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Original Research

An Observational Study to Compare the Effects of Cisatracurium Verses Atracurium During General Anaesthesia

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ABSTRACT

Neuromuscular blockers (NMB) are an essential adjuvant to general anaesthesia. Atracurium and Cisatracurium besylate are intermediate acting non-depolarizing muscle relaxants without much side effects due to non-organ dependent elimination. Compared to atracurium, cisatracurium is three to four times more potent and does not release histamine.

The practice of giving anesthesia was revolutionized with the introduction of neuromuscular blocking agent (NMBA). [(1)] In present era Scoline, which is a depolarizing muscle relaxant, is known for its rapid onset and short duration of action. Several undesirable side effects of Scoline are Bradycardia, Hyperkalemia, raised intraocular pressure, raised intracranial pressure, prolonged paralysis with reduced plasma cholinesterase activity. So, there is a need for finding an ideal non-depolarizing muscle relaxant which has ideal intubating conditions. An ideal NMBA should have fast onset of action, ensures hemodynamic stability with no residual paralysis and provides good condition for intubation. [(2)]

In current study we are comparing two NMBA i.e. cisatracurium with atracurium. Atracurium and Cisatracurium are non depolarising NMBA with intermediate duration of action. [(3)]

Atracurium is a mixture of 10 optical isomers[2] and cisatracurium, has a potency about three to 4 times greater than atracurium, is a purified version of one of atracurium's 10 stereoisomers.

Despite the higher potency, Cisatracurium is associated with more stable hemodynamics than Atracurium and does not cause histamine release even at doses of up to 0.4mg/kg (8×ED95) [(4)(5)]

Like atracurium, cisatracurium is metabolized by Hofmann elimination to laudanosine and a monoquaternary alcohol metabolite [(6)]. The parent molecule is not hydrolyzed by ester bonding. 77% of the 5 to 6 mL/kg per minute clearance is attributed to Hofmann elimination.

MATERIAL AND METHODS

STUDY CENTRE- Department of Anesthesiology, Christian Medical College, Ludihiana

TYPE OF STUDY- Randomized controlled study

INCLUSION CRITERIA-

- Patient with written informed consent.
- 16–60 years of either gender.
- ASA grade I and II.

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- Modified Mallampatti class I and II

EXCLUSION CRITERIA-

- Patient's refusal
- Pregnant patients
- Patients with cardiovascular diseases like ischemic heart disease.
- Patients with hepatic, renal and neuromuscular disease.
- Patient using antipsychotic medication.

METHOD

- A detailed pre anaesthetic evaluation of each case was done. After recording medical history, a thorough systemic examination was carried out to rule out the presence of any systemic disorder. Relevant investigations were done accordingly. All patients were kept nil per orally 6 hours prior to surgery.
- All patients were preoxygenated for 3-5 minutes. Anaesthesia was induced with fentanyl 1.5 µg/kg and propofol 2 mg/kg and was maintained with nitrous oxide in oxygen and isoflurane 1.5%.
- 50 patients each were randomly allocated to receive Group C-Cisatracurium 0.15mg/kg or Group A-Atracurium 0.5 mg/kg.
- Intubation was done by the same anaesthetist who was blinded to the given NMBA after 90 seconds of injection, intubation was done if the intubating condition were acceptable (good or satisfactory), and was re-attempted after 30 seconds if it was poor or inadequate.
- The intubation condition was assessed according to the scoring system described by Viby-Mogensen [7].
- At the end of surgery after spontaneous attempts residual neuromuscular blockade was reversed with inj.neostigmine 0.05mg/kg and inj.glycopyrrolate 0.01mg/kg. Patients were extubated and shifted to recovery room.

RESULTS

We conducted a comparative study between cis-atracurium and atracurium, focusing on various parameters such as intubating conditions, hemodynamic stability and side effeccts. The demographic data of both groups were found to be comparable.

Significant difference was seen in Heart rate (per minute) at baseline (p value=.307) between group A and C.

Significant difference was seen in Heart rate (per minute) at 15 minutes, at 30 minutes, at 45 minutes, at 60 minutes, at 75 minutes between group A and C. (p value<.05)

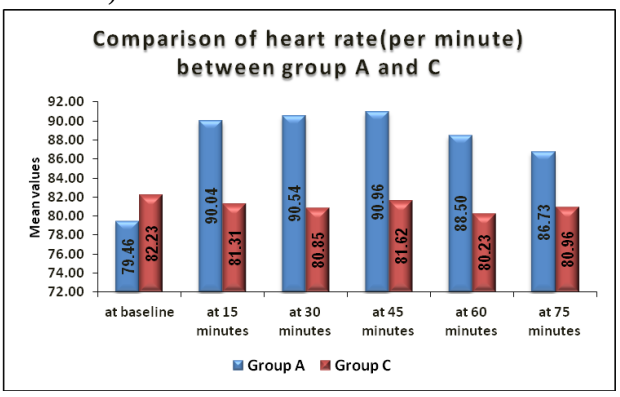

Figure 1: -Comparison of trend of heart rate (per minute) at different time intervals between group A and C.

No significant difference was seen in Systolic blood pressure (mmHg) at baseline (p value=.9), at 75 minutes (p value=.623) between group A and C.

Significant difference was seen in Systolic blood pressure (mmHg) at 15 minutes, at 30 minutes, at 45 minutes, at 60 minutes between group A and C. (p value<.05)

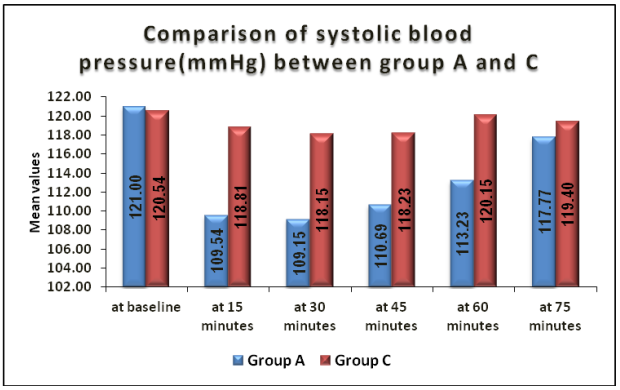

Figure 2:-Comparison of trend of systolic blood pressure(mmHg) at different time intervals between group A and C.

No significant difference was seen in Diastolic blood

pressure (mmHg) at baseline (p value=.303), at 15 minutes (p value=.277), at 30 minutes (p value=.247), at 75 minutes (p value=.188) between group A and C. Significant difference was seen in Diastolic blood pressure (mmHg) at 45 minutes, at 60 minutes between group A and C. (p value<.05)

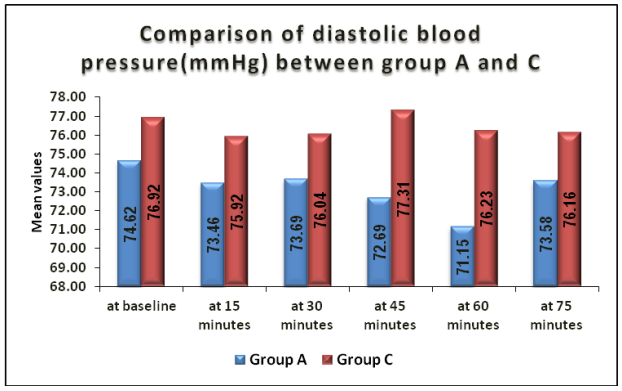

Figure 3: -Comparison of trend of diastolic blood pressure(mmHg) at different time intervals between group A and C.

No significant difference was seen in SpO_2 (%) at 15 minutes (p value=1), at 30 minutes (p value=0.8), at 45 minutes (p value=0.174), at 60 minutes (p value=0.801), at 75 minutes (p value=0.728) between group A and C.

No significant difference was seen in SpO_2 (%) at baseline between group A and C.

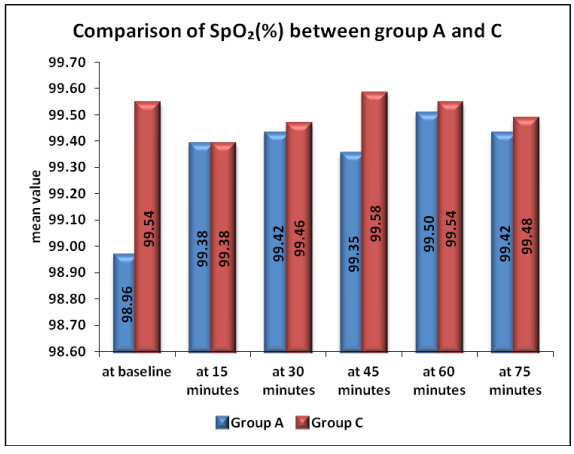

Figure 3: -Comparison of trend of SpO_2(%) at different time intervals between group A and C.

The median intubating score for Group A was 2.5 (with a range of 2 to 3) and for Group C was 3 (with a range of 3 to 3), indicating significant difference between the two groups (p-value = 0.021).

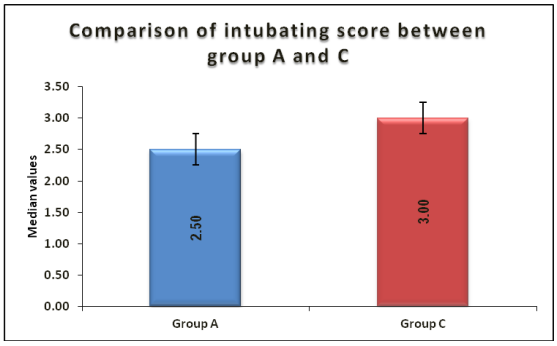

Figure 4: -Comparison of intubating score between group A and C. (non-parametric variable)

GRAPH

Intubation Scoring System According to Viby-Mogensen[8]

Score	Vocal cords	Jaw relaxation	Coughing
3	Fully abducted	Fully relaxed	Nil
2	Slightly abducted	Slightly stiff	Slight
1	Partially abducted	Stiff	Moderate
0	Closed	Impossible to open	Severe

DISCUSSION

An essential adjunct to general anaesthesia is neuromuscular blockers (NMB). In general anaesthesia, a depolarizing or non-depolarizing neuromuscular blocking drug facilitates endotracheal intubation following induction. Certainly the fastest-acting ultrashort-acting muscle relaxant, succinylcholine has a

number of adverse effects, including an increase in intragastric pressure, myalgia, bradycardia, and cardiac arrest. Therefore, a global search was conducted to find a succinylcholine substitute with a quicker onset and fewer side effects. When atracurium was first used in clinical settings in 1983, it had the benefit of being a novel medication whose pharmacokinetics are not influenced by hepatic or renal function. However, less than 10% of the drug is eliminated unchanged by these routes. Cisatracurium is a new benzyl isoquinoline neuromuscular blocker which has intermediate action. One of the ten stereoisomers of atracurium, it is roughly three to four times more potent at higher dosages than atracurium. The dosages are as follows: 0.1 mg/kg, 0.2 mg/kg, and 0.3 mg/kg. Because of its delayed onset of effect, rapid sequence intubation is not as appropriate for it.

This study compared the hemodynamic data, intubating conditions and side effects of two non-depolarizing muscle relaxants with intermediate duration of action: atracurium and cisatracurium besylate. Up until the conclusion of the surgical process, hemodynamic data such as heart rate, mean arterial pressure, diastolic blood pressure, and systolic blood pressure were recorded every 10 minutes.

CONCLUSION

Cisatracurium (0.15mg/kg) as compared to Atracurium (0.5mg/kg), better intubating conditions were observed with Cisatracurium group as compared to Atracurium group. Significant hemodynamic stability was observed with the Cisatracurium group. The majority of adverse reactions associated with atracurium administration are related to histamine release. [(7)] Flushing and erythema are the most frequent side effects linked to histamine release with atracurium treatment. More severe side effects, including as bradycardia, bronchospasm, dyspnea, hypotension, laryngospasm, tachycardia, wheal, urticaria, and wheezing, are less common are also possible. Flushing and wheal are present in 2 patients of atracurium. Urticaria is present in 1 patient of atracuium. Hence Cisatracurium, though more costly, is more effective and a better isomer of Atracurium.

REFERENCES

1. Utting JE. The era of relaxant anaesthesia. Br J Anaesth. 1992;69(6):551-553.
2. Kleinman W, Nitti GJ, Nitti JT, et al. Neuromuscular blocking agents. In: Morgan GE, Mikhail MS, Murray MJ, editors. Clinical anesthesiology, 4th ed. New York: Lange Medical Books/McGraw Hill Medical publishing Division 2006.p.221.
3. Moore EW, Hunter JM. The new neuromuscular blocking agents: Do they offer any advantages. Br J Anaesth 2001; 87:912–25.
4. Jean-Yves Lepage, Jean-Marc Malinovsky, Myriam Malinge, Thierry Lechevalier, Christine Dupuch, Antonie Cozian et al. Pharmacodynamics doseresponse and safety of cisatracurium (51W89) in adult surgical patients during N2O-O2-Opioid anesthesia. Anesth Analg. 1996; 83:823-9.
5. Carroll MT, Mirakhur RK, Lowry DW, McCourt KC, Kerr C. A comparison of the neuromuscular blocking effects and reversibility 0f cisatracurium and atracurium, Anesthesia. 1998; 53:744.
6. Suresh S. N. and Singh NG. 'Comparison between Adductor polices and Orbicularis Oculi as indicators of Adequacy of Muscle relaxation for Tracheal Intubation following Cisatracurium induced Neuromuscular block: Randomized comparative clinical trial. ' Recent Research in Science and Technology; 2010: 2 (5); 25 - 30.
7. Ritz ML, Derian A. Atracurium. 2023 Aug 14. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan
8. Won YJ, Shin YS, Lee KY, Cho WY. The effect of phenylephrine on the onset time of rocuronium. Korean J Anesthesiol. 2010; 59:244-8.