



EFFECT OF EXTRADURAL NORMAL SALINE ON EXTENDING LEVEL OF INTRATHECAL LOCAL ANAESTHETIC

Anaesthesiology

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ABSTRACT

The study was conducted to evaluate the role of extradural volume on intrathecally administered local anaesthetic agent. **Aim of study:** To find out the quality and extent of block with intrathecal bupivacaine by adding epidural normal saline as compared with extradural bupivacaine. **Patients & Methods:** The study was conducted on ninety adult patients undergoing infra umbilical surgery. Group A (n = 30) received 2ml of 0.5% hyperbaric bupivacaine intrathecally. Group B (n = 30) received 2ml of 0.5% hyperbaric bupivacaine intrathecally along with 10ml normal saline epidurally. Group C (n = 30) received 2ml of 0.5% hyperbaric bupivacaine intrathecally along with 10ml 0.5% isobaric bupivacaine epidurally. The extent and duration of block were noted along with the incidence of side effects. **Results:** The level of block achieved in Group A (T9 – T10) < Group B (T7 – T8) < Group C (T4 – T5). The level of sensory block regressed by two segments within 30 minutes in most of the patients in Group B, while it persisted for more than 120 minutes in all patients of Group C. Incidence of side effects was similar in all groups. **Conclusion:** Extradural volume only, in the form of normal saline, may be successful in increasing the extent of intrathecal block. However, it may not be adequate to allow lengthy surgery with low dose intrathecal local anaesthetic agent.

KEYWORDS

Combined Spinal Epidural Epidural Normal Saline

The combined spinal epidural technique has attained widespread popularity for patients undergoing major surgery below the umbilical level. Both spinal and epidural techniques have their own advantages and disadvantages. The combined technique will provide the advantages of both spinal and epidural block, that is, quick, predictable, intense block from the spinal local anaesthetic, and prolonged analgesia for the postoperative period from the epidural anaesthetic.[1]

It has been observed that the mechanism by which epidural top up reinforces the combined spinal epidural anaesthesia is not only by the effect of local anaesthetic in the epidural space, but also by increasing the level of spinal anaesthesia due to the volume of the local anaesthetic in the epidural space.[2] This is especially true if the epidural injection is given within 10 minutes of the intrathecal injection.[3] Delay in the epidural injection would allow the intrathecal block to get fixed. The volume effect component in increasing the level intrathecal block could be assessed by injecting a similar volume of normal saline into the epidural space.[4]

This study was conducted to find out the quality and extension of intrathecal block by adding normal saline or bupivacaine into the epidural space.

Patients & Methods:

The study was conducted on ninety adult patients put for infra umbilical surgery in our Institution.

All the patients belonged to ASA physical status I. Any patient with coagulation defect, infection at puncture site, history of motion sickness, allergy to local anaesthetics, or pre-existing neurological deficit in the lower extremities were excluded from the study.

The patients were distributed into three groups, each consisting of thirty patients. Group A patients received 2ml of 0.5% hyperbaric bupivacaine intrathecally. Group B patients received 2ml of 0.5% hyperbaric bupivacaine intrathecally along with 10ml of normal saline epidurally. Group C patients received 2ml of 0.5% hyperbaric bupivacaine intrathecally along with 10ml of 0.5% isobaric bupivacaine epidurally.

All the patients received 10mg diazepam orally on the night before and on the morning of surgery.

On arrival to the operation theatre basic monitors were placed and an

intravenous line was started. All patients were given 1litre of Lactated Ringer's solution for preloading. The patient was made to sit on the operating table and the back cleaned with antiseptic solution. In the patients of group B and group C a 17 G Tuohy needle was placed in the epidural space at the interspace between second and third lumbar vertebra. Lumbar puncture was done at the third and fourth lumbar interspace with 26G Quinke tipped spinal needle. After free flow of cerebrospinal fluid, 2ml of 0.5% hyperbaric bupivacaine was injected intrathecally. Within 5 minutes of the intrathecal injection, 10ml of normal saline or 0.5% isobaric bupivacaine was injected epidurally through the Tuohy needle according to the group of the patient. The patients of group A were given only the intrathecal injection of 2ml of 0.5% hyperbaric bupivacaine at the third and fourth lumbar interspace. The patients were made to lie down in supine position.

Sensory block was assessed by pinprick and motor block by the Bromage scale. Loss of pin prick sensation and Bromage score of 2 was considered as adequate block. Time taken for two segment regression of the sensory block and Bromage score 0 was considered to be the duration of block. Vital signs were monitored throughout the period of surgery and post operatively. Incidence of side effects like hypotension, bradycardia, headache, shivering, nausea, vomiting or urinary retention was observed for 24hrs.

The results were analysed by the Chi square test and the analysis of variance.

RESULTS:

Ninety patients, sixty-one males and twenty-nine females were taken up for the study. The age of the patients ranged from 44yrs to 53yrs, height varied from 145.9cm to 157.7cm and the body weight was from 44.3kg to 58.2kg. The demographic profile among the three groups was similar as shown in Table 1.

Table 1: Patient Characteristics

	Group A	Group B	Group C
Age (yrs)	50.3 +/- 1.95	49.45 +/- 5.78	47.75 +/- 3.54
Sex (M : F)	18 : 12	23 : 7	20 : 10
Body Wt (kg)	50.5 +/- 3.72	49.7 +/- 5.34	52.2 +/- 5.93
Height (cm)	152.1 +/- 5.84	151.3 +/- 5.46	152.35 +/- 5.36

No significant difference

Table 2: Sensory block

	Group A	Group B	Group C
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Highest level of sensory block	T8 – T10 (T10)	T7 – T9 (T8)	T4 – T6 (T5)
Time to reach upper limit of block (min)	5.2 +/- 0.422	13.5 +/- 4.721	20.8 +/- 1.399
Duration (min)	126.7 +/- 6.750	36.33 +/- 32.031	146.6 +/- 14.518

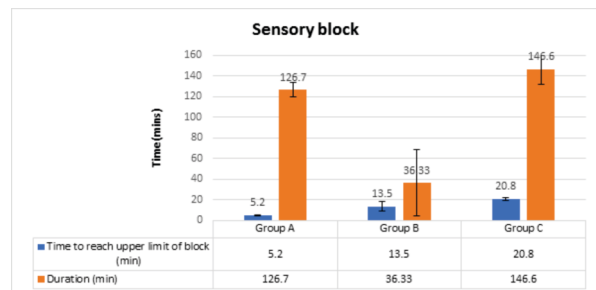


Table 3: Motor block

	Group A	Group B	Group C
Onset (min)	8.9 +/- 0.737	12.42 +/- 2.185	9.35 +/- 0.678
Duration (min)	120.8 +/- 6.196	108 +/- 15.787	146.6 +/- 14.518

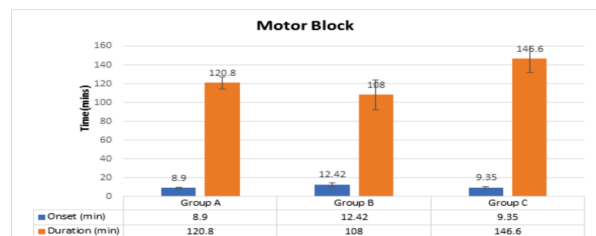
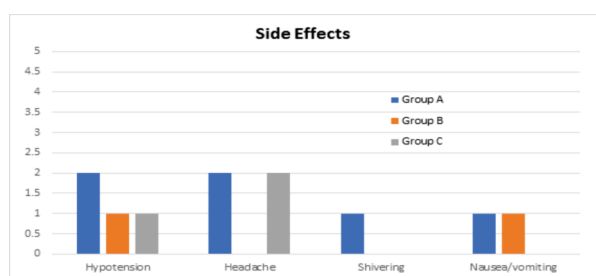


Table 4: Side effect

	Group A	Group B	Group C
Hypotension	2	1	1
Headache	2	0	2
Shivering	1	0	0
Nausea/vomiting	1	1	0



DISCUSSION:

This study demonstrated that epidural injection extended the level of intrathecal block. Both normal saline and bupivacaine elevated the level of block. This was probably due to the volume effect of the epidurally administered drug which exerted a positive pressure on the intrathecal space.[2] The epidural volume would have to be delivered before the spinal anaesthetic got fixed. In our study we found the level of sensory block to be about two segments higher (T_8) in patients receiving normal saline than those with only intrathecal bupivacaine (T_{10}). The much higher level (T_8) achieved in patients that received epidural bupivacaine was due to the additional anaesthetic effect of the bupivacaine in the epidural space.

Unfortunately, the extended level of spinal anaesthesia produced by epidural normal saline was not sustained. Two segment regression in the level of sensory block was seen as early as 10 minutes after reaching the maximum height. The average duration was around 36 minutes and only in two patients it went beyond 90 minutes. This wide variation in duration of extended block is evident from the high standard deviation seen in this group. It may be said that the volume effect by which the intrathecal block would be increased is rather unpredictable. So, it would not be effort effective to enhance low dose spinal anaesthesia by using this technique.[5]

On the other hand, epidural bupivacaine resulted in a well sustained

level of sensory block. The level of block increased for a longer period of time. This of course, was expected in the classical combined spinal epidural anaesthesia.[6]

The incidence of side effects was expected to be lower using the combined spinal epidural technique.[7,8] However, in this study side effects were not different in the three groups. Two patients in the spinal anaesthesia group complained of headache. This was surprising, as the volume of the epidural drug was expected to lower the incidence of post dural puncture headache. Hypotension was seen in a few patients in all of the groups. Bradycardia or urinary retention was not seen in any patient.

Both normal saline and bupivacaine given epidurally increased the level of sensory block after intrathecal bupivacaine. The epidural volume effect was confirmed by administering normal saline epidurally. However, the increased level and duration of sensory block was more reliable with the classical combined spinal epidural technique, that is, local anaesthetic given both in the intrathecal and epidural space.

CONCLUSION:

This study shows that there is extension in the level of sensory block after intrathecal hyperbaric bupivacaine by addition of either normal saline or isobaric bupivacaine extradurally. However, the height of block achieved by volume effect, i.e. normal saline, is not sustained.

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