www.ijrasb.com

ISSN (ONLINE): 2349-8889

Vandana Publications

IJRASB

Volume-1, Issue-1, July 2014

International Journal for Research in Applied Sciences and Biotechnology

Page Number: 11-14

Efficacy and Safety of Rocuronium Succinylcholine with Thiopentone

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ABSTRACT

Tracheal intubation is one of the common procedures performed during general anaesthesia and is a life saving intervention that is performed in the emergency departments. In the present study haemodynamical parameters such as heart rate, systolic blood pressure and diastolic blood pressure are measured and the variation in these parameters are compared during the use of succinylcholine and rocuronium at O, 1 min, 5 min, 10 min of laryngoscopy under intubating conditions. The study reveals that rocuronium produced a slight transient increase in heart rate and blood pressure that may due to the intubation response which returned to normal within 5 minutes.

Keywords— Intubation, Heart Rate, Systolic Blood Pressure, Diastolic Blood Pressure, Succinylcholine (SCh) and Rocuronium (ROC)

I. INTRODUCTION

Erik et al., (2000) concluded that both succinylcholine and rocuronium produced fast and reliable paralysis for RSI. Although succinylcholine had a faster onset and provided more relaxation, the difference had no clinical significance. Approximately a fourth of ED RSI patients qualified for use of rocuronium using these high-risk criteria.

Walls (1998) conducted study in which patients were induced with thiopental (3 to 5 mg/kg) and fentanyl (1 to 2 g/kg), followed by SCh (1 mg/kg) or ROC (0.6 or 1 mg/kg). All patients were successfully intubated. Intubating conditions were excellent or good in 96.2% and 96.9% of ROC and SCh patients, respectively. However, 80% of SCh patients and only 65% of ROC patients had excellent intubating conditions ($p<0.05$) concluding that succinylcholine produces superior intubating conditions and it remains the drug of choice for ED RSI. However, as the authors remind us, a 1 mg/kg dose of recoronium has a clinical duration of action of 50 to 60 minutes.

Cheng et al., (2002) concluded that rocuronium 0.9 mg/kg provided similar intubating conditions to suxamethonium 1.5 mg/kg. Rocuronium 0.6 mg/kg did not provide adequate intubating conditions. Sixty seconds after administration of rocuronium 1-1.2mg/kg, intubating conditions are similar to those produced by succinylcholine.

Toni et al., (1993) concluded that there is a dose-dependent decrease in onset time with rocuronium. The onset times for the two larger doses of rocuronium were similar to that of succinylcholine, but clinical duration of action with rocuronium was significantly longer. The brief onset time achieved with rocuronium indicates that administration of 0.9 – 1-2 mg/kg is an acceptable alternative to succinylcholine for rapid-sequence induction of anesthesia.

Chamorro et al., (1997) found that there were no significant hemodynamic changes with the exception of an increase in the heart rate in the first minute of 103 bpm to 113 ($p<0.05$). And found that rocuronium is an efficacious and safe drug for the emergency intubation of critically ill patients. Susan 139 also showed in her study that the heart rate transiently increased ($P<0.01$) within 1 min. after OrG-9426 (2 X ED95) administration.

Lincoln (2002) who studied in a group of cardiac children after the administration of rocuronium at average dose of 0.6 mg per kg of body weight and found no haemodynamic effects which were attributed to the use of rocuronium.

II. MATERIALS AND METHODS

The study conducted was double blind controlled study.This study was conducted in 60 adult patients of either sex, aged between 18 to 60 years, undergoing gynecological surgery, general surgery and orthopedic surgery.

They were divided in two groups:

Group A included 30 adult patients who received succinylcholine (2mg/kg). Group B included 30 adult patients who received rocuronium (0.6mg/kg). The inclusion criteria included:

1) Patients aged 18 to 60 years.
2) ASA physical status grade I – II
3) Mallampatti class I – II airway The exclusion criteria were:

1) Patients having neuromuscular disease.
2) Patients receiving medications known to influence neuromuscular function.
3) Patients with cardiac, renal, hepatic and metabolic diseases.
4) Patients expected to have difficult intubation, Mallampatti III – IV.

All patients included in the study were premedicated with inj.glycopyrolate 0.2mg intramuscularly ½ hr before surgery.

Patients were shifted into the operation room on a trolley and made to lie on the operating table after loosening the clothes. Patient was connected to all the monitors like ECG, noninvasive blood pressure and pulse oximetry.

Before induction vital signs-pulse rate, noninvasive arterial blood pressure was recorded. ECG, peripheral oxygen saturation (pulse oximetry), pulse rate, non-invasive arterial blood pressure was monitored throughout the procedure.

General anaesthesia was induced with propofol 2mg/kg and fentanyl 2mg/kg intravenously.

III. RESULTS AND DISCUSSION

This is a prospective study consisting of two groups of 30 patients each receiving either succinylcholine or rocuronium for intubation. The haemodynamic changes in an interval period of 0 to 20 minutes for each treatment group were studied.

Sex Distribution:

Table 1 shows the sex distribution in each group. In group A 12 patients are male and 18 female patients. In group B 13 are male and 17 are female. Distributions of sex ratio in both groups were matched and there was no statistically difference between the groups.

Table 1: The sex distribution in each group

Sex	Succinylcholine (GROUP A)		Rocuronium (GROUP B)		Significance
Male	12	(40.0)	13	(43.3)	x^2 = 0.069 P>0.05
Female	18	(60.0)	17	(56.7)	
Total	30	(100.0)	30	(100.0)	

Age Distribution:

Table 2 shows the age distribution in both the groups. The mean age of group A is 36.87 ± 12.21 years and in group B is 34.57 ± 11.73 years. Both the groups have equal distribution of patients of age and there is no statistically difference in the age group distribution.

Table 2: The age distribution in both the groups

Age in years	Succinylcholine (GROUP A) (n=30)		Rocuronium (GROUP B) (n=30)
≤ 20	1	(3.3)	3 (10.0)
21-30	6	(20.0)	11 (36.7)
31-40	12 (40.0)		8 (26.7)
41-50	7	(23.3)	5 (16.7)
50	4	(13.3)	3 (10.0)
Mean age in years	36.87 ± 12.21		34.57 ± 11.73
Significance	T = 0.744, P>0.05		

Systolic Blood Pressure Variation:

Table 3 shows the distribution of mean Systolic Blood Pressure in two groups of patients at various time intervals.

In succinylcholine group (A) there was statistically significant fall in systolic blood pressure from 123.00 ± 14.84 at pre induction to 106.50 ± 14.22 at intubation. At 1 minute after intubation the systolic blood pressure was steadied at 106.77 ± 14.54. There is a steady rise in systolic blood pressure at 5, 10, 20 minutes to 107.77 ± 13.23, 111.43 ± 16.23, 116.57 ± 14.67 respectively.

In the rocuronium group (B) there was fall in systolic blood pressure from 122.00 ± 19.34 at pre induction to

114.73 ± 20.57 at intubation. Statistically significant rise in systolic blood pressure to 132.27 ± 7.18 at 1 minute after intubation was observed. This was again followed by fall in systolic blood pressure at 5 minute to 105.67 ± 20.10. There after there was a steady rise in systolic blood pressure at 10 and 20 minutes to 109.33 ± 19.56 and 121.30 ± 23.89 respectively.

Statistically significant difference between the groups is seen at 1 minute after intubation in which there is rise in systolic blood pressure in rocuronium group (B).

Table 3: Shows the distribution of mean Systolic Blood Pressure in two groups of patients at various time intervals

Time Interval	Succinylcholine (GROUP A) (n=30)	Rocuronium (GROUP B) (n=30)	Significance between two Groups
Pre Induction	123.00 ± 14.84	122.00 ± 19.34	P>0.05
0 minute	106.50 ± 14.22	114.73 ± 20.57	P>0.05
1 minute	106.77 ± 14.54	132.27 ± 7.18	P>0.05
5 minutes	107.77 ± 13.23	105.67 ± 20.10	P>0.05
10 minutes	111.43 ± 16.23	109.33 ± 19.56	P>0.05
20 minutes	116.57 ± 14.67	121.30 ± 23.89	P>0.05
Pair wise significance within each group	Pre-0 minute P<0.05	Pre-0 minute P>0.05	
	Pre-1 minute P<0.05	Pre-1 minute P<0.05	
	Pre-5 minute P<0.05	Pre-5 minute P<0.05	
	Pre-10 minute P<0.05	Pre-10 minute P<0.05	
	Pre-1 minute P<0.05	Pre-1 minute P>0.05	

Diastolic Blood Pressure Variation:

Table 4 shows the diastolic blood pressure variation in two groups at various intervals.

In succinylcholine group (A) there was statistically significant fall in the diastolic blood pressure from 76.87 ± 10.30 at pre induction to 66.03 ± 9.37 at intubation (0 minute). There after there was a steady rise to 67.33 ± 8.05 at 1 minute after intubation, 68.63 ± 9.51 at 5 minute after intubation, 70.60 ± 10.19 at 10 minute after Between both the groups statistically significant difference is seen at 5 minutes after intubation, at which the diastolic blood pressure is low (61.07 ± 15.33) in rocuronium group as compared to succinylcholine group (68.63 ± 9.51).

intubation and returns to 76.67 ± 10.87, near pre induction at 20 minutes.

In rocuronium group (B) there was significant fall in diastolic blood pressure from 73.80 ± 11.41 at pre induction to 68.57 ± 14.74 at intubation (0 minute). There was a sustained fall in diastolic blood pressure at 1, 5 and 10 minutes to 67.60 ± 13.47, 61.07 ± 15.33 and 64.53 ± 14.53 respectively. Diastolic blood pressure returned to 72.53 ± 14.27 near pre induction at 20 minutes.

Table 5: Shows the diastolic blood pressure variation in two groups at various intervals

Time Interval	Succinylcholine (GROUP A)	Rocuronium (GROUP B)	Significance between two Groups

	(n=30)		(n=30)		
Pre Induction	76.87	± 10.30	73.80	± 11.41	P>0.05
0 minute	66.03	± 9.37	68.57	± 14.74	P>0.05
1 minute	67.33	± 8.05	67.60	± 13.47	P>0.05
5 minutes	68.63	± 9.51	61.07	± 15.33	P<0.05 *
10 minutes	70.60	± 10.19	64.53	± 14.53	P>0.05 [a]
20 minutes	76.67	± 10.87	72.53	± 14.27	P>0.05
Pair Wise significance Within each group	Pre-0 minute P<0.05**		Pre-0 minute P>0.05 [a]		
	Pre-1 minute P<0.05**		Pre-1 minute P>0.05 [a]		
	Pre-5 minute P<0.05**		Pre-5 minute P<0.05 **		
	Pre-10 minute P<0.05*		Pre-10 minute P<0.05 **		
	Pre-20 minute P>0.05		Pre-20 minute P>0.05		

[a] Near statistical significance * Statistical Significance at 5% ** Statistical significance at 1%

Heart rate and blood pressure were recorded before induction (pre induction); at direct laryngoscopy (0 minute); 1 minute after laryngoscopy; 5 minute after laryngoscopy; 10 minute after laryngoscopy.

IV. CONCLUSION

The study concluded after 20 min. The procedure will be carried out as required. The present study shows that haemodynamic responses to both groups of patients who receive propofol (2 mg/kg) and fentanyl (2mg/kg) are followed by initial fall of systolic and diastolic blood pressure after induction. The initial fall can be attributed to the haemodynamic effects of propofol. Significant systolic blood pressure rise was seen in rocuronium group at 1 minute after intubation from mean of 114.73 ± 20.57 mmhg at intubation to 132.27 ± 7.18 mmhg at 1 minute after intubation. There was not significant rise in systolic blood pressure in succinylcholine group with 106.50 ± 14.22 mmhg at intubation to 106.77 ± 14.54 after 1 minute of intubation. This rise in systolic blood pressure in rocuronium group as compared to succinylcholine group was statistically significant with P<0.05. This rise in systolic blood pressure occurred inspite of fall expected because of propofol. We therefore conclude that rocuronium causes transient increase in blood pressure. At 20 minutes, the blood pressure returned to pre induction level in both group of patients. The rise in heart rate was seen in rocuronium group. Heart rate rose from 80.52 ± 12.65 at pre induction to 86.67 ± 18.06 at intubation and to 88.30 ± 18.61 at 1 minute after intubation with P<0.05 within the group between pre induction and 1 minute after intubation. However, this rise was not statistically significant between the two groups at 1 minute. Rocuronium produced slight transient increase in heart rate and blood pressure that may be due to the intubation response which returned to normal within 5 minutes.

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