



"COMPARATIVE CLINICAL EVALUATION OF INTRATHECAL ISOBARIC LEVOBUPIVACAINE (0.5%) WITH MORPHINE AND ISOBARIC ROPIVACAINE (0.5%) WITH MORPHINE IN INFRAUMBILICAL SURGERIES -A CLINICAL STUDY"

Anaesthesiology

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ABSTRACT

Background: Subarachnoid block is a simple technique that provides a deep and fast surgical block through the injection of small doses of local anaesthetic drug in Subarachnoid space. Various local anesthetic agents have been used in subarachnoid block since their introduction, isobaric drugs along with opioids provide excellent combination of shorter motor and longer sensory block which is useful for short duration infraumbilical surgeries. **Methods:** The present study is a prospective, comparative and clinical study between age group 18-45 years of either sex belonging to ASA grade I and II undergoing elective infra-umbilical surgeries. 40,40 patients were taken into each group. Mean duration of surgery in each group was around 90 minutes. Perioperative vitals like heart rate, blood pressure, oxygen saturation, ECG were recorded. Motor block was assessed through modified Bromage scale and post operative pain was assessed through VAS visual analogue scale, also need for rescue analgesia was monitored postoperatively. **Results:** We found that 150 microgram intrathecal morphine added as an adjuvant to 0.5% isobaric ropivacaine provided prolonged duration of analgesia and early recovery as compared to 150 microgram intra thecal morphine added with 0.5% isobaric levobupivacaine in patients undergoing infra-umbilical surgeries without causing significant hemodynamic variation and adverse effects. **Conclusion:** In present study, we conclude that time of onset of sensory block was more and duration of sensory and motor block was less in isobaric ropivacaine with morphine as compared to isobaric levobupivacaine with morphine. Which revealed that ropivacaine group provides good postoperative analgesia and shorter motor block, that leads to early recovery and better patient satisfaction So, ropivacaine with morphine seems to be better as compared to levobupivacaine with morphine group.

KEYWORDS

INTRODUCTION:

Subarachnoid block also called as intradural block or intrathecal block, is a form of neuraxial regional anaesthesia involving the injection of a local anaesthetic into the subarachnoid space, generally through a fine needle, usually 9 cm (3.5 in) long. It is a safe and effective form of anesthesia performed by anesthetists and anesthesiologists which can be used as an alternative for general anesthesia commonly in surgeries involving the lower extremities and infra umbilical surgeries. The local anesthetic injected into the cerebrospinal fluid provides anesthesia, analgesia, and motor and sensory blockade. Subarachnoid block is an accepted technique for lower abdominal and lower limb surgeries. It produces complete analgesia with profound muscle relaxation, quiet respiration and small contracted bowel.⁽¹⁾

Various local anaesthetic agents have been used in subarachnoid block since their introduction.

Among them, ropivacaine, (which was first used clinically in 1992, (Berde CB 2010) provides shorter duration of sensory and motor block than bupivacaine, and may be of particular use in the day-case setting. (Fettes PD, 2005) In recent years, use of intrathecal adjuvants like opioid analogues have gained popularity with the aim of prolonging the duration of block, improving success rate, patient satisfaction and reducing resource utilization compared with general anaesthesia and faster recovery.⁽²⁾ Intrathecal morphine, which is less hydrophobic than other opioids, has a longer residence time in the cerebrospinal fluid (CSF) and provides excellent postoperative analgesia.⁽³⁾ (Andrieu G 2009) According to experimental studies, intrathecally administered fentanyl is cleared from the CSF within a relatively short distance, whereas morphine extends to a much greater dermatomal distribution. (Eisenach JC, 2003), in our study we have compared equal volume of isobaric levobupivacaine and ropivacaine with intrathecal morphine in terms of motor and sensory blocks with comparative hemodynamics during short duration infraumbilical surgeries.

MATERIALS AND METHODS:

The present study is a comparative, clinical, observational and hospital-based study between age group 18-45 years of either sex belonging to ASA grade I and II for elective infra-umbilical surgeries.

Study design: Comparative, clinical, observational and hospital-based study

Study Centre: Department of Anaesthesiology, Gandhi Medical College and associated Hospitals, Bhopal

Study Duration: January 2018-july 2019

Inclusion Criteria:

1. After obtaining approval from the institutional ethics committee and informed written consent from all 80 patients. (40 patients in 2 groups).
2. Patients with ASA grade - I and ASA grade - II
3. Age group 18-45 years of either sex.
4. Patients with average height (>5 feet)
5. All patients going for elective infra-umbilical surgeries.

Exclusion Criteria:

1. Patient refusal or not giving consent.
2. Patients with the Neurological disease.
3. Spine/Neurological deformities.
4. Local Skin infections or disease.
5. Patients with bleeding diathesis.
6. History of drug allergy to LevoBupivacaine, Ropivacaine and Morphine
7. Coagulopathy disorders.
8. Severe liver or kidney diseases.
9. ASA grade III and IV, V, E.

Sample size: 80 patients

1. Group LBM (Levo Bupivacaine + Morphine) (n=40) (0.5%) 3ml Levo Bupivacaine + 150 µg Morphine.
2. Group RM (Ropivacaine + Morphine) (n=40) (0.5%) 3 ml Ropivacaine + 150 µg Morphine.

Method: The subarachnoid block was performed in all patients in sitting and left lateral position under strict aseptic precautions, using 25G Quincke needle through midline. The subarachnoid block was performed at the level of L3-L4. After observing the free flow of CSF, the total volume of 3.15ml drug was given slowly, and the patient was immediately be moved to the supine position.

1. parameters like HR, SBP, DBP (hemodynamic variables), Respiratory rate, SpO₂ were monitored preoperatively and

intraoperatively. Sensory block level was assessed by pin prick test

2. and monitor block by Modified Bromage Scale. This scale was used to assess the degree and duration of motor blockade.

The intensity of pain was assessed by Visual Analogue Scale (VAS) at the end of surgery then after every 1 hour till first 6 hours, then after every 6 hours till 24 hours.

Degree of motor block

It was assessed by Modified Bromage Score.

Score	Criteria
1	Complete block (unable to move feet or knees)
2	Almost complete block (able to move feet only)
3	Partial block (just able to move knees)
4	Detectable weakness of hip flexion while supine (Full flexion of knees)
5	No detectable weakness of hip flexion while supine
6	Able to perform partial knee bend.

Duration of effective analgesia: VAS - (VISUAL ANALOGUE SCALE)

(0-no pain, 10-worst pain)

Observations:

TABLE 1: Showing group distribution according to study drugs

GROUPS (NO. OF PATIENTS)	Study drugs and its doses
GROUP LBM (n=40)	(0.5%) 3ml Levobupivacaine + 150µg Morphine
GROUP RM (n=40)	(0.5%) 3ml Ropivacaine + 150µg Morphine

Table 1 showing the distribution of patients in two groups and drugs used in each groups. Group LBM (Levobupivacaine-Morphine) had 40 patients and 0.5% 3ml Levobupivacaine + 150 µg Morphine was given. Group RM (Ropivacaine-Morphine) had 40 patients and 0.5%, 3 ml Ropivacaine + 150 µg Morphine was given.

TABLE -2: COMPARISON OF SENSORY BLOCKADE BETWEEN BOTH GROUPS

Parameters	Group LBM		Group RM		Significance 'p' Value	Student 't' Test Value
	Mean	±SD	Mean	±SD		
Onset of sensory blockade (min.)	4.58	0.81	5.46	1.22	0.0001	3.84
Duration of sensory blockade (min.)	137	4.90	115	4.24	< 0.00001	21.01

Table 2 shows the comparison of sensory blockade between both groups. the onset time of sensory blockade (Mean ± SD) in Group LBM was 4.58 ± 0.81 mins, in Group RM were 4.46±1.22 mins. The mean duration of sensory blockade in Group LBM were 137 ± 4.90 mins, in Group RM were 115±4.24 mins. Comparison was significant with P value <0.001.

TABLE -3: SHOWING COMPARISON OF MOTOR BLOCKADE BETWEEN BOTH GROUPS

Parameters	Group LBM		Group RM		Student 't' Test Value	Significance 'p' Values
	Mean	±SD	Mean	±SD		
Onset of motor blockade(min.)	5.91	0.91	6.67	1.32	3.0	0.0018
Duration of motor blockade (min.)	121	17.5	106	3.33	5.34	<0.00001

Table 3 shows the comparison of motor blockade between both groups. Mean time of onset of motor block was significantly more in Group RM [6.67± 1.32min] as compare to Group LBM [5.91± 0.91min]. Mean time Duration of motor block was significantly more in Group LBM [121± 17.5 min] as compared to Group RM [106 ± 3.33 min]. Comparison was significant with P value <0.001.

TABLE -04 : COMPARISON OF MEAN BASELINE DATA OF BOTH GROUPS

Variables	Group LBM	Group RM	Student 't' Test Value	Significance 'p' Value
Pulse	84.0 ±11.1	86.5±10.6	0.989	0.163
SBP	124 ± 7.78	124±8.38	0.055	0.478
DBP	78.8 ±5.5	77.8±5.72	0.717	0.237
RR	12.9 ±1.44	12.9 ±1.62	0.219	0.413
SpO2	98.3 ± 0.7	98.4 ± 0.69	0.156	0.438

Table 4 compares the baseline hemodynamic characteristics between groups. Mean pulse rate per minute were in Group LBM were 84.0 ±11.1, in Group RM were 86.5±10.6 (p=0.163). Mean systolic blood pressure in mm of Hg were 124 ± 7.78for Group LMB, 124±8.38for Group RM (p=0.055). The mean diastolic pressure in mm of Hg in Group LBM were 78.8 ±5.5, in Group RM were 77.8±5.72and in Group 3 were 77.2 ± 3.62) (p=0.717). Mean Respiratory rate per minute were in Group LBM were 12.9 ±1.44, in Group RM were 12.9 ±1.62 (p=0.219). All these baseline parameters were insignificant in comparison.

DISCUSSION:

In clinical practice, an ideal local anesthetic should have rapid onset and long duration of action with minimal side effects. Among the various local anaesthetic drugs used now a days which include bupivacaine, ropivacaine and levobupivacaine, bupivacaine remains one of the most popular local anaesthetic agent because of its high potency and minimal neurological symptoms, but caution is required because of its toxicity profile particularly to the cardiotoxicity. (Srilakshmi K 2017)

Yaksh and Rudy, in 1976, were the first investigators to demonstrate direct opioid analgesia at the spinal cord level ⁽⁴⁾

Levobupivacaine and Ropivacaine, are safer alternative for regional anesthesia than its racemic parent with lower cardiotoxicity. The sensory and motor blockade characteristics of intrathecal ropivacaine and levobupivacaine are found to be inconsistent in various studies and the findings differ with varying doses of drug used in different studies. ⁽⁵⁾

(Gautier P, 2003) present study was conducted in Gandhi medical college and associated hospitals on 80 patients divided into 2 groups (40 in each group) and after all the standard procedures and consent patients were given Levobupivacaine (0.5%) 3 ml and morphine 150 microgram and other 40 were given Ropivacaine (0.5%) 3 ml and 150 microgram of morphine.

SENSORY BLOCKADE:

a) ONSET:

As shown in Table 3 the onset time of sensory blockade (Mean ± SD) in Group LBM was 4.58 ± 0.81 mins, in Group RM were 4.46±1.22 mins. Onset of sensory blockade was found to be statistically significant as P=0.0001 from one way ANOVA test. This shows that mean time of onset of sensory blockade was significantly higher in RM group as compared to LBM group.

b) DURATION:

The mean duration of sensory blockade as shown in Table 5 in Group LBM were 137 ± 4.90 mins, in Group RM were 115±4.24 mins. Duration of sensory blockade was found to be statistically significant as P <0.00001 (P<0.05). This shows that there is significant difference of mean time of duration of sensory blockade between both the Groups.

Ogun et al studied 25 parturients who received ropivacaine 15 mg and morphine 150 mg (RM group) and twenty-five parturients received bupivacaine 15 mg and morphine 150 mg (BM group) for spinal anaesthesia and reported that intrathecal bupivacaine-morphine and ropivacaine-morphine provided effective motor blockade and better postoperative analgesia.

Mantouvalou et al (2008) found a similar cephalad extent of sensory block after isobaric bupivacaine or ropivacaine subarachnoid block. ⁽⁶⁾

(a) ONSET OF MOTOR BLOCKADE:

Table 6 shows that the mean time of onset of motor block was significantly more in Group RM [6.67 ± 1.32min] as compare to Group

LBM [5.91± 0.91min]. Onset of motor blockade was found to be statistically significant as $P < 0.001$.

Kaur et al (2014) conducted study on comparison of intrathecal inj. butorphanol and inj. fentanyl as an adjuvant in lower abdominal surgeries. Onset of motor blockade was comparable between two groups, duration of analgesia was increased with butorphanol. (Kaur J 2014)

(b) DURATION OF MOTOR BLOCKADE:

Table 2 shows that Mean time Duration of motor block was significantly more in Group LBM [121± 17.5 min] as compared to Group RM [106± 3.33 min].

Ogun et al (2003) reported that time to reach complete motor block was shorter and time to complete recovery from motor block was longer in the bupivacaine group than the ropivacaine group ($P < 0.05$). (Ogun CO 2003).⁽⁷⁾

In a similar study by **Senard et al in 2004** which compared the efficacy, dose requirements, side effects and motor block with epidural infusion of 0.1% levobupivacaine or 0.1% ropivacaine with added 0.1 mg/hour morphine after major abdominal surgery, and showed no differences in quality of pain relief and hourly consumption of the local anaesthetic mixture between the two groups; however, recovery of unassisted ambulation was quicker with ropivacaine than levobupivacaine (76% of patients were able to ambulate on the second postoperative day with ropivacaine versus 48% with levobupivacaine; $P < 0.05$)

Kolkta et al (2009) in which they compared the equipotent doses of isobaric ropivacaine and isobaric bupivacaine (19.5 mg and 13 mg respectively) with fentanyl 20 µg, however the individual readings of motor block of ropivacaine group shows slight difference which may be due to the different dose of ropivacaine used.⁽⁸⁾

Layek et al (2015) in which the duration of motor block was significantly longer in group Bupivacaine when compared to group Ropivacaine in elective infraumbilical orthopedic surgery ($P < 0.001$).⁽⁹⁾

Hunt et al (1989) suggested that even a low dose of 6.25 µg intrathecal fentanyl with hyperbaric bupivacaine significantly extended post-caesarean section analgesia duration from 71 to 192 minutes.⁽¹⁰⁾

Rest of the comparison between both the groups were statistically insignificant like vital status Mean blood pressure, heart rate, respiratory rate, spo2. Both the groups have had almost one or two episodes of hypotension after sub arachnoid block which were treated with fluid boluses and mephenteramine 6mg. No major side effects were seen post operatively in 24 hours of follow up due to morphine, rather it added better analgesia after the surgery and rescue analgesia needs were reduced significantly. This study has some limitation. The sample size is relatively less, so a confirmatory trial is necessary which can provide strength to our findings. In addition, we did not measure the cost-effectiveness of the intervention.

CONCLUSION:

In present study we found that time of onset of sensory block was more and Duration of sensory block and motor was less in isobaric ropivacaine with morphine as compared to levobupivacaine with morphine, which revealed that ropivacaine group provides shorter motor, that leads to early recovery and enhanced patient satisfaction and ropivacaine with morphine seems to be better as compared to levobupivacaine with morphine.

We conclude that 150 microgram intrathecal morphine added as an adjuvant to 3 ml (0.5%) isobaric ropivacaine provided good analgesia and early recovery and seems a better option in view of enhanced recovery after surgery as compared to 150 microgram intrathecal morphine added with 3ml (0.5%) isobaric levobupivacaine in patients undergoing infra-umbilical surgeries without causing significant hemodynamic variation and adverse effects.

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