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Original Research Paper

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A COMPARATIVE CLINICAL EVALUATION OF LUMBAR EPIDURAL BLOCK USING 0.5% BUPIVACAINE AND 0.5% BUPIVACAINE WITH KETAMINE

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ABSTRACT Intrathecal and epidural administration of opioids are widely used even now. Opioid administration intrathecally or epidurally causes dependable method of pain relief without affecting motor functions or other sensory modalities such as touch sensation. But this method of pain relief still has some drawbacks, the most serious of which appears to be delayed respiratory depression especially with hydrophilic drug like morphine. Other adverse effects commonly seen are urinary retension , pruritus, Development of tolerance, somnolence and inefficiency against certain types of pain. In higher doses intraspinal opioids can cause hyperasthesia.

This study was undertaken to compare the efficacy of lumbar epidural block using 0.5% bupivcaine with and without preservative free ketamine.

KEYWORDS : Lumbar Epidural Block, Bupivacaine, Ketamine.

INTRODUCTION:

Epidural block using local anaesthetic drugs are used in clinical practice since many years. It further got revolutionized with the better understanding of opioid receptors by Martin & Co-workers in1976. Intra spinal morphine was first used in 1979, which opened up a new exciting way of pain management.

Intrathecal and epidural administration of opioids are widely used even now. Opioid administration intrathecally or epidurally causes dependable method of pain relief without affecting motor functions or other sensory modalities such as touch sensation. But this method of pain relief still has some drawbacks, the most serious of which appears to be delayed respiratory depression especially with hydrophilic drug like morphine. Other adverse effects commonly seen are urinary retension , pruritus, Development of tolerance, somnolence and inefficiency against certain types of pain. In higher doses intraspinal opioids can cause hyperasthesia.

Mankowitz E et al(1982)[1] first used epidural ketamine. Nagasaka H et al (1993)[2] studied the effects of ketamine on the excitation and inhibition of dorsal horn WDR neuronal activity induced by bradykinin injection into the femoral artery in cats after spinal cord transaction. Hocking G etal (2003)[3] reviewed the available clinical data as a basis for defining the potential use of ketamine for chronic pain.

Gertrud Haeseler et al(2003)4 Studied blockade of voltage operated neuronal and skeletal muscle sodium channels by S(+) and R(-) ketamine. S(+) ketamine was more poetnet than R(-) ketamine.

This study was undertaken to compare the efficacy of lumbar epidural block using 0.5% bupivcaine with and without preservative free ketamine.

AIMS AND OBJECTIVES:

Aim of this study is to compare the clinical efficacy of preservative free ketamine plus 0.5% bupivacaine with 0.5% bupivacaine plain solution in lumbar epidural block.

MATERIALS AND METHODS:

A prospective randomized double blind study was conducted in 60 patients admitted at A.J.Institute of Medical Sciences for various elective surgical procedures during the period 2016 -2017. Surgical procedures which required blockade below T6 dermatome was only selected.

INCLUSION CRITERIA

- ASA physical status — I- patients

EXCLUSION CRITERIA

- Difficult airway
- Previous history of anaesthetic complications

Group-I-patients (n=30) received bupivacaine 0.5% 1.5ml.spinal segment to be blocked and Group-II-Patients (n=30) received bupivacaine 0.5% 1.5ml.spinal segment to be blocked plus preservative free ketamine 1%, 0.5mg.kg body weight as single shot epidurals. Patients were made to lie down supine and an independent fellow resident recorded the following study parameters.

- Time of onset of sensory blockade (Pinprick method)
- Time of onset of maximum motor blockade
- Quality of motor blockade (Modified Bromage scale- by Logan wild smith)
- Duration of motor blockade by Bromage scale
- Duration of postoperative analgesia (Time for first request for analgesics)

Patients were monitored for 24 hours in postoperative ward after surgery.

RESULTS:

GROUP-I (N=30) (CONTROL GROUP)	GROUP-II (N=30) (STUDY GROUP)
Lumbar epidural block with 0.5% bupivacaine 1.5ml.spiral segment to be blocked.	Lumbar epidural block with 0.5% bupivacaine 1.5ml.spinal segment to be blocked plus 1% presenative free ketamine 0.5mg.kg body weight.

PARAMETER	Group I (Bupivacaine Group)		Group II (Bupivacaine plus ketamine Group)		t-value (DF)
	Mean	SD	Mean	SD	
Time of onset of sensory block (min)	17.57	2.14	13.37	2.03	7.78(58)*
Time of onset of maximum motor block (min)	43.73	6.28	33.87	5.35	6.55(58)*
Time to recovery of motor block (min)	182.93	25.90	213.20	32.96	-3.95(58)*
Time of post-operative analgesia	119.73	52.82	304.07	127.55	-7.31(58)*

DISCUSSION:

Sensory blockade

While sensory blockade occurred in 16-20 minutes for majority of the patients in Group I (73.3%), it happened so in Group I well in advance in 11-15 minutes in most of patients (76.6%) and almost in the remaining it occurred before 16-20 minutes. The Mean (±SD) time to onset of sensory block was significantly greater in Group I (17.5±2.14min) than that for group II (13.7±2.03min) ($p<0.05$, based on student t-test for independent samples).

Time to onset of maximum motor blockade

It was observed that in 93.3% of patients maximum motor blockade occurred with in 40 minutes in Group II compared to 40% in Group I in the corresponding period. Further in 30% of the patients in Group II the maximum motor blockade was found to occur between 21-30 minutes, where as to one reached the maximum motor blockade during the same period in Group I. The mean (±SD) time to on set of maximum motor blockade was significantly greater in group I (43.73±6.28min) than that for Group II (33. 87±5.35min) ($p<0.05$ based on students t-test for independent samples).

Quality of motor blockade

It was observed that the percentage of persons with partial blockade 66% (Scale 2) was highest in both groups. However this percentage in Group II (96.7%) was greater than that in Group I (86.7%). The mean degree of motor blockade was significantly higher for patients in group II (2.03±0.18) than that in patients of group I (1.87±0.35) ($p<0.05$, based on mann-Whitney-u-test for independent samples)

Recovery of motor blockade

It was observed that the distribution of item to recovery of motor blockade in group I shifted towards left in time axis; when compared to group II. About 87% of the patients in group I recovered before 210 minutes. This was only 43.3% I group II during the same period. About 80% of patients recovered form motor blockade with in a time period of 151-210 minutes in Group I, where as in group II about 80% of the patients took at least 181 minutes to recover form motor blockade. The mean (±SD) time to very of motor blockade was significantly greater for Group II (213±32.96) patients that for those in Group I (182.93±25.9) ($P<0.05$, based as students t-test for independent samples)

Pain score

About 90% of the patients in Group I has a pain score of $> = 4$ compared to 13.4% in Group II corresponding to the same score. The means (± SD) pain score for Group II (3.03 ± 1.0) was significantly less than Group I (5.97 ± 1.52) ($p<0.05$, based on mann- whitney – u-test for independent samples). Mean pain score for Group II (3.03 ± 1.0) was significantly less than Group I (5.97 ± 1.52) based on Mann-Whitney U test for independent samples at $P<0.05$

Nagib M et al(1991)[5] in their study of caudal epidurals in children found that bupivacaine-ketamine mixture provided better analgesia than bupivacanie solution alone. This result correlates with our study. But we also differed from his study regarding motor weakness and found that bupivacaine-ketamine mixture causes prolongation of recovery from motor blockade. This difference may be due to the higher percentage of bupivacaine used in our study. Our result also correlated with the study of **Ozbek et al (2002)**[6]**.** They concluded that caudal administration of ketamine 0.5mg.Kg with or without alfentanyl in children produced satisfactory postoperative analgesia without respiratory depression or other side effects. Our study correlated with the study of **Frank Weber etal (2003)**[7]. They found that addition of preservative free S-ketamine 0.Smg.kg to caudal bupivacaine 0.125% lml/kg provided significant prolongation of analgesia without producing negative side effects.

Marhofer P et al(2000)[8] evaluated the efficacy of preservative free ketamine with bupivacaine 0.25% and concluded that S(+) ketamine lmg.kg for caudal block in children produced surgical anaesthesia and postoperative analgesia equivalent to that of bupivacaine. Our study result correlated with the above study with regards to better surgical and postoperative analgesia with bupivacaine-ketamine mixture compared with plain bupivacaine solution.

Our study also correlated with the results of **Martindale SJ etal (2004)**[9] who concluded that addition of caudal S(+) ketamine to bupivacaine prolongs the duration of post operative analgesia. However, the same dose of I.V S + ketamine combined with plain bupivacaine caudal provides no better analgesia than caudal bupivacaine alone, indicating that the principal analgesic effect of caudal S(+) ketamine results from a local neuroaxial than systemic effect. This finding explained our study result of low pain score and increased duration of postoperative analgesia in bupivacanie¬ketamine mixture compared to plain bupivacaine. Our study result did not correlate with the study result of **Weir PS etal(1998)**[10]. They compared the efficacy of 0.3mg.kg, 0.5mg.kg , 0.67mg.kg 1% preservative free ketamine along with 75 mg of 0.5% bupivacaine plain for extra dural block and concluded that addition of ketamine to extradural bupivacaine did not improve the block in adult patients undergoing total knee replacement. However we found that addition of ketamine to bupivacaine improved the quality of blockade and gives satisfactory postoperative analgesia.

CONCLUSION:

Postoperative pain scores at the first request of analgesia were comparatively lower in epidural bupivacaine plus ketamine group.

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