

Effect of propofol-ketamine admixture on hemodynamic profiles in elective surgical patients: A comparative study

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Abstract

Background: Several benefits were imputed to ketamine such as its analgesic, amnesic effects, maintenance of muscle tension, as well as protection for airway re-flexes and spontaneous respiration.

Rationale: alteration in the hemodynamic status of the population under- went intravenous induction of anesthesia is a common complication especially in propofol usage, where significant reduction in blood pressure had been noticed, also assessment of ketamine on cardiac function has not well described.

Aim: to evaluate the hemodynamic parameters (blood pressure (B.P) heart rate (H.R)) in response to propofol-ketamine mixture for adults and pediatric patients during different time intervals.

Methodology: the patients were divided into two age groups; group A: twenty five (25) Patients who received propofol 2 mg/kg plus ketamine 0.3 mg/kg I.V, and group B: twenty five (25) patients received propofol plus ketamine (using syringe mixture of 5 mg/ml propofol & 5 mg/ml ketamine) I.V. on hemodynamic changes; heart rate (H.R) and blood pressure(B.P) which monitored and recorded at different time intervals with respect of using other drugs like opioid analgesia.

Result: H.R of pediatric group was decreases un-markedly at induction and after 1min. and 5min, after induction. While the H.R of adult group unchanged at induction but decrease after 1min. and 5min. after induction but unremarked, the means of different age group heart rate where higher among pediatric age group, regarding the blood pressure means, whether systolic or diastolic were unchanged at different occasions.

Conclusion: the propofol Ketamine is an affective safe inductive agent, low injectable pain incidence and with a rapid onset of action, so producing preferable hemodynamic stability.

Keywords— propofol, Ketamine, adult, pediatric, hemodynamic parameters.

1. Introduction

Hemodynamic changes are common consequences of intravenous anesthesia used to induce anesthesia. In patients with cardiac vascular problems, hypotension caused by propofol can be life-threatening. Ketamine causes a significant but temporary increase in blood flow, cardiac output, and heart rate through central sympathetic activation [1]. Although, Propofol and ketamine are widely employed for general anesthetic induction, but their effects on heart function are not fully understood. Therefore, it demands numerous investigations to detect their effects [2]. Propofol is a 2,6-diisopropylphenol[3], firstly, in Europe the

compound was developed in the 1970s. In the subsequent two decades, it was increasingly utilized in USA[3,4]. Propofol has general anesthesia by enabling to inhibit neurotransmission which facilitated by GABA. The major benefits are its rapidly induction, anticonvulsant, and recovery and antiemetic effects. However, the chief disadvantages fabrication of its dose which dependent on hypotension and respiratory depression [5,6].Ketamine is an anesthetic compound that given intravenously synthesized in 1960s from phencyclidine and its anesthetic effects occur by producing dissociative anesthesia[7]. Although, there are many benefits were assigned to ketamine such as analgesic, amnesic effects, preservation of muscle tension , protection of airway re-flexes and spontaneous respiration but it has some side effects which restricted of its routinely use as an anesthetic. The side effects may appear as queasiness, puking, altitude of blood pressure, heart rate and emergence hallucinations which associated to The sympathomimetic characteristics of the substance. It was also suspected that it would raise intracranial pressure[8,9].It was hypothesized that combining the two drugs would result in a mixture with additive effects, allowing us to reduce the dose of each drug while gaining benefits in terms of amnesia, analgesia, and pain relief. On the one hand, hypnosis and hemodynamic stability, and on the other, drugs' shortcomings are lowered[10].The study aimed to evaluate the hemodynamic parameters (blood pressure(B.P) heart rate (H.R)) in response to propofol-ketamine mixture for adults and pediatric patients during different time intervals.

1. Methods

The current study was a comparative study done in Baghdad Educational Hospital, Al-Harriri Hospital and Al-Hashmmia Hospital, in general surgical department. Patients that enrolled fifty (50) patients. All patients were submitted to the American society of anesthesiologists (ASA) physical status (I,II) for elective surgeries necessitating general anesthesia. Patients with history of allergy or adverse reaction to the ketamine plus propofol were excluded .During the current study , the patients were divided into two age groups ;group A: twenty five (25) Patients with age ranged from(6-12) years that received propofol 2 mg/kg plus ketamine 0.3 mg/kg I.V, and group B: twenty five (25) patients with age ranged from (13-60) years, received propofol plus ketamine (using syringe mixture of 5 mg/ml propofol & 5 mg/ml ketamine) I.V. on hemodynamic changes; heart rate(H.R) and blood pressure(B.P) which monitored and recorded at different time intervals (5 min before induction, at induction agent with ketamine plus propofol , 1 and 5 min after intubation) with respect of using other drugs like opioid analgesia. Preoxygenation with (3) min using 100% O₂ occur with 2% halothane. Ethical consideration, including all consents were taken from the management unite of the hospital, and written consent had been taken from the included patients. The data were analyzed by the statistical package for the social sciences (SPSS) that representing by mean, standard deviation (SD±), minimum and maximum values.

FINDINGS AND DISCUSSION

Changes in hemodynamics are common complications, using intravenous anaesthetic during anesthetic induction with cardiac vascular patients, hypotension caused by propofol infusion can be dangerous.. Through central sympathetic stimulation, ketamine causes a considerable but transient increase in blood flow, pulse of heart, and cardiac output[1]. Propofol and ketamine are commonly used to induce general anesthesia, however their effects on heart function are not fully understood[2].It was assumed that both drugs combining would result in a mix of assortment that takes additive properties and role so if minimize the each drug dose used,

getting benefit from advantages such as forgetfulness, analgesia, hypnosis, and hemodynamic stability, while minimizing the drawbacks associated with either drug[10].

<u>Heart rate</u>		n before induction	propofol-ketamine induction	n after intubation	after intubation
paediatric group 6-12 years	No.	25	25	25	25
	Mean	118.24	113.92	112.12	107.12
	Std. Deviation	16.404	17.241	18.831	16.561
	Minimum	96	90	81	85
	Maximum	152	145	144	140
adult group 13-60 years	No.	25	25	25	25
	Mean	85.68	85.36	81.44	81.00
	Std. Deviation	2.46	1.43	2.39	1.90
	Minimum	62	65	85	75
	Maximum	142	188	145	151

Table 1 The statistical analysis (mean, standard deviation (SD±), minimum values, maximum values) of the heart rate hemodynamic parameter (H.R) for two age studying groups during four time intervals after propofol+ketamine induction

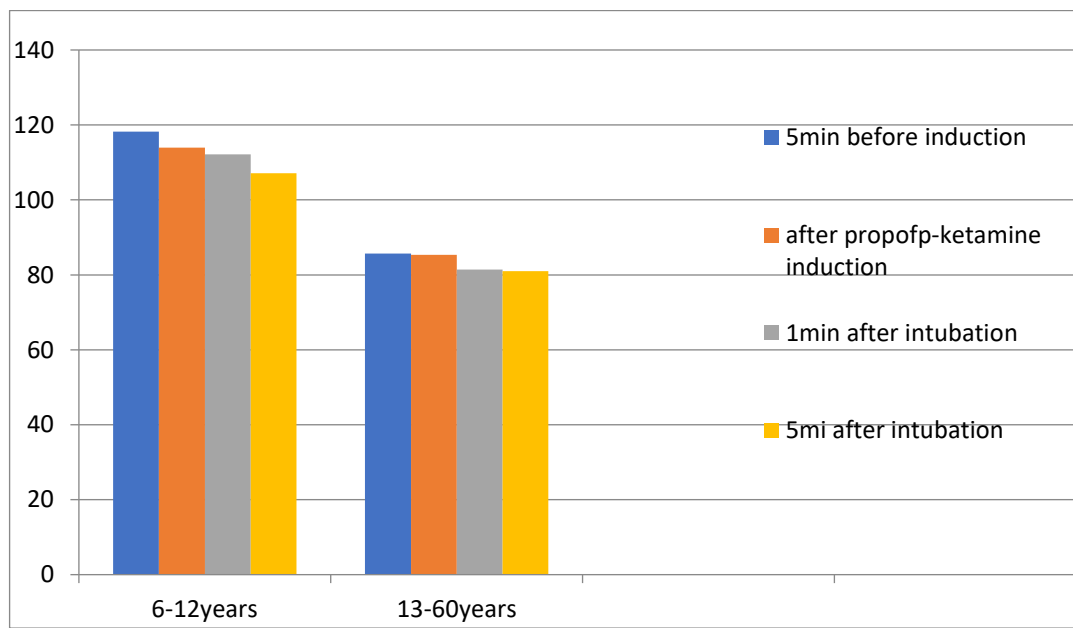


Figure 1 The effect of propofol-ketamine admixture on heart rate hemodynamic parameter (H.R) for studying groups during different time intervals

The results showed in table (1) and figure (1) that H.R of pediatric group was decreases unmarkedly at induction and after 1min. and 5min,after induction. While the H.R of adult group unchanged at induction but decrease after 1min. and 5min. after induction but unremarkedly.

The results showed that there were normal mean levels of heart rate (beat/min) for the pediatric and adults groups during 5 min before induction, (the pediatric groups were physiologically have higher pulse rate than the after adult groups) [11,12], these results revealed in table (1) figure (1).

Blood pressure		5min before induction		After propofol-ketamine induction		1min after intubation		5min after intubation	
		systolic	diastolic	systolic	diastolic	systolic	diastolic	Systolic	diastolic
Pediatric group 1-12 year	Blood pressure								
	No.	25	25	25	25	25	25	25	25
	Mean	101.36	62.92	99.68	62.68	99.27	62.36	98.72	61.64
	Std. Devi.	3.92	1.95	0.23	0.83	1.62	0.18	1.03	0.40
	Minimum	110	70	81	66	90	49	10	50
	Maximum	162	123	148	110	150	110	138	103
Adult group 13-60 year	No.	25	25	25	25	25	25	25	25
	Mean	124.84	80.64	123.36	70.48	123.16	80.76	121.20	74.32
	Std. Devi.	0.36	0.20	2.70	4.31	1.67	0.17	1.160	4.08
	Minimum	91	57	89	47	113	61	99	47
	Maximum	171	122	160	102	202	157	161	105

Table 2 The statistical analysis (mean, std. deviation, minimum values, maximum values) of the hemodynamic parameter blood pressure (B.P) for the studying groups during Four time intervals after propofol+ketamine indication

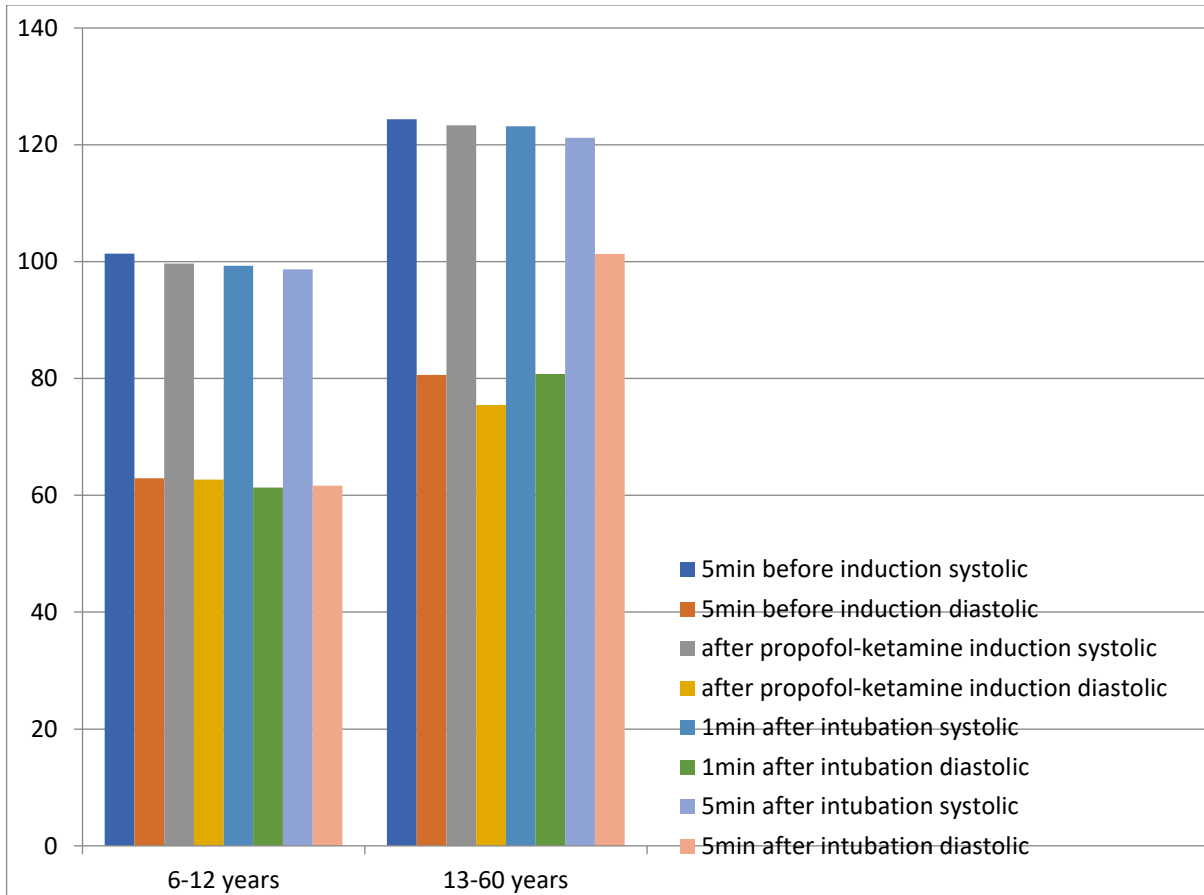


Figure 2 The effect of propofol-ketamine admixture on blood pressure hemodynamic parameter (B.P) for studying groups during different time intervals.

Our findings showed the levels of mean values for systolic and diastolic blood pressure (SBP and DBP) for the pediatric and adults studying groups during the different time intervals (5min before induction, after propofol-ketamine induction, 1min after intubation, 5min after intubation). In table (2)figure (2), this may be due to the administrating of propofol-ketamine admixture that make the hemodynamic parameters more stable with less complicated effect on heart rate (H.R) and blood pressure (B.P) [13].

2. Conclusion

the propofol Ketamine is an affective safe inductive agent, low injectable pain incidence and with a rapid onset of action, so producing preferable hemodynamic stability

3. Reference

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