



Anesthesiology

A COMPARATIVE STUDY OF HAEMODYNAMIC CHANGES DURING INTUBATION BY ATRACURIUM BESYLATE VECURONIUM BROMIDE ROCURONIUM BROMIDE AND SUXAMETHONIUM.

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ABSTRACT Intubation is most important aspect of modern and sophisticated anaesthesia. Various drugs have been used till date to achieve ideal condition for tracheal intubation but lot of difficulties have been experienced and side effect seen with suxamethonium i.e. why nondepolarizer came in for intubation purpose & the concept of priming came in practice. Small dose before induction and full dose of muscle relaxant after induction shorten the intubation time which lead to less hemodynamic changes. An ideal neuromuscular blocking drug for endotracheal intubation with a rapid onset, short duration of action with minimal side effects has not been found so far.

KEYWORDS :

INTRODUCTION AND AIM

A comparative study of haemodynamic changes during intubation by atracurium besylate vecuronium bromide rocuronium bromide and suxamethonium.

Intubation is most important aspect of modern and sophisticated anaesthesia. Various drugs have been used till date to achieve ideal condition for tracheal intubation but lot of difficulties have been experienced and side effect seen with suxamethonium i.e. why nondepolarizer came in for intubation purpose & the concept of priming came in practice. Small dose before induction and full dose of muscle relaxant after induction shorten the intubation time which leads to less hemodynamic changes.

An ideal neuromuscular blocking drug for endotracheal intubation with a rapid onset, short duration of action with minimal side effects has not been found so far.

MATERIAL AND METHODS:

It is a prospective doubled blinded randomized controlled study which includes a total of 70 patient with ASA status grade I & II of either sex aged between 20 yrs to 65 yrs undergoing elective / emergency surgery in between a period of 20th September, 2018 to 30th October, 2018 at GSVM Medical College, Kanpur.

Patients suffering from systemic disorder like hepatic cardiac endocrinology and renal diseases were excluded.

All the patients were divided into three groups:

Group I : 20 Patients Atracurium

Group II : 20 Patients Vecuronium

Group III : 20 Patients Rocuronium

Control group : 10 patients Succinylcholine

The groups were divided into subgroups with 10 patients in each. Sub-group A : given 1/10th the total of intubating dose, muscle relaxant as the priming dose.

Sub-group B : Given 1/5th the total of intubating dose of muscle relaxant as the priming dose.

All the patients were given 5 mg Alprazolam on the previous night and were kept fasting for 6 to 8 hrs. prior to surgery. All the patients were premedicated with 0.2 mg glycopyrrolate 1-2 mg Butrophanol and 1-2

TABLE 2

Showing changes in pulse rate in different group preoperatively after priming, after induction at 5, 10 and 15 minutes

Groups	Mean ± SD Beats/minute	Mean ± SD Beats/minute	Mean ± SD Beats/minute	Mean ± SD Beats/minute	Mean ± SD Beats/minute	Mean ± SD Beats/minute	Mean ± SD Beats/minute
	Preoperatively	After premedication	After Induction	After Intubation	5 minutes	10 minutes	15 minutes
Control Gr	82 ± 7.48	94.8 ± 7.31	94.8 ± 7.31	104.8 ± 6.81	98.6 ± 6.46	96.4 ± 5.71	94.2 ± 5.28
Group I a	91.8 ± 8.35	99 ± 7.65	102.4 ± 7.53	107.4 ± 8.59	100.8 ± 7.31	98.6 ± 8.22	100.6 ± 6.86

mg of midazolam, 15 minutes before induction intravenously.

All the patients were preoxygenated with 100% oxygen for 5 minutes.

Priming dose of muscle-relaxant were given followed by induction with injection 2.5% thiopentone sodium followed by intubating dose of muscle relaxant to facilitate intubation with appropriate size of endotracheal tube in each group.

The changes in

pulse rate, changes in blood pressure were recorded preoperatively after priming and after intubation in each group.

Reversal was done in all the cases with 3 mg of neostigmine and 0.6 mg glycopyrrolate.

Scoring pattern

Score	Jaw relaxation laryngoscopy	Vocal cord	Response to intubation
0	Poor (Impossible)	Closed	Severe coughing or bucking
1	Minimum difficulty	Closing	Mild, cough
2	Moderate (Fair)	Moving	Slight diaphragmatic movement
3	Good (easy)	Open	None

Score of 8–9 excellent, 6–7 good and 3–5 fair, 0–2 poor

STATISTICAL ANALYSIS:

The results of continuous variables are given as mean ± SD and proportion as percentage. The difference between the two groups was assessed by student's unpaired t-test for continuous variables and chi-square test wherever applicable. For all the tests a 'p' value of 0.05 and less was considered for statistical significance

OBSERVATION

Showing sex distribution and total number of cases in each group.

Groups	Control Gr	Groups 1a	Groups 1b	Groups 2a	Groups 2b	Groups 3a	Groups 3b
	No	No	No	No	No	No	No
Male	4	5	6	4	3	5	5
Female	6	5	4	6	7	5	5
Total	10	10	10	10	10	10	10

Group I b	90.2 ± 10.01	95 ± 9.56	99.4 ± 9.93	104.4 ± 10.10	99.4 ± 8.86	98 ± 6.92	97 ± 7.07
Group II a	91.8 ± 13.24	100.8 ± 13.76	103.2 ± 13.60	108 ± 13.92	102.2 ± 9.8	99.4 ± 8.58	97.4 ± 8.84
Group II b	87 ± 8.17	102 ± 7.30	101.6 ± 5.48	111.4 ± 6.11	99 ± 3.01	97 ± 3.16	97 ± 5.05
Group III a	88.4 ± 10.57	92.2 ± 10.13	96.8 ± 11.66	101.6 ± 11.8	98.4 ± 12.35	97.6 ± 14.87	88.2 ± 12.41
Group III b	82.6 ± 8	98 ± 8.79	96.4 ± 8.26	103 ± 9.10	100 ± 8.48	99.2 ± 9.48	98.4 ± 10.10
Control group	Succinylcholine						
Group Ia & Ib	Atracurium						
Group Ia & IIb	Vecuronium						
Group IIIa & IIIb	Rocuronium						

TABLE 3
Showing Changes in systolic and diastolic Blood pressure in different groups pre-operatively after priming after induction at 5,10 and 15 minutes

Groups	Mean ± SD Beats/minute		Mean ± SD Beats/minute		Mean ± SD Beats/minute		Mean ± SD Beats/minute		Mean ± SD Beats/minute		Mean ± SD Beats/minute		Mean ± SD Beats/minute	
	Preoperatively		After premedication & priming		After Induction		After Intubation		5 minutes		10 minutes		15 minutes	
	Sys.	Dia	Sys.	Dia	Sys.	Dia	Sys.	Dia	Sys.	Dia	Sys.	Dia	Sys.	Dia
Control Gr	120.8± 9.15	78 ± 4.89	125.4± 8.27	83.2± 4.23	121.4± 9.04	80.4± 4.08	131.2± 7.61	83.8± 3.82	126.6± 7.05	82.4± 3.74	124.2± 7.62	81.4± 2.50	123± 7.61	80.2±2.7 4
Group Ia	118 ± 10.37	73.2 ± 5.34	119.2± 9.10	73.8 ± 5.02	114± 7.65	75.6 ± 4.97	122.2 ± 7.80	81 ± 2.86	121.2 ± 8.21	81.6± 2.79	121.4 ± 6.93	81.8 ± 2.74	122 ± 7.54	82.8 ± 3.42
Group Ib	119.2± 7.78	77.2 ± 6.87	120.6± 8.11	73.2± 7.80	116±8	77-4± 6.90	126.4± 9.2	84.6± 4.99	125.2± 9.10	83.6± 4.19	124.8± 9.05	84± 5.07	124.2± 8.24	83.4±7.6 0
Group IIa	124.8± 10.96	76 ± 6.90	129.2± 8.4	81± 5.80	122.6± 9.10	80.2± 6.30	131.6± 6.51	83.4± 5.42	127.6± 9.20	82.8± 5.09	128.6± 9.80	83.6± 5.05	130±9.6	83.4±4.8 9
Group IIb	120.4± 7.9	74.2 ± 5.30	124.6± 7.48	78.6 ± 4.40	120.6± 8.22	79.2 ± 0.01	128 ± 8.40	83.6 ± 3.80	125.4± 7.05	83 ± 3.10	123.4± 6.66	82.8 ± 3.90	123.2 ± 7.55	83.2 ± 3.91
Group IIIa	118.8 ± 8.75	74.4 ± 6.85	120.8± 10.11	76.8± 7.49	117± 12.90	77.2± 7.67	124.0± 12.16	79.8± 9.06	121.8± 13.8	81.2± 8.85	121.8± 9.72	82.6± 9.52	121.4± 9.89	81.8±9.4 0
Group IIIb	120.12 ± 8.75	77.4 ± 6.32	122.6± 8.05	79.2 ± 4.02	110.6 ± 7.72	78.6 ± 5.05	126± 8.32	82± 4.10	123.2 ± 7.95	80.4 ± 4.40	122.4± 7.98	80.2 ± 4.66	122 ± 7.94	79.0 + 4.04

Control group Succinylcholine
 Group Ia & Ib Atracurium
 Group Ia & IIb Vecuronium
 Group IIIa & IIIb Rocuronium

TABLE 4
Showing Changes in systolic and diastolic Blood pressure in different groups pre-operatively after priming after induction at 5,10 and 15 minutes

		Control	Group Ia	P Value	Group Ib	P Value	Group IIa	P Value	Group IIb	P Value	Group IIIa	P Value	Group IIIb	P Value
Preoperatively	Pulse	82± 7.48	91.8±8.35	P>0.5 Insig.	90.2±10.01	P>0.5 Insig.	91.8±13.24	P>0.5 Insig.	87±8.17	P>0.5 Insig.	88.4±10.57	P>0.5 Insig.	82.6±8	P>0.5 Insig.
	SBP	120.8±9.15	118±10.37	P>0.5 Insig.	119.2±7.78	P>0.5 Insig.	124.8±10.6	P>0.5 Insig.	120.4±7.90	P>0.5 Insig.	118.8±10.88	P>0.5 Insig.	120.12±8.75	P>0.5 Insig.
	DBP	78±4.89	73.2±5.34	P>0.5 Insig.	77.2±6.87	P>0.5 Insig.	76±6.90	P>0.5 Insig.	74.2±5.30	P>0.5 Insig.	74.4±6.85	P>0.5 Insig.	77.4±6.32	P>0.5 Insig.
After Premedication & Priming	Pulse	94.8±7.31	99±7.65	P>0.5 Insig.	95±9.56	P>0.5 Insig.	100.8±13.76	P>0.5 Insig.	102±7.30	P>0.5 Insig.	92.2±10.13	P>0.5 Insig.	98±8.79	P>0.5 Insig.
	SBP	125.4±8.27	119.2±9.10	P>0.5 Insig.	120.6±8.11	P>0.5 Insig.	129.2±8.4	P>0.5 Insig.	124.46±7.48	P>0.5 Insig.	120.8±10.11	P>0.5 Insig.	122.6±8.05	P>0.5 Insig.
	DBP	83.2±4.23	73.8±5.02	P>0.5 Insig.	78.2±7.80	P>0.5 Insig.	81±5.80	P>0.5 Insig.	78.6±4.40	P>0.5 Insig.	76.8±7.49	P>0.5 Insig.	79.2±4.02	P>0.5 Insig.
After Induction	Pulse	94.8±7.31	102.4±7.53	P<0.5 sig.	99.4±9.93	P<0.5 Sig.	103.2±13.60	P>0.5 Insig.	101.6±5.48	P>0.5 Insig.	96.8±11.66	P>0.5 Insig.	96.4±8.26	P>0.5 Insig.
	SBP	121.4±9.04	114±7.65	P>0.5 Insig.	116±8	P>0.5 Insig.	122.6±9.10	P>0.5 Insig.	120.6±8.22	P>0.5 Insig.	117±12.90	P>0.5 Insig.	118.6±7.72	P>0.5 Insig.
	DBP	80.4±4.08	75.6±4.97	P>0.5 Insig.	77.4±6.60	P>0.5 Insig.	80.2±6.30	P>0.5 Insig.	79.2±8.01	P>0.5 Insig.	77.2±7.67	P>0.5 Insig.	78.6±5.05	P>0.5 Insig.
After Intubation	Pulse	104.8±6.81	107.4±8.59	P>0.5 Insig.	104.4±10.10	P<0.5 Sig.	108±13.92	P>0.5 Insig.	111.4±6.11	P>0.5 Insig.	101.6±11.8	P>0.5 Insig.	103±9.10	P>0.5 Insig.
	SBP	131.2±7.61	122.2±7.80	P>0.5 Insig.	126.4±9.2	P>0.5 Insig.	131.6±6.51	P>0.5 Insig.	128±8.40	P>0.5 Insig.	124.8±12.16	P>0.5 Insig.	126±8.32	P>0.5 Insig.
	DBP	83.8±3.82	81±2.86	P>0.5 Insig.	84.6±4.99	P>0.5 Insig.	83.4±5.42	P>0.5 Insig.	83.6±3.80	P>0.5 Insig.	79.8±9.06	P>0.5 Insig.	82±4.10	P>0.5 Insig.
5 min	Pulse	98.6±6.46	100.8±7.31	P>0.5 Insig.	99.4±8.86	P>0.5 Insig.	102.2±9.8	P>0.5 Insig.	99±3.01	P>0.5 Insig.	98.4±12.35	P>0.5 Insig.	100±8.48	P>0.5 Insig.
	SBP	126.6±7.05	121.2±8.21	P>0.5 Insig.	125.2±9.10	P>0.5 Insig.	127.6±9.20	P>0.5 Insig.	125.4±7.05	P>0.5 Insig.	121.8±13.8	P>0.5 Insig.	123.2±7.95	P>0.5 Insig.
	DBP	82.4±3.74	81.6±2.79	P>0.5 Insig.	83.6±4.19	P>0.5 Insig.	82.8±5.09	P>0.5 Insig.	83±3.10	P>0.5 Insig.	81.2±8.85	P>0.5 Insig.	80.4±4.40	P>0.5 Insig.

10 min	Pulse	96.4±5.71	98.6±8.22	P>0.5 Insig.	98±6.92	P>0.5 Insig.	99.4±8.58	P>0.5 Insig.	97±3.16	P>0.5 Insig.	97.6±14.87	P>0.5 Insig.	99.2±9.48	P>0.5 Insig.
	SBP	124.2±7.62	121.4±6.93	P>0.5 Insig.	124.8±9.05	P>0.5 Insig.	128.6±9.80	P>0.5 Insig.	123.4±6.66	P>0.5 Insig.	121.8±9.72	P>0.5 Insig.	122.4±7.98	P>0.5 Insig.
	DBP	81.4±2.50	81.8±2.74	P>0.5 Insig.	84±5.07	P>0.5 Insig.	83.6±5.05	P>0.5 Insig.	82.8±3.90	P>0.5 Insig.	82.6±9.52	P>0.5 Insig.	80.2±4.66	P>0.5 Insig.
15 min	Pulse	94.2±5.28	100.6±6.86	P>0.5 Insig.	97±7.07	P>0.5 Insig.	97.4±8.84	P>0.5 Insig.	97±5.05	P>0.5 Insig.	88.2±12.41	P>0.5 Insig.	98.4±10.10	P>0.5 Insig.
	SBP	123±7.61	122±7.54	P>0.5 Insig.	124.2±8.24	P>0.5 Insig.	130±9.6	P>0.5 Insig.	123.2±7.55	P>0.5 Insig.	121.4±9.89	P>0.5 Insig.	122±7.94	P>0.5 Insig.
	DBP	80.2±2.74	82.8±3.42	P>0.5 Insig.	83.4±7.60	P>0.5 Insig.	83.4±4.89	P>0.5 Insig.	83.2±3.91	P>0.5 Insig.	81.8±9.40	P>0.5 Insig.	79.8±4.04	P>0.5 Insig.

Control group Succinylcholine
 Group Ia & Ib Atracurium
 Group Ia & IIb Vecuronium
 Group IIIa & IIIb Rocuronium

P Value >0.05 Insignificant
 P Value <0.05 Significant
 P Value >0.01 Highly Insignificant
 P Value <0.01 Most Highly Significant

TABLE – 3

Showing score and percentage of intubating conditioning different groups

Groups	Jaw Relaxation	Condition of Vocal Cord	Response to Intubation	Total
Control Gr	30	30	28	88
Group Ia	30	22	11	63
Group Ib	30	24	16	17
Group IIa	30	24	13	67
Group IIb	30	26	19	75
Group IIIa	30	30	25	85
Group IIIb	30	30	25	85

Control group Succinylcholine
 Group Ia & Ib Atracurium
 Group Ia & IIb Vecuronium
 Group IIIa & IIIb Rocuronium

DISCUSSION:

Although muscle relaxant (non-depolarizing) can be given to facilitate endotracheal intubation) relatively slow onset time limits its usefulness in rapid sequence induction in anaesthesia to hasten the onset time, the priming principle came into practice.

The present study was conducted on 70 patients undergoing elective / emergency surgery using various intermediate acting non-depolarizing agent with priming technique.

After priming induction and intubation in group I there was significant increase in pulse rate. The study was similar to the study of Robert et al (1986) who showed that the increase in heart rate following endotracheal intubation was significantly greater in patients given atracurium (30 ± 17)

In group II the study was similar to the study of Robert et al (1986) who found insignificant increase in heart rate (16 ± 14 beats/minute) using Rocuronium.

In group III insignificant increase basal heart was found and this study was found to be similar to the study of Madan Mohan Moddali et al (1999) showed no significant change in heart rate after administration of vacuronium.

In all the 3 groups blood pressure increases from preoperative value after premedication and priming and intubation and then decreased 5 minutes after intubation.

According to statistical evaluation the intubating condition were most highly significant in group I and group II and insignificant in group III. Bharti and et al (2001) found rocuronium to be beneficial especially in patients requiring rapid tracheal intubation as compared to vacuronium and atracurium.

CONCLUSION :

The present study was conduction for rapid tracheal intubation with nondepolarizing (atracurium besylate, vacuronium bromide and rocuronium bromide) by priming and the intubating conditions and cardiovascular changes produced were compared with that of suxamethonium. The study included 70 patients undergoing various types of surgical procedure with different muscle relaxant used in dividing dose at GSVM Medical College, Kanpur. The following

conclusions were drawn:

In group I (atracurium) A small increase in mean pulse rate was observed after administration of priming dose and after intubation. After 10 to 15 minutes of intubation it returned to preinduction value and was insignificant.

In group II (vecuronium bromide) insignificant change in mean pulse rate was observed after administration of priming doses and after intubation.

In group III (Rocuronium) a small increase in mean pulse rate was observed after administration of priming doses and intubation.

In the present study the blood pressure increased after administration of priming doses and intubation in group I and was more as compared to group II and III.

The intubating condition with rocuronium group were found to be good or excellent and were same as succinylcholine group so rocuronium can be used in place of succinylcholine where rapid sequence endotracheal is desired.

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