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Original Research Article

Comparison of the Ease of Insertion of Nasogastric Tube under General Anaesthesia With Respect to Endotracheal Intubation

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Abstract

Background: Nasogastric tube (NGT) insertion in anaesthetized, paralyzed and intubated patients is often a difficult and challenging job for anaesthesiologist. The present study was undertaken to compare ease of insertion of NGT under general anaesthesia (GA) with respect to endotracheal intubation (ETI).
Method: Total 130 patients were enrolled in the study and randomly allocated in two equal groups. Group A: NGT was inserted under GA before ETI and Group B: NGT was inserted under GA after ETI. Various parameters including first attempt success rate, number of attempts and time taken for successful NGT insertion, incidence of complications were noted and compared between two groups.
Results: First attempt success rate was found to be significantly higher in group A (76.9%) as compared to group B (53.8%), ($p < 0.05$). 11(16.9%) patients in group A and 27(41.5%) in group B required 2 attempts whereas 6.2% patients in group A and 4.6% patients in group B required 3rd attempt for successful NGT insertion ($p > 0.05$). Time taken for successful NGT insertion was significantly higher in group B (57.78 sec) than group A (35.72 sec). In group A 15.4% patients had bleeding and no incidence of kinking or coiling while in group B, 27.7% patients had bleeding, 6.2% had coiling and 9.2% of patients had kinking ($p < 0.05$).
Conclusion: In anaesthetised patients with adequate starvation and without anticipated difficult airway, NGT insertion is easier before ETI as it requires fewer attempts, less time and maneuvers as well as minimal complications as compared to NGT insertion after ETI.
Keywords: Nasogastric tube; Anaesthesiologist; General anaesthesia; Endotracheal intubation.

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1. Introduction

The tracheal intubation is the gold standard method for maintaining a patent airway during anaesthesia. Nasogastric tube (NGT) insertion is indicated almost routinely in patients undergoing abdominal surgery to decompress the stomach intraoperatively and postoperatively, and to allow postoperative tube feeding. During laparoscopic surgery NGT helps to deflate the stomach which obscures the view of the camera and reduces the chances of gastric perforation [1]. NGT insertion is often performed by an anaesthesiologist in the operating room. Although an innocuous and simple procedure, Inserting NGT into a paralyzed and intubated patient is sometimes difficult and frustrating [2]. A potentially difficult NGT insertion is hard to predict according to the outward appearance of the patient.

An average failure rate of NGT insertion has been reported to be nearly 50-66% on first attempt made by conventional method with the patient's head in an intubating position [1,3,4]. Repetitive attempts at NGT insertion may result in nasal mucosal bleeding, kinking, knotting, false passage and unstable vital signs like

hypertension, tachycardia, and arrhythmias [2,3,5]. However, in anaesthetized and intubated patients, the NGT gets coiled in oral cavity due to patients' inability to swallow and the presence of an inflated cuff in the proximal trachea. It has been acknowledged that most difficulties in NGT insertion are due to anatomical reasons. Sometimes the NGT is already slightly folded by the package or is compressed by the outer caliber segments rolled up in a storage bag which also contributes to weak points during placement [6].

Moreover, flexibility of the NGT significantly affects success rate. A rigid tube requires fewer insertion attempts than a flexible tube [7]. Existence of so many methods with variable reported success rate indicates that no single method is ideal and the quest for the best is still on. When NGT is inserted under anaesthesia, whether the difficulty in insertion is produced by the tongue due to loss of tone under anaesthesia or by changes in anatomy by the endotracheal tube or its cuff is not well studied [8]. Hence the present study was conducted to compare the ease of insertion of NGT under anaesthesia, before and after endotracheal intubation and to compare the incidence of complications like bleeding, coiling of NGT and kinking of NGT associated with NGT insertion.

2. Materials and Methods

This prospective randomized comparative study was conducted after obtaining institutional Ethics Committee approval and written informed consent from all patients at a tertiary health care center. Total 130 patients of either sex, aged between 18-60 years, body mass index (BMI) between 18.5 – 28 kg/m² with Mallampati classification grade I & II, ASA physical status I or II and undergoing elective surgery under general anaesthesia with endotracheal intubation and requiring NGT insertion were included in the study. Patients with skull base lesions, anticipated difficult airway, deviated nasal septum, history of nose surgery, obstructive sleep apnoea, hypertrophy of adenoids, coagulation abnormalities, pregnant females, emergency surgery, patients with full stomach, with restricted neck movements (i.e. trauma, cervical disc prolapse, meningitis, neck pain), patients with delayed gastric emptying i.e. diabetic patients, history of pancreatic duodenectomy, Parkinson's disease, multiple sclerosis, patients with esophageal disorders/ varices, patients with history of radiotherapy in head and neck were excluded from the study.

A thorough pre anaesthetic evaluation was carried out in all patients. All routine investigations and investigations relevant to surgery were asked for, and ASA grading of the patient was determined. Patients were randomly allocated to one of the two groups using computer generated randomization table. Group A: NGT inserted under general anaesthesia before endotracheal intubation. Group B: NGT inserted under general anaesthesia after endotracheal tube insertion. After confirming the starvation status, patients were shifted to operating room, and monitoring consisted of electrocardiography, non-invasive blood pressure for systolic (SBP) and diastolic blood pressure (DBP), and pulse oximetry (SpO_2). An intravenous line was secured on the non-dominant upper limb using an 18-gauge cannula and ringer lactate was started at 2ml/kg/hour. Baseline values of heart rate, SBP and DBP and SpO_2 were recorded. Before induction of anaesthesia Oxymetazoline drops (0.05%) were instilled in both nostrils. The more patent nostril was chosen by using metal tongue depressor, and the side with more fogging during exhalation was used for NGT insertion.

All patients were pre-medicated with IV Glycopyrrolate 0.004mg/kg, IV Midazolam 0.03mg/kg, IV fentanyl 2mcs/kg & IV ondansetron 0.08mg/kg. SBP, DBP, pulse rate and SpO2 were noted after pre medication. Patient was pre-oxygenated with 100% Oxygen for 3 minutes; Patient was induced with titrated dose of IV Propofol 2mg/kg till loss of eye lash reflex. After confirming the ability to ventilate, muscle relaxant IV Vecuronium0.08 mg/kg was given and patient was ventilated for 3 minutes using circle absorber system with oxygen & air (50:50) and sevoflurane (2 to 4%). For male patient, NGT number 16 F& for female patient, NGT number 14 F was used. (ANGLE™ manufactured by DEVPARV SURGICO). SBP, DBP, pulse rate and SpO_2 were continuously monitored in all patients.

In group A, after mask ventilation NGT was lubricated with 2% lignocaine jelly and inserted through the more patent nostril. Any time during insertion of NGT, If SpO2 fell below 90% procedure was abandoned and mask ventilation with 100% O_2 was immediately started and further attempt of NGT insertion was done after confirming SpO2 to be 100%. After insertion of NGT patients were again mask ventilated and then intubated.

In group B, direct laryngoscopy was done to visualize vocal cords. Endotracheal intubation was done usingtube no.8.5 for male patient and 7.5 for female patient. The correct placement of tube was confirmed using capnography, chest rise and auscultation. The endotracheal tube cuff was inflated with air so as to have minimal air leak around cuff at 20 cm H_2O pressure. After this the tube was fixed and patient was ventilated with oxygen & air (50:50) and sevoflurane (2 to 4%) using circle absorber system. At room temperature lubricated NGT was inserted through the more patent nostril. Pulse, SBP, DBP and SpO2 were monitored continuously.

Three attempts were given to each patient for NGT insertion. In the first attempt NGT was inserted in neutral position. If not successful, second attempt of NGT Insertion was done with neck flexion and lateral pressure. If still not

successful, third attempt was done with forward displacement of larynx by manually gripping and lifting the thyroid cartilage. After three attempts if NGT was not successfully inserted it was considered as procedure failure. Then NGT was passed under direct vision using laryngoscope and Magill's forceps.

All NGT insertions were done by an anaesthesiologist having at least one year of experience in anaesthesia. At the end of the operation, anaesthetic agents were discontinued. Patient was reversed with Inj. Glycopyrrolate 0.008mg/kg, Inj. Neostigmine 0.05 mg/kg and was extubated after confirming return of adequate tone, power and reflexes. Various parameters including first attempt success rate, number of attempts needed for successful NGT insertion, time taken for successful nasogastric tube insertion and the incidence of complications like bleeding, coiling of NGT and kinking of NGT associated with NGT insertion were compared between study groups.

2.1 Statistical analysis

Data was expressed as percentage and mean ± S.D. Kolmogorove - Smirnove analysis was performed for checking linearity of the data. Student's t test was used to check the significance of difference between two parameters in parametric data. Fischer's exact test or Chi square test was used to analyze the significance of difference between frequency distribution of the data. P value <0.05 was considered as statistically significant. SPSS© for windows™ Vs 17, IBM™ Corp NY and Microsoft excel™ 2007, Microsoft® Inc. USA was used to perform the statistical analysis.

3. Observations and Results

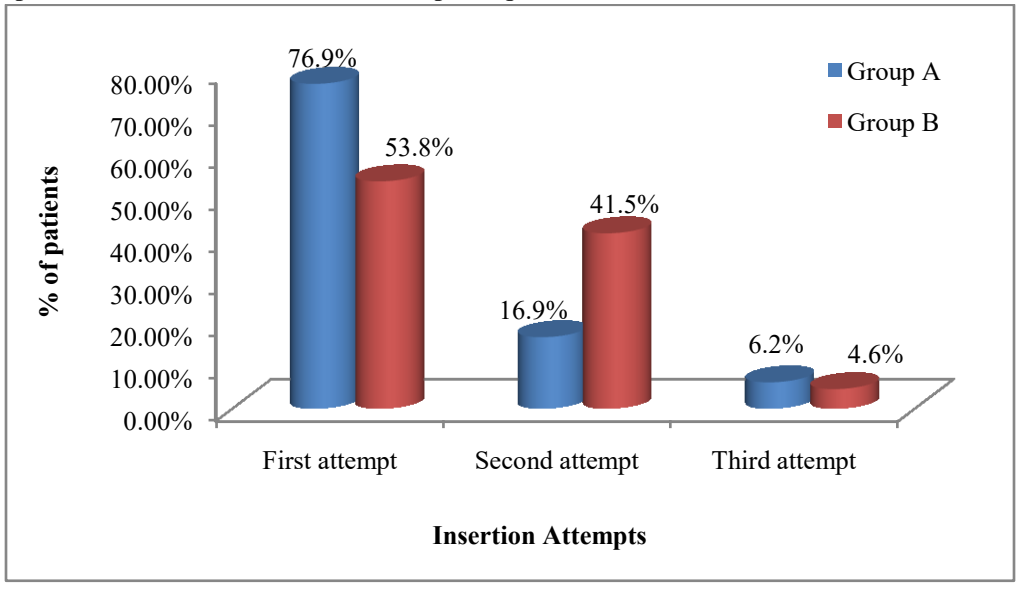
A total of 130 patients were enrolled, of them 62 subjects (47.7%) were female and 68 (52.3%) were male. Mean age of patients in group A was 40.52±9.658 and in group B was 39.80±10.207 years, (0.679). Both the groups were comparable with regards to age, gender, weight, ASA grading and MPC distribution as shown in table 1.

Table 1: Demographic profile of the patients

Demographic data		Group A	Group B	P Value
Age in years	≤30	9 (13.8%)	16 (24.6%)	0.275
	31-40	22 (33.8%)	15 (23.1%)	
	41-50	21 (32.3%)	24 (36.9%)	
	51-60	13 (20.0%)	10 (15.4%)	
Gender	Female	31 (47.7%)	31 (47.7%)	1.000
	Male	34 (52.3%)	34 (52.3%)	
ASA Grade	I	40 (61.5%)	37 (56.9%)	0.592
	II	25 (38.5%)	28 (43.1%)	
MPC	1	40 (61.5%)	34 (52.3%)	0.288
	2	25 (38.5%)	31 (47.7%)	
BMI (Kg/m^2)		22.7±2.21	23.09±2.20	0.333

First attempt success rate was found to be significantly higher in group A compared to group B while second attempts were found to be higher in group B and third attempt success rate was comparable between two groups (Figure 1).

Figure 1: Comparison of number of insertion attempts required for successful insertion of NGT between two groups



Time taken for successful insertion of NGT was found to be significantly higher in group B compared to that in group A, ($p<0.0001$) as depicted in figure 2.

Figure 2: Comparison of Time taken for successful NGT insertion

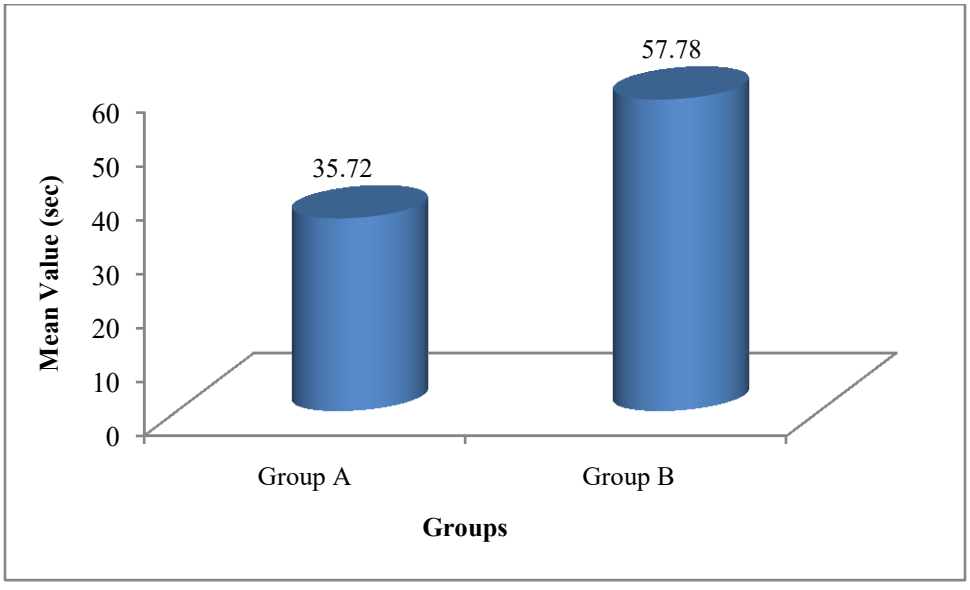


Table 2 show the frequency of complications and were found to be significantly higher in group B than group A ($p=0.001$).

Table 2: Comparison of incidence of complications between two groups

Complications	Group A	Group B	P Value
Bleeding	10 (15.4%)	18 (27.7%)	0.001
Coiling	00 (0.0%)	04 (6.2%)	
Kinking	00 (0.0%)	06 (9.2%)	
No	55 (84.6%)	37 (56.9%)	

Repeated attempts of insertion of NGT increase injury to the nasal and pharyngeal mucosa or larynx and cause bleeding or hoarseness.

4. Discussion

Nasogastric tube (NGT) insertion is done in patients with wide range of diseases and conditions, from very healthy subjects undergoing elective surgeries to critically ill intubated patients. Insertion of a NGT in an anesthetized and intubated patient is not always as easy as in a conscious, cooperative patient. In conscious and cooperative patients, we usually use "push and swallow" technique i.e. along with pushing forward, the patient is asked to swallow it down. This technique mainly requires patient's cooperation. Thus, insertion of a NGT in anesthetized, paralyzed and intubated patients who cannot swallow is a very challenging procedure and may need more attempts [9].

In the present study, first attempt success rate was found to be significantly higher in before intubation group (group A) as compared to that in after intubation group (group B) which is comparable with the previous studies [1, 2,10]. The possible cause stated by authors for this difficulty after intubation is the distortion caused by endotracheal tube and not the loss of airway tone. In the presence of an endotracheal tube, the arytenoid cartilages and piriform sinus may be displaced posteriorly thereby making them common sites of impaction [10]. Various studies [2, 4] reported an average failure rate of nearly 50 to 60% on first attempt made by conventional method in intubated patients with the patients head in an intubating position. In current study, 11(16.9%) patients in group A and 27(41.5%) in group B required 2 attempts for successful NGT insertion. This shows NGT insertion requires more attempts in after intubation (group B) than before intubation (group A). Second attempt was performed in neck flexion and lateral pressure. 3rd attempts were needed in 4 patients in group A and 3 patients in group B which was not statistically significant. These results are comparable with the study done by Desai *et al* [10]. However, we found that neck flexion and lateral pressure improved unsuccessful NGT insertion on first attempt in neutral position to successful NGT insertion in 90% patients on 2nd attempt. This is comparable to other studies [1,3,11]. Moreover, time taken for successful insertion of NGT was found to be significantly higher after intubation (In group B) compared to before intubation (In group A) ($p<0.0001$) which is similar to the study done by Desai *et al* [10].

The overall frequency of complications was significantly higher in group B as compared to group A (p= 0.001). Most common complication of NGT insertion was noted to be bleeding in both the groups but it was more in group B and difference was statistically significant (p-0.001).

In Desai *et al* study [10] no bleeding was noted in before intubation group. Also they have not studied kinking, coiling or any other complications. In the current study, none of the patient in group A had coiling or kinking of NGT during insertion. Coiling was noted in 6.2% subjects and kinking was detected in 9.2% subjects in group B only. This is probably because of the presence of endotracheal tube in the trachea causing obstruction for the passage of NGT into the esophagus. To the best of our knowledge no other studies have successfully reported comparison of complications before and after intubation.

5. Limitations

- Authors used auscultation method to confirm NGT position on the grounds of feasibility.
- Obese, paediatric, pregnant and emergency patients with full stomach were not included in the study.
- This study was not blinded which may lead to observer bias.
- Video laryngoscope has been used to facilitate NGT insertion and it has been found to be superior to blind technique as it helps to diagnose the site of impaction and NGT related complications more accurately. Further studies can be done using this technique [22].

6. Conclusion

In anaesthetised patients with adequate starvation and without anticipated difficult airway, NGT insertion is easier before endotracheal intubation as it requires fewer attempts, less time and manoeuvers as compared to NGT insertion after endotracheal intubation. It avoids some of the messy and time consuming measures of failed NGT insertion along with fewer rates of complications. However it is safe to avoid NGT insertion before intubation in patients with difficult airway as delay caused by NGT insertion may lead to hypoxia.

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