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Comparison of Levobupivacaine and Ropivacaine in Cervical epidural anaesthesia for thyroid surgery

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ABSTRACT

Thyroid surgeries are conventionally performed under general anaesthesia (GA). With the rising concern for GA-related implications on cardiorespiratory, metabolic and immune status of the patient, a preference for regional anaesthetic techniques has increased worldwide. Epidural anaesthesia is a ubiquitous technique in regional anaesthesia. While the earlier trials have widely focused on lumbar or thoracic epidurals, the cervical approach has been an upcoming technique since the past few years and has attracted investigators to explore its viability for various surgeries.

The study was conducted on 80 patients and patients were divided into 2 groups of 40 patients each.

Group L receiving 10 ml Levobupivacaine (0.5%) and Group R receiving 10 ml Ropivacaine (0.5%) for Cervical Epidural Anaesthesia.

Both the groups were compared in terms of mean systolic blood pressure, mean diastolic blood pressure, MAP, and there was no significant difference at preoperative period, 30 min. after cervical epidural anaesthesia and at the end of surgery ($p>0.05$) (although mean SBP, mean DBP and MAP decreases after CEA in both groups).But when both the groups were compared in terms of mean onset time of sensory and motor blockade, there was significant difference ($p<0.05$).

We concluded that the surgeries on thyroid gland can safely be performed under CEA using any of the two formulations of local anaesthetics chosen for our study. In an equal dose (10 ml) Levobupivacaine (0.5%) has a faster onset (sensory and motor block) and longer duration (motor block and analgesia) as compared to Ropivacaine (0.5%). Due to long duration of motor block and analgesia of Levobupivacaine can be used as replacement for other local anaesthetic agent.

Keywords: Levobupivacaine, Ropivacaine, Cervical epidural anaesthesia.

INTRODUCTION

Thyroid surgeries are conventionally performed under general anaesthesia (GA). With the rising concern for GA-related implications on cardiorespiratory, metabolic and immune status of the patient, a preference for regional anaesthetic techniques has increased worldwide. Epidural anaesthesia is a ubiquitous technique in regional anaesthesia. While the earlier trials have widely focused on lumbar or thoracic epidurals, the cervical approach has been an upcoming technique since the past few years and has attracted investigators to explore its viability for various surgeries. Administration of

local anaesthetic into the cervical epidural space results in anaesthesia of cervical plexus, brachial plexus and superior thoracic dermatomes. Additional advantages are lower cost, reduced intraoperative blood loss, stable cardiovascular status, reduced stress response, postoperative analgesia and early ambulation of the patient. CERVICAL EPIDURAL ANAESTHESIA (CEA) results in an effective sensory blockade of the superficial cervical (C1/C4) and brachial plexus (C5/T1- T2). It is used both intraoperatively and in the treatment of postoperative or chronic pain.

Providing safe and effective anaesthesia for thyroid surgery can sometimes become a problem for the anaesthetists. This becomes especially relevant in large goitres which might compress or deviate the trachea. Endotracheal intubation is difficult in such cases and in large goitres can be hazardous. Also, the goitre might be associated with thyroid functional disorders. Patients with both hypo and hyperthyroidism are prone to cardiac rhythm disorders which might get aggravated under the influence of general anaesthetic agents. Cervical epidural anesthesia (CEA) for thyroid surgeries is gaining popularity over general anesthesia (GA) for the various advantages it offers.

Objectives

1. Onset and spread of sensory block.
2. Degree of sensory blockade.
3. Onset and duration of motor block.
4. Degree of motor blockade.
5. Hemodynamic change if any after every 5 min interval.
6. Reporting of complications if any.

Inclusion criteria :

• All the Euthyroid patients with ASA physical status I - III
• Aged : 40-60 years
BMI : 25+10%
• Posted for thyroid surgeries (subtotal thyroidectomy, lobectomy) in the period of next 1.5 years were screened for our study.

Exclusion Criteria :

• Deranged coagulation profile
• History of allergy to local anaesthetics,
• Retrosternal goitre,
• Cardiorespiratory disease or
• Any contraindication to regional anaesthesia.

MATERIAL & METHODS :

This study was performed at Sarojini Naidu Medical College and Hospital, Agra 976 bedded tertiary referral university teaching hospital, Department of Anaesthesia & Critical Care and O.T. of E.N.T. Department of S.N. Medical College, Agra

This was a prospective double-blind study in which patients were randomly allocated to two groups using computer generated random numbers:

• Group L receiving 10 ml Levobupivacaine(0.5%) and
• Group R receiving 10 ml Ropivacine (0.5%) for CEA.

Ethical committee approval and written informed consent was taken. Sample size was calculated using 90% power and 5% alpha error which came out to be at least 40 patients per group.

All patients were premedicated 2 hours prior to the procedure. Standard monitors were attached in OT and all patients were positioned in sitting position. The cervical epidural space were identified with an 18-gauge Tuohy epidural needle, at the C7-T1 interspace using the loss of resistance technique via a midline cephalad approach. A 19-gauge end- holed catheter was then introduced 4 cm into the epidural space. After negative aspiration, the catheter was tunneled

subcutaneously and patients were laid supine. The test dose of prepared drug solution (3 mL) was injected via an epidural catheter. SpO2, consciousness, heart rate (HR), noninvasive blood pressure and electrocardiogram] were monitored for 5 min for any sign of deterioration.

OBSERVATIONS & RESULTS

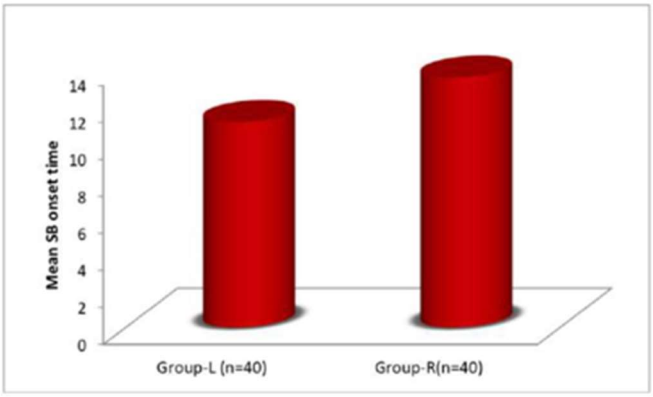
All 80 patients completed the study, and the following results were observed:

Onset of sensory blockade: Levobupivacaine had a faster onset (11.10 ± 2.60 minutes) compared to Ropivacaine (13.50 ± 2.90 minutes) ($p<0.05$).

TABLE-1 COMPARISON OF SENSORY BLOCKADE BETWEEN GROUP L & R

Group	Sensory blockade onset time		t	p
	Mean	S.D.		
Group-L (n=40)	11.10	2.60	3.897	<0.05
Group-R(n=40)	13.50	2.90		

Both the groups were comparable in terms of mean onset time of sensory blockade and there was significant difference ($p<0.05$).

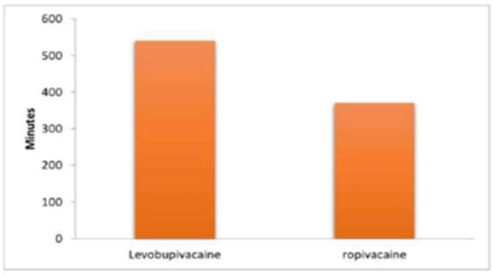


Spread of sensory blockade: Levobupivacaine extended from C2 to T5, while Ropivacaine covered C2 to T4.

TABLE-2 COMPARISON OF SPREAD OF SENSORY BLOCKADE BETWEEN GROUP-L AND GROUP-R

Group		Dermatome
L	Upper	C_2
	Lower	T_5 (T_2-T_9)
R	Upper	C_2
	Lower	T_4 (T_2-T_8)

DURATION OF ANALGESIA

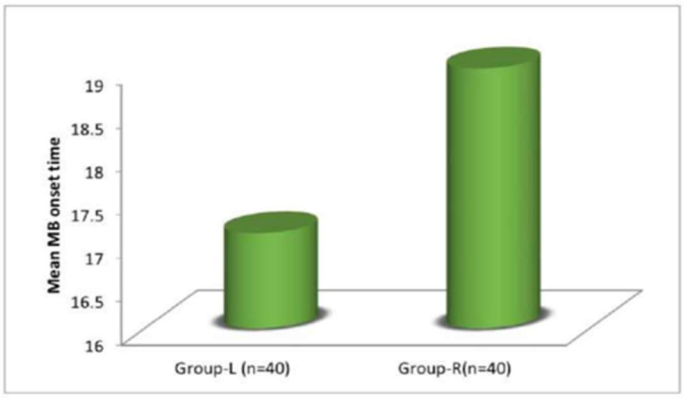


Duration of sensory blockade: Levobupivacaine provided a significantly longer duration of sensory block (540 min) compared to Ropivacaine (380 min) ($p<0.05$).
Motor blockade onset: Levobupivacaine exhibited a quicker onset (17.1 ± 2.60 min) compared to Ropivacaine (19.0 ± 2.70 min) ($p<0.05$).

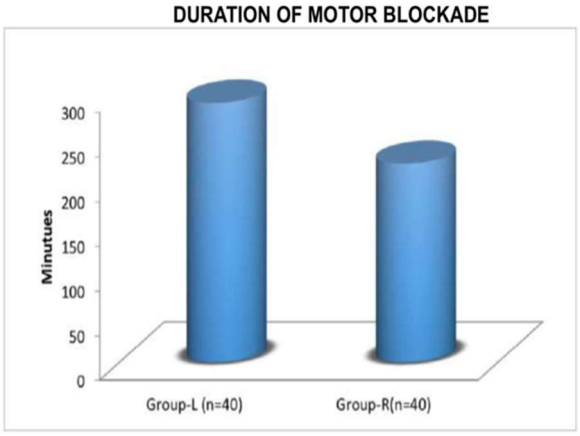
TABLE-3 COMPARISON OF MOTOR BLOCKADE BETWEEN GROUP L & R

Group	Motor Blockade onset time		t	p
	Mean	S.D.		
Group-L (n=40)	17.1	2.60	3.206	<0.05
Group-R(n=40)	19.0	2.70		

Both the groups were comparable in terms of mean onset time of motor blockade and there was significant difference ($p<0.05$).



Duration of motor blockade: Levobupivacaine also showed a longer motor blockade (290.50 min) than Ropivacaine (222.50 min) ($p<0.05$)



Hemodynamic stability:

Both groups experienced a decline in heart rate and mean arterial pressure post-CEA, but these changes were clinically insignificant, with no need for inotropic support or anti-arrhythmic medications.

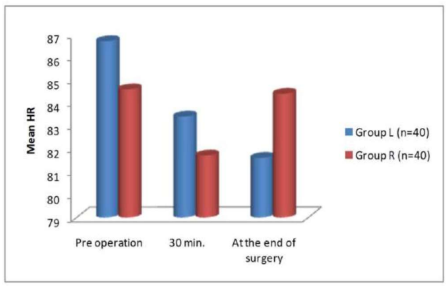
There were no major complications in either group, demonstrating the safety of CEA for thyroid surgeries.

TABLE-4 COMPARISON OF HR BETWEEN GROUP L & R AT DIFFERENT TIME

HR	Group L (n=40)		Group R (n=40)		Statistical Value	
	Mean	S.D.	Mean	S.D.	t	p
Pre operation	86.70	11.10	84.60	14.80	0.718	>0.05
30 min.	83.40	10.80	81.70	9.30	0.754	>0.05
At the end of surgery	81.60	4.90	84.40	13.40	1.241	>0.05

TABLE 5. COMPARISON OF SBP BETWEEN GROUP L & R AT DIFFERENT TIME

SBP	Group L (n=40)		Group R (n=40)			
	Mean	S.D.	Mean	S.D.	t	p
Pre operation	124.25	8.43	123.90	6.11	0.213	>0.05
30 min.	117.40	7.26	116.05	4.89	0.975	>0.05
At the end of surgery	119.15	8.24	119.65	5.31	0.323	>0.05



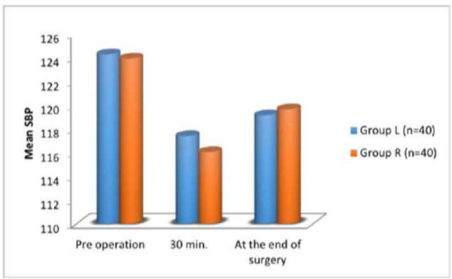


TABLE 6. COMPARISON OF DBP BETWEEN GROUP L & R AT DIFFERENT TIME

DBP	Group L (n=40)		Group R (n=40)			
	Mean	S.D.	Mean	S.D.	t	p
Pre operation	80.05	5.22	80.55	5.16	0.431	>0.05
30 min.	76.65	3.42	76.30	3.42	0.458	>0.05
At the end of surgery	76.83	4.24	78.50	5.53	1.516	>0.05

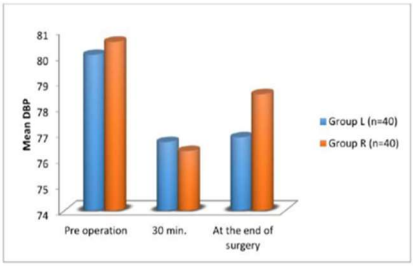
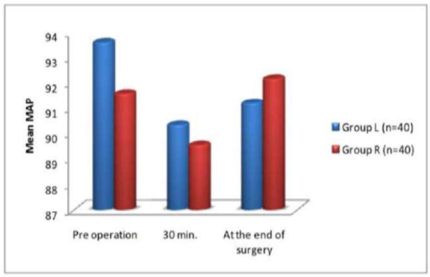


TABLE 7: COMPARISON OF MAP BETWEEN GROUP L & R AT DIFFERENT TIME

MAP	Group L (n=40)		Group R (n=40)			
	Mean	S.D.	Mean	S.D.	t	p
Pre operation	93.61	3.55	91.59	8.96	1.326	>0.05
30 min.	90.34	2.22	89.55	2.93	1.359	>0.05
At the end of surgery	91.20	3.06	92.18	4.48	1.142	>0.05



The results show that Levobupivacaine provides a faster onset and longer duration of both sensory and motor blockade compared to Ropivacaine, making it more suitable for prolonged surgical procedures. Both agents maintained stable hemodynamic parameters, making CEA a safe alternative to general anesthesia, particularly in patients with difficult airways or cardiovascular risks.

These findings are consistent with other studies that suggest Levobupivacaine has better clinical efficacy due to its higher protein binding and reduced cardiotoxicity. However, Ropivacaine may still be preferable in cases where earlier motor recovery is desired.

CONCLUSION:

Levobupivacaine is a superior choice of cervical epidural anaesthesia in thyroid surgeries due to its faster onset and longer duration of sensory and motor blockade compared to Ropivacaine. Both agents are safe and provide stable intraoperative and postoperative hemodynamics supporting the use of cervical epidural anaesthesia as a viable alternative to general anaesthesia in high-risk patients.

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