

A Comparative Study of Single Dose Extradural Analgesia with Bupivacaine and Lignocaine with Adrenaline.

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ABSTRACT

Background: Lignocaine and bupivacaine are still the largely used local anaesthetics in the present day. Here, we are presenting a comparative study of single dose extradural analgesia with Bupivacaine and Lignocaine with adrenaline. **Methods:** The study was carried out in 60 healthy subjects posted for lower abdominal, pelvic, perineal and lower limb surgeries. They were randomly divided into 2 groups. Group I and Group II. Group I (N=30): Received 20ml of 1.5% Lignocaine with adrenaline 1:200000. Group II (N=30): Received 20ml of 0.5% Bupivacaine. **Results:** The mean times (with standard times) been extradural injection and onset of analgesia indicate that Lignocaine had a significantly quicker onset of action. However, it is evident from figure that for both the drugs about 50% of patients showed a latency of 6-10 min. Intra operative complications like hypotension, drowsiness, nausea and vomiting and post-operative complications like headache, back ache, nausea, vomiting, retention of urine and neurological sequelae were noted. **Conclusion:** Lignocaine with adrenaline had a significantly quicker onset of action. Duration of analgesia produced by Bupivacaine was found to be significantly longer than that produced by Lignocaine with adrenaline.

Keywords: Analgesia, Bupivacaine, Clonidine, Infra-umbilical surgery.

INTRODUCTION

Lignocaine was discovered by Lofgeon and Landquist in 1943 in Sweden. It has great supremacy over several other local analgesic agents, because it is potent, safe with minimum incidence of side effects and toxic reactions. Epinephrine (1:200,000 i.e., 5 µg/mL) can prolong an epidural, especially if lidocaine is used (not so much with bupivacaine). However, the mild B-stimulation may accentuate the fall in blood pressure that generally occurs with neuraxial anesthesia.^[1]

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Inspire of this the search continues to find out an ideal agent having potent analgesia, free from local irritation, equally effective topically and regionally with minimum systemic toxicity, having quick onset and prolonged duration of action. It should be stable on storage and sterilization.

Bupivacaine synthesized by Ekenstan and Abbofors in 1957. It has longer duration of action with minimal side effects and toxicity. Bupivacaine produces substantial sensory block with minimal motor block (as opposed to etidocaine, which has relatively high motor block).^[1]

Lignocaine and bupivacaine are still the largely used local anaesthetics in the present day. Here, we are presenting a comparative study of single dose extradural analgesia with Bupivacaine and Lignocaine with adrenaline.

MATERIALS AND METHODS

The study was carried out in 60 healthy subjects posted for lower abdominal, pelvic, perineal and lower limb surgeries. They were randomly divided into 2 groups. Group I and Group II.

Group I (N=30): Received 20ml of 1.5% Lignocaine with adrenaline 1:200000.

Group II (N=30): Received 20ml of 0.5% Bupivacaine.

After obtaining written informed consent from 60 ASA physical status class-I patients, the patients were divided into groups as above. Age, sex, height and weight of all subjects were noted. No premedication in any form was given to any of the patients. Analgesia was evaluated by pinprick method. After a routine check-up of general condition and check-up of BP, pulse rate, patients were put on the operation table for epidural block. Intravenous line was started with ringer lactate. Lateral position was given with pillow under the head. Under strict aseptic conditions, epidural puncture made at L1-L2 or L2-L3 interspinous space. Epidural space identified by LOR technique.

A single shot injection of 20ml of any of two drugs is injected and patient turned supine. Time of onset of analgesia, duration of analgesia, intra and post-operative complications were noted.

The quality of sensory block, motor block and hypotension were assessed according to the following criteria -

Sensory block: classified into 3 grades -

Grade I - perfect analgesia without any supplementation.

Grade II - satisfactory analgesia but supplementation with sedatives was necessary.

Grade III - complete failure. Converted to general anaesthesia.

Motor block: classified into 3 grades -

Grade I - complete muscle relaxation as opined by surgeon and anaesthesiologist.

Grade II - relaxation not satisfactory but not requiring supplementation.

Grade III - relaxation not satisfactory requiring supplementation.

Hypotension: classified into three categories -

Mild - fall < 25% of control value.

Moderate - fall 26-50% of control

Severe - fall >50% of control

Post operatively blood pressure and pulse rate were noted in recovery room. The time of regression of analgesia (by pin prick method) and duration of motor paralysis (by the ability to move legs freely) were noted.

RESULTS

The required data of parameters were collected and statistically analyzed. The demographic data were comparable in both the groups.

Table 1: Demographic data.

	Lignocaine with adrenaline		Bupivacaine	
	Group	Mean	Group	Mean
Age (yrs)	25-30	40.08	25-55	40.08
Height (cm)	152-172	163	152-172	163
Weight (cm)	44-70	57.43	44-72	57.43

Onset of analgesia: Time required for onset of analgesia was shown in table 2.

Table 2: Onset of analgesia.

Onset time (min)	Group I	Group II
	(Lignocaine+ adrenaline)	(Bupivacaine)
1-5	3	2
6-10	21	3
11-15	1	8
16-20	0	2
Average	8.12	10.4

P=0.02 i.e., significant

The mean times (with standard times) been extradural injection and onset of analgesia indicate that Lignocaine had a significantly quicker onset of action. However, it is evident from figure that for both the drugs about 50% of patients showed a latency of 6-10 min.

Duration of analgesia:

Table 3: Duration of analgesia.

Time in min	Number of patients	
	Group I	Group II
Below 60	2	0
61-90	9	0
91-120	6	0
121-150	8	1
151-180	0	0
181-210	0	3
211-240	0	5
241-270	0	6
271-300	0	4
301-330	0	3
331-360	0	1
361-390	0	2
Total	25	25

p < 0.02 i.e., Significant

Intensity of sensory block:

Table 4: Intensity of sensory block.

Grade	No. of patients	
	1.5% Lignocaine with adrenaline	Bupivacaine
I	21	23
II	3	2
III	1	0

p > 0.5 that is comparative study of sensory block of both groups is not significant.

Intensity of motor block:

Table 5: Intensity of motor block.

Grade	No. Of patients	
	Group I	Group II
I	20	16
II	4	7
III	1	2

p > 0.5. comparative study of intensity of motor block of both groups is not significant.

Hypotension:

Table 6: Hypotension.

Hypotension	No. of patients	
	Group I	Group II
Mild	4	3
Moderate	-	4
Severe	-	-

Subjects with mild hypotension did not require any treatment whereas patients with moderate hypotension responded well to oxygenation and I.V. fluids.

Intra and post-operative complications:

Intra operative complications like hypotension, drowsiness, nausea and vomiting and post-operative

complications like headache, back ache, nausea, vomiting, retention of urine and neurological sequelae were noted .

Major complications were not seen in any of the cases under two groups.

DISCUSSION

Epidural, also called as peridural or extradural analgesia was first introduced by Corning and was used in man by Kappis. Curelo and Cuba were the first two to introduce an epidural catheter in 1949.

Various local anaesthetics were used for extradural block. Amongst which bupivacaine has a longer duration of action with minimal side effects and toxicity? But, it has slow inset of action.

The addition of epinephrine to local anesthetics or opioids may enhance epidural analgesia.^[2-5] This effect may be the result of reduced vascular uptake of local anesthetics.^[6] Epidural epinephrine produces segmental hypoalgesia, which, in addition to its vasoconstrictive properties, provides a rationale for using epinephrine with local anesthetics or opioids for enhancing epidural analgesia.

Before the advent of bupivacaine, lignocaine hydrochloride 1.5% was used , together with adrenaline 5 mcg/ml. The first dose of lignocaine might last for 1-1.5 hour with some prolongation from adrenaline, but with subsequent doses tachyphylaxis would occur and it was impossible to maintain continuous analgesia without ultimately producing serious systemic toxicity. On the other hand, continuous technique was less often required with bupivacaine as the extradural block lasted for upto 8 hours, with an average of 3.5 hour. There are a number of important potential advantages of a single-injection over an infusion.^[7]

In our study, the demographic data was comparable between the two groups. On comparing the onset of analgesia, we observed that average onset for lignocaine with adrenaline is 8.12 min and that for bupivacaine is 10.4min. The difference of 2.3min was found to be statistically significant. The double blind trial conducted by M.J.Watt, D.M.Rass, R.S.Atkinson^[8] showed similar result with the difference of mean -2.1min.

The duration of analgesia with bupivacaine varied from 3-6 hours and with lignocaine with adrenaline lasted 45-150min in our study. This indicates that bupivacaine is much longer acting and the difference between both the drugs is highly significant. Studies conducted by Ekblom & Wildman and Fortuna showed similar results.

The intensity of sensory and motor block was of Grade I and Grade II, showing that in both groups p value was statistically insignificant. However, compared to sensory block, motor block regressed earlier in both groups.

We reported 40% hypotension in both the groups, and there was not much difference in relation to the

effect on cardiovascular system^[9] with two groups. The incidence of other complications was negligible with not much difference in two groups. The use of a lidocaine with epinephrine mixture conferred no clear statistically significant benefit over the use of plain 0.5% bupivacaine.^[10]

CONCLUSION

From the results of our study, the following conclusions are drawn -

- 1] Lignocaine with adrenaline had a significantly quicker onset of action.
- 2] Duration of analgesia produced by Bupivacaine was found to be significantly longer than that produced by Lignocaine with adrenaline.
- 3] The prolonged duration of analgesia with bupivacaine is advantageous post-operatively, minimising the requirement of narcotic analgesics.
- 4] Intensity of motor block is excellent with Bupivacaine, but the duration is not as long as the sensory block is.
- 5] Complications other than hypotension are negligible and similar in both the groups.
- 6] Bupivacaine seems to be an excellent local analgesic agent for prolonged surgery and post-operative analgesia, by administering a single shot epidural injection.

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