Original Article

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A Comparative Evaluation of Pressure Response in Conventional Nasal Vs Fiber Optic Bronchoscopic Endotracheal Intubation Techniques in Oral & Maxillofacial Surgery

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Abstract

Background: The purpose of the present study was to compare the blood pressure response between conventional nasal and flexible fiber optic techniques. **Subjects and Methods:** After taking approval of the hospital ethical committee on research, 60 consenting adult patients, of either sex, of ASA physical status 1 and 2, 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 fiber optic bronchoscope (Group B). **Results:** When mean arterial pressure (MAP) was compared between both the groups, we found that at 1 minute after intubation, the increase in MAP was more in group B (fiber optic bronchoscope group), which was significant. Also time taken for intubation with fiber optic technique was significantly more than conventional nasal intubation. **Conclusions:** From our study, we concluded that fiber optic bronchoscopy provides no advantage over conventional laryngoscopy, in terms of decreasing the pressure response to nasotracheal intubation. However, fiber optic intubation remains gold standard technique for difficult airway.

Keywords: Endotracheal intubation, Fiber optic intubation, Conventional nasal intubation, Mean arterial pressure.

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Introduction

Laryngoscopy and endotracheal intubation is an integral part of general anaesthesia.[1] Nasotracheal intubation is often preferable to oral intubation in oropharyngeal and maxillofacial surgery. It provides unrestricted access to mouth, which facilitates the insertion of instruments.[2] The flexible fiber optic bronchoscope is the most widely used, versatile, indirect laryngoscopy device in patients with difficult airway.[3,4] Laryngoscopy and passage of endotracheal tube through the larynx can provoke untoward response in cardiovascular, respiratory and other physiological systems due to sympathetic stimulation.[5] Stretching of the pharyngeal and laryngeal tissues during laryngoscopy is the major cause of pressure response.[6] Fiber optic bronchoscope enables intubation without causing any significant stretching of the pharyngeal or laryngeal tissues.[7] It might, therefore, be expected to result in a less marked rise in mean arterial blood pressure. Present study was designed to compare the blood pressure response between conventional nasal and flexible fiber optic techniques.

Subjects and Methods

After taking approval of the hospital ethical committee on research, 60 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 fiber optic bronchoscope (Group B). Patients with anticipated/ history of difficult airway, pregnant patients, patients with bleeding disorders or history of spontaneous epistaxis were excluded from the study. 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. Nasal preparation was done with

xylometazoline nasal drops 15 minutes and 5 minutes before surgery. 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 patients. Mean arterial pressure measurements were noted down. 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 intravenously with fentanyl 2 micrograms/kg and propofol 2 mg/kg body weight. Injection atracurium 0.5 mg/kg body weight was given to achieve muscle relaxation. Injection propofol 20 mg was given after 2 minutes. Patients were gently assisted manually with intermittent positive pressure ventilation for 4 minutes. Portex cuffed endotracheal tubes, with internal diameters of 7 mm and 7.5 mm were used in female and male patients, respectively. Before intubation the endotracheal tube was lubricated with water based sterile gel. In group A patients, a nasotracheal 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.

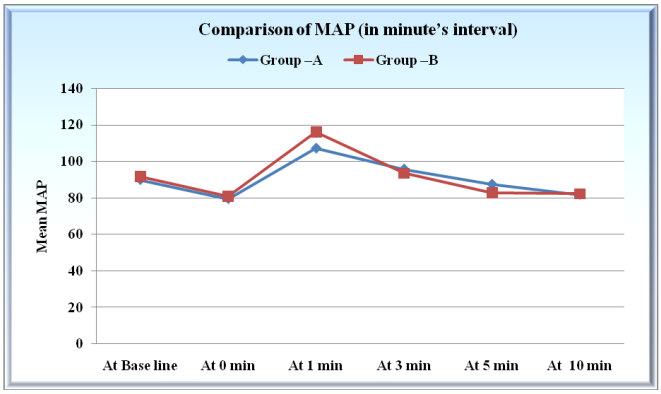
Results

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.

Pre induction mean arterial pressure (in mm of Hg) in group A was 92.37 ± 9.67 and in group B, it was 93.73 ± 11.75. The pre induction mean arterial pressure values were comparable between both the groups.

Comparison of mean arterial pressure (MAP) after intubation

Mean arterial pressure was compared between both the groups at different time intervals (Table 1). We observed that at baseline and at 0 minute, mean arterial pressure in both the groups were comparable. After induction there was increase in mean arterial pressure values in both the groups. At 1 minute after intubation, the increase in mean arterial pressure was more in fiber optic intubation group than in conventional nasal intubation group and the result was statistically significant.



Time taken for intubation

Time taken for conventional nasal intubation (in seconds) was 46.07 ± 21.26 and time taken for fiber optic intubation was 79.5 ± 30.80. Fiber optic intubation took significantly more time than conventional nasal intubation. [Table 2].

Discussion

During laryngoscopy and intubation, there is stimulation of upper respiratory tract resulting in rise in mean arterial pressure.[2] The magnitude of the pressure response varies with the intubation technique, therefore, it is important to establish the cardiovascular effects of fiber optic-assisted nasal intubation and conventional nasal intubation in anaesthetized patients.

In our study, there was significant increase in mean arterial pressure after intubation in both the groups. This increase in mean arterial pressure was compared with post induction (0 minute) mean arterial pressure values. After intubation, mean arterial pressure remained elevated for 5 minutes in conventional nasal group and 3 minutes in fiber optic intubation group, which was significant.

On comparing both the techniques, we found that at one minute after intubation, the rise in mean arterial pressure was significantly more in fiber optic intubation group than in conventional nasal intubation group. Increased hemodynamic response during fiber optic bronchoscopic intubation compared to conventional nasal intubation may be attributed to following reasons:

1) fiber optic bronchoscopic intubation is technically difficult procedure with long learning curve.[8–12]

2) longer duration to perform fiber optic bronchoscopic intubation results in increased sympathetic activity, possibility of developing hypercapnia that may further result in hypertension and weaning of effect of inhaled anaesthetic gaseous agents.[10,12–14]

Xue et al and Tushar et alperformed similar studies and compared hemodynamic response in nasotracheal intubation

Table 1: Comparison of mean arterial pressure (MAP)

Duration	Group –A (n=30)	Group –B (n=30)	p-value
	Mean ± S.D	Mean ± S.D	
At Base line	89.90 ± 9.70	91.73 ± 11.02	0.5045
At 0 min	79.43 ± 10.26	80.83 ± 13.69	0.6557
At 1 min	107.07 ± 15.99	116.07 ± 17.83	0.0441
At 3 min	95.63 ± 13.70	93.43 ± 11.83	0.5082
At 5 min	87.33 ± 11.20	82.87 ± 12.13	0.1444
At 10 min	81.86 ± 8.23	82.23 ± 9.72	0.8741

Table 2: Time taken for intubation (in seconds).

Duration	Group – A (n=30)	Group –B (n=30)	P value
Mean ± S.D	46.07 ± 21.26	79.5 ± 30.80	<0.0001

under general anaesthesia between fiber optic bronchoscopy and direct laryngoscopy and concluded that blood pressure response immediately after intubation was more in fiber optic group.[9,15] These results were similar to our study.

Tsubaki et al,[16] and Omprakash et al,[7] performed similar studies and observed significant rise in blood pressure after intubation but no significant difference between the groups. The significant increase in mean arterial pressure values from baseline corresponds to this study. However, in the present study, increase in mean arterial pressure was significantly more in fiber optic group than conventional nasal group at 1 minute after intubation. This difference in the observation may be attributed to longer duration of time for conventional nasal intubation in their studies.

Time taken for fiber optic nasal intubation in our study was significantly more than time taken for conventional nasal intubation. Studies performed by Xue et al, Smith et al and Omprakash et al also concluded longer duration for performing fiber optic nasal intubation compared to conventional nasal intubation.[2,7,9]

Conclusion

Fiber optic bronchoscopy provides no advantage over conventional laryngoscopy, in terms of decreasing the hemodynamic response to nasotracheal intubation. It is technically more difficult with steep learning curve and severity of hemodynamic response also depends on the expertise of the anaesthetist.

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