

Original Research Article

# A prospective, randomized controlled study to compare the intubating conditions achieved with suxamethonium and rocuronium bromide

Stalin R<sup>1</sup>, Raja Manikandan S<sup>2\*</sup>

<sup>1</sup>Assistant Professor, Department of Anesthesiology, Government Thiruvallur Medical College and Hospital, Thiruvallur, India

<sup>2</sup>Consultant, Anesthesiologist, Chennai Corporation Hospital, Royapettah, Chennai, India

\*Corresponding author email: [dr.rajamanidd@gmail.com](mailto:dr.rajamanidd@gmail.com)

	International Archives of Integrated Medicine, Vol. 5, Issue 12, December, 2018. Copy right © 2018, IAIM, All Rights Reserved. Available online at <a href="http://iaimjournal.com/">http://iaimjournal.com/</a> ISSN: 2394-0026 (P)                      ISSN: 2394-0034 (O)
	Received on: 02-12-2018                      Accepted on: 07-12-2018 Source of support: Nil                      Conflict of interest: None declared.
<b>How to cite this article:</b> Stalin R, Raja Manikandan S. A prospective, randomized controlled study to compare the intubating conditions achieved with suxamethonium and rocuronium bromide. IAIM, 2018; 5(12): 72-76.	

## Abstract

**Background:** Endotracheal intubation is required for giving general anesthesia for which adequate muscle relaxation is necessary. Suxamethonium is still used as a relaxant for endotracheal intubation Rocuronium, a nondepolarizing muscle relaxant was compared here for tracheal intubating conditions.

**Aim of the study:** To compare the intubating conditions achieved in patients undergoing elective surgeries under General Anaesthesia with Suxamethonium or Rocuronium in 60 secs and complications in both groups.

**Materials and methods:** This study was conducted in Institute of Anaesthesiology and Critical care at Madras medical college, Chennai during the period 2014 – 15100 patients of ASA I and II were divided randomly into 2 groups undergoing elective surgeries: Group I - Suxamethonium Group II - Rocuronium assessed for intubating conditions after administration of the corresponding drug.

**Results:** The intubating conditions were excellent in group I Suxamethonium as against Group II Rocuronium in 60 secs. According to the cooper scoring system the scores of vocal cord movement in group I (Suxamethonium) was 2.68 (mean) ± 0.471 and in group II (Rocuronium) was 2.34±0.557, the scores of response to intubation in group I (Suxamethonium) was 2.98±0.141 and in group II (Rocuronium) was 2.70±0.463 with better intubating conditions in group I receiving Suxamethonium than Rocuronium. The results were significant with a p-value of <0.05 whereas the scores of jaw

relaxation in group I patients (Suxamethonium) was 2.70 (mean) $\pm$ 0.463 and group II patients (Rocuronium) was 2.52 $\pm$ 0.544 with better jaw relaxation.

**Conclusion:** Rocuronium can be used as an alternative when suxamethonium is contraindicated for rapid intubation but not if the anticipated difficult airway is present. Rocuronium can be chosen as an alternative to it even in rapid sequence intubation in emergency cases, provided the airway is properly assessed and no anticipated difficult intubation is present.

## Key words

Suxamethonium, Rocuronium bromide, Tracheal intubating, Jaw relaxation.

## Introduction

Endotracheal intubation is necessary for giving general anesthesia. It is important for anaesthesiologist to reduce the airway injuries associated with tracheal intubation [1]. Good intubating conditions are produced by the adequate depth of anesthesia and muscle relaxation [2]. Suxamethonium is often used in surgeries as it provides excellent intubating conditions and early establishment of patent airway thereby reducing airway injuries and aspiration. Still the side effects it may produce may range from postoperative myalgia to life-threatening complications like dysrhythmias, hyperkalemia, malignant hyperthermia [3]. To give good intubating conditions and early establishment of airway patency in patients with risk of complications with Suxamethonium, Rocuronium a newer steroidal nondepolarising muscle relaxant was introduced which has a rapid onset of action comparable to Suxamethonium. This study compares the intubating conditions achieved with Suxamethonium and Rocuronium [4].

## Materials and methods

This study was conducted in Institute of Anesthesiology and Critical care at Madras Medical College, Chennai during the period 2014 – 15 100 patients of ASA I and II were divided randomly into 2 groups undergoing elective surgeries: Group I - Suxamethonium Group II - Rocuronium assessed for intubating conditions after administration of the corresponding drug.

## Exclusion criteria

- Not satisfying inclusion criteria.

- Patients posted for emergency surgery
- Patients with difficult airway.
- Lack of written informed consent.
- Pregnant female.
- Neuromuscular disorders.
- Obese individual.
- Allergy to Suxamethonium or Rocuronium.

The study involved 100 patients who were randomly divided into main groups of 50 patients each with the first group being the Suxamethonium and the second group being the Rocuronium assessed for intubating conditions after administration of the corresponding drug. All patients were subjected to a detailed pre-anesthetic evaluation and the presence of significant systemic diseases and difficult airways were ruled out. Informed consent was taken and the procedure was explained to them. All patients were given 0.5 mg of Alprazolam and 150mg of Ranitidine orally on the previous night of surgery. On the morning of surgery, an intravenous line was secured with the appropriate size. Patient monitors: Monitors included non - invasive blood pressure monitor, ECG, pulse oximeter. All patients were pre-oxygenated with 100% Oxygen for 3 – 5 minutes. Pre-induction heart rate and blood pressure were measured. Patients were induced with Thiopentone 5 mg/kg iv. Patients were ventilated with 100% Oxygen for 60 seconds. Intubating conditions were assessed after administration of neuromuscular blocker in 60 seconds. The intubating conditions were assessed according to the scoring system by Cooper, et al. (1992). Parameters taken into

consideration were jaw relaxation, vocal cords movement and gross response to intubation.

## Results

This study was conducted during the period 2014 – 15 and involved 100 patients undergoing elective surgery under GA. They were randomly divided into two main groups with Group 1 receiving Suxamethonium and Group 2 receiving Rocuronium and the intubating conditions were assessed in 60 seconds according to the system proposed by Cooper et al and were classified as excellent, good, fair and poor.

In both the groups with respect to age, body weight and sex distribution, it is statistically not significant. The intubating conditions assessed at 60 seconds following the administration of corresponding neuromuscular blockers were observed to be excellent in 42 patients (84%) in group I (Suxamethonium) while they were excellent in 26 patients (52%) in group II (Rocuronium). The intubating conditions were good in 8 patients (16%) in group I (Suxamethonium) while they were good in 21 patients (42%) in group II (Rocuronium). The intubating conditions were observed to be fair in

3 patients (6%) in group II (Rocuronium). In all the patients (100%) in Group I (Suxamethonium) it was observed that the intubating conditions were better with dense neuromuscular blockade whereas it was observed in 47 patients (94%) in group II (Rocuronium) the intubating conditions were good to excellent and was acceptable. The result was significant with a p-value of < 0.01. According to the, cooper scoring system the scores of vocal cord movement in group I an (Suxamethonium) was 2.68 (mean)  $\pm$ 0.471 and in group II (Rocuronium) was 2.34 $\pm$ 0.557, the scores of response to intubation in group I (Suxamethonium) was 2.98 $\pm$ 0.141 and in group II (Rocuronium) was 2.70 $\pm$ 0.463 with better intubating conditions in group I receiving Suxamethonium than Rocuronium. The results were significant with a p-value of <0.05 whereas the scores of jaw relaxation in group I patients (Suxamethonium) was 2.70 (mean)  $\pm$  0.463 and group II patients (Rocuronium) was 2.52 $\pm$ 0.544 with better jaw relaxation. The results were not as significant as p-value >0.05. In overall scoring, the results were significant with better intubating conditions in patients receiving Suxamethonium (**Table – 1, 2**).

**Table - 1:** Age group distribution.

			Group		
			GROUP - I Suxamethonium (1.5 mg/kg)	GROUP - II Rocuronium (1.0mg/kg)	Total
Age (In Years)	< 30 Years	Count % within Group	31 62.0%	23 46.0%	54 54.0%
	31 - 40 Years	Count % within Group	10 20.0%	13 26.0%	23 23.0%
	41 - 50 Years	Count % within Group	4 8.0%	10 20.0%	14 14.0%
	51 - 60 Years	Count % within Group	5 10.0%	4 8.0%	9 9.0%
Total		Count	50	50	100
		% within Group	100.0%	100.0%	100.0%

**Table - 2:** Intubating conditions distribution in each group with t-test below.

Group		N	Mean	Std. Deviation	Std. Error Mean
Cooper Scoring System	GROUP - I Suxamethonium (1.5 mg/kg)	50	8.36	.749	.106
	GROUP - II Rocuronium (1.0 mg/kg)	50	7.54	.994	.141
Jaw Relaxation	GROUP - I Suxamethonium (1.5 mg/kg)	50	2.70	.463	.065a
	GROUP - II Rocuronium (1.0 mg/kg)	50	2.52	.544	.077
Vocal Cords	GROUP - I Suxamethonium (1.5 mg/kg)	50	2.68	.471	.067
	GROUP - II Rocuronium (1.0 mg/kg)	50	2.34	.557	.079
Response to Intubation	GROUP - I Suxamethonium (1.5 mg/kg)	50	2.98	.141	.020
	GROUP - II Rocuronium (1.0 mg/kg)	50	2.70	.463	.065

## Discussion

In patients undergoing elective surgeries under GA, the airway of anaesthetized patient needs to be secured at the earliest for which we need a muscle relaxant of rapid onset, which also prevents the aspiration of gastric contents in patients who have a full stomach, delayed gastric emptying time, impaired function of the lower oesophageal sphincter [5]. Suxamethonium was the often used drug till now for rapid onset of intubating conditions. Still the side effects it may produce may range from postoperative myalgia to life-threatening complications like dysrhythmias, hyperkalemia, malignant hyperthermia. Rocuronium is a nondepolarizing muscle relaxant that first came into use in the 1990s [6]. It showed the acceptable faster onset of action compared to another nondepolarising muscle relaxant. There are studies showing different dosage regimens of Rocuronium producing acceptable intubating conditions [7]. Certain studies show that it can be used as an alternative to Suxamethonium in rapid sequence induction [8]. Previous studies showed that intubating conditions at 60 seconds were generally good with a dose of 0.6 mg/kg of

Rocuronium. Use of higher doses of Rocuronium by workers have been observed to increase the onset of intubating conditions during rapid sequence induction with increased duration of action. In our study, the intubating conditions following administration of 1 mg/kg of Rocuronium were compared with Suxamethonium 1.5 mg/kg in 60 seconds in different patients undergoing elective surgeries [9]. The intubating conditions assessed at 60 seconds following the administration of corresponding neuromuscular blockers were observed to be excellent in 42 patients (84%) in group I (Suxamethonium) while they were excellent in 26 patients (52%) in group II (Rocuronium). The intubating conditions were good in 8 patients (16%) in group I (Suxamethonium) while they were good in 21 patients (42%) in group II (Rocuronium) [10]. The intubating conditions were observed to be fair in 3 patients (6%) in group II (Rocuronium). Our findings were compared with to the study conducted by Cooper, et al., (1992). Rocuronium used at the dose of 0.6 mg/kg produced excellent intubating conditions in 60% of patients compared to 95% in patients received [11]

Suxamethonium. In our study, it was found when Rocuronium used at the dose of 1mg/kg it produced an excellent intubating condition in 52% of patients compared to 84% in patients receiving Suxamethonium [12]. It is seen that Rocuronium can be used to provide acceptable intubating conditions near equivalent to Suxamethonium making it an alternative. Rocuronium has the disadvantage of having an intermediate duration of action, with its standard intubating dosage regimens [13]. Hence, it is not recommended for patients with anticipated difficult intubation. A failed intubation in patients given Rocuronium can prove dangerous because of its intermediate duration of action. Suxamethonium with its rapid termination of action is a safer agent with anticipated difficult intubation [14, 15].

### **Conclusion**

Suxamethonium provides ideal intubating conditions very rapidly than Rocuronium, but Rocuronium also provides intubating conditions that are acceptable for the earlier establishment of the airway with minimal injury at 60 seconds at a dose of 1mg/kg near equivalent to Suxamethonium. As Suxamethonium has numerous side effects, Rocuronium can be chosen as an alternative to it even in rapid sequence intubation in emergency cases, provided the airway is properly assessed and no anticipated difficult intubation is present.

### **References**

1. Abouleish E, et al. Rocuronium for caesarean section. *Br J Anaesth*, 1994; 73: 336-341.
2. Abouleish E, et al. Rocuronium (Org 9426) for caesarean section. *Br J Anaesth*, 1994; 73: 336-341.
3. Agoston S. Onset time and evaluation of intubating conditions: Rocuronium in perspective. *Eur J Anaesthesiol*, 1995; 12 (Suppl 11): 31-37.
4. Booij L.H.D.J., Knape H.T.A. The neuromuscular blocking effect of Org 9426. *Anaesthesia*, 1991; 46: 341-343.
5. Booij L.H.D.J., Crul J.F., Van Der Pol F.F. Cardiovascular and neuromuscular blocking effects of four new muscle relaxants in anaesthetized beagle dogs. *Eur J Anaesthesiol*, 1989; 9: 70.
6. Bowman W.C., et al. Structure action relationship among some desacetoxy analogs of pancuronium and the anesthetized cat. *Anesthesiology*, 1998; 69: 57-62.
7. Cheng C.A. Aun C.S., Gin T. Comparison of Rocuronium and Suxamethonium for rapid tracheal intubation in children. *Paediatr Anaesth*, 2002 Feb; 12(2): 140-45.
8. Cooper R, et al. Comparison of intubating conditions after administration of Org 9426 (Rocuronium) and Suxamethonium. *Br J Anaesth*, 1992 Sep; 69(3): 269-273.
9. Cooper R.A., et al. Pharmacokinetics of Rocuronium bromide in patients with and without renal failure. *Eur J Anaesthesiol*, 1995; 12(Suppl 11): 43-44.
10. Cooper R.A., Mirakhur R.K., Maddineni V.R. Neuromuscular effects of Rocuronium bromide (Org 9426) during Fentanyl and halothane anesthesia. *Anaesthesia*, 1993; 48: 103-105.
11. de Rossi L., et al. Onset of neuromuscular block at the masseter and adductor pollicis muscles following Rocuronium or succinylcholine. *Can J Anaesth*, 1999 Dec; 46(12): 1133-1137.
12. Dreyer. Acetylcholine receptor. *Br J Anaesth*, 1982; 54: 115-130.
13. Durant N.N., Katz R.L. Suxamethonium. *Br J Anaesth.*, 1982; 54: 192-208.
14. F. Porte, et al. Rocuronium dose response of the diaphragm and adductor pollicis muscle. *Anesthesiology*, 1993 Sept; 79(3A): A 924.
15. Feldman S.A. Rocuronium - onset time and intubating condition. *Eur J. Anaesthesiol*, 1994; 9: 49-52.