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Original research article

INCIDENCE OF BRADYCARDIA IN INFANTS UNDERGOING INTUBATION WITH OR WITHOUT ATROPINE

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Abstract: *Bradycardia is a life-threatening arrhythmia that endangers life by compromising blood flow to the brain. During intubation, its prevention is life-saving—the benefit of atropine in preventing bradycardia before intubation is controversial in the literature.* ***Objective****: The objective of the study was to find and compare the incidence of bradycardia with and without atropine.* ***Methods:*** *This single-centre randomised controlled trial was conducted at a tertiary care pediatric emergency department for six months. After applying inclusion and exclusion criteria, children were divided into two groups. Group 1 was given atropine before intubation, and group 2 was not. The overall incidence of bradycardia in subgroups was noted, along with the number of attempts and intubation time. Data was analysed using SPSS 26.0.* ***Results****: 86 patents were included in the study, with 43 in both groups. The mean age of the participants was 69.02+109.10 days. 48 (55.8%) were males and 38 (44.2%) were females. The incidence of bradycardia was 7% (6 Patients), with no statistically significant difference in both the groups (p-value was greater than 0.05). The number of attempts for intubation and intubation duration was also neither associated with bradycardia nor with atropine use. (p-value> 0.05).****Conclusion****: There is a higher incidence of bradycardia during intubation in children, with no significant difference in its occurrence with the use of atropine.*

Keywords: Atropine, Bradycardia, Intubation, Infants.

Introduction

Children require endotracheal intubation to secure the airway and to provide assisted ventilation.(1) Hypoxemia, bradycardia, and hypotension may occur during intubation, which are potential physiologic responses to intubation that have been reported in pediatric studies.(2, 3) Recommendation of Rapid sequence intubation (RSI) is a systematic strategy to prevent complications during intubation and advocates using pre-oxygenation and pre-medications to achieve the goal without complication.(4)

Bradycardia during intubation is reported due to vagal stimulation from the intubation equipment, i.e. laryngoscopy blade or endotracheal tube, secondary to hypoxia resulting from the removal of the patient's drive to breathe with soothing agents, or as a result of adverse effects from other commonly used premedication agents (mainly succinylcholine).(1, 5)

Atropine sulfate, an anticholinergic agent, (6) blocks the vagus nerve by reducing the parasympathetic nervous system's effect. Thus, it stimulates the sinoatrial node and conduction through the cardiac electrical system, resulting in cardiac muscle contraction.(7) Because bradycardia is associated with vagal stimulation, atropine is a natural choice for counteracting these effects. In addition to increasing heart rate, atropine reduces respiratory secretions, effectively 'drying out' the airway and facilitating visualisation of the glottis.(7, 8)

The use of atropine during routine RSI procedures is controversial. Some studies recommend the use of atropine as pre-medication to prevent bradycardia.(9, 10) Other studies have shown no benefit from the use of atropine before intubation.(11-13) Thus, careful analysis and evidence-based studies' recommendations are still needed. We hypothesise that pre-medication for intubation with atropine will maintain heart rate stability compared to the non-atropine group without prolonging the time to completion of intubation and will prevent bradycardia. Here, we aimed to analyse the incidence of bradycardia with and without the use of atropine as pre-medication before intubation. Thus, this study seeks to identify the incidence of bradycardia, both with and without the administration of atropine.

Methodology

This was a randomised, blinded control study conducted at G Pediatric Emergency Department Ghurki Trust Teaching Hospital, Lahore, for 6 months. The ethical review board approved the institution's study, and informed consent was taken from the parents.

A sample size of 86 patients (43 patients in each group) was estimated using 95% confidence levels and 10% absolute precision with an expected %age of Bradycardia with atropine at 35.7% and no atropine at 10.7%.(11)

The non-probability consecutive sampling technique was used to select the sample.

Any child under 1 year of age, including preterm, requiring intubation having intravenous access was included in the study.

Any child requiring cardiac compressions, having Congenital cyanotic heart disease, Obvious airway abnormalities, hypothermia and Child receiving succinylcholine during intubation were excluded from the study.

Any child under 1 year of age requiring intubation obeying inclusion and exclusion criteria after parental informed consent in the emergency department was divided into two groups-

Group 1 received atropine at 0.02 mg/kg intravenous/intraosseous and repeats once if needed; the minimum dose is 0.1 mg, and the maximum single dose is 0.5 mg.(12)

Group 2 didn't receive atropine, and we compared the heart rate 2 minutes before intubation, during intubation and 2 minutes after intubation and the duration of intubation between 2 groups. We defined bradycardia as heart beats more slowly than expected, under 100 beats per minute.(13) The primary outcome measure focuses on a heart rate falling below 100 beats per minute within 5 to 6 minutes. Secondary outcome measures encompass the duration and number of intubation attempts made during the procedure. A proforma also recorded additional data about the child's age, number of intubation attempts, and time. The data was analysed using SPSS 26.

Results

There were 86 (43 in each group) patients in our study, with a mean age of 69.02±109.10 days (0 – 332 days) and a mean weight of 3.28 ± 1.85 kg. 48 (55.8%) were males and 38 (44.2%) were females. There were 55 (64%) children who had ages less than 1 month and 17 (19.8%) and 14 (16.3%) who had ages less than 6 months and less than 1-year, respectively.85 (98.8%) intubation was made in 1st attempt and less than 1 minute, whereas 1 (1.2%) child was intubated in more than 1 attempt and took more than a minute. Hypoglycemia (BSR 35) was observed only in 1 (1.2%) patient with a mean glucose level of118.34+ 51.69mg/dl. 6 patients developed bradycardia, and 80 (93%) patients did not have bradycardia. So, the incidence of bradycardia was 7%. (Table 1)

Table 1: Descriptive Statistics of Variables

Variable	Contracts	Frequency	Percentage
Intubation Time	Less than 1 min	85	98.8%
	More Than 1 min	1	1.2%
Attempts for intubation	1st Attempt	85	98.8%
	> 1 Attempt	1	1.2%
Bradycardia	Yes	6	7%
	No	80	93%
Hypoglycemia	Yes	1	1.2%
	No	85	98.8%

After stratification of the variable, we found that out of 6 patients with bradycardia, 2 were males and 4 were females. Both the groups were not significantly associated with each other, i.e.

p value < 0.05. All the patients who had bradycardia were intubated on 1st attempt with a time of less than a minute. In a sub-group analysis, 3 (6.97%) patients developed bradycardia in patients who were given atropine and 40 (93.02%) children did not develop bradycardia. The exact percentages were observed in children who were not given atropine. There was no significant association between bradycardia and the use of atropine since the value was 1.00. The association of striated variables and their p values are given in table 2:

Table 2: Association of variables and bradycardia

Variables	Contracts	Bradycardia		p-value
		Yes	No	
Gender	Male (48)	2	46	0.250
	Female (38)	4	34	
Intubation Time	Less than 1 (85)	6	79	
	More Than 1 min (1)	0	1	0.783
Attempts for intubation	1st Attempt (85)	6	79	
	> 1 Attempt (1)	0	1	0.783
Atropine Given	Yes (43)	3	40	1.000
	No (43)	3	40	
Hypoglycemia	Yes (1)	0	1	0.783
	No (85)	6	79	
Age Strata	Less than 1 month (55)	4	51	
	Less than 6 months (17)	2	15	
	Less than 1 year (14)	0	14	0.437

Among the groups, 24 (55.8%) males and 19 (44.2%) females were in both groups with and without atropine. In the Atropine group, one (1.2%) patient had more than one incubation attempt and an intubation time of more than 1 minute. Whereas, in patients who were not given atropine, all were intubated in 1st attempt and less than a minute. In

the Atropine group, there were 23 (53.5%) patients with age less than 1 month, 11(25.6%) with less than 6 months of age and 9 (20.9%) patients with age less than a year. In the no-atropine group, 32 (74.4%), 6 (14.0) and 5 (11.6%) children were in all three strata, respectively. All these variables and primary endpoint, i.e., bradycardia, were not associated with both groups. A statistically insignificant p-value was found in all these cases, as given in Table 3.

Table 3: Comparison of variables between atropine and no-atropine groups:

Variables	Contracts	Atropine		p-value
		Yes	No	
Gender	Male (43)	24	19	1.00
	Female (43)	24	19	
Intubation Time	Less than 1 (85)	42	43	0.314
	More Than 1 min (1)	1	0	
Attempts for intubation	1st Attempt (85)	42	43	0.314
	> 1 Attempt (1)	1	0	
Bradycardia	Yes (6)	3	3	1.000
	No (80)	40	40	
Hypoglycemia	Yes (1)	0	1	0.783
	No (85)	6	79	
Age Strata	Less than 1 month (55)	23	32	0.130
	Less than 6 months (17)	11	6	
	Less than 1 year (14)	19	5	

Discussion

The literature has been controversial regarding the use of atropine as a premedication. Guidelines regarding its use before intubation have also been variable at different times. We aimed to analyse the effectiveness of atropine in preventing bradycardia, and we studied two groups with and without atropine to look for bradycardia during and after intubation.

In our study, 7% of patients had bradycardia, and equal incidence was observed in both groups. No significant relationship was found between preventing bradycardia and atropine. This incidence was also in a considerable disproportion to another study by Saeed *et al.*, where bradycardia was reported to be 46.7 %, in contrast to our research.(14) other studies have reported a comparable incidence of bradycardia to our research.(12, 13) In our study, the distribution of incidence was also equal, with no statistically significant difference between the groups. Three patients in both groups had bradycardia.

A recent study in Baghdad reported a significant reduction in the use of atropine.(14) This study was an observational study conducted in a specific population of acute illness in intensive care settings and has higher validity to provide the evidence. However, the study provided a lower level of scientific evidence than experimental study designs in the literature(15). The benefit of atropine use was endorsed by a recent randomised trial by Jones et al. As well. This trial was conducted on 327 critically ill patients, and a significant difference in arrhythmia was noted in the atropine group as compared to the control (9 4.5% vs 26.5%).(7) However, many studies have contradicted this—those reported to have insignificant differences in the incidence of bradycardia with the use of Atropine. (11, 16, 17) Desalu et al. have observed this. They conducted a study on children of age less than 1 year undergoing elective intubation; the study reported a low incidence of bradycardia since they defined it to be less than 60 per minute, which is usually not the case in the pediatric population. He reported no bradycardia with the use of atropine and no significant difference between the groups.(18) This can be explained by the elective nature of the procedure and the absence of obvious ongoing life-threatening pathology, contradictory to our study, which was performed in intensive care unit (ICU) settings, predisposing many risks for developing bradycardia. Another study conducted on critically ill patients advocated that there is no benefit in the prevention of bradycardia with the use of atropine as premedication.(19)

The number of attempts and intubation time was not affected by the use of atropine in our study. These results are in accordance with the literature reported. (14, 16, 20) The occurrence of hypoglycemia was also studied but was not found to be significant.

There are a few limitations to our study. It was conducted in a single centre on a limited population with a small sample size. Many confounders that contribute to the development and prevention of bradycardia were not considered. (20, 21) A multicenter large trial with multivariate analysis is recommended.

Conclusion

There is a higher incidence of bradycardia during intubation in children, with no statistically significant difference with the use of atropine. Routine use of atropine before intubation for the prevention of bradycardia is not recommended. Furthermore, a multicenter large trial involving multivariate analysis is also recommended.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate.
Approved by the department Concerned.
Consent for publication
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Conflict of interest

The authors declared an absence of conflict of interest.

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