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Original Research Paper

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INTUBATING CONDITIONS AFTER ROCURONIUM, VECURONIUM AND ATRACURIUM IN CHILDREN - A COMPARATIVE STUDY

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ABSTRACT

Background Muscle relaxation is important to achieve good intubating conditions. Therefore, a study had been planned to compare the intubating conditions after administration of three most commonly used non-depolarizing muscle relaxants vecuronium, atracurium and rocuronium, in children, so that proper selection of drug could be made to intubate the patient. Aim of our study is to evaluate the development of clinically acceptable tracheal intubating conditions and to compare onset time after administration of equipotent doses of vecuronium, atracurium and rocuronium in children. **Material & Methods:** A prospective randomised control trial was carried out among 60 children of age 4 to 18 years of either sex belonging to ASA grade I and II and were allocated 3 equal groups of 20 each (n=20) viz Group A, Group B, Group C. After pre-oxygenation and induction with intravenous injection nalbuphine (0.2mg/kg) and propofol (2mg/kg) all patients were randomly received a bolus of either 0.1mg/kg vecuronium, 0.5mg/kg atracurium or 0.6mg/kg rocuronium and time was noted. After administration of muscle relaxants, endotracheal intubations were attempted every 60 seconds until excellent or good intubating conditions were achieved upto maximum of 240 seconds. The data were analysed statistically by One Way Anova test and Tuskey's post hoc test. **Results:** The quality of intubating condition was better with rocuronium than with vecuronium and atracurium. Time required to achieve successful intubation was also significantly less with rocuronium (106.77 ± 42.06) than with vecuronium (100.15 ± 39.80sec vs. 167.8 ± 62.09sec;) and atracurium (106.77 ± 42.06sec vs. 192.75 ± 50.90sec). **Conclusion:** Hence, it is concluded that clinically acceptable and better intubating conditions were produced earlier with rocuronium than with atracurium and vecuronium with successful intubation achieved more early with rocuronium.

KEYWORDS :

INTRODUCTION

Vecuronium, Atracurium and Rocuronium are the three commonly used intermediate non-depolarizing muscle relaxants, nowadays. Difference in potency and duration of action have been observed among children and adult for most neuromuscular blocking drug. The onset of action of non-depolarizing relaxants is more rapid at diaphragm and laryngeal muscle than at the adductor pollicis, and approximately twice the dose is required to produce the same degree of paralysis at diaphragm. Thus, assessment of intubating conditions is the only criteria to decide which muscle relaxant should be used for tracheal intubation.

Therefore, a study has been planned to compare the intubating conditions in children so that proper selection of drug could be made.

AIMS AND OBJECTIVES

To compare the timing of achievement of successful intubation and to evaluate the development of clinically acceptable tracheal intubating conditions after administration of equipotent doses of vecuronium, atracurium and rocuronium in children.

MATERIAL AND METHOD

Study Parameters

Study design : Prospective, randomized, controlled, double blind study.

Study Centre: This study was carried out in the Department of Anesthesiology & Critical Care, DMCH, Laheriasarai.

Study Sample:
Total number of patients studied were 60 with 20 in each group.

Inclusion criteria :-
Children of age 4 to 18 years of either sex of ASA I or ASA II categories undergoing variety of elective surgical procedures requiring general anesthesia.

Exclusion criteria

1. Patients with refused consent
2. Anticipated difficult intubation
3. Any neuromuscular disorder
4. Patients receiving drugs influencing neuromuscular transmission

Study Period:
This study was completed within 12 months from June 2021 to august 2022 after approval of the Institutional Ethics Committee of DMCH.

Study Technique:

Plan of study-
The patients were randomly allocated to 3 groups of twenty each viz Group A, Group B, and Group C.

GROUP	NUMBER	DRUG	DOSE
A	20	VECURONIUM	0.1mg/kg
B	20	ATRACURIUM	0.5mg/kg
C	20	ROCURONIUM	0.6mg/kg

Patient preparation-
After patient were received in operating room, documents were checked, a brief examination was done and monitors were attached to record Pulse rate, Respiratory rate, Oxygen saturation, Blood pressure.

All patients were preoxygenated with 100% oxygen for 5 min and then induced with intravenous injection of nalbuphine (0.2mg/kg) and propofol (2mg/kg). After induction, equipotent

dose of neuromuscular blocker was introduced to the patients according to their randomization group.

The time of administration of neuromuscular blockers were noted. Endotracheal intubations were attempted using endotracheal tubes [of sizes appropriate for the age]. The first intubation attempt was made at **60 s**, after administration of relaxant. Subsequent attempts were made at 60 seconds interval at **120 seconds**, **180 seconds** and the last attempt was made at **240 seconds.**

Endotracheal intubation was not performed until intubating conditions had been assessed to be excellent or good and the time of successful intubation was noted.

Intubation conditions were scored as excellent, good or poor based on laryngoscopy [jaw relaxation],vocal cords position and movements and movement of limbs and coughing in response to intubation and/ or cuff inflation using the scoring systems proposed by Viby-Mogensen.

VARIABLES	EXCELLENT	GOOD	POOR
JAW RELAXATION LARYNGOSCOPY	EASY RELAXED	FAIR NOT FULLY	DIFFICULT RESISTANCE
VOCAL CORDS POSITION MOVEMENT	ABDUCTED NONE	INTERMEDIATE MOVING	CLOSED CLOSING
REACTION TO INTUBATION AND/OR INFLATION MOVEMENT OF LIMB OR COUGHING	NONE NONE	SLIGHT SLIGHT DIAPHRAGMATIC MOVEMENT	VIGOROUS SUSTAINED

Plan for statistical analysis

Data was analysed by MS Excel and IBM SPSS statistics version 28.0.1.1 with Categorical variables were compared between groups by Chi-square test and Numerical variables by ANOVA test followed by Tukey's test for post- hoc comparisons. P value <0.05 was considered as statistically significant.

RESULT AND ANALYSIS

The mean intubation time in Group C (**100.15± 40.84 sec**) was significantly lower than in A (**167.8 ± 62.09sec)** and group B (**192.75 ± 52.23 sec**) [**One-Way ANOVA test for numerical values; p < 0.001**].

Comparison of intubating conditions at individual time-points between two groups done by Chi-square test was statistically significant [p < 0.001].

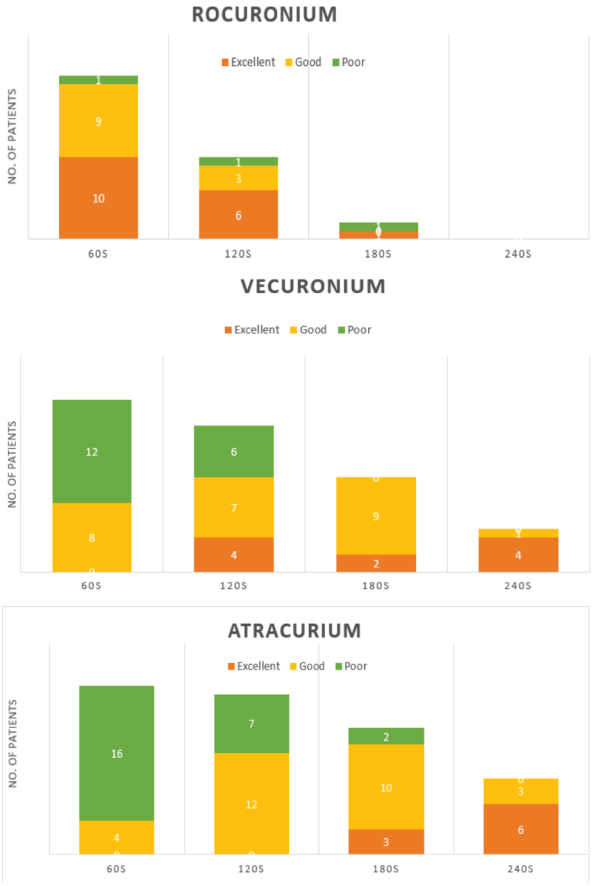
GROUP	MEAN and SD
A	167.8 ± 62.09sec
B	192.75 ± 52.23sec
C	100.15± 40.84s

When the intubation times between any two individual groups were compared by **Tukey's test for post-hoc comparison**, the data showed that the intubation times in **Group C** was significantly different from those in Group A and Group B [**p < 0.001**].

One Way Anova Post Hoc Tuskey Test

GROUP (I)	GROUP (J)	Mean Difference (I-J)	Significance
A	B	-24.950	0.297
	C	67.650	<0.001
B	A	24.950	0.297
	C	92.600	<0.001
C	A	-67.650	<0.001
	B	-92.600	<0.001

Comparison of intubating conditions at individual time-points between two groups done by **Chi-square test** was statistically significant [**p < 0.001**].



CONCLUSION

Successful intubation could be achieved more early with rocuronium (**100.15± 40.84 sec**) than with vecuronium (**167.8 ± 62.09sec**) and atracurium (**192.75 ± 52.23 sec**). And clinically acceptable and better intubating conditions were produced earlier with rocuronium than with atracurium and vecuronium. So, rocuronium may be a better choice than atracurium and vecuronium for intubation in children