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Comparison Of Analgesic Efficacy Of Bilateral Superficial Cervical Plexus Block With 0.5% Ropivacaine Alone Versus 0.5%Ropivacaine With Dexmedetomidine In Thyroid Surgeries Under General Anaesthesia: A Prospective Randomized Double Blinded Study.

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Abstract:
Background and Aims: *Bilateral superficial cervical plexus block (BSCPB) is effective in reducing pain following thyroid surgeries. Aim of the study is to compare the analgesic efficacy of BSCPB with 0.5% Ropivacaine alone versus 0.5%Ropivacaine with Dexmedetomidine in thyroid surgeries.*
Methods:*60 adult patients belonging to ASA physical status I–II scheduled to undergo thyroid surgeries were randomly divided in to two groups to receive BSCPB,either with 20ml of 0.5% Ropivacaine(Group R) or 20ml of 0.5% Ropivacaine with 0.5µg/kg Dexmedetomidine(Group RD) after induction of anesthesia Visual analogue scale (VAS) was used to assess analgesia postoperatively. Wilcoxon signed rank test and Mann–Whitney U-test were applied for VAS and sedation scores. Unpaired t-test was applied for duration of post-operative analgesia.*
Results*: There was significantly longer duration of analgesia in Group RD and higher patient satisfaction at 24 h. While VAS score for pain were similar up to 6 h, they were lower in Group RD at 12h and 24h. Haemodynamic stability and sedation scores were similar across the groups. There were no adverse events. However, pain during swallowing persisted in both the groups.****Conclusion:****Combination of 0.5% ropivacaine and dexmedetomidine for BSCPB provided significantly prolonged and better quality of postoperative analgesia than with 0.5% ropivacaine alone in patients undergoing thyroidectomy*
Keywords:*superficial cervical plexus block,Dexmedetomidine,Analgesia,Ropivacaine.*

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I. Introduction

Among the worldwide endocrine surgical procedures, thyroidectomy is considered the most common.Nowadays, thyroid surgeries are performed on an ambulatory basis, so regional techniques have been considered as the mainstay for postoperative analgesia[1].

Post operative analgesia is a vital part of post operative care. Good post operative analgesia can positively improve the surgical outcome[2].The use of regional anaesthesia as an effective alternative to general anaesthesia in thyroid surgeries is now being accepted in many parts of the world. Superficial cervical plexus block (SCPB) has been found to be very effective in procedures of neck such as thyroid surgeries, clavicular surgery, carotid endarterectomy and tracheostomy[3,4.5].

The duration of analgesia following the nerve blocks is a matter of concern as most of the blocks last for only a few hours.For the purpose of increasing the duration of peripheral single-shot nerve blocks, Dexmedetomidine might be an excellent choice.

Dexmedetomidine is a selective alpha-2 adrenoreceptor agonist which is used as a sedative and analgesic, it prolongs the sensory blockade duration of local anaesthetics.[6]

Ropivacaine, a local anaesthetic with better safety profile is known to produce prolonged analgesia of nerve blocks.[7]

The objective of this study is to compare the duration and effectiveness of post-thyroidectomy analgesia of BSCPB using 0.5% ropivacaine with a combination of 0.5% ropivacaine and dexmedetomidine.

II. Methods & Methodology

After obtaining approval from the Institutional Ethics Committee for the study and written informed consent from 60 participants, they were randomly allocated into two groups using computer generated list of random numbers.

Inclusion Criteria:

1. Age 25-60 years
2. either sex
3. ASA grade I & II
4. Euthyroid at the time of surgery

Exclusion Criteria:

1. Patient refusal
2. Hypersensitive reaction to study drug
3. Non-euthyroid at the time of surgery
4. Infection at the site of the block
5. Neurological diseases
6. The presence of coagulopathy

All the 60 adult patients scheduled to undergo thyroid surgery under general anaesthesia were randomly divided in to two groups to receive BSCPB, as follows:

Group R with 19.5 ml of 0.5% ropivacaine and 0.5 ml normal saline, 10 ml on each side and

Group RD with dexmedetomidine 0.5 μg/kg made upto 0.5 ml in normal saline added to 19.5 ml 0.5% ropivacaine, 10 ml on each side.

After shifting the patients to the OR, 18 G IV cannula was secured in the hand ,standard monitors including a neuromuscular monitor were attached. Baseline values of heart rate, blood pressure and oxygen saturation were noted.

Premedication was given with inj.Glycopyrolate 0.2mg i.v,inj.Ondansetron 4mg i.v& an opiod fentanyl 2mcg/kg i.v followed by pre-oxygenation for 3min.

Patient was induced with inj.Propofol 2mg/kg i.v followed by Non- Depolarising muscle relaxant inj.Vecuronium 0.1mg/kg i.v mask ventilated for 3minutes and then intubated with an appropriate sized endotracheal tube

Maintained anesthesiawithoxygen:nitrousoxide in a 3:4ratio . BSCPB was performed using landmark technique before theonset of surgery. After cleansing the skin with an antiseptic solution, a skin wheal is raised at the site of needle insertion using a 25-gauge needle. Using a "fan" technique with superior-inferior needle redirections, the local anesthetic is injected alongside the posterior border of the sternocleidomastoid muscle[8] 2–3 cm below and then above the needle insertion siteafter negative aspiration for blood every time.

The patients were under general anaesthesia while receiving BSCPB, drug was prepared by another anaesthesiologist and post-operative observer was unaware of the drug used. Hence, they were not aware of the allocation of subjects in the study.

At the end of surgery, after signs of recovery from neuromuscular blockade, residual paralysis was reversed with injection neostigmine and injection glycopyrrolate. Once the patient was fully awake with TOF ratio of one, endotracheal tube cuff was deflated and the patient was extubated. The patient was shifted to PACU when haemodynamically stable and responsive.

Non-invasive blood pressure, heart rate and SpO_2 were noted at baseline and every 30 min intra-operatively, once immediately aftershifting to PACU and then at 2, 4, 6 and 24 h post-operatively. Oxygen was delivered at 4 L/min for 1 h via Hudson's mask.

The severity of pain experienced by the patient was assessed at 0, 2, 4, 6, and 24 h post-operatively using a VAS scale.

Post-operative sedation was assessed at 2 h after surgery using Brussels sedation score as follows: (1) Unarousable, (2) responds to pain stimulation, (3) responds to auditory stimulation, (4) awake and calm and (5) agitated.

Injection tramadol 50 mg IV was used as rescue analgesic when VAS score was >3 in both the groups and time of administration was noted. Other effects such as nausea, vomiting, dysrhythmia and urinary retention were noted and treated appropriately.

VAS scores were taken at 24 h post-operatively to assess the patient satisfaction.

Statistical Analysis:The data was enterd in the Microsoft excel sheet and statistically analyzed using SPSS SOFTWAREA VERSION 16.0.Sample size of 30 patients per group was obtained based on the projected

improvement in the quality of analgesia of atleast 40% with BSCPB, with 80% power.Wilcoxon signed rank test and Mann–Whitney U-test were applied for VAS and sedation scores. Unpaired *t*-test was applied for age, weight, duration of surgery and duration of post-operative analgesia. The value $P < 0.05$ was considered significant, while $P < 0.01$, highly significant and $P < 0.001$, very highly significant.

III. Results

There was no significant difference between patients demographic data, ASA status and duration of surgery(Table 1)

Table 1: Showing demographic data

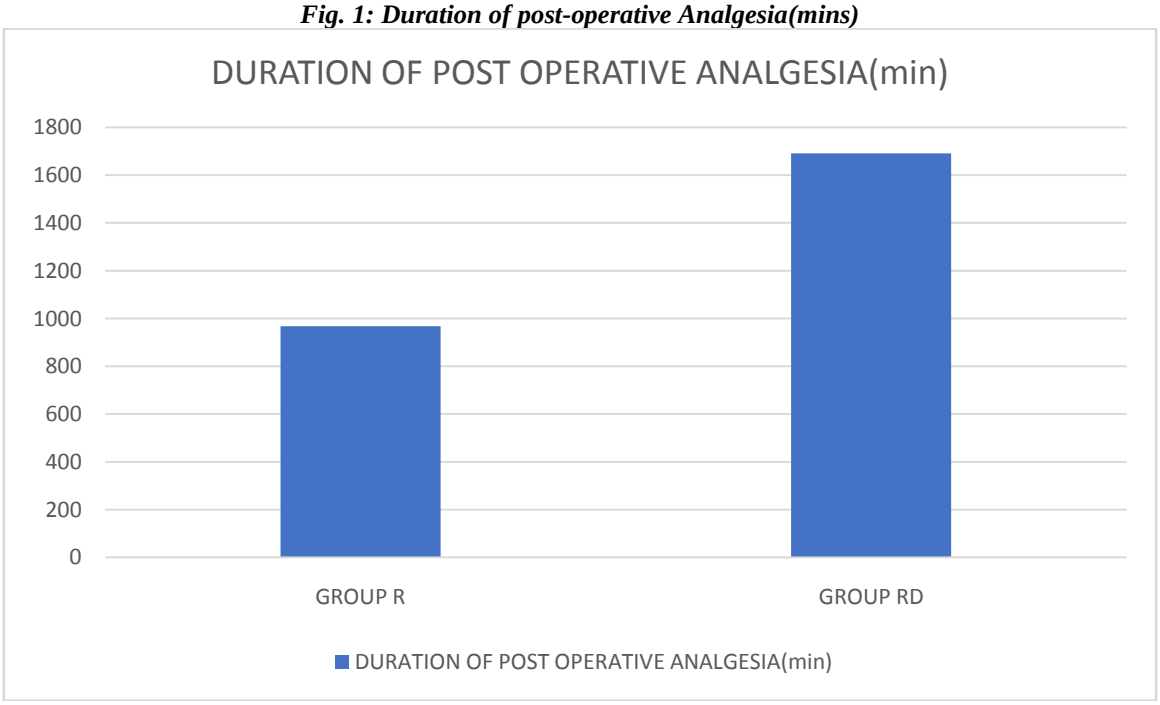
Variable	Group R	Group RD	P-value
Age (years)	42±9.17	43.8±11.3	0.878
Sex(female/male)	25/5	24/6	0.101
Weight (kgs)	52.4±8	53.07±7.9	0.723
Duration of Surgery (mins)	1.97±0.38	1.93±0.44	0.71

Table2: Showing post-operative outcomes

Measures	Group R	Group RD	P- value
Sedation score	4(3-4)	3(3-4)	0.65
VAS score for pain			
12 hr	2(1-2)	0(0-1)	<0.001
24hr	5(5-6)	2	<0.001
VAS score for satisfaction at 24hrs	5(5-6)	7(7-9)	<0.001

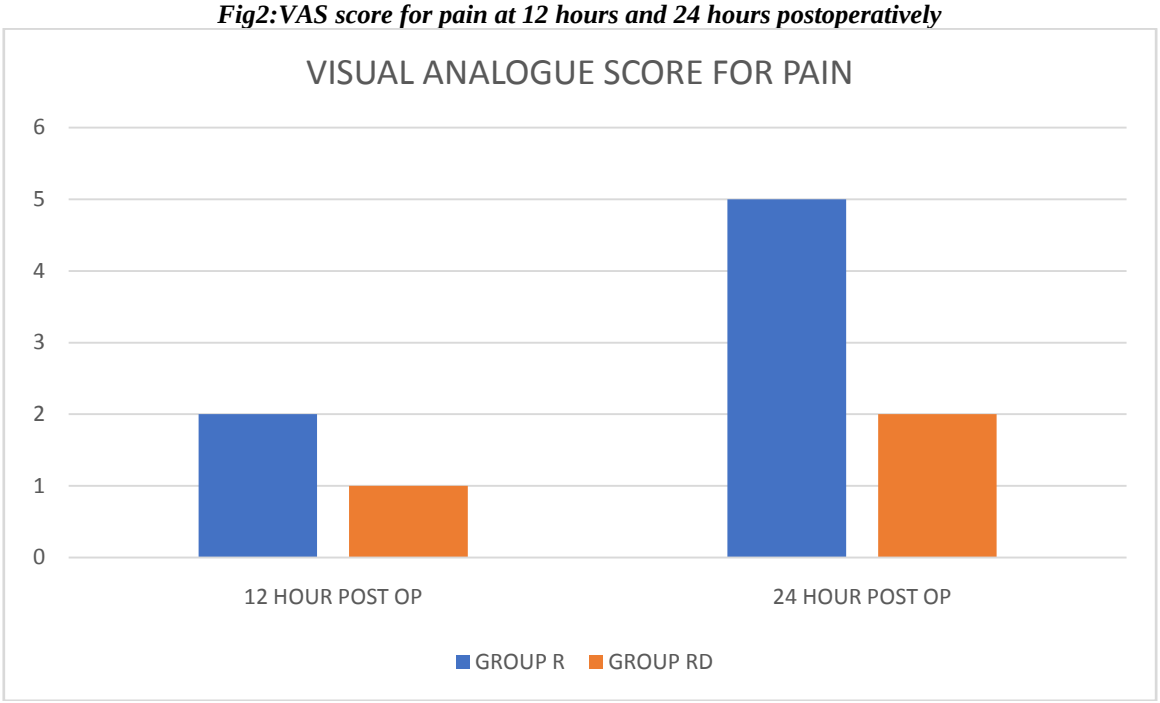
VAS score for pain was compared among the two groups the 'p' value of <0.001 which was highly significant(Tab-2).

Fig. 1: Duration of post-operative Analgesia(mins)



Duration of postoperative analgesia was more in Group RD when compared to Group R(Fig.1),(Fig.2).

Fig2:VAS score for pain at 12 hours and 24 hours postoperatively



There was no difference in haemodynamic parameters among both the groups.

IV. Discussion

Among the worldwide endocrine surgical procedures, thyroidectomy is considered the most common. Numerous challenges can be encountered either in the preoperative, intraoperative, or in the postoperative period.Peripheral nerve blocks are known to provide analgesia for prolonged periods. Some studies have shown it to be less helpful. However, our results suggest that it was successful in alleviating post-operative pain following thyroid surgery.

The main finding of this study is that the post-operative pain scores and rescue analgesic consumed were significantly lower after BSCPB with an α_2-agonist (dexmedetomidine) as adjuvant ($P < 0.001$) after thyroidectomy.

Patient satisfaction in Group RD was superior ($P < 0.001$) as the quality of analgesia was better when dexmedetomidine was used as an adjuvant.There was neither statistically nor clinically significant changes in intra-operative mean arterial blood pressure and heart rate between the groups in the current study. There was no need for intervention aimed at bradycardia or hypotension. Addition of dexmedetomidine in a dose of 0.5 µg/kg did not cause sedation.

However, significant reduction ($P < 0.001$) in haemodynamic parameters has been reported by Swami *et al*.[9]when dexmedetomidine was used in a dose of 1 µg/kg. Hence, a dose of 0.5 µg/kg was decided upon to avoid the haemodynamic and other side effects. The findings justify restricting dose of dexmedetomidine to 0.5 µg/kg for regional blocks.

In a volunteer study[10], peri-neural dexmedetomidine with 0.75% ropivacaine prolonged block of ulnar nerve by 60%, while systemic administration of 20 µg dexmedetomidine resulted in only 10% prolongation of the same, suggesting the peripheral effect of dexmedetomidine when added to the local anaesthetic.

Furthermore, there was no difference in the amount of sedation between groups, indicating the absence of significant central action. Similarly, dexmedetomidine and clonidine provided post-operative analgesia of longer duration and better quality when added to levobupivacaine and bupivacaine, respectively, for brachial plexus block and BSCPB[11].

Patients in both groups complained of discomfort or throat pain in the immediate postoperative period which increased in intensity during deglutition. Later, it was evident only on deglutition, which lasted for few hours.

Our observation indicates that when patients were not concerned about incision pain, they paid more attention to the pain on deglutition.

Unfortunately, SCPB was ineffective in combating throat pain. However, the pain lasted only a few hours (3–5 h) after extubation and patients did not demand additional analgesics.[12]

V. Conclusion

Addition of dexmedetomidine to ropivacaine enhanced the duration of post-operative analgesia of BSCPB and patient satisfaction after thyroid surgeries. Consequently, by limiting its dose to 0.5 μg/kg, undesirable haemodynamic effects were avoided. Therefore, a combination of dexmedetomidine with ropivacaine is better than ropivacaine alone for BSCPB

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