ORIGINAL ARTICLE

Haemodynamic Changes during Induction; Comparison of Propofol with Mixture of Propofol-Ketamine

TAHIR NAZEER, RIAZ HUSSIAN, TAHIR CHAUDRY, *MAQSOOD ALI, TAHIR MEHMOOD, MUHAMMAD YOUNIS, TAHIR H DAR, AMNA TAHIR*

ABSTRACT

The objective of this study was to compare haemodynamic changes during induction of general anaesthesia with propofol and mixture of propofol-ketamine. That was Quasi experimental study. One hundred patients undergoing surgical procedure were included and divided into two equal groups A and B by using random number table. Each group comprised of fifty patients. In group A propofol was used as an inducing agent, dose 2.5mg / kg intravenously with in 30 seconds. In group B propofol 2.5 mg/kg and ketamine 2 mg / kg intravenously within 30 seconds. No other drug like muscle relaxants and analgesics were given to patients. Only 100% O2 given to patient with face mask. Heart rate, systolic and diastolic blood pressure were recorded for three minutes at the interval of 30 seconds. Students "t" test was used and analysis with SPSS version 10. Significant decrease in systolic, diastolic blood pressure and heart rate was recorded with propofol and minimal haemodynamic changes were recorded with propofol-ketamine mixture.

Conclusion: Propofol-ketamine mixture is a better inducing agent as compared to propofol alone.

Keywords: Ketamine, Propofol, Propofol-ketamine mixture, haemodynamic changes.

INTRODUCTION

Cardiovascular effects principally hypotension and bradycardia are the most important physiological changes at the time of induction of general anaesthesia. Cardiovascular complications are the most common caused of postoperative morbidity and mortality in patients who undergo surgery[1]. Propofol (2,6 di-iso-propyl phenol) is 1% aqueous solution[2]. It is an oil-in-water emulsion containing soybean oil, glycerol and egg lecithin. Induction dose of propofol is 1.5-2.5mg/kg. The initial distribution halflife is 2 to 8 minutes and mainly excreted in urine.

Ketamine, an anaesthetic agent with sedative and analgesic properties[3]. Ketamine down-regulates stimulus induced expression of adhesion molecules and inhibits neutrophil activation and associated superoxide anion generation[4]. Ketamine is a dissociative anaesthetic[5]. The mixture of propofol and ketamine is also called "ketofol". The use of propofol and ketamine as single agents for procedural sedation and analgesic in the emergency department has grown in popularity. The reasonable premise behind ketofol is that the two agents ketamine and propofol are theoretically synergistic[6]. Ketofol appears to be safe and efficacious for use in emergency department[7] and sedation depth appeared to be more consistent with ketofol[8]. Ketofol is associated with improved haemodynamic stability[9]. The ketamine–propofol combination provides adequate sedation and analgesia for painful procedures and appears to be safe and useful technique in the emergency department[10].

Department of Anesthesia, Services Hospital, Lahore
Correspondence to: Dr. Tahir Nazeer, Assistant Professor, drtahirnazeer@yahoo.com

MATERIAL AND METHODS

After the approval of study from the hospital ethics committee hundred patients undergoing short gynaecological procedure were included and divided into two equal groups A and B by using a random number table.

Each group was comprise 50 patients. Group A patients were induced with propofol and group B patients with mixture of propofol and ketamine.

That was Quasi experimental study and was conducted in the department of Anaesthesiology services hospital. On the preoperative visit informed consents were taken and signed. Intravenous lines were maintained with 18G cannulas and advised nothing by mouth (NPO) after midnight.

Baseline monitoring was carried with help of pulseoximeter, ECG and noninvasive blood pressure monitor.

During study period all patients received 100% O_2 four liter perminute with face-mask through circle system. No other drugs like muscle-relaxant, analgesics were given and no surgical stimulus was permitted. Blood pressure and heart rate were recorded at interval of 30 seconds for three minutes continuously on specially designed proforma. In group A propofol 2.5mg/kg intravenously in 30

seconds. In group B profpofol 2.5mg/kg along with ketamine 2mg/kg given intravenously within 30 seconds Student's ***"t"*** test was used along SPSS version 10 for data analysis.

RESULTS

During this study 100 female patients of ASA class 1 and Class 2 undergoing short surgical procedure were selected. Mean age in group A was 33.02±9.529 and in group B was 31.62± 8.189. Mean weight in group A was 55.480±10.122 and in group B was 54.620±11.245.

Significant value of P at 2 minutes for heart rate and diastolic pressure and for all three parameters at 2:30 minutes and upto 3 minutes.

Table 1: Distribution of patients according to age and study groups

Age of patients	Group "A" Propofol Group		Group "B" Propofol-Ketamine Group		Total	
	Freq	%	Freq	%	Freq	%
< 20 years	3	6.0%	2	4.0%	5	5.0%
20-30 years	22	44.0%	23	46.0%	45	45.0%
> 30 years	25	50.0%	25	50.0%	50	50.0%
Total	50	100.0%	50	100.0%	100	100.0%

Table 2: Mean age of patients in the study groups

Study groups	(n)	Mean	Std. Deviation	Student *t* test
Group "A" Propofol group	50	33.02	9.529	t-value = 0.79
Group "B" Propofol-ketamine Group	50	31.62	8.189	p-value = 0.43

Table 3: Distribution of patients according to weight and study groups

Patient Weight	Group "A" Propofol Group		Group "B" Propofol-Ketamine Group		Total	
	Freq	%	Freq	%	Freq	%
< 50 kg	12	24.0%	18	36.0%	30	30.0%
50-60 kgs	26	52.0%	23	46.0%	49	49.0%
> 60 kgs	12	24.0%	9	18.0%	21	21.0%

Table 4: Mean weight of patients in the study groups

Study groups	(n)	Mean	Std. Deviation	Student *t* test
Group "A" Propofol group	50	55.480	10.122	t-value = 0.402
Group "B" Propofol-ketamine Group	50	54.620	11.245	p-value = 0.69

Table 5: Comparison of only Systolic Blood pressure at different time intervals in the study groups

Study groups	(n)	Mean	Std. Deviation	Student *t* test
At 0 Second				
Group "A" Propofol group	50	131.34	10.871	t-value = 1.171
Group "B" Propofol-ketamine Group	50	129.06	8.445	p-value = 0.24
At 30 Second				
Group "A" Propofol group	50	125.20	10.971	t-value = 1.185
Group "B" Propofol-ketamine Group	50	122.80	9.212	p-value = 0.24
At 1 minute				
Group "A" Propofol group	50	118.34	10.905	t-value = 1.213
Group "B" Propofol-ketamine Group	50	115.62	11.510	p-value = 0.23
At 1 minute 30 seconds				
Group "A" Propofol group	50	111.70	11.589	t-value = 0.017
Group "B" Propofol-ketamine Group	50	111.66	11.651	p-value = 0.99
At 2 minutes				
Group "A" Propofol group	50	105.38	10.751	t-value = 2.323
Group "B" Propofol-ketamine Group	50	112.40	18.468	p-value = 0.02
At 2 minutes 30 seconds				
Group "A" Propofol group	50	99.90	9.609	t-value = 9.645
Group "B" Propofol-ketamine Group	50	121.00	12.122	p-value = 0.01
At 3 minutes				
Group "A" Propofol group	50	97.34	9.052	t-value = 12.078
Group "B" Propofol-ketamine Group	50	125.60	13.947	p-value = 0.01

Table 6: Comparison of only Diastolic Blood pressure at different time intervals in the study groups

Study groups	(n)	Mean	Std. Deviation	Student *t* test
At 0 Second				
Group "A" Propofol group	50	80.60	8.512	t-value = 1.409
Group "B" Propofol-ketamine Group	50	78.40	7.031	p-value = 0.16
At 30 Second				
Group "A" Propofol group	50	75.80	8.711	t-value = 1.046
Group "B" Propofol-ketamine Group	50	74.20	6.414	p-value = 0.30
At 1 minute				
Group "A" Propofol group	50	70.46	8.242	t-value = 0.970
Group "B" Propofol-ketamine Group	50	68.90	7.843	p-value = 0.34
At 1 minute 30 seconds				
Group "A" Propofol group	50	65.98	8.424	t-value = 0.070
Group "B" Propofol-ketamine Group	50	65.86	8.609	p-value = 0.94
At 2 minutes				
Group "A" Propofol group	50	61.84	7.896	t-value = 3.829
Group "B" Propofol-ketamine Group	50	68.10	8.445	p-value < 0.01
At 2 minutes 30 seconds				
Group "A" Propofol group	50	57.90	7.360	t-value = 10.851
Group "B" Propofol-ketamine Group	50	73.90	7.385	p-value < 0.01
At 3 minutes				
Group "A" Propofol group	50	56.26	8.055	t-value = 13.006
Group "B" Propofol-ketamine Group	50	76.84	7.765	p-value < 0.01

Table 7: Comparison of only Heart Rate at different time intervals in the study groups

Study groups	(n)	Mean	Std.Deviation	Student *t* test
At 0 Second				
Group "A" Propofol group	50	88.44	10.645	t-value = 484
Group "B" Propofol-ketamine Group	50	87.80	6.041	p-value = 0.63
At 30 Second				
Group "A" Propofol group	50	83.44	8.867	t-value = 1.222
Group "B" Propofol-ketamine Group	50	81.78	6.052	p-value = 0.23
At 1 minute				
Group "A" Propofol group	50	78.18	8.236	t-value = 1.331
Group "B" Propofol-ketamine Group	50	76.16	6.879	p-value = 0.19
At 1 minute 30 seconds				
Group "A" Propofol group	50	73.22	7.694	t-value = 0.221
Group "B" Propofol-ketamine Group	50	73.56	7.656	p-value = 0.83
At 2 minutes				
Group "A" Propofol group	50	68.74	7.491	t-value = 3.967
Group "B" Propofol-ketamine Group	50	74.82	7.832	p-value < 0.01
At 2 minutes 30 seconds				
Group "A" Propofol group	50	62.70	10.735	t-value = 9.243
Group "B" Propofol-ketamine Group	50	78.40	5.387	p-value < 0.01
At 3 minutes				
Group "A" Propofol group	50	61.56	7.799	t-value = 14.926
Group "B" Propofol-ketamine Group	50	81.70	5.497	p-value < 0.01

DISCUSSION

This study shows that the use of mixture of propofol-ketamine provides more stability in haemodynamics of patients at the time of induction of general anaesthesia as compare to propofol alone. We know that ketamine alone is causing increase in systemic vascular resistance, cardiac output and mean arterial pressure and raises blood pressure upto 25% and heart rate about 20% and its effect start within 30 to 60 seconds after Intravenous dose and remain for 10 to 15 minutes. On the other hand mechanism of propofol is totally different and its effect start within 20 to 40 seconds and remain for 2 to 8 minutes and cause decrease in Blood pressure upto 40% and has cardiac depresent action and decrease mean arterial pressure, cardiac output and systemic vascular resistance. Ketamine is also effective in the treatment of CRPS pain symptoms[11] and it has been shown to induce a consistently antidepressant effects within a short period of time[12] and Ketamine is an N-methyl-D-asparate (NMDA) receptor antagonist[13]. Similarly

intrathecal ketamine has been reported to have evident analgesic effects on neuropathic pain induced by nerve injury[14] and neuropathic pain is an intractable clinical problem[15]. In one study they found that spinally administered ketamine (preservative free) improve the duration or quality of analgesia in children[16]. Propofol also has anti-inflammatory properties and can suppress cytokines and chemokines production[17].

Propofol and etomidate depress the neurons in the cortex, thalamus and reticular formation and produce un-cmsciousness[18]. Painful procedures on children and adolescents often have to be perormed with the aid of analgesia and sedation in order to prevent pain and emotional distress[19]. Propofol is superior to midazolam in reducing inflammation and oxidase stress and in improving post-operative recovery in children[20]. Similarly in the study of Yalcin S et al they found mixture of propofol and ketamine are better than alone for electroconvulsive therapy[21].

Similarly in the study of Khutia SK et al they found combination of ketamine and propofol is more effective and as safe sedoanalgesia regimen than propofol-fentanyl combination in paediatric emergency. Short surgical procedures in term of haemodynamic stability & less incidence of apnoea[22].

CONCLUSION

Mixture of propofol-ketamine is a better inducing drug as compared to propofol alone, as it caused less haemodynamic changes at the time of induction of general anaesthesia.

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