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Comparison of Levobupivacaine with or without Epinephrine for Lumbar Spine Surgery

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Abstract

Introduction: The aim was to establish if a decrease in the amount of epinephrine from 1:200,000 to 1:400,000 added to epidural levobupivacaine produces a comparable decrease in local anaesthetic assimilation from the epidural space while holding the similar clinical effectiveness and acceptability in patients undergoing elective lumbar spine surgery. *Materials and Methods:* A total of 120 patients with ASA physical status 1 to 3 and aged 18 – 85 years, who were schedule to undergo elective lumbar spine surgery, were enrolled for the study. Total dose of 75 mg was administered. The end of injection of study drug was termed "Time 0" for the purposes of subsequent patient assessment. Intraoperative sedation was offered with added IV midazolam and propofol as essential at the judgment of the anaesthesiologist. *Results:* Levobupivacaine 0.5% produces comparatively small motor blockade. In fact, in 53% of all patients studied, no motor block of the lower extremities could be demonstrated. even though the addition of either 1:200,000 or 1:400,00 epinephrine tended to increase the degree of motor blockade, it was not statistical significance. in addition, in those patients who did build up some degree of motor blockade, its period was not diverse among both the groups. *Conclusion:* Present Study reveals that 0.5% levobupivacaine, with or without epinephrine, is a appropriate anaesthetic for utilize in lumbar spine surgery. The addition of epinephrine be likely to increase the duration of blockade, diminish the ensuing local anaesthetic concentration, and advance intraoperative anaesthetic quality, even though statistical significance was not there for any T10 was achieved within 15 minutes of administering the epidural injection in all patient groups.

Keywords: Levobupivacaine; Epinephrine; Lumbar spine surgery.

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Introduction

Spinal anesthesia is the largely used technique for infraumbilical surgeries since its unmatchable dependability, cost effectiveness, effectual analgesia, muscle relaxation and long-lasting postoperative analgesia. Recent advances in anesthesia have authorized added surgeries to be carry out on day case basis.[1] The chattels of an anaesthetic agent used for day case surgeries in spinal anesthesia should have reduced incidence of anesthesia related difficulties, should offer sufficient postoperative analgesia and permit early patient discharge. Levobupivacaine, a pure S(−) enantiomer of bupivacaine is a long acting amide local anaesthetic

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which creates disparity neuraxial block, which is, early onset and long-lasting duration of sensory block with shorter duration of motor block and lower cardiac toxicity.[2,3] Levobupivacaine has been extensively utilized in ambulatory surgeries after the growth of low dose spinal anesthesia technique. To advance the block characteristics of intrathecally administered low dose local anaesthetics, addition of adjuvant is necessity. Intrathecal opioids augment sensory block without prolonging motor and sympathetic block.[3,4]

Various central nervous system (CNS) and cardiovascular unfavourable reactions accounted in the literature following inadvertent intravascular injection or intravenous regional anesthesia have been linked to the R (+) isomer of bupivacaine.[5] The levorotatory isomers were exposed to have a secured pharmacological profile with fewer cardiac and neurotoxic unfavourable effects. The diminished toxicity of levobupivacaine is credited to its quicker protein binding rate. The pure S (−) enantiomers of bupivacaine, i.e., ropivacaine and levobupivacaine were therefore initiated into the clinical anesthesia practice.[6,7] Levobupivacaine has been newly introduced into Indian market and is being extensively utilized in a variety of health set-ups. Such an increased practice commands certification of evidence based literature with regards to jeopardy and security concerns as well as clinical issues allied to levobupivacaine.[8,9]

The aim of this study was to decide whether a reduction in the amount of epinephrine from 1:200,000 (5.0 g/mL) to 1:400,000 (2.5 g/mL) added to epidural levobupivacaine produces a alike decrease in local anaesthetic absorption from the epidural space while keeping the similar clinical effectiveness and acceptability in patients undergoing elective lumbar spine surgery.

Materials and Methods

A total of 120 patients with ASA physical status 1 to 3 and aged 18–85 years, who were schedule to undergo elective lumber spine surgery were enrolled for the study. All the participants were explained about the study and written inform consent was taken from all the patients. The exclusion criteria followed were: any allergy to local anesthesia, history of renal or hepatic, respiratory or cardiac diseases or neuromuscular or psychiatric condition. All the patients were premedicated with IV midazolam (1–5 mg) after the IV infusion of 500 ml of lactated Ringer's solution. At the L1-2 interface 1% Lidocaine was used to infiltrate the subcutaneous tissue. Epidural space was identified. After negative aspiration, the patients were randomized to receive one of the two study solutions: 0.5% levobupivicaine without epinephrine and 0.5% levobupivicaine with epinephrine incrementally over a period of 3 min period.

Total dose of 75 mg was administered. The end of injection of study drug was termed "Time 0" for the purposes of subsequent patient assessment. Intraoperative sedation was supplied with additional IV midazolam and propofol (25–100 g kg1 min1) as essential at the judgment of the anaesthesiologist. The chief usefulness measure was the duration of effective anesthesia, defined as the period of time from achieving bilateral T10 blockade to the time of bilateral regression to T10. Secondary efficacy measures incorporated peak block height, time to reach peak block, time to two-segment regression, time to regression to T10, and time to complete regression. Levobupivacaine levels were determined with liquid chromatography-mass spectrometry, with limits of determination of 10 ng/mL and coefficients of variation at these limits of approximately 0.8%.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations. For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Results

A total of hundred and twenty patients were included into the study for the treatment. All the patients meet the criteria and were included in the study. All the patients were divided into two groups evenly. There was no dissimilarity in age, sex or body mass among the groups (Table 1). The mean time to onset of sensory block for surgery and effective duration were same in both the groups. (Table 2) Levobupivacaine 0.5% produces relatively little motor blockade. In 53% of all patients studied, no motor block of the lower extremities could be established (Table 3). even though the adding of either 1:200,000 or 1:400,00 epinephrine tended to augment the degree of motor blockade, this did not have statistical significance. in addition, in patients

who did build up a number of degree of motor blockade, its duration was not different among both the groups (Table 3).

In general quality of intraoperative epidural block was measured by the researcher as "excellent" or "good" in 85% of patients. There was fervent agreement between block quality ratings by the anesthesiologist and the surgeon ($p < 0.0001$). Even though patients in the Plain Levobupivacaine group had the leastt time before requesting analgesics, it was not also statistical significance. There were no differences between groups in time to first impulsive voiding after surgery ($p = 0.58$). Nausea (26%) and hypotension (18%) were the most common side effects attributed to study drug.

Table 1: Demographs of patients

Variable	Levobupivacaine plain solution	Levobupivacaine with 1:400,000 epinephrine
Age (yr)	60	56
Sex (M/F)	34/36	28/32
Height (cm)	165	170
Weight (kg)	80	82
Midazolam (mg)	3	4
Propofol	52	54
Time to first spontaneous void (min after t =0)	354	352

Table 2: Efficacy results – sensory block

Variable	Treatment group	Mean + SD
Onset to T10	LP	10 ± 9
	L400	11 ± 6
Time to two-segment regression (min)	LP	110 ± 50
	L400	112 ± 60
Duration min (T10-T10)	LP	187 ± 60
	L400	200 ± 60
Time to complete regression	LP	350 ± 110
	L400	378 ± 94

Table 3: Motor Blockade

Variable	Levobupivacaine plain solution	Levobupivacaine plain solution with 1:400,000 epinephrine
0	24	16
1	9	10
2	5	7
3	5	8
Motor block duration	204 ± 60	239 ± 90

Discussion

Traditionally, the levobupivacaine dose used for spinal anesthesia has been 15 mg. This dose supplies an adequate sensory and motor block for most surgical procedures lasting ~6.5 h. Levobupivacaine is lipid-soluble, highly protein-bound local anaesthetic with a dissociation constant (pKa) comparable to that of bupivacaine and ropivacaine, but superior than that of lidocaine. These pharmacological characteristics determine its relatively slow onset, high potency, and long duration of action. Analogous to other local anaesthetics, inhibition of impulse transmission in an variety of tissues leads to the development of adverse reactions.[10,11]

Levobupivacaine has a similar mechanism of action and pharmacodynamic properties as that of bupivacaine. It reversibly blocks the sodium channels at the nodes of Ranvier in myelinated nerves chief to quicker onset as match up to to unmyelinated nerves. Equally, nerves which are small in diameter are extra without exertion blocked than large nerves.[12]

This research described that 0.5% levobupivacaine, with or without epinephrine, is a appropriate anaesthetic for utilization in lumbar spine surgery. The adding up of epinephrine tends to augment the duration of blockade, lessen the ensuing local anaesthetic concentration, and get better intraoperative anaesthetic quality; though statistical significance was not there for any T10 was achieved within 15 minutes of administering the epidural injection in all patient groups. Few institutions regularly and productively use equally epidural and spinal anesthesia for lumbar spine surgery.

Projected compensation of neuraxial blockade comprise retaining the patient's capability to turn to the prone position; guarding against compressive injuries; vocal contact with the patient, agreed to precise localization of nerve root involvement; a reduce in intraoperative blood loss; and long-lasting postoperative analgesia. Anticipated difficulties of regional anesthesia for lumbar spine surgery include the incapability to instantly measure lower extremity motor function and a probable stoppage in bladder function. Nevertheless, in the present study, 53% of patients did not accomplish any degree of motor blockade.

Conclusion

Present study describes that 0.5% levobupivacaine, with or without epinephrine, is

a appropriate anaesthetic for utilization in lumbar spine surgery. The adding up of epinephrine tends to augment the duration of blockade, reduce the resultant local anaesthetic concentration, and recover intraoperative anesthetic quality; though statistical significance was not achived for any T10 was achieved within 15 minutes of administering the epidural injection in all patient groups.

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