

Intrathecal Isobaric Bupivacaine Fentanyl Mixture Versus Hyperbaric Bupivacaine Fentanyl Mixture in Urological Procedures- A Comparative Study

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Abstract

Background: Comparison of intrathecal isobaric bupivacaine fentanyl mixture and hyperbaric bupivacaine fentanyl mixture in urological procedures. **Subjects and Methods:** One hundred ten patients undergoing urological procedures were divided into 2 equal groups was done. Group 1 patients received 3 ml of 0.5% isobaric bupivacaine with 25 µg fentanyl and group 2 received 3 ml of 0.5% hyperbaric bupivacaine with 25 µg fentanyl. Parameters such as blood pressure, onset and duration of motor and sensory blockade was recorded. **Results:** There was significant difference in mean systolic and diastolic blood pressure in both groups ($P < 0.05$). The mean onset of sensory block was 4.5 minutes in group 1 and 1.2 minutes in group 2, onset of motor block was 5.2 minutes in group 1 and 1.1 minutes in group 2, mean duration of sensory block was 2.4 minutes in group 1 and 3.6 minutes in group 2 and mean duration of motor block was 2.8 minutes in group 1 and 3.8 minutes in group 2. **Conclusion:** Intrathecal isobaric bupivacaine fentanyl mixture was associated with better haemodynamic stability and lesser duration of both sensory and motor blockade.

Keywords: Bupivacaine fentanyl, Sensory blockade, Motor, urological.

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Introduction

The advantages of spinal anaesthesia are its rapidity in onset, safety and reliability. The baricity of a solution is the ratio of the density of solution to that of the cerebrospinal fluid (CSF).^[1] The importance of isobaric spinal anaesthesia is that the distribution of drug is not dependent on the positioning of the patient during the injection of drug.^[2] For an anaesthetic drug to become hyperbaric, the baricity should be above 1.0015 at 37°C.^[3]

Neuraxial opioids are widely used in conjunction with local anaesthetics (LA) as they permit the use of lower dose of LA while providing adequate anaesthesia and analgesia.^[4] Neuraxial opioids also allow prolonged analgesia in the postoperative period and faster recovery from spinal anaesthesia. Antinociceptive synergism between LA and intrathecal opioids has been demonstrated in various animal studies.^[5]

Baricity of local anaesthetics could also be an important determinant of the distribution of anaesthetic in the intrathecal space, and hence the level of anaesthetic block. The two forms of bupivacaine also appear to differ in their motor blockade and duration of action. However, no study could conclusively show one to be better than the other.^[6] Fentanyl, a highly lipid soluble, pure μ -agonist opioid with rapid onset and short

duration of action, has been used with various local anaesthetics for a wide variety of surgical procedures.^[7] Bupivacaine is available in isobaric and hyperbaric forms for intrathecal use and opioids are used as additives to modify their effects. Most of the previous studies were conducted using either hyperbaric or isobaric bupivacaine for lower limb procedures and caesarean sections, and additives were rarely added.^[8] The present study was conducted to compare intrathecal isobaric bupivacaine fentanyl mixture and hyperbaric bupivacaine fentanyl mixture in urological procedures.

Subjects and Methods

One hundred ten American Society of Anesthesiologists physical status 1 and 2 patients undergoing urological procedures were selected for the study. All selected patients were informed regarding the study with their written consent. Ethical clearance from ethical review committee was obtained before enrolling patients.

Randomization of patients into 2 equal groups was done. Group 1 patients received 3 ml of 0.5% isobaric bupivacaine with 25 µg fentanyl and group 2 received 3 ml of 0.5% hyperbaric bupivacaine with 25 µg fentanyl. Parameters such as blood pressure, onset and duration of motor and sensory blockade was recorded. Side effects such as giddiness,

nausea/vomiting, shivering, respiratory depression were noted. Results of the present study after recording all relevant data were subjected for statistical inferences using chi-square test. The level of significance was significant if p value is below 0.05 and highly significant if it is less than 0.01.

Results

Table 1: Distribution of patients

Groups	Group 1	Group 2
Agent	0.5% isobaric bupivacaine + 25 µg fentanyl	0.5% hyperbaric bupivacaine with 25 µg fentanyl
M:F	30:25	28:27

Group 1 had 30 males and 25 females while group 2 had 28 males and 27 females [Table 1].

Table 2: Comparison of parameters

Variables	Parameters	Group 1	Group 2	P value
SBP (mm Hg)	5	136.2	128.0	<0.05
	10	130.6	110.2	
	20	127.2	108.4	
	30	124.0	116.2	
	40	120.8	114.8	
DBP (mmHg)	5	76.2	78.4	<0.05
	10	75.4	76.0	
	20	74.3	74.2	
	30	75.1	70.2	
	40	75.0	72.2	
Onset of sensory block (mins)		4.5	1.2	<0.05
Onset of motor block (mins)		5.2	1.1	<0.05
Mean duration of sensory block		2.4	3.6	<0.05
Mean duration of motor block (mins)		2.8	3.8	<0.05

There was significant difference in mean systolic and diastolic blood pressure in both groups ($P < 0.05$). The mean onset of sensory block was 4.5 minutes in group 1 and 1.2 minutes in group 2, onset of motor block was 5.2 minutes in group 1 and 1.1 minutes in group 2, mean duration of sensory block was 2.4 minutes in group 1 and 3.6 minutes in group 2 and mean duration of motor block was 2.8 minutes in group 1 and 3.8 minutes in group 2 [Table 2, Figure 1].

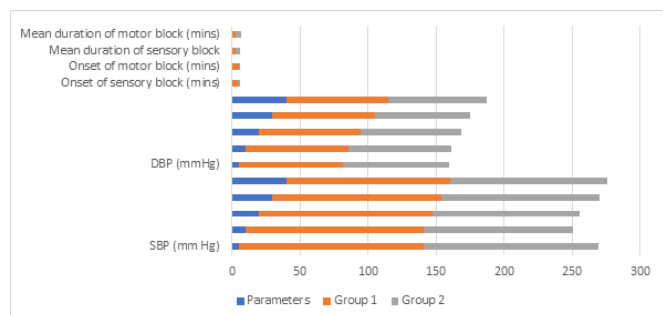


Figure 1: Comparison of parameters

Table 3 Adverse events in both groups

Adverse events	Group 1	Group 2	P value
Post-spinal headache	2	3	>0.05
Post-operative shivering	1	6	<0.05
Nausea/ vomiting	1	2	>0.05
Bradycardia	1	4	<0.05
Hypotension	3	7	<0.05

Post spinal headache was seen in 2 in group 1 and 3 in group 2, post-operative shivering was seen in 1 in group 1 and 6 in group 2, nausea/ vomiting was seen in 1 in group 1 and 2 in group 2, bradycardia 1 in group 1 and 4 in group 2 and hypotension 3 in group 1 and 7 in group 2. A significant difference was observed ($P < 0.05$).

Discussion

Subarachnoid block is one of the most popular techniques but has the disadvantages of sympathetic and motor block resulting in hypotension, bradycardia and immobility.^[9] Sensory blockade with reduction in complications can be achieved by adding drugs such as opioids, hence, local anaesthetics combined with opioids are the appropriate choice.^[10] The use of opioids in conjunction with local anesthetic for spinal anesthesia has been associated with decreased pain scores and reduced analgesic requirement in the post-operative period. Results of previous studies have demonstrated that intrathecal opioids not only enhance analgesia when added to subtherapeutic doses of local anesthetics but also do not prolong recovery.^[11] The present study was conducted to compare efficacy of intrathecal isobaric bupivacaine fentanyl mixture and hyperbaric bupivacaine fentanyl mixture in common urological procedures.

Our study had 110 patients scheduled for urological procedures. Group 1 had 30 males and 25 females while group 2 had 28 males and 27 females. Upadya et al,^[12] included one hundred patients undergoing urological procedures which were randomized into two groups. Group 1 received 3 ml of 0.5% isobaric bupivacaine with 25 µg fentanyl while Group 2 received 3 ml of 0.5% hyperbaric bupivacaine with 25 µg fentanyl. The haemodynamic stability was better with isobaric bupivacaine fentanyl mixture (Group 1) than with hyperbaric bupivacaine fentanyl mixture (Group 2). The mean onset time in Group 1 for both sensory block (4 min) and motor block (5 min) was longer compared with Group 2. The duration of sensory block (127.8 ± 38.64 min) and motor block (170.4 ± 27.8 min) was less with isobaric bupivacaine group compared with hyperbaric bupivacaine group (sensory blockade 185.4 ± 16.08 min and motor blockade 201.6 ± 14.28 min). Seventy percent of patients in Group 2 had maximum sensory block level of T6 whereas it was 53% in Group 1. More patients in Group 1 required sedation compared to Group 2.

We found that there was significant difference in mean systolic and diastolic blood pressure in both groups ($P < 0.05$). The mean onset of sensory block was 4.5 minutes in group 1 and 1.2 minutes in group 2, onset of motor block was 5.2 minutes in group 1 and 1.1 minutes in group 2, mean duration of sensory block was 2.4 minutes in group 1 and 3.6 minutes in group 2 and mean duration of motor block was 2.8 minutes in group 1 and 3.8 minutes in group 2. Mochamat et al,^[13] compared intrathecal isobaric and hyperbaric bupivacaine anaesthesia for lower abdominal surgeries, 20 mg bupivacaine was used without additives. There was no statistically significant haemodynamic variation between the two groups. It was found that the onset of analgesia and motor blockade was faster with isobaric bupivacaine and the duration of analgesia was prolonged with isobaric bupivacaine, which

was contrary to our findings where hyperbaric bupivacaine had a faster onset and a longer duration of analgesia. Hallworth et al.^[14] studied the effect of position and baricity on the spread of intrathecal bupivacaine. The patients were given 10 mg of hyperbaric, isobaric or hypobaric bupivacaine in combined spinal epidural technique either in sitting or right lateral position. They found that baricity had no effect on spread of sensory levels in lateral position compared to sitting position. In the sitting position hypobaric bupivacaine produced higher sensory levels (T2) than hyperbaric bupivacaine. Increased baricity produced less motor blockade which was evident in lateral position. The isobaric mixture was injected in the L3 4 space getting a median maximum sensory level of T2 and for hyperbaric it was T3.

Kumar et al.^[15] compared the safety and efficacy of anesthesia and analgesia of intrathecal bupivacaine-butorphanol mixture with intrathecal bupivacaine-fentanyl mixture. Eighty patients aged above 18 years, of ASA physical status 1 or 2, undergoing lower limb orthopedic surgeries were randomly allocated to two groups of 40 patients each. Patients in group A and group B received intrathecal 2.5 ml of hyperbaric bupivacaine (0.5%), with 25 µg of fentanyl and 25 µg of butorphanol, respectively. The times required for onset of sensory and motor blockade were comparable among the two groups. Significantly slower block regression to S2 level was observed in the group receiving intrathecal butorphanol as compared to intrathecal fentanyl. A higher number of patients in group A requested for rescue analgesia during the postoperative period than in group B. The average times to first request for rescue analgesia were 308.6±14.9 minutes and 365.9±12.3 minutes in group A and B, respectively (P=0.0254).

Conclusion

Intrathecal isobaric bupivacaine fentanyl mixture was associated with better haemodynamic stability and lesser duration of both sensory and motor blockade.

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