

Efficacy of Ketamine and Fentanyl Vs. Intrathecal Bupivacaine Post-operatively in Patients Undergoing Abdominal Hysterectomy: A Prospective Comparative Study

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ABSTRACT

Background: Although disturbing emergence reactions are associated with its use, ketamine has several clinically useful properties, including analgesia and less cardiorespiratory depressant effects than other anaesthetic agents, in fact it causes some stimulation of the cardiovascular system.

Methods: Two group were included in this study i.e. Group A & Group B. Both group had 18 cases. This study conducted in Department of Anaesthesiology & Critical Care, Mahatma Gandhi Medical College & Hospital.

Results: Demographic variables were compared between both groups A and B. Group A is a significant faster onset of sensory block was found in ketamine group in comparison to fentanyl group. (p-value<0.001). While the time to achieve the highest level of sensory block was found to be almost similar in both the groups.

Conclusion: Addition of ketamine or fentanyl to spinal bupivacaine were equally effective in pain control after abdominal hysterectomy.

Keywords: Ketamine, Fentanyl, Hysterectomy

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INTRODUCTION

For lower abdominal surgeries, the most preferred technique of regional anesthesia is spinal anesthesia. Hyperbaric bupivacaine is generally used as a local anesthetic for spinal anesthesia. Along with this, several intrathecal adjuncts are also used to enhance spinal anesthesia. Nowadays, opioids are commonly used for pain relief. They often provide sub-optimal analgesia with occasional serious side effects. The most frequently used intrathecal lipophilic opioid is fentanyl. It is used as an analgesic adjuvant with minimal cephalad spread making. It is the most safer among all the intrathecal opioids to cause delayed respiratory depression.^[1] In the postoperative period, neuraxial opioids provide prolonged analgesia and faster recovery from spinal anaesthesia.^[2]

Ketamine is an anesthetic agent which also has effective analgesic properties. It is effective by epidural and intrathecal routes of administration. Ketamine acts by causing non-competitive antagonism at N methyl D aspartate (NMDA) receptors and it also has local anesthetic effects as well.^[1]

The present study was conducted to compare the effects of intrathecal fentanyl 25µg added to 0.5% hyperbaric bupivacaine and intrathecal ketamine 25 mg added to 0.5 % hyperbaric bupivacaine. In the present study, the effects of both agents on sensory and motor blockade, duration of analgesia as a primary outcome variable, hemodynamic variations, and adverse effects were compared.

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METHODS

Study population: - This study consisted of two group i.e. Group A & Group B. Both group had 18 cases.

Study Area:-This study conducted in Department of Anaesthesiology & Critical Care, Mahatma Gandhi Medical College & Hospital.

Data Collection: - Group A and group B patients received 15 mg (3mL) hyperbaric bupivacaine 0.5% + 25 µg fentanyl intrathecally and 15 mg (3mL) hyperbaric bupivacaine 0.5% + 25 mg ketamine preservative free intrathecally respectively. Spinal anaesthesia was performed in the left lateral position using a 25- gauge spinal needle at L3-4 interspace via a midline approach. After free flow of cerebrospinal fluid, the premixed solution (3.5 mL) was injected over 30 seconds to the assigned group. Patient was then placed supine with a 15-degree head tilt to achieve level of block up to T5-T6. Immediately after block performance HR, SBP, DBP and SpO2 were noted at baseline, and then every 2 min for the first 10 min and then at 15, 25, 40 and 60 min, followed by every 30 min till the end of the surgery. Hypotension was defined as a fall in systolic pressure >20% below baseline and injection ephedrine 5 mg IV was given. Bradycardia (heart rate <50/min) was treated with intravenous atropine sulphate 0.02 mg/kg. The level of sensory block was assessed every minute by pinprick in the dermatomes T-10, T-8 and T-6, until a stable level of block was achieved at T6 level. Thereafter assessment was done at 15 min interval till one hr and then at 30 minutes interval till the patients complained of pain. Time of onset of sensory blockade was taken as the time to attain the highest level of sensory blockade. Two segment regression time was defined as time of regression of sensory level by two segments from the highest level attained. The duration of sensory block was defined as the time from intrathecal injection to regression of the sensory block to L1. Whereas, duration of analgesia was defined as the time from spinal injection to the time of administration of first rescue analgesic for pain in the postoperative period. Postoperatively, intramuscular diclofenac 75 mg was given for rescue analgesia, whenever the pain score was >3. It was considered as the end point of the study. The incidence of side effects such as hypotension, bradycardia, pruritus, nausea and vomiting were noted every 15 min during surgery and 2, 4, 8, 12 h postoperatively. The primary outcome variable included block characteristics and duration of analgesia. The secondary outcome variable was haemodynamic changes and adverse effects. Perioperative monitoring of heart rate and noninvasive blood pressure was done every 2 min for the first 10 min and then at 15, 25, 40 and 60 min, followed by every 30 min till the end of the surgery and any changes greater than 20 % from the baseline value were treated.

RESULTS

Demographic variables were compared between both groups A and B. Group A is A significant faster onset of sensory block was found in ketamine group in comparison to fentanyl group. (p-value<0.001). While the time to achieve the highest level of sensory block was found to be almost similar in both the groups. (p-value>0.05) A highly significant early regression to L1 dermatome was noticed in ketamine group in comparison to fentanyl group (88.58±5.91 min and 96.97±8.20min respectively). Similarly, in the ketamine group, onset of motor block was reported to be faster

significantly (p-value<0.001) in comparison to fentanyl group. (1.24±0.44 min and 1.81±0.46 min respectively) On contrary, the duration of motor block and duration of analgesia were significantly longer in fentanyl group in comparison to ketamine group. While, the degree of motor block was comparable in both of the groups as Bromage core^[3] was reported in all the patients. On the study of peri- and post-operative adverse effects like hypotension, bradycardia, shivering and nausea, no significant differences were reported between both the groups.

Table :-1 Distribution of cases in both group according to gender

Gender	Group A	Percentage	Group B	Percentage
Male	11	61.2%	10	55.6%
Female	7	38.9%	8	44.5%
Total	18	100%	18	100%

Table :- 2 Distribution of cases in both group according to age

Age	Group A	Percentage	Group B	Percentage
30-35	4	22.3	7	38.9%
36-40	9	50	4	22.3%
41-45	3	16.7	4	22.3%
46-50	2	11.2	3	11.2%
Total	18	100	18	100

Table :-3 This table showed onset of sensory & motor block

Variable	Group A	Group B	P value
Onset on sensory block	2.83±0.44	2.15±0.44	<0.001
Onset of motor block	1.81±0.46	1.24±0.44	<0.001

Table :-4 This table showed duration of sensory & motor block

Variable	Group A	Group B	P value
Duration of sensory block	96.97±8.20	88.58±5.91	<0.001
Duration of motor block	131.33±10.8	120.69±6.61	<0.001
Total duration	159.92±11.19	151.58±8.10	<0.001

Table :-5 Prevalence of adverse effect

Adverse effect	Group A	Group B
Hypotension	4	4
Bradycardia	3	2
Shivering	1	1
Nausea	2	2

DISCUSSION

In the present study, the faster onset of sensory as well as motor blockade was noticed while the duration of spinal analgesia was not prolonged when intrathecal hyperbaric bupivacaine was added to preservative free ketamine in comparison to addition of fentanyl to intrathecal hyperbaric bupivacaine in patients scheduled for abdominal hysterectomy under spinal anaesthesia. The axonal

conduction block produced by the ketamine may be attributed for this effect. The results of the present study are supported by other studies. The similarity of median Bromage score has also been found in the other researches as well.^[3-8]

In comparison to ketamine group, fentanyl group was found to be longer induration of sensory-motor block and postoperative analgesia. The similar observations were showed in studies done by Unlugenc, Shrestha and Kathirvel et al. In contrast Galindo et al found longer duration of analgesia with ketamine.^[4,6 9-10] They also suggested that the decrease in pH of local anesthetics, produced a more rapid onset and longer duration of blockade on addition of ketamine. Tugal et al also supported these findings.^[11] However, the discrepancy of the results may be due to different methodologies. Hypotension endured the most commonly observed adverse effect. Though, it was controllable with fluid bolus or with inj atropine. The incidence of hypotension were observed more in fentanyl group. Other studies also revealed the similar observations.^[6,12-13] Bion found that during spinal anesthesia, the transmission of ketamine into the venous system of the spinal cord leads to hemodynamic stability.^[13]

CONCLUSION

Both sensory and motor blockade got faster onset by adding preservative free ketamine 25 mg to 15 mg of hyperbaric bupivacaine 0.5%. Though, it did not lengthen the duration of spinal analgesia compared to addition of fentanyl 25 µg to 10 mg of hyperbaric bupivacaine 0.5% undergoing abdominal hysterectomy with spinal anaesthesia. On the other hand, fentanyl provides prolonged duration of analgesia.

Therefore, it can be concluded that both ketamine and fentanyl are equally effective adjuvant to intrathecal bupivacaine.

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