

Original article:

Cardiovascular response of Rocuronium and Succinylcholine

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Abstract:

Introduction: The present study was under taken to Study clinical duration of rocuronium 0.6mg Kg⁻¹ and 0.9 mg Kg⁻¹ body weight and succinylcholine 1 mg Kg⁻¹ body weight and to Study the Cardiovascular responses associated with the administration of 60 rocuronium and succinylcholine for first 3 minutes.

Methodology: The study population consisted of 90 adult patients of ASA grade I and II belonging to both sexes in the age group of 20 to 50 years who were posted for various emergency surgeries. The study population was randomly divided into three groups with 30 patients in each group.

Results: In our study, there was no changes in haemodynamic variables following the administration of rocuronium. There was a mean change in heart rate of $109.07 \pm 10.99/\text{min}$ and $109.07 \pm 10.99/\text{min}$ following administration of rocuronium 0.6 mg kg⁻¹ body weight and 0.9 mg kg⁻¹ body weight, one minute following intubation. There was a similar increase in mean arterial pressure by mean of 99.3 ± 6.7 mm of hg and 99.3 ± 6.7 mm of hg from pre induction value following rocuronium 0.6 mg kg⁻¹ and 0.9 mg kg⁻¹ body weight one minute following intubation.

Conclusion: The pulse rate increase was maximum at 1 minute after intubation the pulse rate gradually decreased towards resting time of 5 minutes.

Introduction

With the introduction of endotracheal anesthesia during World War I and balanced anaesthesia in 1926, a search began for a drug which could cause jaw relaxation to facilitate endotracheal intubation. Most of the intubations were done with inhalational technique which was associated with problems like laryngospasm, bronchospasm. Further there was a need to take the patient sufficiently deep before intubation which lead to haemodynamic disturbances.¹

The first skeletal relaxant d-tubovurarine which was non-depolarising in nature was introduced in 1942 to fulfil the need for jaw relaxation. Though this drug provided excellent muscle relaxation, it had additional

ganglion blocking properties causing tachycardia, hypotension even in clinical doses. Further it had a delayed onset at jaw, making it unsuitable for use during rapid sequence intubation in emergency cases. Hence a search began for a relaxant which had a rapid onset and short duration of action. Hence the present study was under taken To Study clinical duration of rocuronium 0.6mg Kg⁻¹ and 0.9 mg Kg⁻¹ body weight and succinylcholine 1 mg Kg⁻¹ body weight.

To Study the Cardiovascular responses associated with the administration of 60 rocuronium and succinylcholine for first 3 minutes.

Methodology

A clinical study comparing rocuronium 0.6 mg kg⁻¹ and 0.9 mg kg⁻¹ with succinylcholine 1 mg kg⁻¹ for use during rapid sequence intubation of anaesthesia in adult patients was undertaken at Chigateri general hospital, Women and Child Hospital and Bapuji hospital attached to J.J.M. MEDICAL COLLEGE, DAVANGERE during the period from June 2010 to aughst 2012.

The study population consisted of 90 adult patients of ASA grade I and II belonging to both sexes in the age group of 20 to 50 years who were posted for various emergency surgeries. The study population was randomly

divided into three groups with 30 patients in each group.

In group I, Rocuronium 0.6 mg kg⁻¹ body weight was given intravenously after the loss of eyelash reflex. Similarly in group II and group III, Rocuronium 0.9 mg kg⁻¹ and Succinylcholine 1 mg kg⁻¹ respectively was given intravenously after the loss of eyelash reflex. No mask ventilation was done in any patient after administration of relaxant.

In all the three groups of patients, oral endotracheal intubation was attempted at 60 seconds following the administration of muscle relaxant and intubating conditions were graded using the rating scale adopted by Land and stovne et. al (1962).

Results

Table 1 : ASA Grading

ASA Grade	Grade I	Grade II
ROC 0.6 Group I	24 (80)	6 (20)
ROC 0.9 Group II	24 (80)	6 (20)
Succinylcholine Group III	26 (87)	4 (13)

$X^2 = 0.60$ P = 0.73 NS

Table 1 shows ASA grading of all patients

In group I, 24 patients (80%) belonged to ASA grade I, 6 patients (20%) belonged to ASA Grade II, In group II, 24 patients (80%) belonged to ASA grade I, 6 patients (20%) belonged to ASA grade II, In group III, 26 patients (87%) belonged to ASA grade I, 4 (13%) patient belonged to ASA grade II.

Table 2 : Onset of action

Groups	Onset time (sec)
ROC 0.6 (Group I)	60
ROC 0.9 (Group II)	60
Succinylcholine 1 mg/kg Group III	60

Since laryngoscopy was performed at the end of 60 sec. after injection of muscle relaxant, the onset of action for the two groups was considered to be 60 sec.

II. Duration of action

Table 3 : duration of action (minutes)

	Parameter	ROC 0.6 Group I	ROC 0.9 Group II	Succinylcholine Group III	P* Value, Sig
	Median	30.00	30.00	7.00	
Duration of Action	Inter Quartile Range	25-30	25-30	005-10	< 0.001 HS

Table 3 shows duration of action of group I, II, III.

In group I Rocuronium 0.6 has range of 25 to 30 minutes duration. The median duration of action in Group I was 30.00

In group II Rocuronium 0.9 has range of 25-30 minutes duration. The median duration of action 30.00.

In group III Succinylcholine 1 mg/kg has range of 05-10 minutes duration. The median duration of action 7.00

The p value was < 0.001 which is highly significant. The student t-test was used to determine the significance in duration of action rocuronium 0.6, rocuronium 0.9 and suddinylcholine in group I, II and group III respectively.

III. Haemodynamic effects

a. Pulse rate

Table 4 : Pulse Rate Variations

		ROC 0.6 Group I		ROC 0.9 Group II		Succinylcholine Group III	
Time of Assessment		Mean	SD	Mean	SD	Mean	SD
Resting		89.8	12.5	89.8	12.5	81.4	10.6
After Induction		100.9	11.7	100.9	11.7	90.8	11.2
After Untubation	1 Min	109.1	11.0	109.1	11.0	105.6	9.9
	3 Min	103.3	10.4	103.3	10.4	102.5	10.6

Cardiovascular Changes

The cardiovascular changes following the administration of rocuronium have been studied by Eamon P. McCoy et al. 1993 and Mark E. Hudson et al. 1998.

Discussion

Eamon P. McCoy et al. 1993 have demonstrated changes in heart rate (+ 7%), mean arterial pressure (- 5%), systemic vascular resistance (- 12%), that were insignificant. They concluded that rocuronium in doses of 0.6 mg kg⁻¹ is associated with changes of

only small magnitudes in haemodynamic variables. Mark E. Hudson et al. 1998 measured the haemodynamic effects of rocuronium in adults undergoing cardiac surgery with cardiopulmonary bypass. They found the haemodynamic profile for a dose of 0.6 mg kg⁻¹ bolus of rocuronium to be

acceptable oxygen demand and supply. Although CVP and PAP decreased significantly, rocuronium had no effect on pulmonary capillary wedge pressure, systemic vascular resistance, mean arterial pressure and cardiac index. Thus rocuronium has been demonstrated to be haemodynamically a stable drug.

In our study, there was no changes in haemodynamic variables following the administration of rocuronium. There was a mean change in heart rate of $109.07 \pm 10.99/\text{min}$ and $109.07 \pm 10.99/\text{min}$ following administration of rocuronium 0.6 mg kg^{-1} body weight and 0.9 mg kg^{-1} body weight, one minute following intubation. There was a similar increase in mean arterial pressure by mean of $99.3 \pm 6.7 \text{ mm of hg}$ and $99.3 \pm 6.7 \text{ mm of hg}$ from pre induction value following rocuronium 0.6 mg kg^{-1} and 0.9 mg kg^{-1} body weight one minute following intubation. This was a haemodynamic response to laryngoscopy and endotracheal intubation which subsided to near pre induction values 5 minutes after intubation.

Bibliography

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Similar trends were seen following the administration of succinylcholine 1 mg kg^{-1} body weight. There was a change in mean heart rate of $105.57 \pm 9.93/\text{min}$ from pre induction value one minute after intubation. There was also a change in mean arterial pressure by mean of 99.1 mm of hg from pre induction value one minute after intubation. These values returned towards pre induction values 5 minutes following intubation. Thus there were no haemodynamic disturbances following administration of succinylcholine and rocuronium and rise in mean heart rate and blood pressure was a response to laryngoscopy and intubation.

Conclusions

Succinylcholine 1 mg Kg^{-1} body weight produces excellent intubating conditions in all patients at 60 seconds with an average clinical duration of action of 7 minutes.

The pulse rate increase was maximum at 1 minute after intubation the pulse rate gradually decreased towards resting time of 5 minutes.