ORIGINAL RESEARCH PAPER

Anesthesiology

AN EVALUATION OF INTRAOPERATIVE ANALGESIA WITH LOW DOSE KETAMINE FOR LOWER ABDOMINAL SURGERY

KEY WORDS:

Col (Dr) Sanil Mohan Sr Adv & Assoc Prof Anaesthesiology, Army Hosp, Research and Referral, Delhi Cantt.

Lt Col (Dr) Amit Dua* Cl Spl Anaesthesiology, Pain Physician and Assoc Prof, Army Hosp, Research and Referral, Delhi Cantt. *Corresponding Author

ABSTRACT

Ketamine, a dissociative anaesthetic agent was introduced with a hope of it being a monoanaesthetic which will emcompass all properties of a balanced anaesthetic but it fell into disrepute because of its adverse effects at hypnotic doses. Newer research into its mode of action and different dosages has recommended its use in subhypnotic doses causing minimal side effects. We conducted a prospective study of 75 pts coming for a lower abdominal surgery in which each group consisting of 25 pts received a different intraop analgesic. Therefore ketamine given in low doses(0.50 mG/kg bolus and 0.25mG/kg as required) was compared with morphine and pentazocine for intraop and postop analgesia. We concluded that ketamine in lower doses gives comparable analgesia as compared to conventional opioids without causing any significant side effects.

INTRODUCTION

Ketamine, a dissociative anaesthetic agent, was introduced more than 50 yrs ago. It has a lipid solubility 5-10 times that of Thiopentone as mentioned by David L Reich et al1 and J Gerald Reeves et al2 .It has an asymmetric carbon atom which results in the existence of two optical isomer; which are S(+) Ketamine and R(-) Ketamine. The racemic mixture was approved for general clinical use in 1970 [1,3,4]. The dissociative anaesthetic state produced by Ketamine has been described as a functional and electrophysiological dissociation between the thalamocortical and limbic systems [1,3,5,6]. Ketamine was introduced with the hope that it would function as a 'monoanaesthetic' drug; inducing analgesia, amnesia, loss of consciousness and immobility This dream was not fulfilled because of its significant side effects thus limiting the use of ketamine to very specific indications in anaesthesia like induction of anaesthesia in hemodynamic shock, in patients with active asthmatic disease, intramuscular sedation of un cooperative patients spl children and short painful procedures such as dressing change in burn patients.

Recent insight into its anaesthetic mechanisms of action, its neuronal effects as well as re evaluation of its profound analgesic properties, offer the potential for expanding the range of indications in which Ketamine can be used, making it a useful tool to the anaesthetic practitioner in the management of perioperative pain.

Thus this study was undertaken to evaluate the intraoperative analgesia achieved with low dose ketamine for lower abdominal surgeries and to study the possibility of its use as an alternative to routinely used opioids.

AIMS AND OBJECTIVES:

To evaluate the efficacy of low dose Ketamine for intraoperative analgesia in lower abdominal surgeries by comparing with commonly used opioids and to evaluate whether it could be used as an alternative to routinely used opioids.

MATERIAL AND METHODS:

A prospective study of 75 adult patients for lower abdominal surgery was performed in a major referral hospital. All the patients included were between 20-60 yr, ASA 1 pts coming for elective lower abdominal surgeries.

The patients suffering from cardiovascular disease, CNS disorder, drug addiction, open globe eye injury, psychiatry disorder or any allergy to any of the study drugs were excluded from the study.

A written informed consent was obtained from all the patients. Patients were randomly allocated into 3 groups of 25 each. All the patients received oral lorazepam 50mcg/kg 2 hrs before surgery. Standard monitoring as per ASA minimum monitoring standards was initiated including pulse oximeter, non invasive blood pressure every 3 min and ECG.A standarised anaesthetic technique was adopted for all the patients. A vein was secured in the dorsum of the hand. The premedication included an antisialogogue Inj Glycopyrollate 0.2mg IV. After premedication Group I received Inj Ketamine in the dose of 0.5mg/kg IV bolus. Group II received Inj Morphine in the dose of 0.125mg/Kg IV and Group III received Inj Pentazocine in the dose of 0.25mg/Kg.

Inj Thiopentone at the dose of 3-5mg/kg IV was used for induction of anaesthesia. The patient was ventilated by face mask using Oxygen 33%, nitrous oxide 67% and Halothane 0.5%. Inj Vecuronium 0.15mg/kg IV was administered to facilitate tracheal intubation. Tracheal intubation was carried out using a portex endotracheal tube (oral) of appropriate size and was accomplished in 20 sec.

Maintenance of anaesthesia was with oxygen 33%, Nitrous oxide 67% and Halothane in the range of 0.5% to 1.0%. Muscle relaxation was provided with Inj Vecuronium bromide in the dose of 0.04mg/kg IV if muscle relaxation was inadequate.

Intravenous fluids calculated as per body weight including fluid deficits for fasting, third space losses and maintenance were replaced to prevent hypovolaemia. Blood loss more than 10% was replaced. Intraoperative analgesia was assessed using the variations in heart rate, blood pressure. End tidal carbondioxide was measured to exclude hypercarbia as a cause of tachycardia. The respiratory rate was adjusted to keep the ETCO2 between 35-45 mmHg. Tidal volume was set to 8-10ml/kg.

Increment of analgesics were given during anaestheia in a dose of Inj Ketamine 0.25 mG/kg IV(Group I), Inj Morphine 0.125mG/kg IV (Group II) and Inj Pentazocine 0.25mG/kg IV(Group III) if the level of analgesia was found to be inadequate as assessed by:

1. Sudden increase in systolic blood pressure more than 20 mmHg
2. Increase in heart rate more than 10 beats per min in absence of hypovolumia
3. Signs of sweating, lacrimation

Administration of halothane, nitrous oxide was discontinued at the end of surgery. Residual neuromuscular blockade was reversed with Inj Atropine 0.01mG/kg IV and Inj Neostigmine 0.05mg/kg IV. Tracheal extubation was done with the return of good respiratory effort and protective reflexes; the patient was then shifted to Post Anaesthesia Care Unit.

The patients in all groups were observed for side effects like nausea, vomiting, urinary retention. The requirement of subsequent analgesia was provided in the following manner

1. Group I: Inj Ketorolac 30mg IM
2. Group II: Inj Morphine 0.0125mG/kg IM
3. Group III: Inj Pentazocine 0.25mG/kg IM.

The time taken from extubation to the administration of the first dose of postoperative analgesia was recorded.

OBSERVATIONS AND RESULTS:

1. Demographic Profile: a total of 75 adult pts were studied. There were 39 males and 36 female pts. They were evenly distributed within the 3 groups. The mean age of the patients in groups I, II and III was 37.68yrs, 40.12 yrs and 36.96 yrs resp. the mean weight of the patients in the 3 groups was 50.52kg, 54.16kg and 48.12 kg resp. The above demographic data was subjected to tests of statistical significance by using ANOVA and a p value of more than 0.05 was obtained, which was therefore considered statistically not significant.

2. Surgeries performed: The surgeries performed in various group were as per the Table 1.

TABLE I: Type of Surgeries Performed

S no	Surgery	Group I		Group II		Group III	
		No	%	No	%	No	%
1	Herniorrhaphy	10	40	10	40	11	44
2	Interval appendicectomy	5	20	6	24	4	16
3	Cystolithotomy	1	4	-	-	2	8
4	Total Abdominal Hysterectomy	2	8	1	4	2	8
5	Tuboplasty	2	8	1	4	-	-
6	Abdominal Tubectomy	4	16	5	20	4	16

3. Intraoperative Variables: The heart rate and the systolic and diastolic blood pressures were recorded for all the patients of the three groups. They were found to be comparable without any statistically significant difference between the groups.

4. Other parameters for assessment of intraoperative analgesia:

TABLE II: Intraoperative variables for assessment of Intraoperative Analgesia

S No	Variables	Group I(n=25)		Group II(n=25)		Group III(n=25)		P value
		No	%	No	%	No	%	
1	Lacrimation	0	0	0	0	0	0	>0.05
2	Sweating	0	0	0	0	0	0	>0.05
3	Extra dose of analgesic	6	24	5	20	7	28	>0.05

5. Postoperative recovery: Postoperatively, the pts were assessed in the recovery room for reaction to command and duration of drowsiness. Then the pts in all groups were asked five questions:

a. Name of the pt
b. Age of the pt
c. Where the pt was located
d. The date
e. The time

A good response was seen in 76% pts of Group I, 68% in Group II and 60% in Group III as shown in Table III

TABLE III: Post op Variables (Recovery room)

S No	Variable	Group I	Group II	Group III	P value
1	Time until adequate Reaction(min)	7.48	12.55	13.48	p<0.05
2	Duration of Drowsiness(min)	12	14.92	17.96	p<0.05
3	Good response to five questions(%)	76	68	60	p>0.05

6. Side effects/complications: The details are as in Table IV. Chi square test was used for statistical analysis. The incidence of nausea, vomiting and urinary retention were significantly higher in groups II and III as compared to group I($p < 0.05$)

7. Postoperative analgesia: The mean time from extubation to the first dose of analgesic was noted for each pt. as shown in Table IV. It was comparable in the 3 groups with $p>0.05$

TABLE IV: Post op side effects and analgesia

S No	Variable	Group I		Group II		Group III		P value
		No	%	No	%	No	%	
1	Nausea	1	4	12	48	10	40	p<0.05
2	Vomiting	0	0	9	36	10	40	p<0.05
3	Urinary retention	0	0	6	26	5	24	P<0.05
4	Mean time before demand for 1st analgesic(min)	271.72		273.92		281.88		p>0.05

DISCUSSION:

Recent insights into the mechanism of action of Ketamine, its neuronal effects and a reevaluation of its profound analgesic properties in low doses has led to a renewed interest in its use in anaesthetic practice. A number of studies [7,8,9,10] have indicated that ketamine given before the noxious stimulus occurs, is the most effective as an analgesic as it prevents the formation of pain memory.

In our study, 75 pts were allocated into 3 groups and each group received different kinds of intraoperative analgesia. We found that the group receiving ketamine as an intraoperative analgesic (0.5mG/kg initially and 0.25mG/kg increments if req) had a comparable analgesia with the morphine and pentazocine groups without any delay in recovery and with fewer side effects.

M. R. Ali Hassan et al conducted a randomized trial and studied 50 pts coming for open gynaecological surgeries. They concluded that low dose ketamine infusion significantly improved pain control and decreased post operative morphine requirements.[11]

Beena parikh et al conducted a prospective randomized trial wherein they observed 60 pts for open renal surgery and found that low dose ketamine reduces post op pain and morphine requirement and the effects last more than the clinical effects of ketamine. [12]

CONCLUSION:

From the present study it is reasonable to conclude that Ketamine administered in sub hypnotic low doses provides excellent analgesia in the intraoperative and post operative period with fewer side effects. The quality of analgesia is comparable to the traditionally used opioids- morphine and pentazocine. So ketamine can be a good substitute for the routinely used opioids esp in situations where their use is contraindicated.

REFERENCES:

1. David L Reich, George Silvay. Ketamine: an update on the first twenty five years of clinical experience. Can J Anaesth 1989; 36:2 : 186-97
2. J Gerald Reves, Peter SA Glass. Non barbiturate intravenous anaesthetics. In Miller Rolald D, Editor, Anaesthesia Vol 14th ed. Churchill Livingstone 1994; 247
3. Paul F White, Walter L way. Ketamine- its pharmacology and therapeutic uses, Anaesthesiology 1982; 56: 119-136
4. PF White, J Schuttler, A Shafer et al. Comparative pharmacology of Ketamine isomers. Br J Anaesth 1985; 57: 197-203
5. Corssen G, Domino EF. Dissociative anaesthesia. Further pharmacological studies and first clinical experience with the phencyclidine derivative CI-581. Anaesth Analg(Cleve) 1966;45: 29-40
6. Corssen G, Miyasaka M, Domino EF. Changing concepts of pain control during surgery, dissociative anesthesia with CI 581: a progress report. Anesth Analg 1968; 47: 746-759
7. Eugene S fu, Rafael Miguel et al. Pre emptive ketamine decreases post operative narcotic requirements in pts undergoing abdominal surgery. Anaesth Analg 1997; 84: 1086-90
8. Javery KB et al. Comparison of Morphine and Morphine with ketamine for postoperative analgesia. Can J Anaesth 1996; 43(3): 212-5
9. K Hirota, DG Lambert. Ketamine: Its mechs of action and unusual clinical

uses(Editorial) Br J Anaesth 77;4: 441-444
10. Rainer Kohr et al Ketamine. Teaching old drug new tricks. Anaesth Analg 1998; 87:1186-93
11. M.R ali Hassan et al effects of Low Dose Intraoperative Ketamine Infusion on Post Op Morphine Consumption. Anaesthesiology and Intensive care; Sep 2016, Vol 123
12. Beena parikh et al. Preventive Analgesia: effect of low dose ketamine on morphine requirement after renal surgery. Journal of Anaesthesiology Clinical Pharmacology.Oct-Dec 2011, Vol 27