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Original Article

Comparison of Epidural Anaesthesia between Levobupivacaine with Clonidine and Ropivacaine with Clonidine in Lower Limb and Lower Abdominal Surgeries

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ABSTRACT

Introduction: Epidural anesthesia is a versatile technique for providing anesthesia andpostoperative analgesia. Contributes to maintenance of hemodynamic stability and reduces postoperative stress, improving the patient outcome.
Objectives: Levobupivacaine with clonidine and ropivacaine and clonidine were used in lower abdomen and lower limb procedures during epidural anesthesia to compare the onset and duration of sensory and motor blocking.
Materials and method: The present study was prospective observational analytical study. This study was conducted from January 2021 to June 2021, the study was done in the R.G. Kar Medical College's Obstetrics and Gynecology, Orthopaedics, and Surgery operation operation theatre. Total 70 patients were included in this study.
Result: In our study, out of 70 patients, mean Duration of Surgery was higher in Group-A [97.91428571± 18.35815483] compared to Group-B [95.85714286±21.57359887 (min)] which was not statistically significant (p=0.66). We found that, mean Onset of sensory block was higher in Group-A [18.65714286± 1.433688315] compared to Group-B [16.34285714±0.998317913 (min)] though it was not statistically significant (p=0.989). It was found that, mean Onset of motor block was lower in Group-B [18.91429± 2.019651] compared to Group-A [22.45714±0.781079 (min)] but this was not statistically significant (p=0.622). We found that, mean Duration of Sensory Block was higher in Group-A [186.9428571± 6.949155078] compared to Group-B [163±7.970534 (min)] though it was not statistically significant (p=4.39). Our study showed that, mean Duration of Motor Block was higher in Group-A [203.5714286± 6.92092188] compared to Group-B [179.4286±7.252933 (min)] though it was not statistically significant (p=2.31). Our study showed that, slightly higher number of patients had ASA1 in Group-B [24 (23.5)] compared to Group-B [23 (23.5)] but this was notstatistically significant (p=.799133). In our study. Majority number of patients had MPG 1 in GROUP A [28] compared to GROUP B [27] which was notstatistically significant (p=.419316).
Conclusion: we conclude that, the onset and duration of sensory and motor blockade higher in levobupivacaine with clonidine compared to ropivacaine with clonidine for Epidural anaesthesia in lower abdominal and lower limb surgeries.

Key Words: *Epidural anesthesia, Levobupivacaine, clonidine and ropivacaine*

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INTRODUCTION

A flexible method for administering anesthesia and postoperative analgesia is epidural anesthesia. Decreases surgical stress and helps to maintain hemodynamic stability, both of which improve patient outcomes [1]. The administration of labor analgesia as well as various abdominal and lower limb procedures have all benefited from the widespread use of epidural anesthesia. Depending on the kind of block needed, different local anesthetic concentrations can be utilized. Epidural anesthesia includes analgesia as a crucial component [2]. Preservative-free solutions of bupivacaine are offered in concentrations of 0.25%, 0.5%, or 0.75%. For analgesia, more diluted doses between 0.125% and 0.25% might be used. The possibility for motor block from higher doses as well as damage to the heart and central nervous system are drawbacks. For surgical anesthetic, 0.5% and 0.75% solutions are employed [3]. For usage in epidurals, liposomal bupivacaine is currently being researched. In comparison to boluses of plain bupivacaine, an epidural bolus of liposomal 0.5% bupivacaine had similar onset but more enduring analgesia. It doesn't seem to be any more toxic or to have a different cardiac safety profile than regular bupivacaine. However, it is not offered in stores [4]. Levobupivacaine can be used as an epidural local anesthetic in doses of 0.5% to 0.75% for surgical anesthesia while concentrations of 0.125% to 0.25% can be used to provide analgesia. The clinical properties of levobupivacaine when injected epidurally are identical to those of bupivacaine [5]. Levobupivacaine has the benefit of being less cardiotoxic than bupivacaine. Levobupivacaine has qualities that are virtually equal to those of bupivacaine, with the benefit of less cardiotoxicity. Preservative-free formulations of ropivacaine are offered in 0.2%, 0.5%, 0.75%, and 1.0% concentrations. 0.5% to 1.0% is utilized for

surgical anesthetic, compared to 0.1% to 0.2% for analgesia. When compared to bupivacaine, ropivacaine has a better safety record. Bupivacaine may have a 1.5 to 2.5 lower seizure threshold than ropivacaine, according to data from animal models. Additionally, ropivacaine is less cardiotoxic [7]. At equivalent concentrations, ropivacaine has a clinical profile that is generally similar to those of bupivacaine and levobupivacaine. While ropivacaine's motor block lasts a shorter time, its sensory analgesia lasts longer [8]. Although the diminished motor block might actually be a result of the medications' varying potencies rather than a genuine motor sparing effect of ropivacaine. When injected epidurally, ropivacaine is 40% less effective than bupivacaine. The length and degree of blockage are increased when adjuvant is added, and the amount of local anesthetic required is decreased. Vasoconstrictors, opiates, alpha 2 agonists, epidural ketamine, neostigmine, tramadol, Dexamethasone, and droperidol are some of the different ingredients to local anesthetics. More so than motor block, sensory block can be prolonged by epidural clonidine [9]. Instead of a 2-agonist action, the process appears to be mediated by the activation of potassium channels and consequent membrane hyperpolarization. Both the need for an opioid and an epidural local anesthetic is decreased by the addition of clonidine [10].

Reduced immunological stress and cytokine response may be other advantages of clonidine [1]. There are a number of adverse effects associated with epidural clonidine, such as hypotension, bradycardia, dry mouth, and sedation. But with a dosage of 2mcg/kg^2, these side effects are reduced. The study compared the effects of levobupivacaine and clonidine to those of ropivacaine and clonidine on post-operative analgesia, sensory and motor blockage, and pain relief.

MATERIALS AND METHODS

The study was prospective observational analytical study conducted in R.G. Kar Medical college, Obstetrics and gynaecology, orthopaedics and surgery operation operation theatre from January 2021 upto June 2021. After getting clearance from the institutional ethics committee, study was conducted on patients undergoing lower limb and lower abdominal surgeries. The inclusion criterias were patients undergoing lower abdominal and lower limb surgery with ASA-PS 1 and 2.

The exclusion criterias were patients refusing epidural anaesthesia and patients with ASA-PS 3 to 6. Epidural anaesthesia was administered according to standard protocol.In sitting position, after proper antiseptic dressing and administration of local anaesthetic in appropriate intervertebral spaces, Epidural Tuhoy needle (18G) was introduced into the epidural space. The epidural space was confirmed by loss of resistance technique and hanging drop technique (4). Epidural catheter was inserted and kept at appropriate length depending on the level of block required. Depending on the group in which patient belongs single dose local anaesthetic drugs were administered. Patients belonging to Group A received 0.5 % levobupivacaine with 2 microgram/kg clonidine and group B received 0.75% ropivacaine with 2 microgram/kg clonidine via epidural catheter. The total volume of drug (approximately 20 to 30ml) depend on the type of surgery and level of block required (1.5ml for every space required to block) not exceeding the safe dose i.e 2 mg/kg for both levobupivacaine and ropivacaine (3). After injecting the epidural drug, patient was laid supine and checked for onset of sensory block and motor block. Intra-operative vitals were monitored including Mean arterial pressure, spo2, and pulse rate. The onset and duration of sensory and motor block was evaluated and post-operative pain was evaluated by VAS score (6). Modified bromage scale was used to evaluate the duration of motor block.

RESULT

In our study, out of 70 patients, mean Duration of Surgery was higher in Group-A [97.91428571± 18.35815483] compared to Group-B [95.85714286±21.57359887 (min)] which was not statistically significant (p=0.66).

We found that, mean Onset of sensory block was higher in Group-A [18.65714286± 1.433688315] compared to Group-B [16.34285714±0.998317913 (min)] though it was not statistically significant (p=0.989). It was found that, mean Onset of motor block was lower in Group-B [18.91429± 2.019651] compared to Group-A [22.45714±0.781079 (min)] but this was not statistically significant (p=0.622). We found that, mean Duration of Sensory Block was higher in Group-A [186.9428571± 6.949155078] compared to Group-B [163±7.970534 (min)] though it was not statistically significant (p=4.39). Our study showed that, mean Duration of Motor Block was higher in Group-A [203.5714286± 6.92092188] compared to Group-B [179.4286±7.252933 (min)] though it was not statistically significant (p=2.31).

Our study showed that, slightly higher number of patients had ASA1 in Group-B [24 (23.5)] compared to Group-B [23 (23.5)] but this was not statistically significant (p=.799133). In our study. Majority number of patients had MPG 1 in GROUP A [28] compared to GROUP B [27] which was not statistically significant (p=.419316).

Table 1: Statistical comparison between Group A and Group B w.r.t Duration of Surgery

		MEAN	SD	P-Value
Duration of Surgery (Min)	**GROUP-A**	97.91428571	18.35815483	0.66

	GROUP-B	95.85714286	21.57359887	

Table 2: Statistical comparison between Group A and Group B w.r.t Onset of sensory block and Onset of motor block

		MEAN	**SD**	**P-Value**
Onset of sensory block (Min)	**GROUP-A**	18.65714286	1.433688315	0.989
	GROUP-B	16.34285714	0.998317913	
Onset of motor block (Min)	**GROUP-A**	22.45714	2.019651	**0.622**
	GROUP-B	18.91429	0.781079	

Table 3: Statistical comparison between Group A and Group B w.r.t Duration of Sensory Block (Min)

		MEAN	**SD**	**P-Value**
Duration of Sensory Block (Min)	**GROUP-A**	186.9428571	6.949155078	**4.39**
	GROUP-B	163	7.970534	
Duration of motor block (Min)	**GROUP-A**	203.5714286	6.92092188	**2.31**
	GROUP-B	179.4286	7.252933	

Table 4: ASA grade wise distribution

	GROUP A	**GROUP B**	**Marginal row total**
ASA 1	23	24	56
% of total population	32.85714	34.28571	80
ASA 2	12	11	14
% of total population	17.14286	15.71429	20
Marginal column total	35	35	70
%TOTAL	50	50	100.00%

Table 5: MPG grade wise distribution

WISE DISTRIBUTION MPG				
	GROUP A	**GROUP B**	**Marginal row total**	**P-Value**
MPG 1	28	27	55	0.419316
% of total population	40	38.57143	78.57143	
MPG 2	5	8	13	
% of total population	7.142857	11.42857	18.57143	
MPG 3	2	0	2	
% of total population	2.857143	0	2.857143	
Marginal column total	35	35	70	
%TOTAL	50	50	100%	

DISCUSSION

The study was prospective observational analytical study conducted in R.G. Kar Medical college, Obstetrics and gynaecology, orthopaedics and surgery operation operation theatre from January 2021 upto June 2021. 70 patients were included in this study.

Mittal A et al [87](2013) showed that ropivacaine lower propensity for motor block and reduced potential for CNS toxicity and cardiotoxicity, appears to be an important option for regional anaesthesia and management of postoperative and labour pain. The mean duration of surgery was 102.1 mins in group I and 108.9 mins in group II.

Anusha T et al [114](2021) observed that pain is one of the most noxious stimuli a living being perceives; the most painful moments are the surgical procedure. The mean duration of surgery is 101.04 ± 24.18 mins in Group C and 107.42 ± 27.50 mins in Group D. In Group C, the mean time to onset of sensory analgesia till T 10 was 6.1 minutes and in Group D was 3.68 minutes.

In our study, out of 70 patients, mean Duration of Surgery was higher in Group-A compared to Group-B which was not statistically significant (p=0.66).

Aruna P, et al [110](2020) showed that various adjuvants are being used with local anaesthetics for prolongation of intra- and post-operative analgesia. Onset of sensory block (seconds) was faster in Group D than in Group C (141.7 [+ or -] 84.5 Vs 152.4 [+ or -] 77.8; P = 0.48).

Anusha T et al [114](2021) observed that pain is one of the most noxious stimuli a living being perceives; the most painful moments are the surgical procedure. In Group C the mean time taken from onset of sensory blockade to regression to T12 was 151.7 minutes and in Group D was 199.7 minutes.

We found that, mean Onset of sensory block was higher in Group-A compared to Group-B though it was not statistically significant (p=0.989).

Kulkarni J, et al [101](2016) examined that comparison Of Levobupivacaine And Clonidine With Bupivacaine And Clonidine In Spinal anaesthesia For Lower Segment Caesarean Section Intrathecal Levo Bupivacaine is having similar clinical profile with less cardio-toxicity than Bupivacaine is used commonly for LSCS. The mean time for the onset of motor blockade in patients in group B was 1.90 ± 0.54 min and in group L was 2.15 ± 0.47 min.

Ravipati P, et al [105](2017) examined that Spinal anesthesia is used commonly intraoperatively. However, local anesthetics are associated with relatively short duration of action. Time taken for onset of motor block was almost same in both groups.

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It was found that, mean Onset of motor block was lower in Group-B compared to Group-A but this was not statistically significant (p=0.622).

Ravipati P, et al [105](2017) examined that Spinal anesthesia is used commonly intraoperatively. However, local anesthetics are associated with relatively short duration of action. The mean of total duration of sensory block in Group RD was 194.400 min while it was 139.9000 min in Group RF which was clinically and statistically significant (*P* - 0.0001).

We found that, mean Duration of Sensory Block was higher in Group-A compared to Group-B though it was not statistically significant (p=4.39).

Ravipati P, et al [105](2017) examined that Spinal anesthesia is used commonly intraoperatively. However, local anesthetics are associated with relatively short duration of action. The mean of total duration of motor block in Group RD was 136.7333 min while it was 94.8667 min in Group RF which was clinically and statistically significant (*P* - 0.000). Our study showed that, mean Duration of Motor Block was higher in Group-A compared to Group-B though it was not statistically significant (p=2.31).

Kejriwal AK, et al [97](2016) showed that regional anesthesia (RA) is gaining popularity for laparoscopic surgeries these days. Also fall in blood pressure and heart rate was greater in group II patients.

Kabi S et al [111](2021) examined that the epidural analgesia technique is effective for labor analgesia and combinations of various local anesthetics with lipophilic opioids like fentanyl are used. The fall in heart rate was significantly greater in Group A and at almost all the time intervals after baseline, diastolic blood pressure (DBP) was also lower in group A.

We showed that, mean Heart Rate (HR)[B], 5,10, 25, 30, 45, 60,75, 90, 105, 120 and 180 min was higher in Group-B compared to Group-A and mean HR15 and HR20 was lower in Group-B compared to Group-A which was not statistically significant (p=.05845).

Cham SC, et al [94](2015) found that spinal anaesthesia reduces the incidence of morbidity that follows general anaesthesia in children with good efficacy and safety record. Blockade characteristics and duration of analgesia were recorded along with mean SpO2 Satisfactory surgical anaesthesia was achieved in all 60 patients with comparable mean arterial pressure, heart rate, respiratory rate and SpO2.

It was found that, mean SPO2[B], 5, 10, 15, 20, 25, 30, 45, 60 and 120 min was higher in Group-B compared to Group-A and mean SPO2 75 and 180 min was lower in Group-B compared to Group-A. we observed that, mean SPO2 90 min was equal in both Group-A and Group-B which was not statistically significant (p=.100382).

We found that, mean MAP(B), 5, 10, 60,75, 90,105, 120 and 180 min was lower in Group-B compared to Group-A and mean MAP 15, 20, 25, 30 and 45 min was higher in Group-B compared to Group-Abut these were not statistically significant (p=.45365).

Kabi S et al [111](2021) examined that the epidural analgesia technique is effective for labor analgesia and combinations of various local anesthetics with lipophilic opioids like fentanyl are used. VAS scores in both the groups progressively decreased to <3 by 15 min with significant differences at five, 10, 15, and 120 min being lower in group A.

Madhukant SC et al [115](2022) examined that epidural anaesthesia commonly used for inducing anaesthesia and postoperative analgesia in patients undergoing lower limb surgeries. Pain intensity at rest and during motion (flexion of the knee, about 30 degree) was assessed using the VAS score. The difference in bolus requirement and the mean VAS score at various time intervals (0, 0.5, 1, 2, 4, 8, 16, and 24 hours) in two groups was statistically insignificant.

In our study, mean VAS (B), 5, 10, 15, 20, 25 and 90 min was lower in Group-B compared to Group-A and mean VAS 165, 210, 255 and 300 min was higher in Group-B compared to Group-Awhich was not statistically significant (p=.971274).

Chiruvella S, et al [106](2018) found that anesthesia for total abdominal hysterectomies is not only concerned with relieving pain during intraoperative period but also during the postoperative period. A total of 80 individuals between the age of 45 and 65 years of American Society of Anesthesiologists (ASA) physical status Classes I and II who underwent total abdominal hysterectomies were randomly allocated into two groups, comprising 40 patients in each group.

Our study showed that, mean age was slightly higher in Group-B [39.94 ± 10.40] compared to Group-A [39.62 ± 10.95] and it was notstatistically significant (p=0.902).

Gupta K, et al [88](2014) observed that epidural adjuvants enhance the quality and duration of surgical anesthesia.Sixty consented females of ASA physical status I and II aged 35-65 years weighing 55-75 kg, were double blindly randomized into two treatment groups.

Mittal A et al [87](2013) showed that ropivacaine lower propensity for motor block and reduced potential for CNS toxicity and cardiotoxicity, appears to be an important option for regional anaesthesia and management of postoperative and labour pain. There were 35 males and 25 females in group I and 32 males and 23 females in group II.

It was found that. male population was higher [22] in Group-A compared to female population in Group-B [14]. Sex was not significantly related with both Group-A and Group-B (p=0.806).

We showed that, mean Weight was lower in Group-B [66.34 ± 6.06] compared to Group-A [68.08 ± 8.85] which was notstatistically significant (p=0.340).

Singh R, et al [86](2011) found that various additives have been used to increase the duration of analgesia provided by bupivacaine administered by single-shot caudal injection in children. A prospective, randomized, double-blind controlled study in 50 ASA I–II children (34 boys and 16 girls) aged 1–6 yr undergoing upper abdominal surgery was conducted.

Sindhu Baglur S, et al [92](2015) observed that clonidine has been extensively evaluated as an alternative to neuraxial opioids for control of pain and has been proven to be a potent analgesic. This clinical study was conducted on 90 adult patients of ASA grade 1 & 2 in the age group of 18 to 55 years posted for elective lower abdominal and lower limb surgeries under epidural anaesthesia.

Kejriwal AK, et al [97](2016) showed that regional anesthesia (RA) is gaining popularity for laparoscopic surgeries these days. After taking approval from Institutional Ethical Committee, 80 adult patients of ASA grade I and II were selected and divided in two groups; group I levobupi-vacaine having 0.5% concentration in the dose of 2mg/kg with 1.5µg/ kg fentanyl was administered and in group II levobupi-vacaine having 0.5% concentration in the dose of 2mg/kg with 1.5 µg/ kg of clonidine was administered.

Our study showed that, slightly higher number of patients had ASA1 in Group-B [24 (23.5)] compared to Group-B [23 (23.5)] but this was notstatistically significant (p=.799133).

- In our study. Majority number of patients had MPG 1 in GROUP A [28] compared to GROUP B [27] which was notstatistically significant (p=.419316).

CONCLUSION

We conclude that, the onset and duration of sensory and motor blockade higher in levobupivacaine with clonidine compared to ropivacaine with clonidine for Epidural anaesthesia in lower abdominal and lower limb surgeries.

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