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Original Research Article

Comparative Study of Intrathecal Levobupivacaine and Ropivacaine in Endoscopic Urological Procedure in Gujarat Population

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Conflict of interest: Nil

Abstract:

Background: Regional anesthesia is the preferred technique for endo-urological procedures. Both anesthetics, i.e., levobupivacaine and ropivacaine, have the same clinical profile. Hence, a safe and effective anesthetic has to be found.

Method: 77 patients admitted for endoscopic urologic procedures were studied. Out of 77, 37 patients were administered ropivacaine (group R) and 40 were administered levobupivacaine (group L). The motor and sensory blocks were assessed by using the pin-prick method with a 23G or 25G needle in the mid-clavicular line. The intra-operative blood pressure, heart rate, and SPO2 were recorded and compared in both groups. Move-over side effects were also recorded and compared.

Results: Sensory and motor blockade duration have a significant p value ($p<0.001$).

Conclusion: Both anesthetic agents have similar clinical profiles, but Ropivacaine group had rapid sensory and motor black. However, both anesthetic agents are ideal alternatives to Bupivacaine.

Keywords: hemodynamic stability, heart rate, sensory and motor blockade, endo-urological surgery, Gujarat.

Introduction

Spinal anesthesia is a safe and effective alternative to general anesthesia for lower abdominal, lower limb, genitourinary, and endoscopic urological surgeries, as it is very economical and easy to administer. The major advantages are blood loss, reduced deep vein thrombosis, good muscle relaxation, and better pain control in the early post-operative period [1].

Bupivacaine is the most common local anesthetic used due to its long duration of action. However, profound myocardial depression and even cardiac arrest can occur after an accidental intravascular injection, and resuscitation from Bupivacaine-induced cardio-vascular collapse has been reported in many cases [2].

Rapivacaine and Levobupivacaine have strongly emerged as new and safer alternatives for regional anesthesia than Bupivacaine. Ropivacaine is a long-acting amide, a local anesthetic agent, less lipophilic than Bupivacaine, and less likely to penetrate large myelinated motor fibers, resulting in a relatively reduced motor blockade that could be useful when motor blockage is undesirable [3]. The reduced lipophilicity is also associated with decreased potential for central nervous system toxicity and cardiotoxicity.

Regional anesthesia is a preferred technique in endo-urological surgeries because sensory supply to urogenital organs comes from the thoracolumbar and sacral outflows. These patients may have some element of renal dysfunction and associated comorbid medical conditions [4]. Levobupivacaine and ropivacaine have a nearly similar clinical profile and better hemodynamic stability with less cardiotoxicity and neurotoxicity. Hence, an attempt was made to evaluate and compare the clinical effects of intrathecal administration of levobupivacaine versus ropivacaine for endoscopic urological surgeries.

Material and Method

77 (Seventy Seven) adult patients admitted to hospital during the period of year 2013 to 2015 were studied.

Inclusive Criteria: Patients aged between 20 to 80 years (ASA I and II) and given their consent in writing for study were selected for study.

Exclusion Criteria: ASA grade more than 3 (ASA>III), contra indicated for regional anesthesia, patients having bleeding disorders and under treatment anticoagulant and anti-platelet diseases, allergy to amide anesthesia, and patients with neurological disorders were excluded from the study.

Method: 77 patients admitted for endoscopic urological procedures were grouped into two groups: 40 were in group R (intrathecal 3 ml of 0.5% of ropivacaine) and 40 were in group L (intrathecal 3 ml of 0.5% of levobupivacaine).

The day before surgery, all patients underwent a fitness and pre-anesthetic checkup.

After taking patients into the operating room, an 18-gauge intravenous cannula was secured, and patients were pre-loaded with normal saline or lactated ringer solution at 10 ml/kg. Routine monitors like non-invasive blood pressure, pulse oximetry, and ECG were applied, and base line parameters were recorded. Spinal anesthesia was given in the right or left lateral position with aseptic precaution, and a 23-gauge Quincke spinal needle was put in the lumbar intervertebral space (L_2-L_4).

After free flow of CSF, a selected drug was injected without aspiration. The intra-operative BP (SBP, DBP, MAP), heart rate, and SPO2 data were recorded initially at 1, 3, 5 minutes, every 5 minutes up to 30 minutes, and then every 15 minutes up to 60 minutes, and then even 30 minutes up to the end of surgery.

Sensory and motor blockage:

Every patient was placed in a supine position after an injection. Sensory and motor block were assessed using the pin-prick method with a 23G or 25G needle in the mid-clavicular line.

Onset of sensory blockade was defined as the interval between intrathecal administration and the maximum pin prick score (time for the maximum level of sensory block) assessed in the normal limb by assessing the changes in pin prick sensation every 1 minute until no sensation (grade 2) was achieved, graded according to Gromley and Hill 1996.

Normal sensation 0; blurred sensation 1; no sensation 2; Grade 2 was taken as the onset of sensory block. Maximum sensory block height: defined as the maximum height of sensory block achieved after intrathecal administration. Onset of motor block assessed from time of intrathecal administration to every 1 minute until complete motor block was achieved (grade 3) in the normal limb Graded according to a modified bromage scale, 0 = no paralysis, able to flex hip, knee, or ankles; 1 = able to move knee, unable to rise extended leg; 2 = able to flex ankle, unable to flex knees; and 3 = unable to move any part of the lower limb.

Grade 3 was taken as a complete motor block.

Time to two-segment regression: was taken as an interval from intrathecal administration to the point of two-segment regression.

Duration of sensory block: was taken as an interval from intrathecal administration to the point of complete resolution of sensory block.

Duration of motor block: was taken as an interval from intrathecal administration to the point in which the bromage score was back to 0.

The quality of the block was graded as Adequate sedation, or analgesia, is required. Inadequate need for additional analgesia, failed—GA required.

If the level of block was inadequate, the regimen was switched to general anesthesia, and the patient was excluded from the study.

At the completion of surgery, the duration of surgery was noted, and the patient was shifted to the PACU, where vital parameters, the duration of sensory and motor blockade, and any side effects of the drugs were observed for 12 hours.

Pain was assessed by the visual analogue scale (VAS) postoperatively, in which patients were asked to grade their severity of pain (0 was minimal or no pain, 10 was the worst pain ever felt). Rescue analgesia in the form of intravenous tramadol (2 mg/kg) was given if VAS $\geq$ 3. The time for the first demand for rescue analgesia was recorded.

The side effects, like hypotension, bradycardia, nausea, vomiting, and shivering, were noted and compared in both groups.

Statistical analysis: The demographic data, motor and duration of sensory and motor blockades, and side effects in both groups were compared, and significant values were noted. The statistical analysis was carried out in SPSS software. The ratio of males and females was 2:1.

Observation and Results

Table 1: Demographic data of the patients: In group R, there were 37 patients. In Group I, 40 patients were studied. The age group was between 42 to 49 years old in both groups. In group R, out of 37, 28 were male and 9 were female. And in group I, out of 40 patients, 36 were male and 4 were female. Body weight in group R was 60.5 kg

and in group I was 61.9 kg. The height of patients 161 (cm) in group-R, and 163 (cm) in group-I, ASA status I-30, II-5, III-2 in group R, 25-I, 14-II, 1-III in group-II.

Duration of surgery: 81.4 ±6.34 minutes in group R and 834 ±1.62 minutes in group I

Table 2: Onset of motor and sensory 6.36 (minutes) in group R and 6.55 in group I, and the p value is significant (p > 0.99). Onset of motor block: 12.30 minutes in group R and 12.45 minutes in group I, and p > 0.83 (the p value is insignificant).

Table 3: Study of time in two segment regression of sensory and motor block 149.80 (minutes) in group R and 164.2 in group I and p<0.01 (p value is highly significant)

Duration of motor block: 181.63 minutes in group R and 255.77 minutes in group I, p< 0.01 (p value is highly significant).

Duration of sensory block: 261.11 in group R and 355.32 in group I, p<0.001 (p value is highly significant).

Table 4: Study of post-surgical complications Bradycardia 2 (5.4%) in group R, 1 (2.5%) in group R. Hypotension 3 (8.1%) in group R and 4 (10%) in group I.

Table 1: Demographic Data (mean Values SD) Total No. of patients: 77

Variables	Group R	Group L
No of patients	37	40
Age (years)	42.51±12.646	49.45±17.423
Sex (M/F)	28/9	36/4
Weight (kg)	60.5±19.506	61.45±11.295
Height (cm)	161.11±4.495	163.77±4.14
ASA status(I/II/III)	30/5/2	25/14/1
Duration of surgery (min.)	81.48±26.34	83.37±41.62

Table 2: Onset of sensory and motor block, Total No. of patients: 77

Variables	Group R (37)	Group L (40)	P value
Onset of sensory block(min)	6.36 (±1.2)	6.55 (±1.4)	0.99
Onset of motor block(min)	12.30 (± 1.5)	12.453.18 (±1.8)	0.83

Table 3: Time to two segment regression, Duration of sensory block and motor block, Total No. of patients: 77

Variables	Group R (37)	Group L (40)	P value
Time to two segment regression(min)	149.86 (±3.2)	164.2 (± 4.3)	0.01
Duration of motor block(min)	181.63 (±2.8)	255.27 (±3.6)	<0.01
Duration of sensory block(min)	261.11 (±1.8)	335.32 (±2.6)	<0.01

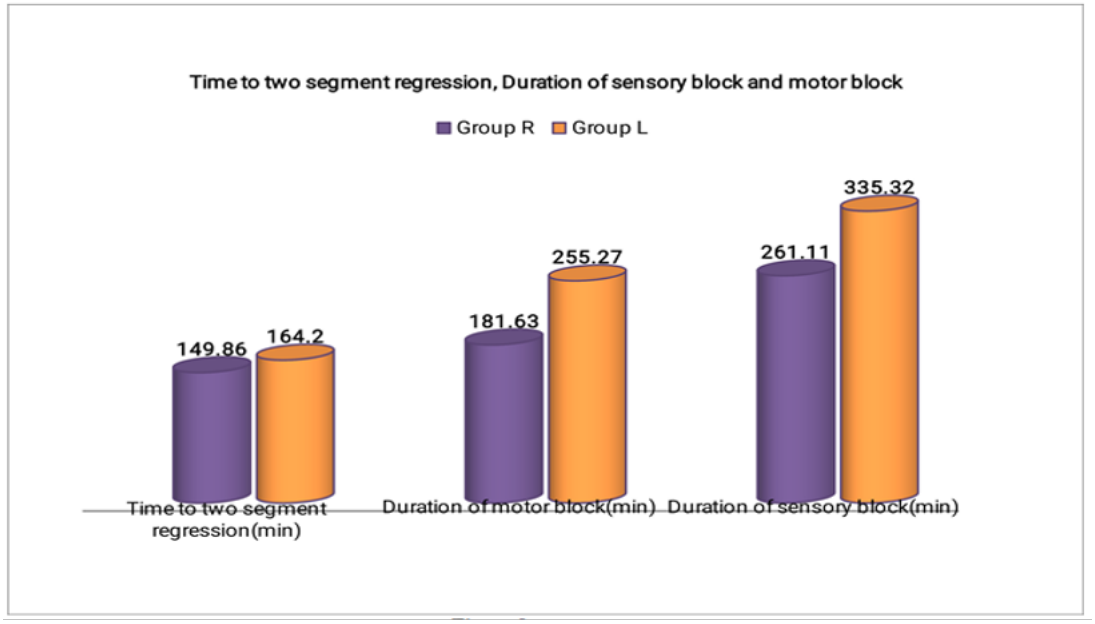

Figure 1: Time to two segment regression, duration of sensory block and motor block

Table 4: Study of Complications

Complications	Group R (37)	Group L (40)
Bradycardia	2 (5.4%)	1 (2.5%)
Hypotension	3 (8.1%)	4 (10%)
Hypoxia	0	0
Nausea & Vomiting	0	0

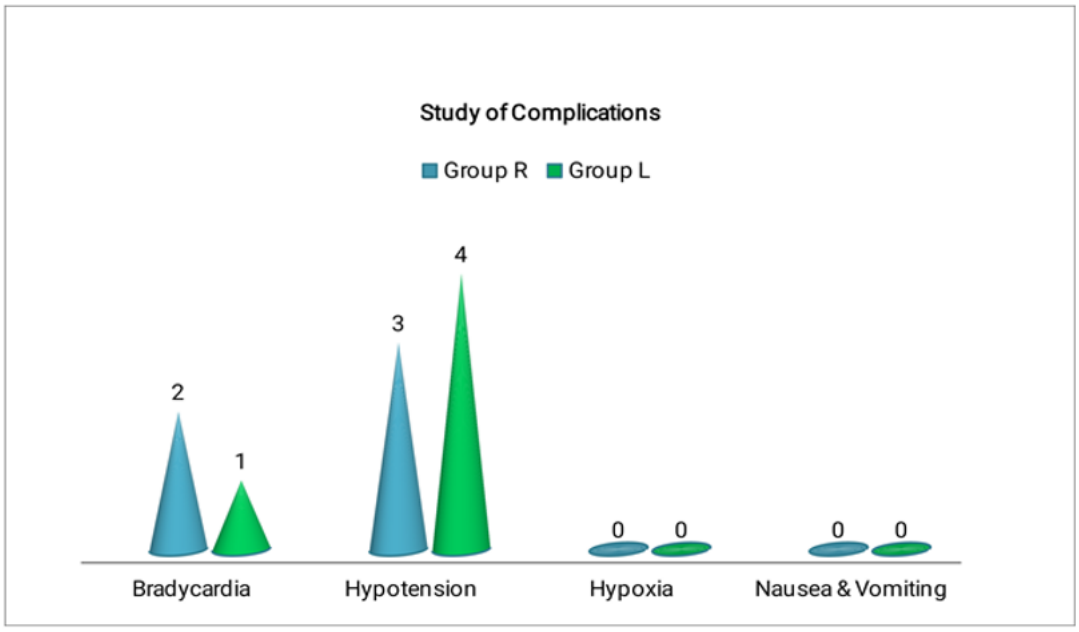

Figure 2: Study of complications

Discussion

Present a comparative study of intrathecal levobupivacaine and rupivacaine in endoscopic urological procedures in the Gujarat population. Group R had 37 patients, and Group L had 40 patients. The age in group R was 42.5 (±12.646) and in group L The age group was 49.4 (±17.423). In group R, there were 28 males and 9 females. In group L, there were 36 males and 4 females. In group R, the body weight was 60.5 (±19.506); in group L, the body weight was 61.4 (±11.295). In group-R, the height in CM was 161.1 (±4.45), and in group-L, the body height was 163.7 (±4.14). The ASA status was 30-I, 5-II, 2-III in group R, 25-I, 14-II, and 1-III in group L.

Duration of surgery (minutes): 81.4 (± 26.34) in group R and 83.3 (±41.62) in group L (Table 1). The onset of sensory block was 6.36 in group R and 6.55 in group L, $p > 0.99$ (the p value was insignificant). The onset of motor block (in minutes) was 12.30 in group R and 12.45 in group L, with $p<0.83$ (the p value was insignificant) (Table 2). The study of time-to-two segment regression duration of sensory block and motor block was compared, and both values had a significant p value ($p<0.01$) (Table 3). Complications of Bradycardia 2 (5.4%) in group R, 1 (2%) in group L, Hypotension 3 (81%) in group R, and 4 (10%) in group L (Table 4). These findings are more or less in agreement with previous studies [5,6,7]. The novel, long-acting local anesthetics Ropivacaine and levobupivacaine are amino amide local anesthetics belonging to the n-alkyl-substituted pipecholyl xylidine family. They were developed to offer a safer alternative to bupivacaine in regional anesthesia. Ropivacaine has fewer potential cardiotoxic effects than levobupivacaine, but its clinical efficacy does not substantially differ [8]. Ropivacaine and levobupivacaine are pure left-isomers of bupivacaine, which, due to their three-dimensional structure, have less central nervous system and cardiac toxicity than bupivacaine. Due to their reduced toxic potential, the majority of studies involving these drugs are related to epidural or peripheral nerve blocks, where the risk of systemic toxicity related to either overdosing or unintended intravascular injection is high.

This might not be true in spinal anesthesia, where the dosage of the drug is comparatively small.

Both ropivacaine and levobupivacaine have been used successfully for spinal anesthesia. The majority of studies compare ropivacaine or levobupivacaine with bupivacaine. Ropivacaine is well tolerated after intrathecal use, and it was found to have a shorter duration of action than bupivacaine, making it a possible alternative to lidocaine for ambulatory surgery [9]. Levobupivacaine and racemic bupivacaine share many pharmacokinetic proper-

ties because of the close chemical relationship, but studies have found that the sensory blockade lasted significantly longer with levobupivacaine than with racemic bupivacaine when given intrathecally [10]. There are very few studies directly comparing ropivacaine with laevobupivacaine to come to a conclusion about a better choice between the two for spinal anesthesia [11]. Hence, we performed this randomized, double-blind study to compare the clinical characteristics of these newer local anesthetic drugs when the same volume and concentration are administered intrathecally in Endourological surgeries.

In the present study, the duration of sensory and motor blockades in the ropivacaine group was significantly shorter than that in the levobupicaine group. Such findings were also observed in many previous studies, like prostatic surgeries, but there were no significant changes in hemodynamic stability, heart rate, adverse reactions, or oxygen saturation.

Summary and Conclusion

Present comparative study of the conclusion efficacy of intrathecal isobaric Levobupivacaine and isobaric Ropivacaine for endoscopic urological surgeries with regard to onset and duration of sensory and motor block hemodynamic changes and side effects. Both drugs are quite safe, efficacious, and well-tolerated anesthetic agents. But the Ropivacaine group recovered from sensory and motor blockades earlier than the Levobupicaine group. Such studies have to be conducted on a large number of patients in hi-tech hospitals where the latest techniques have to be present to combat any severe side effects and confirm the significant findings of the present study. However, both drugs are good alternatives to Bupivacaine for intrathecal anesthesia.

Limitation of Study: Owing to the tertiary location of the research center, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

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