to its feasibility and efficacy, ultrasound-guided SCPB is a well-established technique for providing regional anesthesia during thyroidectomy³⁻⁵.

Bupivacaine is a well-established long-acting regional anaesthetic, which like all amide anaesthetics has been associated with cardio toxicity when used in high concentration or when accidentally administered intravascularly. Hence for moderate prolongation of analgesia (<24 h), various adjuvant drugs can be admixed with local anaesthetic.

Dexamethasone is a systemic glucocorticoid commonly used to reduce postoperative nausea, vomiting and pain and to improve the quality of recovery after surgery. Recently, several studies have examined the use of perineural dexamethasone to prolong analgesic duration of peripheral nerve blocks, which is thought to be mediated by attenuating the release of inflammatory mediators, reducing nerve root

oedema, reducing ectopic neuronal discharge, and inhibiting potassium channel mediated discharge of nociceptive C-fibres. For the purpose of increasing the duration of peripheral single-shot nerve blocks, dexamethasone might be an excellent choice⁶⁻⁷.

The present study was done to compare the effectiveness of dexamethasone to bupivacaine and bupivacaine plain in bilateral superficial cervical plexus block for thyroid surgeries in prolonging the duration of first rescue analgesia during postoperative period by visual analogue scale(VAS) and compare the intraoperative fentanyl requirements based on intraoperative haemodynamic monitoring.

MATERIALS AND METHODS

This was a prospective comparative study, after approval of the research protocol by the hospital ethics committee for human studies and obtaining written informed consent from patients, 60 American Society of Anesthesiologists(ASA)grade 1 and 2 patients, age group between 18-60 years of both gender with BMI <30kg/sq.m undergoing elective thyroidectomy surgeries were included in this study. Patients who had allergy to study medications, any local infection, pre existing peripheral nerve neuropathies, history of pulmonary, cardiac, renal or endocrine disease were excluded in this study.

All patients were subjected to a routine pre anaesthetic check up. In the operating room, after attaching all standard ASA monitors baseline HR, blood pressure, SpO₂ were noted. The superficial cervical plexus block was performed in supine position, with head turned to opposite side. After proper positioning, painting and draping, the procedure was done by ultrasound guided approach using ultrasound with 6-13MHz linear probe. The Transducer is placed on the lateral neck overlying the SCM at the level of its midpoint(approximately the level of the cricoids cartilage). Once the SCM

was identified, the transducer was moved posteriorly until the tapering posterior edge was positioned in the middle of the screen. The cervical plexus was visible as small collection of hypoechoic nodules (honeycomb appearance) immediately superficial to the prevertebral fascia that over lies the interscalene groove. The goal was to guide the needle tip from lateral to medial direction just under the tapering posterolateral edge of the SCM to the fascial plane under SCM and just above the levator scapulae muscle. After negative aspiration 10ml of drug will be administered. The Local anesthetic administered should be visualized layering out between the SCM and underlying prevertebral fascia. Procedure was done bilaterally. After waiting for onset time of around 10-15 mins the blockade was assessed by pinprick by a separate assistant.

GROUP D: Dexamethasone 4 mg (1ml) + 0.25% bupivacaine (19ml) was administered bilaterally to block the branches of the plexus (10 ml on each side) and

GROUP P: Normal saline (1ml) + 0.25% Bupivacaine (19ml) (10 ml on each side)

General anesthesia was induced with Midazolam 0.04mg/kg, fentanyl 2mcg/kg, glycopyrrolate 0.004mg/kg and a dose of 2mg/kg propofol intravenous. An intubating dose of vecuronium 0.1mg/kg is injected to all patients for muscle relaxation and oral endotracheal intubation was performed. Anaesthesia was maintained with 50% nitrous oxide and 0.5-1% isoflurane. Paracetamol

15mg/kg I.V. was administered over the span of 15mins.

We monitored patient's hemodynamic status at preoperative baseline, after induction, after block (0 min), 15 min, 30 min, 45 min, 60 min, 75 min, 90 min, 105 min, 120 min, 135 min, 150 min, 165 min, 180 min using variables like HR, SpO₂, SBP, DBP, and MABP. We had given injection fentanyl (1 mcg.kg⁻¹) iv. bolus if there was increase in SBP / HR of more than 20% of basal value. At the end of surgery, after signs of recovery from neuromuscular blockade, residual paralysis was reversed with injection neostigmine (0.05 mg/kg) and injection glycopyrrolate (0.008 mg/kg).

Incidences of postoperative pain (including VAS scores), nausea and vomiting, hematoma were recorded. Duration of block was (between injection of LA and till the time of the first complaint of postoperative pain) noted. If a patient's pain on the VAS (where 0 meant no pain and 10 means the worst imaginable pain) higher than 5, additional analgesia was administered intravenously (1000 mg Paracetamol). If the patients' VAS values still higher than 5, tramadol hydrochloride (1 mg/kg) was administered.

Side effects such as nausea, vomiting were treated with Injection Ondansetron 4mgIV. Hypotension defined as a fall in blood pressure by more than 20% from the baseline or an absolute MAP<60mmHg was treated with IV crystalloids. Bradycardia defined as the pulse rate less than 50beats/min, or if hemodynamically unstable was treated with Inj. Atropine 1mgIV.

These 60 patients were randomly allocated in to two groups in this study, Dexamethasone group (30 patients) and Normal saline group (30 patients).

RESULTS

Prospective comparative study was conducted among 60 patients undergoing thyroid surgery.

Table 1: Age group wise distribution of patients underwent thyroid surgery (N=60)

Age group (in years)	Patients underwent Thyroid surgery		Total (%)
	Dexamethasone (D) group (%)	Normal saline (P) group (%)	
25 to 35	3 (33.4)	6 (66.6)	9 (15)
36 to 45	15 (62.5)	9 (37.5)	24 (40)
46 to 55	11 (45.8)	13 (54.2)	24 (40)
56 to 65	1 (33.4)	2 (66.6)	3 (5)
Total	30	30	60

Table 2: Means of heart rate (HR) of the patients at base line and during intra-operative period of thyroid surgery (N=60)

Time intervals of intra-operative period	Means of heart rate (HR) of the patients at baseline and during intra-operative of thyroid surgery
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	Dexamethasone (D) group (mean $\pm$ SD)	Normal saline (P) group (mean $\pm$ SD)
Baseline	87.40 $\pm$ 5.26	83.17 $\pm$ 5.29
At 5 minutes	77.27 $\pm$ 3.66	75.03 $\pm$ 4.98
At 15 minutes	76.70 $\pm$ 3.21	74.47 $\pm$ 4.76
At 30 minutes	75.93 $\pm$ 3.17	74.23 $\pm$ 3.62
At 45 minutes	75.67 $\pm$ 3.88	74.77 $\pm$ 3.87

Table 3: Means of mean arterial pressure (MAP) of the patients at base line and during intra-operative period of thyroid surgery (N=60)

Time intervals of intra-operative period	Means of mean arterial pressure (MAP) of the patients at baseline and during intra-operative of thyroid surgery	
	Dexamethasone (D) group (mean $\pm$ SD)	Normal saline (P) group (mean $\pm$ SD)
Baseline	86.87 $\pm$ 4.83	89.50 $\pm$ 5.05
At 5 minutes	86.13 $\pm$ 7.43	84.07 $\pm$ 6.37
At 15 minutes	86.13 $\pm$ 7.57	84.17 $\pm$ 6.18
At 30 minutes	86.03 $\pm$ 7.53	84.03 $\pm$ 6.28
At 45 minutes	86.20 $\pm$ 7.28	83.80 $\pm$ 7.05

Table 4: Duration of anesthesia block among the patients in Dexamethasone (D) group and Normal saline (P) group. (N=60)

Duration of anesthesia block in hours	Number of post- thyroid surgery patients		Total (%)	p Value
	Dexamethasone (D) group (%)	Normal saline (P) group (%)		
6 to 10	0	30 (100)	30 (50)	0.001
11 to 15	6 (100)	0	6 (10)	
16 to 20	22 (100)	0	22 (36.6)	
21 to 24	2 (100)	0	2 (3.4)	
Total	30	30	60	

Pearson Chi-Square: 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.00.

Table 5: Number of intravenous paracetamol doses required to treat the pain in patients of Dexamethasone (D) group and Normal saline (P) group (N=60)

Number of intravenous paracetamol doses given in post operative 24 hours	Number of post- thyroid surgery patients received intravenous paracetamol for relief of pain		Total (%)	p Value
	Dexamethasone (D) group (%)	Normal saline (P) group (%)		
1	28 (100)	0	28 (46.6)	0.001
2	2 (100)	0	2 (3.4)	
3	0	17 (100)	17 (28.3)	
4	0	13 (100)	13 (21.7)	
Total	30	30	60	

Table 6: Means of heart rate (HR) of the patients at extubation and in the post operative period of thyroid surgery (N=60)

Time intervals of post operative period	Means of heart rate (HR) of the patients at extubation and in the post operative period of thyroid surgery
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	Dexamethasone (D) group (mean $\pm$ SD)	Normal saline (P) group (mean $\pm$ SD)
At extubation	76.83 $\pm$ 2.73	76.90 $\pm$ 3.93
At 5 minutes	74.00 $\pm$ 2.94	75.37 $\pm$ 3.97
At 10 minutes	73.07 $\pm$ 2.74	75.03 $\pm$ 3.98
At 15 minutes	72.47 $\pm$ 2.75	74.33 $\pm$ 3.89
At 30 minutes	71.93 $\pm$ 2.65	74.43 $\pm$ 4.03
At 1 hour	72.17 $\pm$ 2.82	74.33 $\pm$ 3.68
At 2 hours	72.80 $\pm$ 3.06	75.00 $\pm$ 3.70
At 4 hours	72.97 $\pm$ 2.97	75.43 $\pm$ 4.00
At 6 hours	73.77 $\pm$ 3.37	76.40 $\pm$ 3.96
At 12 hours	74.67 $\pm$ 3.15	84.03 $\pm$ 3.81
At 18 hours	77.50 $\pm$ 3.40	88.00 $\pm$ 2.82
At 24 hours	83.73 $\pm$ 3.54	91.13 $\pm$ 2.71

Table 7: Means of mean arterial pressure (MAP) of the patients at extubation and in the post operative period of thyroid surgery (N=60)

Time intervals of post operative period	Means of mean arterial pressure (MAP) of the patients at extubation and in the post operative period of thyroid surgery	
	Dexamethasone (D) group (mean $\pm$ SD)	Normal saline (P) group (mean $\pm$ SD)
At extubation	87.23 $\pm$ 7.29	84.57 $\pm$ 7.99
At 5 minutes	86.03 $\pm$ 7.46	83.70 $\pm$ 7.75
At 10 minutes	85.70 $\pm$ 7.43	83.63 $\pm$ 7.59
At 15 minutes	85.70 $\pm$ 7.32	83.80 $\pm$ 7.69
At 30 minutes	85.47 $\pm$ 7.42	83.43 $\pm$ 7.39
At 1 hour	85.90 $\pm$ 7.35	83.57 $\pm$ 7.41
At 2 hours	85.87 $\pm$ 7.36	83.83 $\pm$ 7.35
At 4 hours	86.10 $\pm$ 7.60	83.90 $\pm$ 7.65
At 6 hours	86.00 $\pm$ 7.42	83.93 $\pm$ 7.70
At 12 hours	85.80 $\pm$ 7.35	91.93 $\pm$ 6.16
At 18 hours	87.57 $\pm$ 7.43	94.27 $\pm$ 5.29
At 24 hours	92.60 $\pm$ 6.03	94.93 $\pm$ 5.17

Table 8: Assessment of pain intensity using visual analogue scale (VAS) score among the post operative thyroid surgery patients (N=60)

Time period	Pain intensity (VAS scoring)	Patients underwent thyroid surgery		Total (%)	p value
		Dexamethasone (D) group (%)	Normal saline (P) group (%)		
Pain at extubation	No pain	30 (100)	30 (100)	60	-
Pain at 5 minutes	No pain	13 (43.3)	8 (26.6)	21	0.176
	Mild pain	17 (56.7)	22 (73.4)	39	-
Pain at 30 minutes	Mild pain	30 (100)	30 (100)	60	-
Pain at 1 hour	Mild pain	30 (100)	30 (100)	60	-
Pain at 2 hours	Mild pain	30 (100)	30 (100)	60	-
Pain at 4 hours	Mild pain	30 (100)	30 (100)	60	-
Pain at 6 hours	Mild pain	30 (100)	30 (100)	60	-
Pain at 12 hours	Mild pain	30 (100)	26 (86.6)	56	0.056
	Moderate pain	0	4 (13.4)	4	
Pain at 18 hours	Mild pain	30 (100)	0	30	<0.001
	Moderate pain	0	30 (100)	30	

Pain at 24 hours	Mild pain	18 (60)	0	18	<0.001
	Moderate pain	12 (40)	9 (30)	21	
	Severe pain	0	21 (70)	21	

[Note: Visual analogue scale (VAS) score: 0 to 4 mm is No pain, 5 to 44 mm is Mild pain, 45 to 74 mm is Moderate pain and 75 to 100 mm is severe pain]

DISCUSSION

This prospective comparative study was conducted among 60 patients undergoing thyroid surgery. In our study, as the post operative period progresses from 5 minutes to 45 minutes, the mean heart rate (HR) decreases and then remains within the normal values. The baseline means of mean arterial pressure (MAP) were 86.87 ± 4.83 and 89.50 ± 5.05 for Dexamethasone (D) group and Normal saline (P) group respectively. There is no significant change in the Means of mean arterial pressure (MAP) of the patients in the intra-operative period. According to a study done by Kumar et al.⁸, the intraoperative hemodynamic parameters were comparable between the two groups.

Our study found that, among total 60 patients, the duration of anesthesia block was 6 to 10 hours in 30 (50%) in which all from Normal saline (P) group. The duration of anesthesia block was 16 to 20 hours in 22 (36.6%) of the patients in which all from Dexamethasone (D) group. And also the duration of anesthesia block was 21 to 24 hours in 2 (3.4%) of patients who all were also from Dexamethasone (D) group. This difference of the duration of anesthesia block between the two groups was found to be statistically significant.

In this study, among the total 60 patients, 13 (21.7%) of the patients received four doses of intravenous paracetamol for pain relief in which all from the Normal saline (P) group. For treating the post operative pain, this difference in the requirement of number of intravenous paracetamol doses between the Dexamethasone (D) group and Normal saline (P) group for the treatment of post operative pain was found to be statistically significant ($p < 0.001$). Therefore the administration of Dexamethasone along with bupivacaine for bilateral superficial cervical plexus block is useful in reducing the post operative pain following the thyroid surgery. Our study findings are similar to the study conducted by Kumar et al.⁸, this showed

that, the time of rescue analgesic in Group A was 7.09 ± 1.04 min and Group B was 13.19 ± 1.46 min with $P < 0.0001$. The mean time for rescue analgesic was longer in dexamethasone group than in control group.

Woldegerima Y.B. et al.¹¹ conducted a prospective cohort study to determine the analgesic efficacy of bilateral superficial cervical plexus block for thyroid surgery under general anesthesia, showed that there was reduced consumption of analgesic by the patients in the post-operative period. Shah PM et al.¹² showed that the time to first dose of analgesia was higher in group B (bupivacaine group) compared to group S (normal saline group). The patient in the group S required more doses of tramadol for pain relief than in the group B. So the bilateral superficial cervical plexus block was useful for pain relief after thyroidectomy surgery. Steffen T. et al.¹⁴ conducted a randomized controlled trial showed that the bilateral superficial cervical plexus block with bupivacaine combined with general anesthesia reduced the post operative pain significantly in the patients underwent thyroid surgery.

In our study, it was observed that the means of heart rate (HR) were decreased in the post-operative period and then the means of heart rate (HR) were increased to the normal as the post-operative time period progresses towards 24 hours. The means of mean arterial pressure (MAP) at the time of extubation were 87.23 ± 7.29 and 84.57 ± 7.99 in Dexamethasone (D) group and Normal saline (P) group respectively. It was observed that there is no significant variation in the means of MAP among the both Dexamethasone (D) group and Normal saline (P) group in the post operative period from 5 minutes to 24 hours monitoring. A study conducted by Prasanna P. et al.⁹ also showed stable haemodynamic parameters in intra-operative period.

Velayutham N. et al.¹⁰ conducted a study showed that, bilateral superficial cervical plexus block with bupivacaine did not caused the significant alterations in the hemodynamic parameters in the intra-operative period. According to a study conducted by Hassan RM et al.¹⁵, heart rate and blood pressure were well controlled in the study group as compared that of control group.

Bupivacaine administration along with the bilateral superficial cervical plexus block reduced the occurrence of post operative pain and also reduced the need for analgesia for pain relief as compared to the control group. P. Rajkumar et. al.¹⁶ conducted a study showed that the administration of bupivacaine with clonidine in bilateral superficial cervical plexus block helped to maintain the stable heart rate and blood pressure during the intra operative period and post operative period. also reduces the post operative pain and the decreased the need for analgesics in the post operative pain relief.

The finding of our study showed that, at post operative 24 hours, among the Dexamethasone (D) group, 18 (60%) and 12 (40%) patients experienced mild and moderate types of pain respectively. Among the Normal saline (P) group, 9 (30%) and 21 (70%) patients experienced moderate and severe types of pain respectively. The difference of the occurrence of the post operative pain between these two groups was found statistically significant ($p < 0.001$). According to the study conducted by Suh Y.J. et. al.¹, the superficial cervical plexus block is more effective technique than the combined superficial and deep cervical plexus block to reduce the pain during and immediately after thyroidectomy. Kumar et. al.⁸ conducted a study showed that, there was a significant difference in mean VAS score between two groups from 6 h to 20 h postoperatively. Prasannan P. et. al.⁹ conducted a comparative study on analgesic efficacy of bilateral superficial cervical plexus block showed that, the lower VAS scores, reduced need for additional analgesics.

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