



## Comparative Study of Efficacy 0.9mg/Kg Rocuronium Bromide with 1.5mg/Kg Succinyl Choline for Optimal Intubating Conditions – A Prospective Study

Dr Raghunath N

Associate Professor, Dept of Anesthesiology  
East Point College of medical sciences and research centre,  
Bidarahalli, Virgonagar post, Bangalore.

Dr E.J.Srinivas

Associate Professor, Dept of Anesthesiology  
East Point College of medical sciences and research centre,  
Bidarahalli, Virgonagar post, Bangalore.  
Corresponding Author: Dr E.J.Srinivas

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**ABSTRACT:** Rocuronium bromide (brand names Zemuron, Esmeron) is an aminosteroid non-depolarizing neuromuscular blocker or muscle relaxant used in modern anaesthesia to facilitate tracheal intubation by providing skeletal muscle relaxation, most commonly required for surgery or mechanical ventilation. Succinylcholine is a depolarizing skeletal muscle relaxant consisting of two molecules of the endogenous neurotransmitter acetylcholine (ACh) linked by their acetyl groups. It has been widely used for over 50 years, most commonly in its chloride salt form, as a means of neuromuscular blockade during intubation and surgical procedures. 50 patients, who are undergoing surgery under general anesthesia for various reasons at East Point College of medical sciences and research centre, were included in the study. In Group A constitutes of 25 patients, after adequate induction, skeletal muscle relaxation was carried out by intravenous administration of 0.9MG/KG ROCURONIUM BROMIDE. In Group B constitutes of 25 patients, after adequate induction, skeletal muscle relaxation was performed by intravenous administration of 1.5MG/KG SUCCINYL CHOLINE. In the present study, there were no significant differences in age, sex, body mass index and co morbidities between the two groups. Jaw relaxation was adequate in all patients in 2 groups with no significant difference among 2 groups. Vocal Cords were fully open in 20 patients of the group A, while group B showed fully open vocal cords in 24 patients. Response to intubation was none in 18 cases in group A, 24 cases in group B. Overall grading of intubating conditions at 60 seconds with group A is excellent in 20 cases and

satisfactory in 5 cases, with group B excellent in 24 cases and satisfactory in 1 case. From this study we conclude that, Succinylcholine is an ideal agent for intubation in all surgical procedures. Intubating conditions of Rocuronium bromide at a dose of 0.9mg/kg is comparable to Succinylcholine 1.5mg/kg at 1minute. Rocuronium bromide 0.9 mg/kg can be used safely in patients where Succinylcholine is contraindicated.

**KEYWORDS:** Rocuronium bromide, Succinylcholine.

### I. INTRODUCTION:

Rocuronium bromide (brand names Zemuron, Esmeron) is an aminosteroid non-depolarizing neuromuscular blocker or muscle relaxant used in modern anaesthesia to facilitate tracheal intubation by providing skeletal muscle relaxation, most commonly required for surgery or mechanical ventilation. It is used for standard endotracheal intubation, as well as for rapid sequence induction (RSI).<sup>[1]</sup> Rocuronium Bromide is a competitive antagonist for the Nicotinic acetylcholine receptors at the neuromuscular junction. Of the Neuromuscular-blocking drugs it is considered to be a non-depolarizing neuromuscular junction blocker, because it acts by dampening the receptor action causing muscle relaxation, instead of continual depolarisation which is the mechanism of action of the depolarizing neuromuscular junction blockers, like succinylcholine. It was designed to be a weaker antagonist at the neuromuscular junction than pancuronium; hence its monoquaternary structure and its having an allyl group and a pyrrolidine group attached to the D ring quaternary



nitrogen atom. Rocuronium has a rapid onset and intermediate duration of action.<sup>[2]</sup> There is considered to be a risk of allergic reaction to the drug in some patients (particularly those with asthma), but a similar incidence of allergic reactions has been observed by using other members of the same drug class (non-depolarizing neuromuscular blocking drugs). The  $\gamma$ -cyclodextrin derivative sugammadex (trade name Bridion) has been recently introduced as a novel agent to reverse the action of rocuronium. Sugammadex has been in use since 2009 in many European countries; however, it was turned down for approval twice by the US FDA due to concerns over allergic reactions and bleeding, but finally approved the medication for use during surgical procedures in the United States on December 15, 2015. Neostigmine can also be used as a reversal agent of rocuronium but is not as effective as sugammadex. Neostigmine is often still used due to its low cost compared with sugammadex.

Succinylcholine is a depolarizing skeletal muscle relaxant consisting of two molecules of the endogenous neurotransmitter acetylcholine (ACh) linked by their acetyl groups. It has been widely used for over 50 years, most commonly in its chloride salt form, as a means of neuromuscular blockade during intubation and surgical procedures. Its rapid onset and offset, with effects beginning within 60 seconds of intravenous administration and lasting between four to six minutes, make succinylcholine particularly useful in the setting of short medical procedures requiring brief periods of muscle relaxation. Succinylcholine's neuromuscular blockade takes effect within 60 seconds of intravenous administration and lasts between four to six minutes. Similar to acetylcholine, it binds to

cholinergic receptors of the motor endplate to induce membrane depolarization and, eventually, muscle paralysis, which may be maintained for as long as an adequate concentration of succinylcholine remains at the receptor site.<sup>8</sup> Succinylcholine has no direct action on smooth or cardiac muscle, nor does it appear to act on pre-synaptic or ganglionic acetylcholine receptors. The paralysis induced by succinylcholine has been described as "progressive", first involving the muscles of the face and glottis, then the intercostals and diaphragm, then followed by other skeletal muscles.<sup>3</sup>

## II. OBJECTIVE:

To compare efficacy 0.9mg/kg rocuronium bromide with 1.5mg/kg succinyl choline for optimal intubating conditions

## III. MATERIALS AND METHODS:

50 patients, who are undergoing surgery under general anesthesia for various reasons at East Point College of medical sciences and research centre, were included in the study. In Group A constitutes of 25 patients, after adequate induction, skeletal muscle relaxation was carried out by intravenous administration of 0.9MG/KG ROCURONIUM BROMIDE. In Group B constitutes of 25 patients, after adequate induction, skeletal muscle relaxation was performed by intravenous administration of 1.5MG/KG SUCCINYL CHOLINE.

**Ethical approval:** For collection and analysis of data in our study approval was obtained by institutional ethical committee.

## IV. RESULTS:

Table 1: Demographic characteristics of the patients.

	0.9MG/KG ROCURONIUM BROMIDE GROUP (n=25)	1.5MG/KG SUCCINYL CHOLINE GROUP (n=25)
Age in years	Average 42 years	Average 46 years
Sex ratio(male:female)	15:10	18:7
BMI	Average 22	Average 23
Co-morbidities		
• Hypertension	8	10
• Diabetes	6	3
• COPD	5	9

There were no significant differences in age, sex, body mass index and co morbidities between the two groups.

**Table 2: Comparison of intubating conditions among the two groups at 60 seconds.**

		0.9MG/KG ROCURONIUM BROMIDE GROUP (n=25)	1.5MG/KG SUCCINYL CHOLINE GROUP (n=25)
<b>Jaw relaxation</b>	Good	25	25
	Moderate	-	-
	Minimal	-	-
	Poor	-	-
<b>Vocal cords</b>	Open	20	24
	Moving	5	1
	Closing	-	-
	Closed	-	-
<b>Reaction to intubation</b>	None	18	24
	Light movements	7	1
	Mild cough	-	-
	Sever cough	-	-

Jaw relaxation was adequate in all patients in all 2 groups with no significant difference among 2 groups. Vocal Cords were fully open in 20 patients of the group A, while group B showed fully open vocal cords in 24 patients. Response to intubation was none in 18 cases in group A, 24 cases in group B.

**Table - 3: Comparison of grading of intubating conditions among the two groups**

<b>GRADING OF INTUBATING CONDITIONS</b>	0.9MG/KG ROCURONIUM BROMIDE GROUP (n=25)	1.5MG/KG SUCCINYL CHOLINE GROUP (n=25)
Excellent	20	24
Satisfactory	05	01
Poor	-	-
Impossible	-	-

Overall grading of intubating conditions at 60 seconds with group A is excellent in 20 cases and satisfactory in 5 cases, with group B excellent in 24 cases and satisfactory in 1 case.

## V. DISCUSSION:

In the present study, there were no significant differences in age, sex, body mass index and co morbidities between the two groups. Jaw relaxation was adequate in all patients in all 2 groups with no significant difference among 2 groups. Vocal Cords were fully open in 20 patients of the group A, while group B showed fully open vocal cords in 24 patients. Response to intubation was none in 18 cases in group A, 24 cases in group B. Overall grading of intubating conditions at 60 seconds with group A is excellent in 20 cases and satisfactory in 5 cases, with group B excellent in 24 cases and satisfactory in 1 case.

According to a study by Maitriya et al., total 90 patients were randomly allocated into 3 groups. Muscle relaxant given in group A is roc 0.6mg/kg, in group B roc 0.9mg/kg and in group C

Succinyl Choline (sch) 1.5mg/kg. Intubating conditions at 60s were poor with roc 0.6mg/kg when compared with roc 0.9mg/kg and sch 1.5mg/kg. Mean time of onset of action was (80.2 ± 4.74) secs in roc 0.6mg/kg, (57.33 ± 2.28) secs in roc 0.9mg/kg and (55.6 ± 2.22) secs in sch 1.5mg/kg. Statistically, changes in heart rate and mean blood pressure were significant (p<0.0001) immediately after and 5 min after intubation (p<0.0001) but not significant at 10 and 15 min after intubation (p>0.05) among the three groups.<sup>4</sup>

According to a study by Mahalakshmi, Vocal cord relaxation is comparable between group a and c. Excellent intubating conditions was seen with Group A (Sch 1.5mg/kg) with 100% score. Excellent intubating conditions with Group B (Roc 0.6 mg/kg) and Group C are 30% and 85% respectively. P value of Succinylcholine 1.5 mg/kg and Rocuronium 0.9 mg/kg is 0.466 statistically not significant. Succinylcholine is an ideal agent for intubation in all surgical procedures. Intubating conditions of Rocuronium bromide at a dose of 0.9mg/kg (3xED95) is comparable to



Succinylcholine 1.5mg/kg at 1minute. Rocuronium bromide 0.9 mg/kg can be used safely in patients where Succinylcholine is contraindicated.<sup>5</sup>

According to a study by Shobhana Gupta, the patients were divided into two groups, each consisting of 30 patients: group a patient's received Rocuronium bromide, 0.6 mg/kg and group B patients received Succinyl Choline 1.5 mg/kg. In both the groups, jaw relaxation and vocal cord relaxation were considered for atraumatic laryngoscopy at 60 seconds or, if needed, at 75 seconds and then at 90 seconds. Intubation conditions were rated as excellent in 90% and good in 10% of the patients who received Rocuronium, and excellent in 100% of the patients who received Succinyl Choline. It is concluded from this study that intubation can be performed under good to excellent conditions at 60-90 seconds after a bolus dose of Rocuronium of 0.6 mg/kg. The result of this study indicates that this new nondepolarizing neuromuscular blocking agent may be considered as a valuable alternative to Succinyl Choline for rapid tracheal intubation, i.e., within 60 seconds, even after induction with Thiopentone as the sole anesthetic agent.<sup>6</sup>

## VI. CONCLUSION:

From this study we conclude that, Succinylcholine is an ideal agent for intubation in all surgical procedures. Intubating conditions of Rocuronium bromide at a dose of 0.9mg/kg is comparable to Succinylcholine 1.5mg/kg at 1minute. Rocuronium bromide 0.9 mg/kg can be used safely in patients where Succinylcholine is contraindicated.

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