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Original Research Article

A PROSPECTIVE, RANDOMISED CONTROLLED STUDY TO COMPARE THE INTUBATING CONDITIONS OBTAINED WITH BOTH SUXAMETHONIUM AND ROCURONIUM BROMIDE

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ABSTRACT

Background: Endotracheal intubation is used to administer general anesthesia, requiring sufficient muscle relaxation. Suxamethonium is still utilized as a muscle relaxant, particularly for the specific purpose of endotracheal intubation. This study evaluated the conditions under which Rocuronium, a non-depolarizing neuromuscular blocking drug, is used for tracheal intubation.

Materials and Methods: A randomized trial was undertaken on a cohort of 200 patients who were classified as ASA I and II. The patients were randomized to two groups for elective procedures using a randomization process. Suxamethonium is classified under Group I. Rocuronium is categorized as a part of Group II.

Results: Group I, which administered Suxamethonium, exhibited significantly superior intubating conditions in comparison to Group II, which administered Rocuronium, within a duration of 60 seconds. Both factors in both groups showed an increase after reaching the highest point at 1 minute, and then gradually returned to their normal values.

Conclusion: Rocuronium can serve as a substitute when suxamethonium is not appropriate for swift intubation. However, it should not be administered in cases when there is an expected challenging airway.

Keywords: Suxamethonium, rocuronium bromide, endotracheal intubation, ASA.

INTRODUCTION

Endotracheal intubation is a required procedure for administering general anesthesia. Anaesthesiologists must prioritize the reduction of airway injuries that are commonly associated with tracheal intubation. Optimal intubating circumstances are achieved through sufficient anesthetic depth and muscular relaxation. Prior to the implementation of muscle relaxants, the only option for endotracheal (ET) intubation was the use of inhalational drugs. However, this method was often insufficient in achieving the desired level of anesthesia. In order to produce sufficient intubating circumstances, it was necessary to employ larger concentrations, which were linked to hemodynamic abnormalities. Succinylcholine, often referred to as suxamethonium chloride, was introduced by Thesleff and Foldes in 1952. This medicine is highly preferred for its extremely fast start and brief duration of action. It is commonly used to achieve optimal circumstances for intubation in under 60 seconds, whether it is for planned or urgent surgical procedures. Nevertheless, the adverse consequences of succinylcholine prompted a quest for an optimal nondepolarizing neuromuscular blocking drug. Rocuronium bromide,

which was introduced into clinical practice by Dr. Sleigh and the late Dr. Savage in 1990, was the first medicine to rival the quick onset time of succinylcholine while allowing for speedy and safe endotracheal intubation without its associated adverse effects.[1-4]

Suxamethonium is frequently employed during surgical procedures due to its ability to create optimal circumstances for intubation and quickly establish an unobstructed airway, thus minimizing the risk of airway injury and aspiration. The potential adverse effects of this treatment might vary from postoperative muscle pain to severe issues such as abnormal heart rhythms, high levels of potassium in the blood, and a life-threatening condition called malignant hyperthermia. This study examines and contrasts the intubating conditions attained with Suxamethonium and Rocuronium.[5-7]

MATERIAL AND METHODS

The study was conducted in the Department of Anaesthesiology, Government Siddhartha Medical College, Vijayawada, Andhra Pradesh, India from March 2023 to February 2024. Its objective was to assess and compare the circumstances achieved for intubation. The study was conducted on a sample of 200 participants following ethical permission from the institution's committee.

Inclusion Criteria

1. Individuals within the age range of 18 to 60 years old
2. Individuals having a body mass index (BMI) below 30 kg/m2.
3. Individuals who have ASA I and II classification and are undergoing elective surgery.
4. Subjects who have Mallampatti scores of I and II.
5. Who have given explicit and informed consent.

Exclusion Criteria

1. 1.Patient does not meet the required criteria.
2. Patients who have been assigned a specific date and time for surgical operations that require immediate attention.
3. Patients who have difficult or complex airway difficulties
4. Lack of documented consent
5. Pregnant female
6. Individuals suffering from neuromuscular disorders
7. People who are obese
8. Hypersensitivity to Suxamethonium or Rocuronium.

RESULTS

Table 1: Groups distribution

Group	N	Mean	Std. Deviation	Std. ErrorMean
Age (In Years) GROUP - I Suxamethonium (1.5mg/kg)	100	32.76	15.568	1.985
GROUP - II Rocuronium(1.0mg/kg)	100	36.65	14.664	1.865

Table 2: Age Distribution

			Group		
			GROUP - I Suxamethonium (1.5 mg/kg)	GROUP - II Rocuronium (1.0mg/kg)	Total
Age In Years)	< 30 Years	Count	43	37	80
		% within Group	43%	37.0%	40.0%
	31 - 40 Years	Count	22	28	50
		% within Group	22.0%	28.0%	25%
	41 - 50 Years	Count	20	20	46
		% within Group	20.0%	20.0%	23.0%
	51 - 60 Years	Count	15	15	30
		% within Group	15.0%	15.0%	15.0%
Total		Count	100	100	200
		% within Group	100.0%	100.0%	100.0%

Table 3: Distribution of weight

Group	N	Mean	Std. Deviation	Std. Error Mean
Body Wt Kg GROUP - I				
Suxamethonium (1.5 mg/kg)	100	56.95	9.687	1.564
GROUP - II Rocuronium (1.0mg/kg)	100	67.89	8.899	1.354

Table 4: Distribution of gender

	Group		
	GROUP - I	GROUP - II	
	Suxameth	Rocuronium	

			onium		Total
			(1.5 mg/kg)	(1.0mg/kg)	
Sex	Male	Count	52	48	100
		% within Group	52.0%	48.0%	50.0%
	Female	Count	48	52	100
		% within Group	48.0%	52.0%	50.0%
Total		Count	100	100	200
		% within Group	100.0%	100.0%	100.0%

Table 5: Distribution of intubating conditions

Group		N	Mean	Std. Deviation	Std. ErrorMean
Cooper Scoring System	GROUP - I Suxamethonium (1.5mg/kg)	100	9.84	.987	.165
	GROUP - II Rocuronium (1.0mg/kg)	100	8.64	.935	.136
Jaw Relaxation	GROUP - I Suxamethonium (1.5mg/kg)	100	4.16	.698	.098
	GROUP - II Rocuronium (1.0mg/kg)	100	3.49	.635	.086
Vocal Cords	GROUP - I Suxamethonium (1.5mg/kg)	100	3.85	.659	.065
	GROUP - II Rocuronium (1.0mg/kg)	100	3.18	.598	.098
Response to Intubation	GROUP - I Suxamethonium (1.5mg/kg)	100	3.67	.169	.046
	GROUP - II Rocuronium (1.0mg/kg)	100	3.15	.587	.056

Table 6: Mean Arterial Pressure

Time of monitoring	I	II
Resting	94.3±4.3	94.5±7.9
After induction	94.7±9.8	94.5±7.6
After intubation at 1 minute	98.7±4.8	106.8±8.9
At 2 minutes	97.5±9.5	100.5±7.6
At 5 minutes	93.7±13.8	95.3±8.5

DISCUSSION

When conducting elective procedures using general anesthesia, it is crucial to promptly and securely establish the airway of the anesthetized patient. To do this, it is imperative to utilize a muscle relaxant with a rapid onset. Moreover, this muscle relaxant is anticipated to impede the inhalation of stomach contents in individuals who have disorders such as a distended stomach, delayed gastric emptying, or reduced functionality of the lower esophageal sphincter. Suxmethonium is commonly employed as a pharmaceutical agent for rapid induction of intubation.[8-10]

The potential negative outcomes of this surgical procedure might vary from postoperative muscle soreness to more severe problems such as dysrhythmias, hyperkalemia, and malignant hyperthermia. Rocuronium is a neuromuscular blocking drug that functions as a non-depolarizing muscle relaxant. Several studies have demonstrated that various dose regimens of Rocuronium can result in advantageous intubation circumstances. Various investigations indicate that it has the capability to serve as a substitute for Suxamethonium in rapid sequence induction. Prior research has demonstrated that the intubation circumstances were generally acceptable within a time frame of 60 seconds while administering a dose of 0.6 mg/kg of Rocuronium.[11-13]

Empirical research suggests that when medical personnel administer higher doses of Rocuronium, it leads to a faster commencement of intubation during rapid sequence induction and a longer duration of its effects. A study was conducted to examine the intubating conditions in individuals who were undergoing elective procedures. The administration of 1 mg/kg of Rocuronium and 1.5 mg/kg of Suxamethonium was accomplished within a duration of 60 seconds. Within group I (Suxamethonium), 8 patients (16%) encountered favorable intubating conditions, but in group II (Rocuronium), 21 patients (42%) encountered favorable intubating settings. Out of the patients in group II who received Rocuronium, only three (6%) experienced favorable intubating conditions. Additionally, we assessed the hemodynamic response in our experiment.[14.15]

Some investigations indicate that it can serve as a substitute for Suxamethonium in rapid sequence induction. Prior research demonstrated that the intubating circumstances were generally favorable after 60 seconds when administering a dosage of 0.6 mg/kg of Rocuronium. whereas Suxamethonium achieved this in 95% of patients. Our study revealed that administering Rocuronium at a dosage of

1mg/kg resulted in a favorable intubating situation in 52% of patients, whereas patients who received Suxamethonium had an 84% success rate. Rocuronium can be utilized as a viable alternative to Suxamethonium for achieving satisfactory intubating circumstances. Rocuronium can be a viable alternative to Suxamethonium as it can produce intubation conditions of comparable quality. Rocuronium is characterized by a moderate duration of action, which is a drawback when considering its usual dosage regimens for intubation. Therefore, it is not recommended for patients who are expected to experience a challenging intubation. Administering Rocuronium to persons can pose a significant risk if intubation is unsuccessful, because to its moderate duration of action. Suxamethonium is the preferred medicine to employ in circumstances where difficult intubation is expected, because it quickly stops working.[16,17]

CONCLUSION

Suxamethonium facilitates intubation more expediently than Rocuronium by creating optimal circumstances. However, Rocuronium offers suitable conditions for intubation, enabling the quick formation of the airway with few negative consequences. Administering a dose of 1mg/kg can achieve this within 60 seconds, with results similar to Suxamethonium. Rocuronium can be used as a suitable substitute for Suxamethonium in emergency situations requiring rapid sequence intubation. This is because Rocuronium has the capacity to reduce the various negative effects commonly associated with Suxamethonium. Nevertheless, it is essential to conduct a thorough evaluation of the airway and verify that there are no expected difficulties during the intubation procedure.

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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. Anaesthesiology, 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 political muscle. Anaesthesiology, 1993 Sept; 79(3A): A 924.
15. Feldman S.A. Rocuronium - onset time and intubating condition. Eur J. Anaesthesiol, 1994; 9: 49-52
16. Parikh, Kusuma, Dixit B. Modh, and Mahendra R. Upadhyay. "Comparision of rocuronium bromide with suxamethonium chloride for tracheal intubation." (2014).
17. Gupta, Shobhana, and R. Kirubahar. "A comparative study of intubating conditions of rocuronium bromide and suxamethonium in adult patients." Anesthesia Essays and Researches 4, no. 1 (2010): 15-19.