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Fiberoptic intubation with modified nasopharyngeal airway as conduit .

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ABSTRACT

AIM : *Modified nasopharyngeal airway can be used as a conduit for awake nasal fiberoptic intubation. A study was carried out to investigate the success rate, ease of fiberoptic intubation, complications and heamodynamic response with and without nasopharyngeal airway as a conduit.*

METHOD : *70 patients for elective surgery under general anaesthesia were randomized in two groups of 35 each. In group 1 awake nasal fiberoptic intubation was carried out using modified nasopharyngeal airway as a conduit while in group 2 awake nasal fiberoptic intubation was performed without nasopharyngeal airway.*

RESULTS : *Although success rate of intubation and hemodynamic response was not significant in either group, Intubation time, no. of attempts and complications were significantly less in Grp 1.*

CONCLUSION : *Fiberoptic intubation can be reliable and safe by using modified Nasopharyngeal airway..*

KEYWORDS *Nasopharyngeal airway, Fiberoptic intubation, Conduit, General Anaesthesia.*

INTRODUCTION

The most common cause of mortality or serious morbidity due to anaesthesia is from airway problems. It is estimated that one third of all anaesthetic deaths are due to failure to intubate and ventilate.1 During routine anaesthesia the incidence of difficult tracheal intubation has been estimated to be 3 – 18%. Old techniques like blind nasotracheal intubation, retrograde intubation and cricothyrotomy have been replaced by, bougie, supraglotttic devices, Bullard laryngoscope, video optical intubation stylet, McGrath laryngoscope, Glidescope, AirTrack, flexible fiberoptic bronchoscope etc.

The flexible fiberoptic endoscope is the most valuable single tool available for the anaesthetist to manage difficult airway and is considered as gold standard in airway management. Fiberoptic intubation via nasal route is usually easier and has a higher success rate due to its secured placement compared with an oral approach.

To facilitate fiberoptic intubation (FOI) various conduits have been used in past like the intubating oral airways, the intubating laryngeal mask airway (LMA), the endotracheal tube and the Nasopharyngeal airway(NPA).

But oral airways are associated with gag reflex and significant discomfort to the patient during awake intubation. In conventional nasal fiberoptic intubation method, the nasal tube is inserted after visualization of the vocal cords by a flexible fiberoptic laryngoscope.2 In this method two major problems encountered are difficulty in the visualization of the glottis and the passage through vocal cords. To overcome these problems, NPA can be used as a conduit for nasal FOI as it offers minimal discomfort to awake patients due to its soft material.3

A study was undertaken to increase the ease of insertion of fibreoptic bronchoscope by using a modified technique .A nasopharyngeal airway (NPA) was cut vertically throughout its length prior to its insertion in nostril so that when bronchoscope is entered through vocal cords, NPA can be removed easily and endotracheal intubation can be done with minimal manipulations.

AIMS AND OBJECTIVES:

This study was carried out as randomized prospective clinical trial with following aims and objectives-

Primary Aim:

1) To compare the success rate of nasal fiberoptic intubation with & without Nasopharyngeal Airway
2) To compare the number of attempts required for nasal fiberoptic intubation with & without Nasopharyngeal Airway
3) To compare the time required for nasal fiberoptic intubation with & without Nasopharyngeal Airway

Secondary Aim–

1) To compare the haemodynamic changes during nasal fiberoptic intubation with and without Nasopharyngeal Airway
2) To compare the complications during nasal fiberoptic intubation with and without Nasopharyngeal Airway

MATERIAL AND METHOD:

This study was undertaken after obtaining Institutional Ethical Committee approval and written informed consent from all the patients. 70 patients of 18-75 years of age group of either sex belonging to ASA grade I and II with BMI < 35kg/m2 scheduled for elective surgical procedures under general anaesthesia were included. Whereas patients with other systemic disorders, not fit to the ASA grade, age group and BMI, patients with deranged coagulation profile or having basilar skull fracture were excluded from the study.

Patients were randomly allotted in 2 groups of 35 each using computer generated numbers.

Group 1: patients undergoing nasal fiberoptic intubation with modified Nasopharyngeal airway (n=35)

Group 2: patients undergoing nasal fiberoptic intubation without modified
Nasopharyngeal airway (n=35)

Patients detail history, general and systemic examination was done. Routine investigations like haemogram, complete blood count, liver function tests, renal function tests, coagulation profile and urine examination were performed. Their height and weight were measured to calculate BMI . Patients were kept nil by mouth for 6 hours prior to the procedure.

In operation theatre, Standard monitoring of heart rate, noninvasive blood pressure monitoring, SPO2 and ECG was done using multipara monitor. 10ml/Kg of Ringer Lactate infusion was started . Oxygen supplementation was started at the rate of 5 litres per minute and continued till intubation.Patients were

premedicated with IV inj. Ondansetron 4 mg, inj. Glycopyrrolate 0.2 mg, IV inj. Midazolam 0.02mg/kg and inj. Fentanyl 2µg/kg, 15 minutes prior to the procedure. Two drops of nasal mucosal vasoconstrictor (Xylometazoline 0.05%) were instilled into each nostril as decongestant. Oral gargles with viscous Lignocaine 2%(10 ml) were given. . 10% Lignocaine was sprayed over tongue and posterior pharyngeal wall. Nasal packing was done with gauze pieces soaked in Lignocaine 2% solution. Intratracheal instillation of 2 ml of 4% Lignocaine was administered by cricothyroid puncture. Total dose of Lignocaine did not exceed 3.5 mg/kg. The nostril with least resistance during nasal packing was chosen for intubation.

Nasopharyngeal airway was modified by cutting it vertically throughout its length. It was then inserted into nostril through which fiberoptic intubation was planned.

In group 1 nasal fiberoptic intubation was done using modified nasopharyngeal airway as a conduit.While in Group 2 Intubation was done without using conduit. Fiberscope was passed through the modified Nasopharyngeal airway (NPA) and advanced till the epiglottis could be visualized, then after passing through the vocal cords, Nasopharyngeal airway was removed. Finally the endotracheal tube was negotiated over the fiberscope into trachea. . After confirmation of correct placement of the endotracheal tube by EtCo2 , patient was induced with IV Inj. Propofol 2mg/kg followed by muscle relaxant inj. Vecuroniun 0.1mg/kg. Anaesthesia was maintained with oxygen, nitrous oxide,Isoflurane 1% and inj. Vecuronium intermittently.

Any events of desaturation, hypotension, hypertension, bradycardia, tachycardia, epistaxis, trauma and mucosal ulceration during the procedure were noted.

In group 2 conventional way of nasal fiberoptic intubation was done without nasopharyngeal airway. Rest of procedure was similar to that of group 1.

Success rate of intubation, number of attempts, time required for successful intubation was compared in both groups. Pulse rate, blood pressure, oxygen saturation and complications during intubation were also compared in both the groups.

RESULTS

Both groups were comparable for age,sex BMI and ASA grading and were found to be nonsignificant. Intubating conditions were also compared and it was found that the success rate was 100% in both the groups

Table 1: Comparison of No. of attempts between Groups

Parameter	Group 1		Group 1		p Value
	N	%	N	%	
No. of attempts	1	24	68.6%	13	37.1%
	2	11	31.4%	10	28.6%
	3	0	-	12	34.3%
Mean no. of attempts	Mean	SD	Mean	SD	p<0.05(S)
	1.31	0.47	1.97	0.86	

In group 1, 24 (68.6%) patients were intubated in 1st attempt while remaining 11 (31.4%) patients were intubated in 2nd attempt. In group 2 , 13 (37.1%) patients were intubated in 1st attempt, 10 (28.6%) patients were intubated in 2nd attempt while 12 (34.3%) patients required 3rdattempt for intubation

The mean number of attempts required for successful intubation was less in Group 1 (1.31 ± 0.47) as compared to Group 2 (1.97 ± 0.86) and it was statistically significant as per student t test.

Table 2: Comparison of intubation time in both Groups

Parameter	Group 1		Group 1		p Value
	N	%	N	%	
Intubation Time (min)	2.19	0.86	3.52	1.25	p<0.05(S)

The mean intubation time in group 1 was 2.19 ± 0.86 min and that in group 2 was 3.52 ± 1.25 min which was statistically significant (p< 0.05) as per Student's t-test.

Table 3: Comparison of complications between Groups

Adverse Effects	Group 1		Group 1		p Value
	N	%	N	%	
Desaturation (< 90%)	3	8.4%	4	11.2%	p>0.05(NS)
Hypotension (systolic BP < 90mm of Hg)	2	5.6%	3	8.4%	p>0.05(NS)
Hypertension (systolic BP > 160mm of Hg)	3	8.4%	3	8.4%	p>0.05(NS)
Bradycardia (HR < 50 beats / min)	1	2.8%	2	5.6%	p>0.05(NS)
Tachycardia (HR >120 beats / min)	3	8.4%	3	8.4%	p>0.05(NS)
Epistaxis	4	11.2%	12	33.6%	p<0.05(S)
Trauma and mucosal ulceration in nose	4	11.2%	13	37.1%	p<0.05(S)

Complications in the form of epistaxis and trauma to nasal mucosa were found more in group 2 than in group 1 which statistically significant (by Chi-square test).Rest of the parameters were comparable in both the groups.

DISCUSSION

Awake fiberoptic intubation under local anesthesia is the technique of choice in anticipated difficult airway due to restricted mouth opening and difficult mask ventilation[4] so also due to deviation of the course of the tube from fiberscope towards epiglottis, arytenoid cartilage, pyriform fossae, or esophagus.[5] **Marfin et al**[6] showed that posterior structures of the laryngeal inlet are the sites of impingement during fiber-optic nasal intubation and suggested anti-clock wise rotation as its solution.

Hence a study was undertaken to compare the ease of nasal fibreoptic intubation using a modified nasopharyngeal airway .70 patients were enrolled in 2 groups of 35 each in which Group 1: modified nasopharyngeal airway was used as a conduit during nasal fibreoptic intubation ;Group 2: nasal fibreoptic intubation was done without using conduit. Both patients were comparable for age,sex BMI and ASA grading.

Varghese E et al[7] used laryngeal mask airway for Fiberoptic intubation and compared it with oropharyngeal airway. **Mohammadzadeh A et al**[8] compared the success rate of NASAL-18 technique with the conventional one in attempting nasal FOI where endotracheal tube was used as conduit.In our study the success rate was 100% in both the groups but the ease of intubation was observed more in Group 1.

Various conduits have been used to minimize the no. of attempts in fiberoptic intubation. **Varghese E et al**[7] compared the use of LMA with oropharyngeal airway and found that the success rate of single attempt intubation was 73.33%. Nasopharyngeal airway has been used by **Ashraf A. Abdel Basset et al**[9] with higher success rate. In our study 68.6% patients were successfully intubated with conduit in 1st attempt in group 1 while 31.4% patients required 2 attempts. Whereas in group 2 only 37.1% patients were intubated in 1st attempt without conduit. In group 2, 28.6% patients were intubated in 2nd attempt and 34.3% patients required 3rd attempt. The mean number of attempts required for successful intubation were significantly less due to use of conduit.(p<0.05) We observed that the mean intubation time required was 2.19 ± 0.86 min in group 1and 3.52 ± 1.25 min in group 2. **Mohammadzadeh A et al**[8] used endotracheal tube as conduit and concluded that significant reduction in intubation time was observed with conduit (87±41 sec) than conventional method (176.2±56.3 sec). **Varghese E et al**[7] also observed lesser time required for intubation (59.20 ± 42.85 sec vs 108.66 ± 52.43 sec).

Insertion of endotracheal tube is the most invasive stimulus

causing haemodynamic response in the form of increase in heart rate and blood pressure.10 In our study proper doses of premedicants and reduction in the time of intubation due to conduit maintained the hemodynamic stability throughout the procedure.

Ashraf A. Abdel Basset et al[9] observed that the incidence of epistaxis and trauma to nasal mucosa was 10.5% after using nasophyrangeal airway as against 44.4% without airway. In our study epistaxis and trauma to nasal mucosa was seen in 4 (11.2%) patients in group 1 and 12 (33.6%) and 13 (37.1%) respectively in group 2.However no patient required any rescue treatment.

Awake flexible fiberoptic intubation causes a significant increase in heart rate and blood pressure.[11] The rate of tachycardia (8.4%) and degree of hypertension (8.4%) were found to be equal in both the groups in our study. Rate of desaturation, hypotension and bradycardia were insignificantly higher in group 2 compared to group 1

($p > 0.05$).Rate of epistaxis, trauma and mucosal ulceration were also significantly higher in group 2 as compared to group 1 ($p < 0.05$). (Analysis as per Chi-square test)

It can be concluded that modified nasopharyngeal airway offers more ease of nasal intubation. The lingual branch of the glossopharyngeal nerve is bypassed in this method which makes the patients less prone for gag reflex;and hence this method is well tolerated by patients. Anatomically correct curvature of the Nasopharyngeal airway places its tip directly over the epiglottic opening which is responsible for higher success rate of intubation. The relative ease of its removal is remarkable, even with the ETT in place. However one may come across complication like overlapping of cut edges of conduit occluding the lumen completely.

CONCLUSION

Fiberoptic intubation requires lot of practice and expertise. Success largely depends on the skill and experience of anaesthesiologist.

On the basis of the present study and results obtained, it can be concluded that nasal fiberoptic intubation through modified Nasopharyngeal airway seems to be reliable and safe procedure with increase in ease of intubation and decrease in number of attempts for successful intubation. The chances of intubation induced epistaxis and nasal trauma are also reduced with this modified method.

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