Original Article

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Clinical Study on Complications of Ketamine

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Abstract

Introduction: Intrathecally administered ketamine is advantageous as its beneficial effects on the cardiovascular system and respiratory functions may be combined with the analgesic effects of spinal anesthesia. The primary mechanism of action of the spinal anesthetic ketamine is noncompetitive blocking of the NMDA ionophore.

Methodology: 100 Patients were monitored continuously using sphygmo-manometer, pulse oximeter and electrocardiogram. After spinal anesthesia the patients pulse rate and blood pressure were recorded at 0, 5, 10, 20, 30, 45, 60, 90 and 120 minutes.

Results: The most common complication was nystagmus, which was present in all males and females, followed by sedation, which occurred in 45 males and 25 females. Only 4 patients had delirium reaction.

Conclusion: Intrathecal ketamine with adrenaline produces a reliable anesthesia, better operative conditions and patients comfort with minimal side effects.

Keywords: Ketamine; Complications; Blood Pressure.

Introduction

Spinal anesthesia or regional anesthesia is a potent anesthetic procedure. Additional modalities have been sought to increase the duration of block in spinal anesthesia [1]. Ketamine is an N-methyl-D-aspartate (NMDA) receptor blocker that has an anesthetic effect when injected intrathecally and has a synergic effect with bupivacaine. Ketamine also has potent analgesic properties [2,3].

Ketamine, an N-methyl-D-aspartate (NMDA) receptor blocker, has an anesthetic effect when injected intrathecally and is synergic with bupivacaine. Ketamine is a phencyclidine derivative with potent analgesic properties, which has various advantages over other local anesthetics, as it tends to stimulate the cardiovascular system and maintains respiratory response to carbon dioxide. Intrathecally administered ketamine is advantageous as its beneficial effects on the cardiovascular system and respiratory functions may be combined with the analgesic effects of spinal anesthesia. The primary mechanism of action of the spinal anesthetic ketamine is noncompetitive blocking of the NMDA ionophore [4,5].

Methodology

Inclusion Criteria

1. Patients of either sex
2. Patients with ASA grade-I and II.
3. Patients aged between 18-60 years.

Exclusion Criteria

Patients with severe systemic disease metabolic disorders, neurological, congenital or cardiovascular disease were excluded from this study.

Mode of Selection: Random.

Perioperative Period

On the eve of the surgery, all the patients were visited and a detailed examination including history, clinical examination, systemic examination of cardiovascular, respiratory and central nervous system and examination of spine for deformity, infection was carried out.Routine investigations like hemogram, total leucocyte count, differential leucocyte count, ESR, complete urine examination, random blood sugar, electrocardiogram, chest X-ray,

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blood grouping, blood urea, serum creatinine, etc. were done wherever necessary.

Intraoperative Periods

Once the patient was shifted to the operating room, the patients was connected to the routine monitors, which included electrocardiogram, non-invasive blood pressure and pulse oximeter. All resuscitation equipments like intubation trolley with airways, laryngoscopes, endotracheal tubes along with drugs like atropine, mephentramine was kept ready. The anaesthesia machine was also checked along with oxygen delivery system.

A wide bore intravenous access was obtained and secured. All patients were premediated with injection ranitdine 50mg, injection Odansetron, 4mg, injection diazepam 5mg intravenously. All patients were preloaded with 500ml of ringer lactate prior to spinal anesthesia.Baseline pulse rate, blood pressure, respiratory rate, SPO_2 were noted.

Under strict aseptic precaution lumbar puncture was performed in left lateral position by midline approach by using disposable quince spinal needle (22-25 G) at L3 L4 intervertebral space and injection ketamine 100mg (2ml) + injection adrenaline 0.1 mg (0.1ml of 1:1000) was injected intrathecally after free now of CSF.

Patients were monitored continuously using sphygmomanometer, pulse oximeter and electrocardiogram.After spinal anesthesia the patients pulse rate and blood pressure were recorded at 0, 5, 10, 20, 30, 45, 60, 90 and 120 minutes.

Following Parameters were Assessed

Assessment of sensory blockade

This was tested by pinprick method.

- Time of onset of sensory blockade – Time taken from injection of the drug into the sub-arachnoid space to loss of pinprick sensation.
- The time to achieve maximum sensory blockade. Time from injection of the drug to loss of pinprick sensation at highest dermatomal level.
- Duration of analgesia: it is the priod between the onset of analgesia and time of regression of analgesia by the two dermatomes.
- Degree of analgesia (sensory blockade): This was graded as follows:

Grade-I: Good analgesia, sedation were given only to relieve apprehension.

Grade-II: Inadequate, incomplete or patchy analgesia, supplementation was given with narcotics or N_2O/O_2/ halothane or ketamine intravenously.

Grade-III: Very poor analgesia, general anesthesia was given.

Assessment of Motor Blockade

- Time of onset of motor blockade: Time interval between injection of drug into subarachnoid space to the patients inability to lift the straight extended leg.
- Duration of motor blockade was recorded from onset time to the time when patient was able to lift extended leg.
- Degree of motor blockade: This was assessed by Bromage scale.

0 Full flexion of knee and feet, no motor blockade

1 Just able to flex knee, full flexion of feet, partial blockade.

2 Unable to flex knee, but some flexion of feet possible. Almost complete block.

3 Unable to move legs or feet: Complete motor blockade.

The side effects such as nausea, vomiting, hypotension, neurological sequelae, delirium reaction, sedation, dizziness, nystagmus were noted down. Hypotension was defined as decrease in systolic blood pressure more than 20% of the baseline value and was treated with injection mephenteramine 6mg intravenous increments and bradycardia as pulse rate<60 / minute and was treated by atropine 0.6 mg intravenous stat.

Results

In the present study, majority of the males (45

Table 1: Weight wise distribution of the patients scheduled for the study.

Weight (KGS)	Male	Female
46-50	4	9
51-55	20	10
56-60	25	9
61-65	14	1
66-70	6	1
71-75	1	0
Total	**70**	**30**

patients) and females (19 patients) were in 51-60 Kgs group.

In the present study, majority of the males (60 patients) were in 5′ 7" – 5′ 9" group, while majority of the female were shorter falling in 5′1" – 5′3" group.

Table 2: Height wise distribution of the patients scheduled for the study

Height (Ft &Inc)	Male	Female
4′10″-5′00″	-	-
5′1″-5′3″	2	20
5′4″-5′6″	8	9
5′7″-5′9″	60	1
Total	**70**	**30**

Table 3: Mean Heart rate in the study group

Time (Minutes)	Mean	± SD.
0	81.89	11.63
5	83.57	10.89
10	84.60	10.47
20	85.06	10.63
30	85.50	10.49
45	85.59	10.09
60	58.53	10.52
90	85.53	10.56
120	85.57	10.29

In the present study there was no much variation in the heart rate.

In the present study there was no much variation in the mean systolic blood pressure.

In the present study there was no much variation in the mean diastolic blood pressure.

In the present study, the most common complication was nystagmus, which was present in all males and females, followed by sedation, which occurred in 45

Table 4: Mean systolic blood pressure in the study group

Time (Minutes)	Mean	± SD.
0	112.26	11.90
5	115.79	11.91
10	118.98	11.79
20	121.62	11.49
30	122.90	11.18
45	123.58	10.74
60	124.20	10.35
90	124.230	9.99
120	124.04	10.07

Table 5: Mean diastolic blood pressure in the study group

Times (Minutes)	Mean	± SD.
0	74.32	7.80
5	76.42	7.63
10	79.00	8.00
20	80.70	7.14
30	81.45	7.16
45	82.10	7.14
60	82.60	6.73
90	82.37	6.49
120	82.14	6.91

Table 6: Complications

Complications	Male	Female
Hypotension	--	--
Nausea	--	--
Vomiting	--	--
Delirium reaction	3	1
Neurological sequelae	--	--
Sedation	45	25
Nystagmus	70	30
Dizziness	--	--

males and 25 females. Only 4 patients had delirium reaction.

Discussion

In the present study, there was increase in the resting blood pressure and pulse rate.In the study conducted by Bansal SK in 1994 [6], they reported that there was a significant increase in the resting blood pressure, pulse rate irrespective of the addition of adrenaline to the injected mixture.The present study is in accordance with their study.

In the present study, the most common complication was nystagmus, which occurred in all the patients. Sedation was seen in 70 patients and delirium reaction was seen in 4 patients. In the study conducted by Chris Hawksworth in 1998 [7], nystagum occurred in six out of ten patients, four patients developed psychomimetic disturbance. One complained of simply feeling strange and three patients had frank hallucination.In the study conducted by Bansal SK in 1994, sedation was observed with all the doses used in the study, which was however of mild or moderate intensity with the patient being easily awakening from the sleep.The present study is in accordance with their studies [8,9].

With all the above observations we can conclude that intrathecal ketamine with adrenaline produces a reliable anesthesia, better operative conditions and patients comfort with minimal side effects.

Conclusion

In addition, unlike other intrathecal local anaesthetics, ketamine stimulated the cardiovascular and respiratory systems, which may be an advantage in emergency operations especially in a shock patient.

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