

Heart Rate Response in Conventional Nasal Vs Fiber Optic Bronchoscopic Endotracheal Intubation Techniques in Oral & Maxillofacial Surgery

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Abstract

Background: Present study was conducted to compare the change in heart rate between conventional nasal intubation and flexible fiberoptic nasal intubation in oral and maxillofacial surgeries. **Subjects and Methods:** Sixty consenting adult patients, of either sex, of ASA physical status 1 and 2, in the age group of 18-60 years coming for oral and maxillofacial surgery were included in the study. These patients were randomly divided into two groups of 30 patients, each for either conventional nasal endotracheal intubation (Group A) or nasal intubation using flexible fiberoptic bronchoscope (Group B). **Results:** When heart rate was compared between the two groups we found that heart rate was comparable in both the groups. **Conclusions:** From our study, we concluded that there is no advantage of flexible fiberoptic intubation over conventional nasal intubation in terms of increase in heart rate.

Keywords: Endotracheal Intubation, Conventional Nasal Intubation, Fiber Optic Intubation, Heart rate.

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Introduction

Nasal intubation is indicated for better surgical access in patients undergoing oral and maxillofacial procedures when oral intubation is not feasible because of limited mouth opening, tumors of tongue or oropharynx or interference with surgical access during oral procedures.^[1] It can be performed by both direct and indirect techniques. Flexible fiber optic intubation has been the gold standard for difficult airway.^[2] Laryngoscopy and tracheal intubation can result in undesirable rise in heart rate, blood pressure along with ECG changes due to sympathetic stimulation.^[3,4] Fiber optic intubation may avoid the mechanical stimulus to oropharyngeal structures and is likely to attenuate hemodynamic response.^[5] So this study was designed to compare the rise in heart rate along with other complications between conventional nasal intubation and flexible fiber optic nasal intubation.

Subjects and Methods

A randomized controlled study approved by the ethical committee of the institution was done on sixty consenting adult patients, of either sex, of ASA physical status 1 and 2, in the age group of 18-60 years coming for oral & maxillofacial surgery. These patients were randomly divided into two groups of 30 patients each for either conventional nasal endotracheal intubation (Group A) or nasal intubation using flexible fiber optic bronchoscope (Group B). Exclusion criteria include difficult airway, pregnant patients, antiplatelet / anticoagulant medication and history of spontaneous epistaxis. In both the groups premedication was given in the form of tablet alprazolam 0.25 mg at bedtime on the day before surgery and two hours before the scheduled surgery. Baseline heart rate was recorded. Two drops of xylometazoline were applied in each nostril 15 minutes and 5 minutes before the anaesthesia induction. Injection glycopyrrolate 0.2 mg intravenously was given to every patient 15 minutes before anaesthesia induction. In the operation theatre, standard noninvasive monitoring was applied to all the patients. Preinduction heart

rate was recorded. Anaesthesia technique remained same for all the patients except for the mode of intubation. All the patients were preoxygenated followed by standardized induction of anaesthesia with fentanyl 2 micrograms/kg and propofol 2 mg/kg body weight intravenously. Muscle relaxation was achieved with injection atracurium 0.5 mg/kg body weight. Injection propofol 20 mg was given after 2 minutes. Ventilation of the patient was gently assisted manually with intermittent positive pressure ventilation for 4 minutes. Patient's heart rate was recorded just before the start of procedure for intubation (0 minute). Portex cuffed endotracheal tubes, with internal diameters of 7 mm and 7.5 mm were used in female and male patients, respectively. In group A patients, nasal endotracheal tube was introduced into the trachea under vision in the conventional manner using a Macintosh laryngoscope. In group B patients, endotracheal intubation was done with the help of fiber optic bronchoscope. Patient's heart rates were recorded at 1, 3, 5 and 10 minutes interval after intubation. Comparison of bleeding while performing intubation procedure was done based on grading where no bleeding was given grade 1, endotracheal tube stained with blood was given grade 2, blood in nasopharynx was given grade 3 and an episode of epistaxis was given grade 4 of bleeding. Other complications like pain in nasal cavity and sore throat were also recorded.

Results

Mean age (in years) in group A and group B was 38.5 ± 13.73 and 44.73 ± 11.66 respectively. While mean weight (in kg) in group A and group B was 57.5 ± 8.37 and 58.53 ± 13.34 respectively. Hence, in terms of age and weight, both the groups were comparable to each other. In group A there were 19 males and 11 females, in group B there were 17 males and 13 females. In group A there were 16 patients of ASA physical status 1 and 14 patients of ASA physical status 2, in group B there were 15 patients of ASA physical status 1 and 15 patients of ASA physical status 2 and the two groups were comparable. In terms of gender and ASA, both the groups were comparable.

Comparison of Heart Rate

Mean pre induction heart rate (in beats per minute) in group A was 89.7 ± 17.23 and in group B was 90.37 ± 17.72 . The pre induction heart rate was comparable between both the groups. Heart rate (in beats per minute) was compared between both the groups at different time interval. We observed that at baseline and at 0 minute, heart rate measurements in both the groups were comparable. Maximum heart rate measurements were observed at 1 minute in both the groups, which were also comparable. At 3 minutes, 5 minutes and at 10 minutes, heart rate values in both the groups were comparable to each other.

Comparison of Grade of bleeding

The incidence of bleeding was comparable between both the groups with no statistically significant difference.

Discussion

Laryngoscopy and endotracheal intubation is a noxious stimuli which results in change in the hemodynamic parameters.^[1,3,6] This change in hemodynamic response can be particularly dangerous in patients with limited cardiovascular reserve. This hemodynamic response can be different with different techniques of intubation.^[7] Shribman et al compared the hemodynamic response to direct laryngoscopy with and without tracheal intubation and found no difference in hemodynamic response and concluded that the laryngoscopy itself acts as a major contributor for stress response.^[8] Fiber optic bronchoscope enables intubation without causing any significant stretching of the pharyngeal or laryngeal tissues. It might, therefore, be expected to result in a less marked rise in vital parameters.^[5]

Our study showed that after intubation there was significant increase in heart rate in both the conventional nasal and flexible fiber optic groups. This increase in heart rate was compared with post induction (0 minute) heart rate. In both the groups, this increase in heart rate remained significant for 3 minutes. There was no significant difference in heart rate between the groups.

Omprakash et al and Tushar et al conducted similar studies and observed that tracheal intubation caused significant increase in mean heart rate in both the conventional nasal and fiber optic bronchoscopy groups when compared with baseline and post induction values.^[5,9] However no significant difference was observed in heart rate measurements between the patients intubated with the Macintosh laryngoscope and those intubated with the fiber optic bronchoscope. These results correspond to the present study.

Smith et al,^[7] conducted a similar study and found that tracheal intubation caused significant increase in mean heart rate in both groups compared with pre-intubation values. The mean heart rate in the fiber optic group was significantly greater than in the conventional nasal group after intubation. In this study there was significant increase in heart rate from baseline after intubation which corresponds to our study. There was significant difference of heart rate between the two groups. While in the present study there was no significant difference between both the techniques in terms of heart rate. The difference in the observations may be attributed to the use of injection fentanyl at the time of induction in the present study.

Adachi et al,^[10] compared cardiovascular response between fiberoptic orotracheal intubation with conventional direct

Table 1: Comparison of heart rate between group I And group II

Duration	Group –A (n=30)		Group –B (n=30)	p-value
	Mean ± S.D		Mean ± S.D	
At Base line	82.8 ± 16.43		80.83 ± 15.01	0.6296
At 0 min	83.23 ± 13.07		83.33 ± 14.95	0.9781
At 1 min	101.6 ± 15.63		104.23 ± 18.91	0.5594
At 3 min	93.33 ± 13.88		93.53 ± 16.25	0.9593
At 5 min	87.97 ± 13.46		90.13 ± 14.52	0.5525
At 10 min	84.73 ± 10.93		83.37 ± 15.64	0.6977

Table 2: Comparison of grade of bleeding between group I and group II

Grade of bleeding	Group –A (n=30)		Group –B (n=30)	
	No.	Percentage	No.	Percentage
1	8	26.67%	8	26.67%
2	19	63.33%	17	56.66%
3	3	10%	4	13.33%
4	0	0	1	3.33%

laryngoscopic intubation. The patients showed significant increase in blood pressure and heart rate in both the groups contradictory to the expectation of fiberoptic bronchoscopy to be minimally invasive procedure. No significant differences between the two groups were observed in cardiovascular responses immediately after intubation. They concluded that insertion of an endotracheal tube may be the most invasive stimulus during intubation procedures.

In the present study, severity of bleeding between both the techniques was also compared. Only one patient had an episode of epistaxis belonging to fiber optic bronchoscopy group. No significant difference between fiberoptic nasotracheal intubation and conventional nasal intubation regarding the incidence and severity of bleeding was observed in our study. No statistically significant difference was observed in the incidence and severity of other complications like sore throat and pain in nasal cavity. These results corresponds to the study done by Omprakash et al. [5]

Conclusion

Fiber optic bronchoscopy provides no advantage over conventional laryngoscopy, in terms of decreasing the hemodynamic response to nasotracheal intubation. Shortcomings of our study were small sample size and the procedure of intubation was performed by different anaesthetists which may have affected the results indirectly.

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