

Comparison of Intubating Conditions at 60 Seconds with Different Doses of Rocuronium Using the Timing Principle

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Abstract

Objective: To evaluate the intubating conditions with rocuronium at 0.6 mg/kg (2⁺ED 95) and 0.9 mg/kg (3⁺ED 95) at 60 s using the timing principle.

Methods: 60 patients were divided into 2 groups of 30 each. Group A received 0.9 mg/kg and group B received 0.6 mg/kg of rocuronium. Intubation was done at 60 s. The Train of four monitoring was done at the adductor pollicis muscle. The TOF count at intubation and time to loss of TOF were noted and compared.

Results: Intubating conditions were excellent 13 (65%) in group A compared to 9 (45%) in group B. The TOF count at intubation was not statistically significant ($p=0.677$) between the groups whereas time to loss of TOF ($p=0.03$) were significant between the groups.

Conclusion: Clinically acceptable intubating conditions were found in both groups but the conditions were better with group A in comparison with group B.

Keywords: Rocuronium; Timing principle

Introduction

A rapid sequence induction of anaesthesia and endotracheal intubation are indicated in emergency situations in the presence of full stomach or conditions with increased risk of aspiration.

The ease with which endotracheal intubation is performed depends upon degree of muscle relaxation, depth of anaesthesia and skill of anaesthesiologists.

Succinyl choline has been for a long time the NMBD (Neuro muscular blocking drug) of choice for RSII (Rapid sequence induction and intubation), because of the quick onset along with excellent intubating conditions. However it is desirable to look for an alternative due to its side effect profile.

Rocuronium bromide, a non depolarising neuromuscular blocking drug has a faster onset of action with a stable hemodynamic profile.

Need for the study: In the literatures reviewed there are similar studies comparing the intubating conditions between different drugs like rocuronium, succinyl choline and vecuronium. But there were minimal literature comparing the doses of rocuronium for RSII and there were no studies conducted in my study settings on comparison of the rocuronium doses for RSII.

With this basic knowledge in our study we evaluate the intubating conditions with rocuronium at 0.6 mg/kg (2⁺ED 95) and 0.9 mg/kg (3⁺ED 95) at 60 s using the timing principle.

Materials and Methods

After the approval from the institutional ethical committee, written informed consent was taken from the patient.

Study area: Department of anaesthesiology, SSIMS-RC, Davangere.

Study population: Adult general anaesthesia cases in ENT OT.

Study duration: 2 months (June-July 2017)

Sample size: Based on the proportions taken from the previous study [1], sample size was estimated using appropriate formula and power of the study to be 80% and 95% significance level. And the total calculated sample size was 25 in each group and was rounded of to 30 in each group.

Inclusion criteria:

1. Age group of 18-60 yrs.
2. ASA 1 and 2 patients undergoing elective surgeries under general anaesthesia.

Exclusion criteria:

1. ASA 3 and 4
2. Mallampati grade 3 and 4
3. Anticipated difficult airway
4. Neuro muscular disorders.
5. Contraindication to the use of propofol
6. Allergy to the drugs.

Methodology

Randomisation

Cases were randomly allocated to 2 groups by coin toss method. As and when the cases were taken for OT coin was tossed and the prefixed criteria that all the cases with heads will go to group A and the cases with tails will go to group B.

Group A: patients receive rocuronium 0.9 mg/kg as a bolus dose

Group B: patients receive rocuronium 0.6 mg/kg as a bolus dose.

After the pre anaesthetic evaluation, the patients were fasted overnight. On the day of surgery, antacid prophylaxis was given in the morning. The patient was shifted to OT (operation theatre), an appropriate size cannula secured. Basic monitors such as ECG, Pulse oximeter, NIBP (Noninvasive blood pressure) were attached and the baseline reading noted. The nerve stimulator applied to ulnar border of the forearm and its monitor is also attached.

Patients were premeditated with glycopyrrolate 0.01 mg/kg and fentanyl 2 mcg/kg. Preoxygenated for 3 min.

Patients were induced with propofol 2 mg/kg. After loss of eye lash reflex a baseline TOF (Train of Four) count is taken and rocuronium was administered.

Variables	Intubating Conditions		
	Acceptable		Unacceptable
	Excellent	Good	
Ease of Laryngoscopy	Easy	Fair	Difficult
Vocal Cord Position	Abducted	Intermediate	Closed
Vocal Cord Movement	None	Moving	Closing
Airway Reaction	None	Diaphragm	Sustained
Movement of Limbs	None	Slight	Vigorous

Neuromuscular monitoring using the train of four at the adductor pollicis muscle is commenced. At 60 s a TOF count is recorded and tracheal intubation is done by an experienced anaesthesiologists. The time to loss of TOF will be noted.

Intubating conditions will be assessed as excellent, good and poor according to the grading scale based on criteria of good clinical practice [2].

SBP (Systolic Blood Pressure), DBP (Diastolic Blood Pressure), HR (Heart Rate) and SpO₂ (oxygen saturation) were recorded at intubation 1,3 and 5 min following intubation.

Statistical analysis

Statistical tests used were descriptive statistics (mean age, weight) chi square test and software used was SPSS version 20.

Results

Variables	0.9 mg/kg n (%)	0.6 mg/kg n (%)	Total	P value
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Ease of laryngoscopy	Easy	16 (80)	18 (90)	20 (100)	0.331
	Fair	4 (20)	2 (10)	20 (100)	
Vocal position	Abducted	17 (85)	12 (60)	20 (100)	0.078
	Intermediate	3 (15)	8 (40)	20 (100)	
Airway reaction	None	20 (100)	12 (60)	20 (100)	0.007
	Diaphragm	0 (0)	6 (30)	20 (100)	
	Sustained	0 (0)	2 (10)	20 (100)	
Movement of limbs	None	20 (100)	14 (70)	20 (100)	0.02
	Slight	0 (0)	6 (30)	20 (100)	

Table 1: Table showing the comparison of assessment of intubating conditions.

Variables	0.9 mg/kg n (%)	0.6 mg/kg n (%)	Total	P value
Excellent	13 (65)	9 (45)	20 (100)	0.036
Good	7 (35)	11 (55)	20 (100)	

Table 2: Table showing the comparison of intubating conditions.

The intubating conditions were excellent in 13 (65%) in group A and 9 (45%) in group B. And they were good in 7 (35%) in group A and 11 (55%) in group B, Tables 1 and 2.

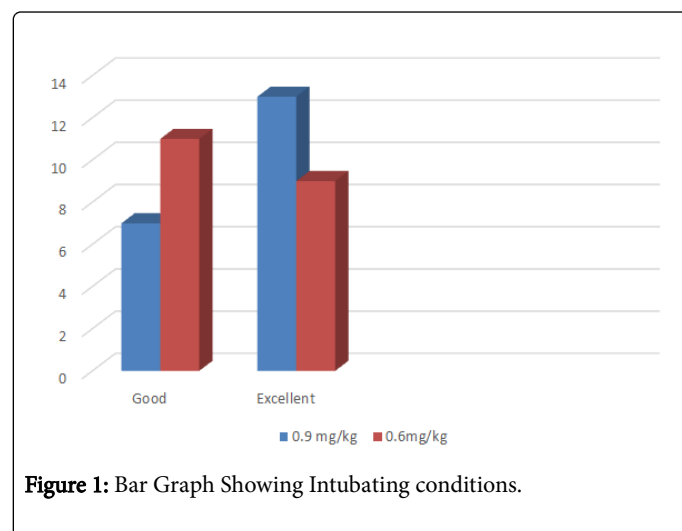


Figure 1: Bar Graph Showing Intubating conditions.

There was no statistically significant difference in TOF at intubation between the groups whereas time to the loss of TOF was significantly different, Figure 1 and Table 3.

Discussion

The ideal neuromuscular blocking agent is one which has brief duration of action, provides profound relaxation and is free from hemodynamic changes.

Succinylcholine is the commonly used muscle relaxant for RSII due to its fast onset, excellent intubating conditions and short time course

of action. However it may have adverse effects which can limit or even contraindicate its use at times.

An alternative drug suggested and used in recent times for rapid sequence induction is rocuronium in the dose of 0.6 to 1.2 mg/kg. Onset time of a neuromuscular blocker is considered important because it serves as a predictive parameter for the rate of development of ideal intubating conditions [3].

Variables		Rocuronium Dose		Total	P value
		0.9 mg/kg n (%)	0.6 mg/kg n (%)		
TOF at intubation	1	4 (20)	3 (15)	20 (100)	0.677
	2	16 (80)	17 (85)	20 (100)	
Time to loss of TOF	<120 s	15 (75)	7 (35)	20 (100)	0.039
	<180 s	4 (20)	11 (55)	20 (100)	
	<240 s	1 (5)	2 (10)	20 (100)	

Table 3: Table showing the TOF at intubation and time to loss of TOF.

Hence in our study we decided to compare the intubating conditions between 0.6 and 0.9 mg/kg of rocuronium along with the train of four counts at intubation and time to loss of train of four count and we found that the intubating conditions were better with 0.9 mg/kg when compared with 0.6 mg/kg and the results were statistically significant.

But the intubating conditions were clinically acceptable in both the groups.

A similar study by Devi et al. [4] in cesarean sections also concluded that conditions after 0.9 mg/kg are better than those offered by 0.6 mg/kg of rocuronium. Cheng et al. [5] did a similar study with thiopentone and alfentanil induction and concluded that intubating conditions were adequate after 0.9 mg/kg of rocuronium but found 0.6 mg/kg dose inadequate.

The TOF value at intubation was either 3/4 or 4/4 and the values are also not statistically significant between the two groups. This implicates that monitoring the TOF at adductor pollicis is not correlating with the intubating conditions. This finding of ours is substantiated as Meistelman et al. [6] concluded that monitoring the adductor pollicis for onset of blockade might be misleading, further Donati et al. [7] also concluded from his study that neuromuscular block at adductor pollicis lags behind that of laryngeal muscles.

The mean time to the loss of TOF is 115 s with 0.9 mg and 132 s with 0.6 mg which is statistically significant. Similar results were seen in the study by Mathias sluga et al. [8] where the median time for loss of TOF was 130 s with 0.6 mg/kg dose of rocuronium and by Veena chathrath et al. [1] had the median time for loss of TOF at 110 s with 0.6 mg/kg of drug.

Conclusion

Clinically acceptable intubating conditions are present with both 0.6 mg/kg and 0.9 mg/kg of rocuronium but 0.9 mg/kg offers better conditions than those of 0.6 mg/kg.

The use of train of four counts at the adductor pollicis as a guide for laryngeal muscle paralysis is questionable.

References

1. Chatrath V, Singh I, Chatrath R, Arora N (2010) Comparison of intubating conditions of rocuronium bromide and vecuronium bromide with succinyl choline using timing principle. *J Anaesthesiol Clin Pharmacol* 26: 493-497.
2. Viby-Mogensen J, Engbaek J, Eriksson LI, Gramstad L, Jensen E, et al. (1996) Good clinical research practice (GCRP) in pharmacodynamic studies of neuromuscular blocking agents. *Acta Anaesthesiol Scand* 40: 59-74.
3. Chavan SG, Gangadharan S, Gopakumar AK (2016) Comparison of rocuronium at two different doses and succinylcholine for endotracheal intubation in adult patients for elective surgeries. *Saudi J Anaesth* 10: 379-383.
4. Devi U, Srinivas VY, Shivaramu BT, Mallikarjuna VV, Sanjay BG, et al. (2014) Intubating Conditions with two different Doses of Rocuronium Bromide for Caesarean Section: A comparative clinical study. *J of Evol Med and Dent Sci* 3: 12947-12955.
5. Cheng CA, Aun CS, Gin T (2002) Comparison of rocuronium and suxamethonium for tracheal intubation in children. *Paediatric anaesth* 12: 140-145.
6. Meistelman C, Plaud B, Donati F (1991) Neuromuscular blockade effects of succinylcholine on vocal cords and adductor pollicis muscle. *Anesth Analg* 73: 278-282.
7. Donati F, Plaud B, Meistelman C (1991) Vecuronium neuro-muscular blockade at adductor muscle of larynx and adductor pollicis. *Anesthesiology* 74: 833-837.
8. Sluga M, Ummenhofer W, Studer W, Siegemund M, Marsch SC (2005) Rocuronium versus succinylcholine for rapid sequence induction of anesthesia and endotracheal intubation: A prospective randomised trial in emergent cases. *Anesth Analg* 101: 1356-1361.