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Efficacy Of 0.25% Ropivacaine With Dexmedetomidine Vs. Dexamethasone For Cervical Plexus Block For Thyroidectomy

Dr. Chengalasetty Rishi Kaushik [1*,] Dr. Samatham Veera Sruthi Chandana[2]
*(Postgraduate, Dept. of Anesthesia, Great Eastern Institute of Medical Sciences, Srikakulam[*1], Postgraduate[2], Dept. of Anesthesia, Great Eastern Institute of Medical Sciences, Srikakulam)*

Abstract:
Background*: Bilateral Superficial Cervical Plexus Block (BSCPB) Provides Good Postoperative Analgesia For Thyroidectomy, Which Is Associated With Incisional Pain, Post-Operative Nausea Vomiting (PONV), Dysphagia Due To Tissue Dissection, And Endotracheal Intubation. Adjuvants Like Dexmedetomidine Provides Prolonged Analgesia With Slight Adverse Effects.*
Aim: *This Study Was Done To Know The Efficacy Of Dexmedetomidine Alone And Dexamethasone As An Adjuvant With 0.25 % Ropivacaine In BSCPB For Thyroidectomy.*
Materials And Methods*: The Current Interventional, Randomized Single Blinded Study Was Done Among 50 Patients Scheduled For Thyroidectomy. The Patients Were, Randomized And Given BSCPB Using 0.25% Ropivacaine With Either 2 Mg Of Dexamethasone (Group DT) Or 25 Mg Dexmedetomidine (Group DD) After Induction Of General Anaesthesia. Post-Operative Pain Was Assessed Using A Numeric Rating Scale (NRS). Age, Gender, Time For 1st Rescue Analgesia, NRS Score, And Postoperative Side Effects Was Compared Between The Two Groups.*
Results*: The Mean NRS Score Was More In Patients Of DT Group. The Mean Time For Rescue Analgesia Was More For DD Group. The Incidence Of PONV Was Significantly Less In Group DT Patients. There Was No Significant Difference In Hemodynamic Parameters Like Heart Rate (HR), Systolic Blood Pressure (SBP), Or Diastolic Blood Pressure (DBP) Between Patients Of The Two Groups.*
Conclusion: *Dexamethasone Showed Benefit Of Reduced Decreased Incidence Of PONV, But BSCPB Using Ropivacaine With Dexmedetomidine Provided More Post-Operative Analgesia With Stable Hemodynamic Parameters Compared To Dexamethasone*
Key Words: *Ropivacaine, Dexamethasone, Dexmedetomidine, Bilateral Superficial Cervical Plexus Block, Post-Operative Analgesia*

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I. Introduction

Thyroid disease is one of the common medical problems in India.[1-3] So, thyroid surgery is one of the most commonly done surgical procedures.

Acute pain is one of the main complaints after surgery which has serious implications on wellbeing and psychological status of the patient.[4-7] Pain after thyroid surgery is severe during the early postoperative hours. One study showed that the mean VAS score post-thyroidectomy as 6.9 and almost every patient required opioid analgesics like morphine.[8] Despite giving paracetamol, 70% of patients had a score of ≥ 4 on numeric rating scale (NRS-11).[9] Simple analgesics or non-steroidal anti-inflammatory drugs(NSAIDs) like paracetamol was insufficient in managing pain after thyroidectomy.[10] Bilateral superficial cervical plexus block (BSCPB) is routinely used for managing pain after thyroid surgery. Some previous studies reported that the block allowed to decrease anaesthetic requirements and provided adequate and prolonged postoperative analgesia. It reduced pain score, requirement for rescue analgesic and overall opioid need during early postoperative hours.[11-13] So, this can reduce opioids related expenses and side effects.[14] BSCPB was a safe, simple, inexpensive and effective for managing pain after thyroidectomy.[15]

Ropivacaine is a local anaesthetic used to reduce postoperative pain effectively. Along with ropivacaine adjuvants like dexamethasone or dexmedetomidine may be used.

Dexmedetomidine is a centrally acting alpha agonist which acts by increasing the onset of sensory and motor blockade along with enhanced duration of analgesia.

Dexamethasone is a corticosteroid, used to decrease PONV and helps to improve the quality of recovery after surgery. Recently, one study showed that dexamethasone prolonged the duration of analgesia, which is

mediated by decreasing the release of inflammatory mediators, decreasing ectopic neuronal discharge, and inhibiting potassium channel-mediated discharge of nociceptive C-fibers.[16]

In spite of huge implications on thyroidectomy, the postoperative analgesic efficacy of bilateral superficial plexus block (BSCPB) for thyroid surgery was not yet estimated in South Indian settings. Hence, the current study was undertaken.

Aim: This study was done to know the efficacy of dexmedetomidine alone and dexamethasone as an adjuvant with 0.25 % ropivacaine in BSCPB for thyroidectomy.

II. Material And Methods

Study site: Department of anesthestiology, GEMS, Srikakulam, Andhra Pradesh, India

Study duration: Six months: January 2023 to June 2023

Sample size: 50 subjects who were scheduled for thyroidectomy were included.

Sample size calculation:

As per the study done by Banu *et al*.[17] the expected mean difference in duration of analgesia was 13 min between two groups with an SD of 16. We calculated 25 subjects for each group using the standard formula, to have a power of 75% with type A error of <0.05. So, we included 25 subjects in each group.

Type of study:

The study is randomized, single blinded study.
The study is single blinded as patients doesn't know what combination of drugs they got
But the investigator knows the combination the patients are getting.

Groups:

Patients were randomized by computer generated software.
Patients were divided into two groups. Group DT and DD.
Group DD: Patients received 0.25% ropivacaine 10ml with 9ml of 0.9% normal saline with dexmedetomidine 25 mg made to 1ml (total 20ml): 25 patients.
Group DD: Patients received 0.25% ropivacaine 10ml with 9ml of 0.9% normal saline with dexamethasone 2mg made to 1ml (total 20ml): 25 patients.

Inclusion criteria:

- Male and female patients aged 20 to 60 years.
- Patients with American Society of Anesthesiologists (ASA) grade I and II, scheduled for elective thyroid surgery under general anesthesia.
- Patients who provided informed consent to participate in the surgery.

Exclusion criteria:

- Pregnant and lactating women
- Patients with severe cardiac, renal or hepatic disorders that interrupt data collection.
- Patients with infection at the injection site,
- Patients with known allergy to Ropivacaine or dexamethasone or dexmedetomidine
- Patients with diabetes mellitus or chronic hypertension
- Patients with coagulation disorders
- Patients with retrosternal thyroid mass
- Patients with tracheal deviation.

Ethical considerations:

Institutional ethical committee approval was obtained before conducting the study.

Methodology:

Preanesthetic assessment was done, and all subjects were educated about NRS. Patients were kept fasting 8 hours before surgery. They were given Capsule Omeprazole 20mg and Tablet Alprazolam 0.5 mg 8 hours before surgery. Intravenous access was obtained by 18G cannula and fluids were started. Monitors were connected.

Under aseptic precautions, the block was done under local anesthesia with the patient lying supine and head turned to contralateral side. Linear probe was kept transversely over lateral aspect of the patient's neck, after skin sterilization, at posterior edge of sternocleidomastoid muscle. The probe was displaced backward to detect tapering posterior edge of muscle in middle of the view seen on screen. Needle was introduced from posterior aspect. After negative aspiration, local anesthetic was deposited on either side of the plane. Same procedure was done on contralateral side also.

Patients were preoxygenated using oxygen and then induced with an propofol 20 mg.

Postoperative pain was assessed using NRS.

Patients received 1 g paracetamol intravenously as a rescue analgesic if the NRS was above 3.

Statistical analysis: Data were analyzed using Epi info software 7.2.5. The student t test was used to compare numerical parameters between two groups and chi-square test was used to compare categorical parameters between two groups. P value below 0.05 is considered significant.

III. Results

Demography:

Age of patients: There is no significant difference in the mean age of patients of groups DD and DT

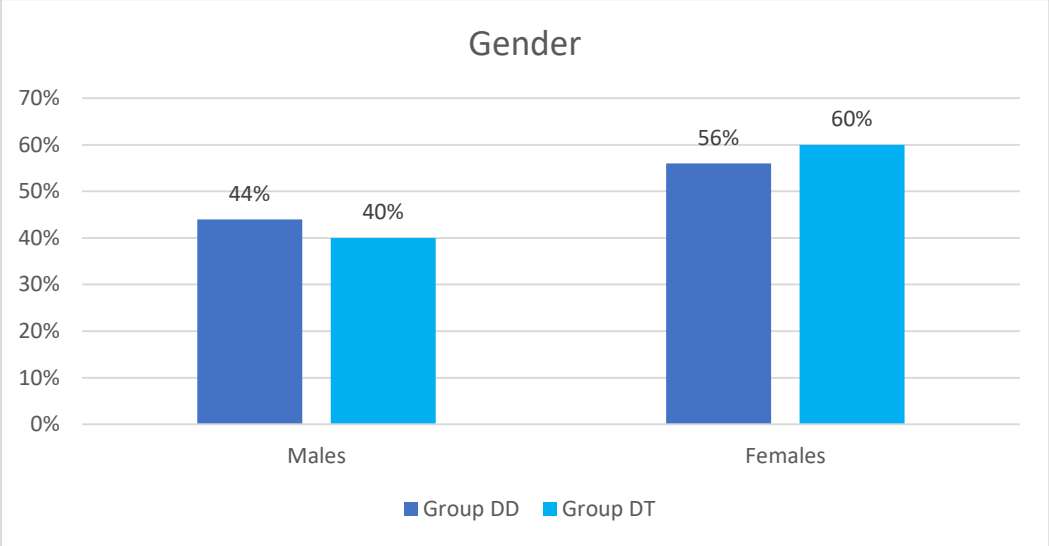
Table 1: Mean age of patients of both groups

Parameter	Group DD	Group DT	P value
Mean age	52.3±4.5	51.2±3.9 years	0.36

Gender:

There is no significant difference in gender between two groups, as per chi square analysis (p= 0.56)

Graph 1: Gender of patients of both groups



ASA status: There is no significant difference in the ASA status of patients of both groups

Table 2: ASA status of patients of both groups

ASA status	Group DD	Group DT	P value
I	64%	56%	0.24
II	36%	44%	

Mean NRS score:

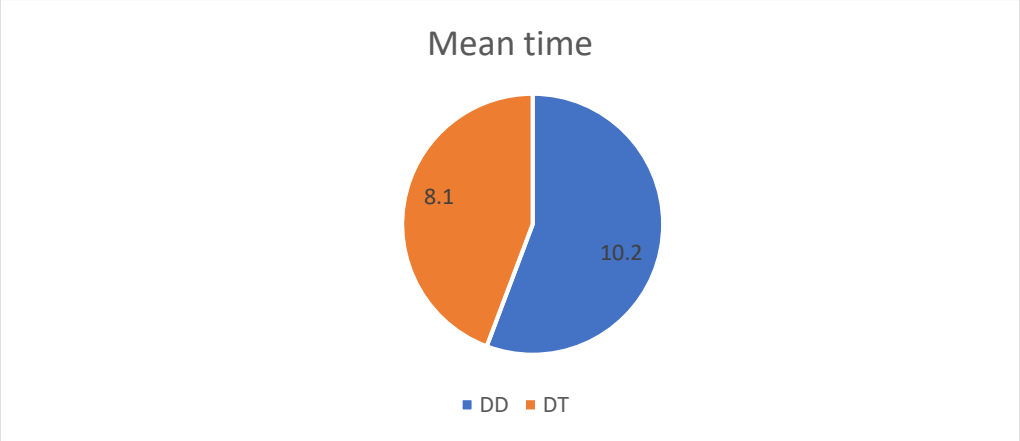
There was significant difference in the mean NRS score between two groups during immediate postoperative period, 6th, 12th and 24th hours of post operative period. Mean NRS score was significantly lower in DD group compared to DT group patients.

Table 3: Mean NRS scores at various intervals

NRS scores at various intervals	Group DD	Group DT	P value
Mean NRS during immediate postoperative time	1.1±0.01	2.3±1.1	0.001
NRS-11 at 6th postoperative hour	2.1 ±1.02	3.4±1.7	0.001
NRS-11 at 12th h	1.23±0.76	3.2±1.4	0.001
NRS-11 at 24th h	2.6±1.45	3.9±1.4	0.002

Mean time for rescue analgesia:
There is significant difference in the mean time for rescue analgesia between two groups. It was less in DD group.

Graph 2: Mean time for rescue analgesia



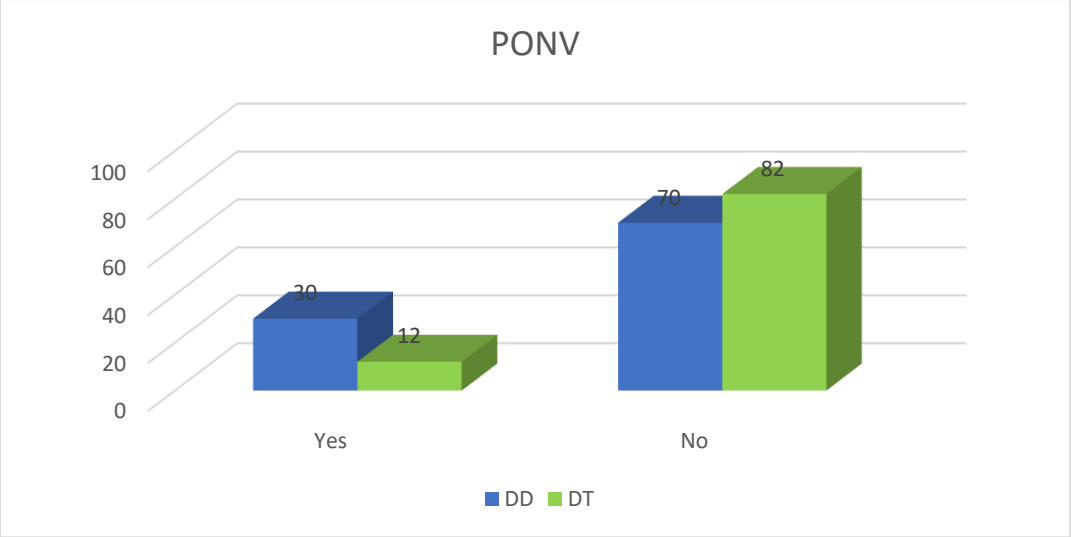
Hemodynamic parameters: There is no significant difference in heart rate, SBP, DBP at 6 12 and 24 hours between two groups of patients.

Table 4: Hemodynamic parameters among two groups

Hemodynamic parameters	Group DD	Group DT	P value
HR at 6 hours	74.2±4.5	74.1±5.1	0.94
HR at 12 hours	75.8±8.2	79.2±7.2	0.12
HR at 24 hours	73.4±4.2	74.6±6.1	0.42
SBP at 6 hours	121.6±12.3	123.9±10.4	0.47
SBP at 12 hours	118±4.8	119.2±3.1	0.29
SBP at 24 hours	120.4±10	121.3±10.1	0.75
DBP at 6 hours	73.2±4.5	74.2±5.1	0.46
DBP at 12 hours	77.8±5.2	78.2±6.2	0.80
DBP at 24 hours	76.3±7.2	75.6±8.1	0.74

Post operative nausea and vomiting: Post operative nausea and vomiting was less significantly among patients of DT group compared to DD group. (p=0.001).

Graph 3: Incidence of PONV



IV. Discussion

In the current study, we included 50 patients of ASA status 1 and II scheduled for thyroidectomy under general anaesthesia. There is no significant difference in the mean age of patients, gender, ASA status of groups DD and DT. This implies that basic demographic features are almost similar and comparable between groups. There is significant difference in the meantime for rescue analgesia between two groups. It was less in dexmedetomidine group. The mean NRS score was more in dexamethasone group. This implies that dexmedetomidine is powerful analgesic compared to dexamethasone. There is no significant difference in heart rate, SBP, DBP at 6 12 and 24 hours between two groups of patients. Post operative nausea and vomiting was less significantly among patients who received dexamethasone in our study.

Andrieu *et al.*[18] and Goulart *et al.*[19] chosen 0.25% concentration of Ropivacaine as they found that enhancing the concentration of ropivacaine to 0.5% or 0.75% failed to increase duration of analgesia.

During the postoperative period, the mean SBP, DBP, and HR were comparable in both groups, which imply that both dexmedetomidine and dexamethasone provides hemodynamic stability. Hassan *et al.*,[20] reported a decline in SBP DBP and HR with dexmedetomidine compared to dexamethasone used as adjuvant for different blocks, in contrast to our study findings.

Gao *et al.*[21] compared the efficacy of dexmedetomidine and dexamethasone as adjuvants for erector spinae plane block and found no significant difference in mean pain scores between two groups, in contrast to our study findings.

In the study done by Neena Jain et al.[22] on 80 patients, authors compared dexmedetomidine with dexamethasone and found that there is no significant difference in the mean duration of analgesia or time required for rescue analgesia.

V. Conclusion

Dexamethasone showed the benefit of reduced decreased incidence of PONV, but BSCPB using ropivacaine with dexmedetomidine provided more post-operative analgesia with stable hemodynamic parameters compared to dexamethasone.

The study is self-sponsored.
There were no conflicts of interest.

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