VOLUME-7, ISSUE-6, JUNE-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Anaesthesiology

EVALUATION OF INTUBATING CONDITIONS WITH ROCURONIUM BY PRIMING TECHNIQUE. A RANDOMIZED DOUBLE BLIND STUDY.

Dr.Sangeetha Rao.Dara — Associatet Professor, Department of Anaesthesiology, RIMS ,Ongole.

Dr.Madhu priya.vempalli* — Assistant Professor, Department of Anaesthesiology, ACSR Govt. Medical College, Nellore.* Corresponding Author

ABSTRACT

BACKGROUND: a prospective, randomized, double-blind study was designed to evaluate the effects of priming technique with rocuronium bromide for intubation in adult patients undergoing surgical procedures.

METHODS: sixty adult patients of 20-60 years of age with asa-1 physical status posted for surgical procedures were divided in to two groups. group c received normal saline (2ml) as priming dose and group p received 0.06mg/kg rocuronium (2 ml) as priming dose and after 3 minutes intubating dose group c received 6 mg /kg (5 ml) group p received the 5.4 mg /kg (5 ml) as intubating dose .muscle relaxation was assessed with nerve stimulator for every 10 seconds and assessed visually for loss of adduction of thumb and disappearance of t1 of train of four (TOF) stimuli. By this we can note the onset time of intubation (Ti) and intubating conditions were assessed buy cooper et al scoring system. Any adverse effects were also noted.

RESULTS: The mean onset of intubation time (Ti) in the group P was 52.33±6.79 sec, in the group C was 95.67±11.04 sec ,P value is 0.00 it is highly significant. Minimum Ti is 80 sec. and maximum Ti is 120 sec. intubation scores as per "cooper et al scoring" were 8 or 9 in both the groups. There were no incidences of weakness, aspiration, bradycardia, ptosis, hypotension, in either of the groups during study observation.

CONCLUSION: administration of Priming dose of rocuronium before the intubating dose causes the onset of neuromuscular block is rapid and onset time of intubation is became comparable to that of suxamethonium with excellent intubating conditions and without adverse effects.

KEYWORDS : Rocuronium,Priming,Intubating Conditions,Onset Time Of Intubation.

INTRODUCTION

Succinylcholine chloride is commonly used for rapid sequence intubation and for routine intubations because of its near ideal intubating conditions. but succinylcholine chloride is associated with many side effects like muscle pain, bradycardia, hyperkalaemia, increased intra gastric pressure, increased intraocular pressure, masseter spasm, sudden cardiac arrest especially in infants and adolescents.[1]

In situations where the use of succinylcholine is considered undesirable, a non-depolarizing neuromuscular drug can be used. Rocuronium bromide, a steroid non-depolarizing relaxant is a promising drug as it showed a faster onset of development of neuromuscular block with good to excellent intubating conditions within 60 seconds.[2]

Priming principle refers to administration of a small priming dose of a non-depolarizing relaxant, which when followed by the larger intubating dose, after 2 to 4 minutes, produces relatively rapid and profound blockade with good intubating conditions and without undue prolongation of action or undesirable side effects.[3,4,5]

However priming carries risk of aspiration, difficulty in swallowing and the visual disturbances, which even in subtle degree may be uncomfortable for the patient.[6,7]

The present study evaluates the efficacy of priming technique with rocuronium to evaluate the intubating conditions and onset time of intubation.

METHODOLOGY

After "institute ethics committee" approval and informed consent, 60 patients belonging to ASA physical status I and II, aged between 20-60 years, belonging to either sex, undergoing elective surgical procedures were selected for the study. The patients were randomized into two groups namely, group 'C' (control group) and group 'P' (priming group). Patients with neuromuscular disease, with focal neuromuscular defects in the distribution of ulnar nerve, anticipated difficult intubation (obesity, thyro mental distance <6 cm and mallampati grade 3 and 4),pregnancy, hepatic, renal diseases, patients receiving drugs interfering with neuromuscular action, significant respiratory and cardiovascular diseases, with malignant disorders and with history of allergic reactions were excluded from the study.

After shifting to operating theatre midazolam 0.03 mg/kg i.v had given to all patients in both groups 10 minutes prior to priming dose. Each patient was explained about the nerve stimulation technique with peripheral nerve stimulator and supra maximal stimulus was set. The distal electrode (negative charge) was placed on the proximal crease lateral to the flexor carpi ulnaris muscle; the proximal electrode (positive charge) was placed 2-3 cm proximal to distal electrode.

Total intubating dose of rocuronium bromide 0.6 mg/kg was diluted to 5 ml in 5 ml syringe. In group 'C' 2 ml of normal saline was taken in a 2 ml syringe. In group 'P' 0.5 ml of rocuronium bromide was taken from the 5 ml syringe and diluted to 2 ml with normal saline and the remaining 4.5 ml was diluted to 5 ml with normal saline. Drugs were loaded, labeled and administered by another anesthesiologist.

Group	Priming Dose	Intubating Dose	No. of. Patients
P	0.06mg/kg(2 ml)	0.54mg/kg(5 ml)	30
C	normal saline(2ml)	0.6mg/kg(5 ml)	30

Preoxygenation was done with 100% oxygen for 3 minutes with face mask. Priming dose of rocuronium bromide 0.06 mg/kg or normal saline given. The patient was enquired about the ptosis, double vision, difficulty in swallowing, difficulty in breathing. Patient was induced with fentanyl 1µg/kg and propofol 2 mg/kg. Intubating dose of rocuronium bromide was injected 3 minutes after the priming versus normal saline injection.

After giving intubating dose of rocuronium, supra maximally set train of four, stimuli was applied over ulnar nerve at wrist through surface electrodes which was repeated for every 10 seconds and assessed visually for loss of adduction of thumb and disappearance of t_1 of train of four (TOF) stimuli.

Time interval between intubating dose and loss of t_1 of TOF stimuli was considered as 'onset time of intubation'. After loss of t_1 of TOF stimuli trachea was intubated and intubating conditions were noted and scored according to intubation scoring system (cooper et al' scoring system).

TABLE 1: Cooper et al Scoring system[8]

Score	Jaw Relaxation	Vocal Cords	Intubation Response
0	poor	closed	severe coughing/ bucking
1	nominal	closing	mild cough
2	moderate	moving	slight diaphragmatic movement
3	good	open	none
	excellent 8-9	**good 6-7**	**fair 3-5** **poor 0 -3**

Intubating conditions were graded as excellent with score in between 8-9, good with 6- 7, fair with 3-5 and poor with 0 - 2.

All patients were monitored with ECG, NIBP and SPO2. Data noted includes onset time of intubation, intubating conditions at the time of intubation and HR, MAP, spo_2 at baseline, immediately after induction, 1 minute and 5 minutes after intubation.

Data were analysed using spss® version 16 (statistical packages for the social sciences, chicago, il, usa). Results were expressed as mean ± standard deviation (SD). Quantitative statistical analysis data were compared using one-way analysis of variance (ANOVA) and unpaired t-test; qualitative data were analyzed using a chi-square test. P-value of < 0.05 was considered statistically significant.

RESULTS

In present study, patents were in the age group of 20-60 years with mean age of 38.70±12.23 yrs in group p and 39.33±12.93 yrs in group c, mean weight of 58.60±9.17 kg in group p and 58.03±7.92 kg in group c and with almost equal male and female population. The two groups were comparable with respect to age, weight (table-2).there were no statistical differences in the demographic parameters.

Table 2: Demographic Data

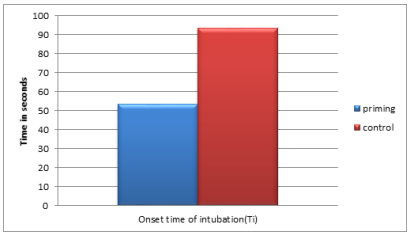
Demographic Data	Group P	Group C	P- Value	Significance
Age (Yrs)	38.70±12.23	39.33±12.93	0.85	Not Significant
Weight(Kg)	58.60±9.17	58.03±7.92	0.79	Not Significant

Mean onset of intubation time (Ti) in the group P was 52.33±6.79 sec in the group C was 95.67±11.04 sec .p value is 0.00 it is highly significant. minimum Ti is 80 sec. and maximum Ti is 120 sec. in group C and 40 sec & 70 sec. in group Pp (table-3).(graph-1).

Table 3: Mean Onset of Intubation Time (Ti)

Onset Of Intubation Time (Ti)	Group P	Group C	P-Value	Significance
Ti (Sec)	52.33±6.79	95.67±11.04	0.00	Highly Significant

Graph 1: Onset Time of Intubation (Ti)

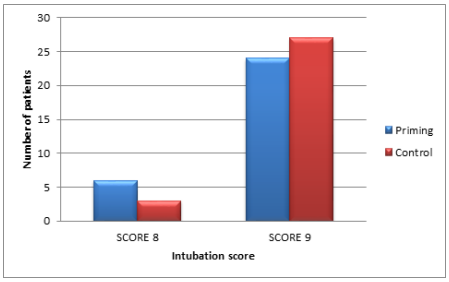


Intubation scores as per "cooper et al scoring" were 8 or 9 in both the groups, which comes under excellent grade of cooper's score. here intubation score was noted in two groups after loss of t1 of TOF which around 52 seconds in group P and 95 seconds was in group C, intubation score might be of low grade (good, fair or poor) if intubation was done at around 50 seconds in control group. (Table-4). (Graph-2).

Table 4: Comparison of Intubation Score (Number Of Patients)

Group	Intubation Score	
	8	**9**
P	6	24
C	3	27

Graph 2: Cooper's Intubation Score



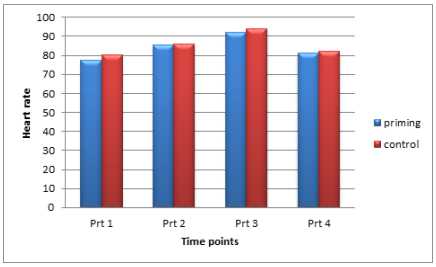
Heart rate and mean arterial pressure are comparable in two groups, but both rose at T3 and may be due to intubation response. There is no significant change in heart rate with rocuronium. (Table-5). (Graph-3,4).

Table 5: Comparison of Haemodynamics

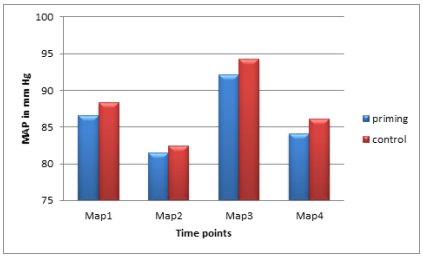
Vital Data	Priming	Control	P-Value	Significance
Pr B	77.27±8.26	80.23±9.34	0.198	Not Significant
Pr I	85.27±8.14	86.06±7.06	0.686	Not Significant
Pr 1	92.06±9.02	94.03±7.65	0.366	Not Significant
Pr 5	81.13±8.14	82.17±8.04	0.623	Not Significant
Map B	86.59±4.45	88.29±4.52	0.148	Not Significant
Map I	81.51±4.96	82.37±4.80	0.498	Not Significant
Map 1	92.09±5.85	94.29±4.75	0.116	Not Significant
Map 5	84.11±5.37	86.06±5.15	0.156	Not Significant
Spo_2 B	99.53±0.51	99.5±0.51	0.800	Not Significant
Spo_2 I	99.97±0.18	99.63±1.82	0.325	Not Significant
Spo_2 1	99.93±0.25	99.9±0.30	0.647	Not Significant
Spo_2 5	99.9±0.30	99.87±0.34	0.694	Not Significant

b -- base line, i -- immediate post induction, 1 --1 minute post intubation, 5-- 5 minutes post intubation, pr -- pulse rate/min, map-- mean arterial pressure in mm hg, spo2—oxygen saturation in %.

Graph 3: Changes in Heart Rate (PR)



Graph 4: Changes in Mean Arterial Pressure (Map)



DISCUSSION

Rocuronium bromide is a steroidal non-depolarizing muscle relaxant when compared to the suxamethonium in terms of onset time and quality of intubation varying results were noted so we study the rocuronium only with priming technique and without priming so that the study can be an aid for further analysis. [9,10,11.]

Rocuronium bromide is a mono quaternary amino steroid with an ED95 of 0.3 mg/kg that has onset of action of 1 to 2 minutes. Several groups of investigators have recommended that a small sub-paralyzing dose of non-depolarizing agent (20% of ED95, or 10% of intubating dose) to be given 2 to 4 minutes before second larger dose for tracheal intubation. It accelerates the onset of block of most non-depolarizing relaxants by about 30 to 60 sec. [3,12]

The priming dose of 0.06 mg/kg rocuronium given 2 min before intubating dose of 0.54 mg/kg significantly reduced the onset times without increase in the duration of action.previous studies proved that 3 minute priming interval was effective than 2 minute priming interval so we choose 3 minute interval than 3 minutes for rocuronium intubation. [12,13]

In our study using $2\times ED_{95}$ dose of rocuronium showed that with priming, the onset time of intubation (i.e. onset of maximum block) were 52.33±6.79 seconds in priming group and 95.67±11.04 seconds which are comparable to succinylcholine.

in scenarios of anticipated difficult intubation and contraindication of succinylcholine coexist, due to its own adverse effects, rocuronium with priming principle can be safely used keeping sugammadex ready. So rocuronium can be an alternative to succinylcholine for rapid sequence intubation. [14,15,16]

In our study both groups have comparable intubating conditions at the time of intubation that is after loss of t_1 of TOF. Low grade intubation score might have been observed if intubation was done at around 50 seconds in control group.

The major drawback of priming technique was the priming dose itself can cause adverse effects like double vision, difficulty in swallowing, difficulty in breathing and generalized weakness.

None of the patients in our study had evidence of such adverse effects of priming. Priming dose of rocuronium is advantageous in patients where suxamethonium is contraindicated for providing better quality of intubation with faster onset of action comparable to that of suxamethonium.

If there is any adverse event or cannot intubate and cannot ventilate situation we can reverse the action of rocuronium with sugammadex @1-6 mg/kg and, independent of the depth of block, the shortest possible recovery time that can be achieved with sugammadex; is 1-3 min.the reversal was sustained without any evidence of recurarization. This process of reversal is safer in patients of cardiovascular and respiratory diseases. [16,17]

The autonomic safety ratio for vagal block for rocuronium is about 10 times less than that of vecuronium. Due to pain on injection or weak vagolytic effect of rocuronium may be the reason for rise in heart rate. The tachycardia can be attenuated by giving fentanyl before the rocuronium. [18,19]

In our study any increase in heart rate or blood pressures after rocuronium administration were not observed and this may be due to prior administration of fentanyl.

CONCLUSION

In our prospective, double blind study on rocuronium using priming principle, we finally conclude that by giving priming dose of rocuronium before intubating dose, the onset of neuromuscular block is rapid and onset time of intubation is comparable to that of suxamethonium with excellent intubating conditions and without adverse effects. Rocuronium can be safely used in rapid sequence induction and intubation as a replacement to suxamethonium .

References

1. William L. Young, Jeanine P. Wiener - Kronish, Lee A. Fleisher, Lars I. Eriksson, Ronald D. Miller. Pharmacology of muscle relaxants and their antagonists. Miller 7th edition, 864-866.
2. Wierda JM, de Wit AP, Kuizenga K, Agoston S. Clinical observations on the neuromuscular blocking action of Org 9426, a new steroidal non-depolarizing agent.Br J Anaesth 1990; 60: 521-523.
3. William L. Young, Jeanine P. Wiener - Kronish, Lee A. Fleisher, Lars I. Eriksson, Ronald D. Miller. Pharmacology of muscle relaxants and their antagonists. Miller 7th edition, 878-879.
4. Mehta M P, Choi W W, Gergis S Dt. Facilitation of rapid endotracheal intubations with divided doses of non-depolarizing neuromuscular blocking drugs. Anesthesiology 1985; 62:392–395.
5. Schwarz S, Ilias W, Lackner F. Rapid tracheal intubation with vecuronium. The priming principle. Anesthesiology 1985; 62: 388–391.
6. Engbaek J, Howardy-Hansen P, Ording H. Precurarization with vecuronium and pancuronium in awake, healthy volunteers. The influence on neuromuscular transmission and pulmonary function. Acta Anaesthesiol Scand 1985: 29:117–120.
7. Jones R M. The priming principle. How does it work and should we be using it? Br J Anaesth 1989; 63: 1–3.
8. Misra M N ,Agarwal M,Pandey R P .A comparative study of rocuronium, vecuronium and succinylcholine for rapid sequence induction of anaesthesia. Indian j anaesth 2005; 49(6): 469-473.
9. McCourt KC, Salmela L, Mirakhur RK, Carroll M, Mäkinen MT, Kansanaho M, Kerr C, Roest GJ, Olkkola KT. Comparison of rocuronium and suxamethonium for use during rapid sequence induction of anaesthesia. Anaesthesia 1998; 53(9): 867-871.
10. Naguib M. Different priming techniques, including mivacurium, accelerate the onset of rocuronium. Can J Anesth 1994; 41: 902-907.
11. Singh ajeet, Bhatia pradeep kumar,Tulsiani kishan lal. Comparison of onset time, duration of action and intubating conditions achieved with suxamethonium and rocuronium. Indian j anaesth 2004; 48(2): 129-133.
12. Griffith KE, Joshi GP, Whitman PF, Garg SA. Priming with rocuronium accelerates the onset of neuromuscular blockade. J Clin Anesth 1997; 9(3): 204-207.
13. Yavascaoglu B, Cebelli V, Kelebek N, Uçkunkaya N, Kutlay O. Comparison of different priming techniques on the onset time and intubating conditions of rocuronium. Eur J Anaesthesiol 2002; 19(7): 517-521.
14. Francois Donati. Sugammadex: an opportunity for more thinking or more cook book medicine? Can J Anaesth 2007; 54(9): 689-695.
15. Mohamed Naguib. Sugammadex: another milestone in clinical neuromuscular pharmacology. Anesth Analg 2007; 104(3): 575-581.
16. AL Molina, de Boer HD, Klimek M, Heeringa M, Klein J. Reversal of rocuronium-induced (1.2 mg kg-1) profound neuromuscular block by accidental high dose of sugammadex (40 mg kg-1).Br J Anaesth 2007; 98(5): 624-627.
17. Shields M, Giovannelli M, Mirakhur RK, Moppett I, Adams J, Hermens Y. Org 25969 (sugammadex), a selective relaxant binding agent for antagonism of prolonged rocuronium-induced neuromuscular block.Br J Anaesth 2006 ;96(1): 36-43.
18. Sparr HJ, Giesinger S, Ulmer H, Hollenstein-Zacke M, Luger TJ. Influence of induction technique on intubating conditions after rocuronium in adults: comparison with rapid-sequence induction using thiopentone and suxamethonium. Br J Anaesth 1996; 77(3): 339-342.
19. Aziz L, Jahangir SM, Choudhury SN, Rahman K, Ohta Y, Hirakawa M. The effect of priming with vecuronium and rocuronium on young and elderly patients. AnesthAnalg 1997; 85(3): 663-666.