

Postoperative Analgesia for Inguinal Hernia Repair: Comparison of Ropivacaine with Bupivacaine

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Abstract

Background and Objectives: Inguinal hernia surgery is one of the commonest day care procedures and have very high incidence of moderate to severe postoperative pain which remains a great challenge for the anesthesiologist to treat it. Multimodal analgesic techniques like parenteral analgesics or regional analgesia are commonly practiced. Peripheral nerve block after surgical closure provide effective postoperative analgesia without any major side effects. This study was designed to compare the analgesic efficacy of Bupivacaine (B) and Ropivacaine (R). **Materials and Methods:** Fifty adult male patients scheduled for elective inguinal hernia repair were randomly allocated into two groups of 25 each. Group B - Bupivacaine, Group R - Ropivacaine respectively. General anaesthesia was given. Nerve block was administered at the end of surgery with 15 ml of the study drug. Visual Analog Score (VAS) was noted immediately at the end of surgery and hourly up to 8 hours and the time for rescue analgesia was noted. Independent 't' test, SPSS version 16 was used for analysis. **Results:** We have found that both the drugs provided excellent postoperative pain relief for inguinal hernia repair with hemodynamic stability. Duration of analgesia was significantly longer in bupivacaine than ropivacaine. (389.96 ± 25.37 mins Vs 301.24 ± 20.72 mins with 'p' value < 0.01). **Conclusion:** At equal concentration, bupivacaine provided prolonged postoperative analgesia than ropivacaine.

Keywords: Inguinal Hernia; Ropivacaine; Bupivacaine.

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Introduction

"Pain is perfect misery, the worst of evils, and excessive, overturn all patience".

Milton, Paradise Lost

In the past, pain has been underestimated and many times the patients received inadequate analgesia. Postoperative pain is the main adverse outcome that causes distress to the patient, prolongs the hospital stay. Postoperative analgesia is now

regarded as part of the surgical care which aids faster recovery and reduces the medical expenditure [1]. Insufficient pain relief can have marked pathophysiological and psychological effects in postoperative patients [2]. The goal of postoperative pain management is to improve quality of care, decrease postoperative morbidity and promote early ambulation. Peripheral nerve blocks using local anesthetics provide excellent pain relief in postoperative period as compared to the traditionally used opioids, NSAIDS with minimal side effects [3,4].

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Ropivacaine is a local anaesthetic belonging to amide group, developed as a pure S enantiomer and related structurally to bupivacaine, less lipophilic and is therefore less likely to produce neurotoxicity and cardiotoxicity [5-8].

Hence we decided to do comparative study between analgesic efficacy of 0.25% bupivacaine and ropivacaine in adults undergoing inguinal hernia surgeries and also side effects if any.

Materials and Methods

It was a prospective randomised controlled, double blinded study, conducted after approval from institution ethical committee and obtaining valid written informed consent from the patients. Study was conducted at RMMCH, Chidambaram from July 2017-June 2018. Fifty adult male patients, aged 18-60 years, weighing between 40 and 75 kg belonging to ASA grade I and II undergoing elective unilateral inguinal hernioplasty under general anaesthesia were subjected in the study. Patient's refusal, known allergic to local anaesthetics, infection on the block area were excluded.

Fifty patients with 25 in each Group B (0.25% bupivacaine) and R (0.25% ropivacaine) were subjected to the study. Patients were randomised using a computer generated randomization. Double blinding is done by selecting another anaesthetist who will prepare the local solution and will not participate further in the study. The anaesthetist or patients who participated in the study were not aware of the drug contents in the syringes. Patients were taught about the Visual analog score (VAS) preoperatively.

In the operation theatre, the patient's baseline heart rate, blood pressure, SpO₂, respiratory rate were recorded. All cases were premedicated with Inj. Glycopyrolate 0.05mg/kg and with Inj. Fentanyl

1µg/kg, and induced with Thiopentone 5mg/kg. Patient was intubated after Suxamethonium 1.5mg/kg and maintained with Vecuronium 0.1mg/kg, Oxygen and Nitrous oxide in the ratio of 33:66, volatile anaesthetics.

After the completion of surgery, patient's anterior superior iliac spine was palpated 2 cm medial and 2 cm superior from it was marked. A 22 G blunt tipped needle is inserted perpendicular to the skin. First pop indicates the needle pierces external oblique fascial layer to reach the plane between external and internal oblique, where 5ml of the local anaesthetic is injected. While advancing the needle, second pop indicates the needle pierces internal oblique fascial layer to reach the plane between internal oblique and transversus abdominis, where the remaining half of the local anaesthetic is deposited. Another 5 ml of drug was given in fan like distribution between external and internal oblique and internal and transverse abdominis with 2.5 ml each. Postoperatively Visual Analogue Scale (VAS) was used for the assessment with mark "0" represents no pain and mark "10" represents worst possible pain.

When pain assessment score was more than 4 rescue analgesia was given and noted. The study was ended with first request of analgesia.

At the end of study, the data were compiled and subjected to statistical analysis using students paired "t" test and chi square test. SPSS version 16 was used for analysis. A statistical value of p<0.01 was considered significant.

Results

Both the groups were comparable with respect to demographic variables (Age, Height, Weight) and ASA status did not differ significantly between groups (Table 1,2).

Table 1: Patient demographics

	Bupivacaine		Ropivacaine		t	p value
	Mean	SD	Mean	SD		
Age	47.9200	15.21764	50.3600	14.42475	0.582	0.563
Weight	61.4000	8.28151	57.7200	7.68939	1.628	0.110
Height	159.93	5.70877	159.23	5.82549	0.181	0.672

Table 2: ASA Classification

Group	ASA				Total
	I		II		
Bupivacaine	12	46.15	13	54.17	25
Ropivacaine	14	53.85	11	45.83	25
Total	26	100.00	24	100.00	50

Haemodynamics

There was no statistically and clinically significant variation in pulse rate, systolic blood

pressure (SBP), diastolic blood pressure (DBP) and respiratory rate in both the groups during the study period (Figure 1,2, 3 and 4).

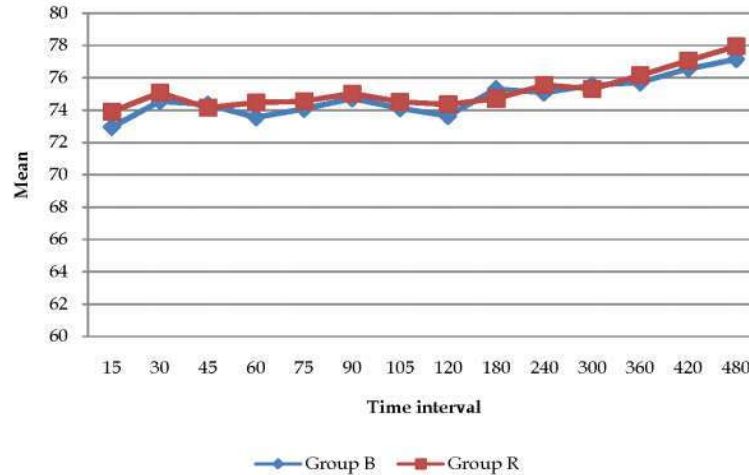


Fig. 1: Comparison of pulse rate at various time intervals between bupivacaine (Group B) & ropivacaine (Group R) groups

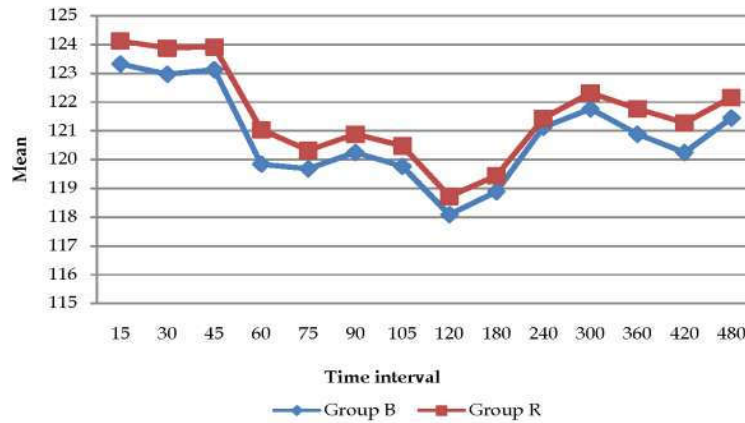


Fig. 2: Comparison of Systolic blood pressure at various time intervals between bupivacaine (Group B) & ropivacaine (Group R) groups.

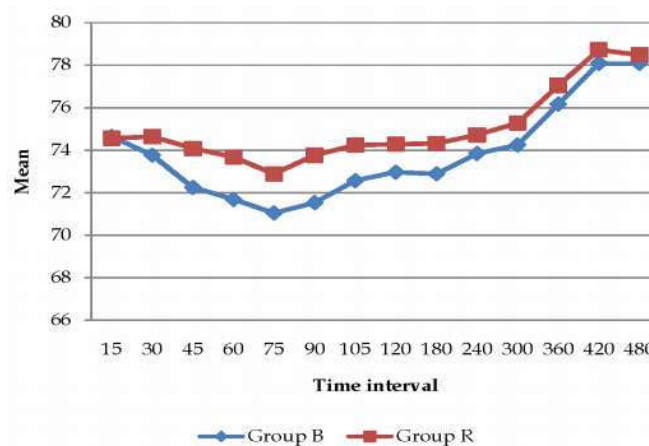


Fig. 3: Comparison of Diastolic blood pressure at various time intervals between bupivacaine (Group B) & ropivacaine (Group R) groups

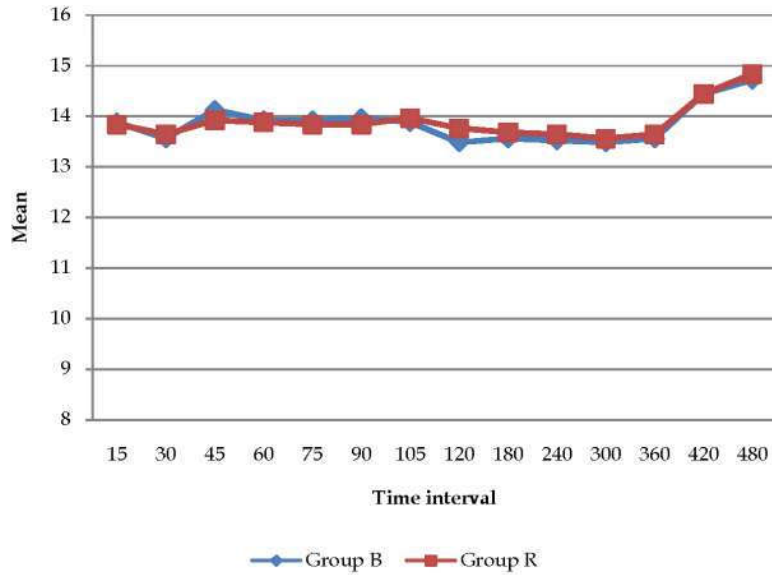


Fig. 4: Comparison of RR at various time intervals between bupivacaine (Group B) & ropivacaine (Group R) groups

Table 3: Visual Analog Score

Time (mins)	Bupivacaine		Ropivacaine		t	p value
	Mean	SD	Mean	SD		
15	-	-	-	-	-	-
30	-	-	-	-	-	-
45	-	-	-	-	-	-
60	.0800	.27689	.0000	.00000	1.445	0.155
75	.0800	.27689	.1200	.33166	0.463	0.646
90	.1600	.37417	.4800	.50990	2.530	0.015
105	.2400	.43589	.9200	.27689	6.584	0.000
120	1.0800	.27689	1.5600	.50662	4.157	0.000
180	2.0800	.27689	2.6800	.69041	4.033	0.000
240	2.3200	.62716	3.5200	.82260	5.800	0.000
300	3.3200	.62716	4.5600	.50662	7.690	0.000
360	4.2400	.43589	5.0400	.35119	7.146	0.000
420	4.8800	.43970	5.5600	0.50662	5.068	0.000
480	5.2400	.59722	5.8000	0.40825	3.871	0.000

Table 4: Duration of analgesia (DOA)

Group	DOA (min)	
	Mean	SD
Group B	389.96	25.37
Group R	301.24	20.72
Significance	0.001 (Significant)	

Table 5: Comparison of side effects

Side Effect	Group B	Group R
Nausea/Vomiting	2(8%)	1 (4%)

In comparison of Group B and Group R, highly significant difference in VAS was seen from 2 hours in between the groups. (Table 3,4 and 5).

Discussion

Inguinal hernia repair is commonly performed day care surgical procedure among elderly persons [9]. Majority of the patient experiences somatic pain due to abdominal wall incision depending on ilioinguinal, iliohypogastric nerve distribution being moderate to severe which leads to an increase in morbidity, incidence of complications and prolong postoperative rehabilitation [10,11].

Usually acute pain which accompanies inguinal hernia surgery is rather self limited or persists for the first twenty four hours and subsides within weeks but in 10% of cases, patients have chronic or persistent post surgical pain (PPSP/CPSP). Hence, adequate peri- operative pain relief is essential to prevent PPSP/CPSP in hernia surgeries [12-14].

Postoperative pain incidence varies with individual patients. Uncontrolled postoperative pain lead to several negative physiological effects that include disturbances of respiratory, cardiac, gastrointestinal, renal, autonomic nervous system, endocrine system function. Keeping in mind the above detrimental effects of pain, post operative pain relief is very important [15].

Postoperative pain therapy mainly consists of administration of oral or intravenous opioids in combination with non steroidal anti-inflammatory drugs, but it often results in insufficient pain control and undesirable side effects. Peripheral nerve block has been found to be better than intravenous analgesia with respect to quality of pain relief and incidence of side effects.

Lucia Vizcaino Matinez et al. [16], (2014) have shown that general anaesthesia with ilioinguinal nerve block for hernia surgery provides excellent pain relief after surgery which concurs with our study. In our study, there was statistically significant variation in pulse rate, systolic and diastolic blood pressure in both the groups. Various studies such as Kocum A et al. [17], (2007) Hickey et al. [18], (1992) found that 0.25% ropivacaine and bupivacaine maintained hemodynamic stability which was similar to our study.

Toivonen et al. [19], (2001) used 15ml of 0.5% bupivacaine for preincisional ilioinguinal and iliohypogastric nerve block combined with GA. Our study showed that blocking of nerves towards the

end of procedure with minimal concentration of local anaesthetics 0.25% extends the duration of analgesia in the postoperative period. One of the advantage of giving nerve block postoperatively is that patient did not feel the pain of puncture and extends the analgesic duration. The results from this study showed that a volume of 15 ml was sufficient to provide effective analgesia, as evidenced from lower VAS scores in the postoperative period till 6 hours in Group B and 5 hours in Group R whereas in the studies by Erichsen et al. [20], Pettersson et al. [21], Johansson et al. [22] used high volume of 40–50 ml for providing pain relief after inguinal hernia repair. Duration of analgesia in the bupivacaine group (389.96 ± 25.37 mins) was significantly longer than (301.24 ± 20.72 mins). This is related to the study conducted by Gupta SL et al. [23], (2016). Postoperative side effects – 8% of patients in Group B and 4 % in Group R had nausea and vomiting and there were no other complications such as hematoma, local anesthetic toxicity, bowel injury.

Conclusion

From the present study we conclude that both bupivacaine and ropivacaine were successfully used for postoperative analgesia through ilioinguinal/ iliohypogastric nerve block. However, bupivacaine found to have longer duration of analgesia than ropivacaine at equal concentration with minimal side effects.

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