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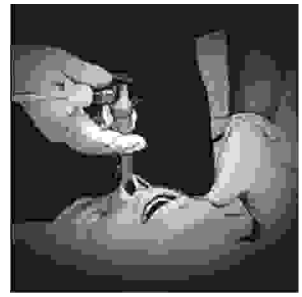
BLIND NASOTRACHEAL INTUBATION;
A COMPARATIVE STUDY OF WITH AND WITHOUT SUCCINYLCHOLINE



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ABSTRACT... zmcgoc@hotmail.com **Objective:** Blind Nasotracheal Intubation (BNI) can be undertaken after muscle relaxation with Inj. Succinylcholine or under deep inhalational anesthesia. The objective of study was to determine the preferred one of these 2 techniques of BNI. **Design:** Prospective, randomized study. **Place and Duration of Study:** PNS SHIFA, Karachi and AFID, Rawalpindi from May 2002 to April 2005. **Subjects and Methods:** Sixty patients between 10 - 40 years of age presenting for elective surgery in whom BNI was required due to limited or no mouth opening were enrolled through convenient sampling. Patients were randomly divided into two groups: WMR (n=30) or NMR (n=30) to undergo BNI after relaxation with Succinylcholine or under inhalational anesthesia with 2% Halothane, respectively. A red rubber nasal endotracheal tube (cuffed and un cuffed in adults and children respectively) was used. **Results:** The frequency of successful BNI in WMR group was 100% and significantly higher (P=0.03) than in the NMR group (86%). Time to succeed was significantly less in the WMR group 2±0.9 minutes versus 3.4±2.0 in the NMR group. There was no statistically significant difference of occurrence of adverse events in the two groups. **Conclusion:** BNI with Succinylcholine produced a higher success rate. This technique can decrease failure to intubate, we speculate that it may, therefore, increase patient safety.

Key words: Intubation, Blind nasotracheal, Succinylcholine.

INTRODUCTION

Blind nasal intubation[1] (BNI) is the intubation of the trachea through the nose, without visualization of the glottis. It is undertaken when oral route is difficult or impossible e.g. conditions in which there is limited or no mouth opening[2]. BNI is recommended in difficult airway algorithms[3] and is the most frequently employed technique (84%) to achieve intubation in difficult situations by French anesthetists[4]. However, it is associated with lower success rate[5], increased frequency of complications[6] and excessive trauma[7].

There are 2 techniques of BNI in anesthetized patients[1]:

a) Intubation without giving muscle relaxant (Breath guided)
b) Intubation after muscle relaxation (Apneic)

BNI in spontaneously breathing patients under inhalational anesthesia without giving muscle relaxant has the obvious advantage of avoiding apnea and safety of patient's ventilation. However, anesthetic level may diminish resulting in cough, vomiting, laryngospasm and bronchospasm. Patient's movement may make intubation difficult or impossible. The technique of locating the laryngeal inlet using breath sounds was attempted on 6 patients for appropriate management following a failed intubation at the Eldonet Hospital in Kenya[8]. Five of the 6 patients were successfully intubated. It was still impossible to intubate the 6th patient who required tracheostomy. On the other hand, after administering a muscle relaxant e.g. succinylcholine, studies have shown that, conditions for oral and nasal intubation are improved[9]. In one study BNI was accomplished successfully in 96% of patients after muscle relaxation[10]. However, if intubation proves to be difficult after muscle relaxation[11], a situation of can't intubate/ventilate may arise especially in difficult airways. As many as 30% of deaths attributable to anesthesia alone are because of inability to manage difficult airway[12].

The comparative studies on the two methods of BNI are lacking[13]. The existing studies do not show the relative success or failure associated with either of the methods. These also do not quantify/ measure the adverse events in anticipated difficult airway. In our study, the two commonly practiced techniques of BNI were compared in patients with limited mouth opening. The aim was to find out which one of these 2 techniques produces higher success rate and least complications.

MATERIALS AND METHODS
SUBJECTS

60 patients presenting for elective surgery under general anesthesia, in whom Blind Nasal Intubation was required, were selected through convenient sampling for this prospective randomized, interventional study. Patients with a history of impossible intubation, mouth opening (inter-incisor distance) less than 35 mm, mallampati III or IV or thyromental distance less than 65 mm. Patients with no mouth opening due to dental wiring were also included. Patients of 10-40 years of age and having ASA status I or II were included. All the patients were in good health regarding hydration and nutritional status. Written informed consent was taken from all the patients.

Patients having nasal pathologies e.g.. chronic sinusitis, nasal polyposis or history of recurrent epistaxis, cases with abnormal coagulation status e.g. having coagulation disorders or receiving anti-coagulation therapy or taking anti-inflammatory medication in the preceding week were excluded. Patients in whom Succinylcholine was contra indicated, were also excluded from this study.

All patients were investigated for hemoglobin, total and differential leukocytes counts, platelets counts and urine analysis. X-rays soft tissue neck for viewing of laryngeal tissue shadow and orthopantogram were also performed preoperatively. Just before induction of anesthesia, patients were randomly allocated to one of the two groups:

1. No Muscle Relaxant (NMR) group in which BNI was done after inhalational induction and no muscle relaxant was given.
2. With Muscle Relaxant (WMR) group in which Inj Succinylcholine 1.5 mg/kg was given as muscle relaxant.

Randomization was performed using a random number table in balanced blocks of 20 (10 per group). This study had a cross-over design i.e. in the event of failure of the first assigned technique, defined by five unsuccessful attempts, the alternative method of intubation was performed. More specifically, after 5 unsuccessful attempts of BNI without giving muscle relaxant (in the NMR group), Inj. Succinylcholine was administered and BNI was attempted. Conversely, after 5 unsuccessful attempts of BNI after administering Inj Succinylcholine (in the WMR group) patient was to be ventilated until spontaneous breathing was resumed and BNI with the help of breath sounds was to be attempted. Alternative means for ensuring patient's oxygenation (Cricothyrotomy, tracheostomy) were always immediately available. Intubations were performed by the anesthetist assigned to the case, encompassing 4 anesthesia faculty and 6 anesthesia residents.

PROCEDURE

Patient's head was supported by a pillow to achieve a neutral head position. No pre-medication was given. All patients received topical vasoconstrictor (4 drops of Xynosine nasal drops in each naris) and pre-oxygenation with 4 vital capacity breaths was done. Throughout the procedure, oxygen was administered continuously either by nasal or oral route via a cannula. 2% Xylocaine gel was instilled into the more patent naris.

In the NMR group, after giving Inj Pentothal 6mg/kg I/V, anesthesia was deepened with inhalation of 2% halothane vaporized in a 50/50 mixture of oxygen and nitrous oxide. BNI was attempted after achieving a depth of anesthesia, sufficient enough to prevent movements, breath-holding, coughing or tachycardia at the time of intubation. BNI was breath guided and NETT was advanced listening to the breath sounds. The passage of tube into esophagus or a pyriform sinus was detected by disappearance of breath sounds and capnography. The passage of NETT into the trachea was followed by a cough.

In the WMR group, after giving Inj Pentothal 6 mg/kg intravenously, efficient mask ventilation was demonstrated. This was followed by Inj. Succinylcholine 1.5 mg/kg intravenously. Intermittent positive pressure ventilation was done and BNI attempted once fasiculations had disappeared. The NETT was advanced through the nasopharynx while chin was lifted with other hand, the patient,s head was extended, flexed or turned to guide the tip.

In both the groups, correct positioning of NETT was confirmed by detection and curve analysis of carbon dioxide in the exhaled gas with capnograph and bilateral chest auscultation.

Following observations were made by an assistant;

1. Time to achieve intubation (Interval of time from the last inflation through face mask and the placement of the tube in the trachea).
2. Number of attempts: An attempt was defined as: a try to enter the trachea.
3. Failure: A failure was considered when the operator was not able to intubate the trachea even after 05 attempts. In this instance, the other technique was employed or intubation with the aid of instruments was accomplished or tracheostomy was done; success was defined as confirmed NETT placement.
4. Laryngospasm
5. Tracheostomy
6. Esophageal intubations

RESULTS

Both groups were almost similar with respect to age, ASA physical status and mallampati class (Table I).

Table-I. Comparison of pre anaesthesia assessment for BNI with and without succinylcholine

Parameters		WMR (n=30)	NMR (n=30)	Significance
Age		25 ± 15	23 ± 17	t = 0.48 P=0.631
ASA Status	I	18	17	X^2 = 0.07 P=0.79
	II	12	13	
Mallampati Class	III	10	11	X^2 = 0.07 P=0.79
	IV	20	19	

The mean age was 25±15 years and 23±17 years, in the WMR & NMR group respectively. TMJ ankylosis was the most frequently encountered indication of surgery and a total of 25 patients (42%) suffering from this affliction were included in our study (Table II).

Table-II. Surgical procedures performed			
Indication of operation	No of cases	WMR (n=30)	NMR (n=30)
TMJ Ankylosis	25	13	12
Dental Wiring	10	05	05
Ludwig's angina	06	03	03
Post burn contractures	08	05	03
Zygomatic bone fractures	07	03	04
Malignant parotid tumors	02	-	02
Oral Mcous fibrosis	02	01	01

As indicated in table III, the average time to achieve intubation in NMR group (3.4±2.0 minutes) was significantly longer (p=0.001) as compared with the average time for WMR group (2± 0.9 minutes).

Table-III. Comparison of BNI in the two groups WMR or NMR			
Parameter	WMR (n=30)	NMR (n=30)	Significance
Time to achieve intubation	2 ± 0.9	3.4 ± 2.0	t = 3.50 P=0.001
Number of attempts	3.20 ± 1.21	3.43 ± 1.04	t = -0.80 P = 0.43
Outcome * Successful Intubation * Failed Intubation	 30 0	 26 04	X^2 = 4.29 P = 0.03
Adverse events	09	14	X^2 = 1.76 P = 0.18
** Shows statistical significance at P < 0.05*			

The average number of attempts were (3.20±1.21) & (3.43±1.4) for WMR and NMR group respectively. However, this difference was not found statistically significant (p=0.43).

The frequency of successful BNI in WMR group was higher (100%) compared with the NMR group (86%). This difference between the success rates of two groups was found to be statistically significant (p<0.05). Moreover, all patients were intubated successfully and per-procedure tracheostomy was not performed in any of the patients.

STATISTICAL ANALYSIS

Data collected was analyzed by using chi square and student 't' tests. P value was calculated to test the significance of difference between the success rate of BNI with and without Succinylcholine. A P value of less than 0.05 was considered significant. Statistical analysis was performed using SPSS version 10.0

DISCUSSION

A number of variables affect the success of BNI. Our hypothesis was that giving Inj Succinylcholine improves the success rate and is associated with lesser number of adverse events. Furthermore, it was not associated with risks of laryngospasm, coughing or patients' movements as is feared of when Inj Succinylcholine is not given. Our study results supported this hypothesis.

Nasal ETT could not be passed through the nostrils in 13.2%[6] of the patients in different studies. However, there was no case of failure to intubate through the nose due to our exclusion criteria of nasal pathologies or deformities for this study.

We took special measures to ensure adequate ventilation and oxygenation during the procedure as patients die from failure to oxygenate; not from failure to intubate. We pre-oxygenated all the patients and placed a nasal cannula for continuous oxygen insufflation while the attempts at intubation were being made. In our study, efficient mask ventilation was demonstrated before Inj. Succinylcholine was given in the WMR group. This method was also employed by Olivier and colleagues[14] and was found to be an efficient method of assessing an upcoming potentially life-threatening situation in cases of anticipated difficult airway. Furthermore, patients were ventilated in between the attempts at intubation to ensure adequate depth of anesthesia and maintenance of oxygen saturation. Ventilating the patient's lungs by withdrawing the tube to the epipharynx after each failure to insert the tube in the trachea was found to be an efficient method to overcome the risk of suboxygenation and has been used by other investigators[10].

The adverse events were encountered in 14 patients (47%) of NMR group and 9 patients (30%) of WMR group. However, this difference was not found significant (p=0.18). There was no failed intubation after giving Inj Succinylcholine, as compared to the 4 cases of failed intubation when no muscle relaxant was given and laryngospasm necessitated giving Inj Succinylcholine subsequently.

Several techniques have been suggested to increase the success rate of BNI. In a study, the success rate of BNI for the paramedics using endotracheal tube with directional tip control was 72% compared with 56 % when conventional ETTs were used[15]. An Endotrol endotracheal tube has an operator-end loop that directs the tube tip anteriorly when pulled was used.

A study was conducted at the Department of Oral and Maxillofacial Surgery, School of Medicine, Japan. Sugiura and colleagues[16] were able to improve the success rate of BNI by using nasogastric tube as a guide during intubation, first for passing the endotracheal tube through the nasal cavity, and second, passing it from the pharynx to the larynx. The intubation in 36 spontaneously breathing patients was accomplished safely with this method. The average time for successful intubation in this study was 8.5 minutes which was longer than the time taken for successful intubation in the spontaneously breathing patients of NMR group of our study.

The Rush spiral tube is suited for BNI because it has got 90 degrees cut of its tip and the tip of the tube can be raised anteriorly by inflation of the cuff. In our study, we used a red rubber endotracheal tube which has got an anterior curvature that facilitates entry into the glottis. It maintains this curvature after it has been advanced into the pharynx; therefore, it is more likely to enter the glottis even without the support and guidance of a nasogastric tube. These aids to intubation (endotrol tube, nasogastric tube), however, require additional expense, training and equipment[17].

Inflation of the tracheal tube cuff to facilitate BNI is an inexpensive modification which has been shown to be effective for increasing the rate of successful intubation from 45% to 95 % in patients with no airway alterations. In another study conducted on spontaneously breathing patients, neutral head position combined with cuff inflation increased the success rate of BNI to 84 % [18]. The remaining patients had to be intubated with alternative techniques. Still other investigators found cuff inflation as effective as fiberoptic guided intubations.

However, since cuff inflation can be used only in spontaneously breathing patients and not in apnoeic patients, this technique was impracticable in our study. We, therefore, attempted BNI without cuff inflation.

To increase the success of BNI, several devices for detection and amplification of breath sounds have also been employed. One such device Sonomatic Confirmation of Tracheal Intubation (SCOTI) [19] was compared with capnography. However, the study showed that this device was not very useful for ascertaining the correct placement of tracheal tubes after blind nasal intubation. We did not use any device for detection/amplification of breath sounds instead; we used capnography in our study, for the correct placement/confirmation of endotracheal tube. It was valuable in the WMR as well as NMR group for the detection of esophageal intubation and also for entering the laryngeal inlet in spontaneously breathing patients. There were certain limitations in our study. We did not measure the bleeding caused during the BNI and a comparison of the incidence and severity of bleeding was not made. We, however, used the vasoconstrictor drops to shrink the nasal mucosa in an effort to make the technique less traumatic. In the present study we studied only the per procedure complications of the two techniques and patients were not followed for post-operative complications such as hoarseness, sore throat, myalgias etc. These variables may be studied in subsequent investigations.

In assessing the relevance of our study, the following points should be considered. First, the power of our study was adequate to demonstrate a significant difference between these techniques. Second, the study was conducted in patients with limited mouth opening during general anesthesia and not in awake subjects. Furthermore, patients with complaints of difficulty in opening mouth who came for manipulation under anesthesia (MUA) for TMJ dysfunction were not included in this study because they were not intubated.

Lastly, all investigators were highly trained in difficult airway management and were accustomed to performing these two tracheal intubation techniques in patients with limited mouth opening. Thus the level of investigator's experience should be taken into account and the results of our study cannot necessarily be extrapolated to patients with an unanticipated difficult airway or to anesthetists with differing levels of training in BNI techniques.

CONCLUSION

In conclusion, we obtained a high success rate for blind nasotracheal intubation when Inj. Succinylcholine was given versus when muscle relaxant was not given. BNI after giving Inj. Succinylcholine is less time consuming. This technique can decrease failure to intubate, and we suggest that it may therefore, increase patients safety. Minor drawbacks to the technique are that it requires an additional drug (Inj. Succinylcholine) and entails to its adverse effects yet in search for an ideal technique, it may be inducted that BNI with Succinylcholine fulfills many of the criteria for a better technique.

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If two men on the same job agree all the time

then one is useless,

if they disagree all the time,

then both are useless.

Darry 1 F. Zanuck (1902-79) US film producer