ORIGINAL ARTICLE ASIAN JOURNAL OF MEDICAL SCIENCES

Nasogastric tube insertion in anesthetized intubated adult patients: A comparison between the "reverse Sellick's maneuver with throat pack *in situ*" and reverse Sellick's maneuver alone

Mrinal Kanti Roy[1], Sanjay Maitra[2], Sangita Mandal[3], Arpita Laha[4], Mohanchandra Mandal[5]

[1]Post Graduate Trainee, [3]Assistant Professor, [4]Professor and Head, [5]Professor, Department of Anaesthesiology, Institute of Post Graduate Medical Education and Research/Seth Sukhlal Karnani Memorial Hospital, [2]Associate Professor, Department of Surgery, N.R.S. Medical College and Hospital, Kolkata, West Bengal, India

Submission: 16-11-2022 Revision: 28-12-2022 Publication: 01-02-2023

ABSTRACT

Background: Nasogastric tube (NGT) insertion is an essential procedure in the operating room for which the anesthesiologists often take the responsibility. This simple procedure often becomes difficult in anesthetized patients. Literature reveals the flooding of studies and novel techniques are in the pipeline, indicating that quest for the best is still on. **Aims and Objectives:** The aim of the study was to determine the proportion of patients in whom successful NGT insertion would be possible in the first attempt using either the "Reverse Sellick's maneuver (RSM) with throat pack *in situ*" technique or RSM alone; and to compare the proportions between the two groups. **Materials and Methods:** This interventional study was performed on 222 adult patients (≥18 years), undergoing abdominal surgeries requiring intraoperative NGT insertion. Patients received NGT insertion using the combined RSM with "throat pack *in situ*" technique (Group A, n = 111) or RSM alone (Group B, n = 111). The proportion of patients in whom successful NGT insertion was possible in the first attempt using either of the techniques and the time taken for correct placement of NGT in both the groups. In addition, the incidence of adverse events was noted. **Results:** Although, NGT placement was possible in higher proportions of patients in Group A in first attempt compared with Group B (91% vs. 83.8%), it was not significant on analysis (P = 0.106). The procedure time in both the groups was comparable (30.0 ± 4.0 vs. 29.9 ± 4.3, P = 0.859). Coiling was found to be significantly more in the RSM alone technique as compared to the combined method. (P = 0.04). **Conclusion:** With comparable success rate and lesser incidence of adverse events, it can be commented that the RSM with throat pack *in situ* technique appears to be a better alternative to RSM alone.

Key words: Anesthetized; Intubation; Nasogastric tube; Reverse Sellick's maneuver; Throat pack

Access this article online

Website: http://nepjol.info/index.php/AJMS

DOI: 10.3126/ajms.v14i2.49599

E-ISSN: 2091-0576

P-ISSN: 2467-9100

INTRODUCTION

Nasogastric tube (NGT) insertion is a vital procedure that is often performed by the anesthesiologists in the operating room. Although it is a simple procedure, often the correct placement of this tube in anesthetized intubated patients becomes difficult.[1] Conventional insertion of a NGT in anesthetized, paralyzed, and intubated patient is often a difficult and challenging job with a failure rate as high as 50% in the first pass.[2] The distal portion of NGT with multiple apertures (the weakest part) makes it susceptible to kink, coil, and knot.[2] Several modifications of blind insertion have

Address for Correspondence:
Dr. Mohanchandra Mandal, Professor, Department of Anaesthesiology, Institute of Post Graduate Medical Education and Research/Seth Sukhlal Karnani Memorial Hospital, Kolkata, West Bengal, India. **Mobile:** +91-9433072820. **E-mail:** drmcmandal@gmail.com

been tried such as head flexion,[2] neck flexion with lateral pressure,[3] reverse Sellick's maneuver (RSM),[4] use of split endotracheal tube,[5] "peel-away tube" method,[6] "slipknot to an intubation stylet,"[7] glidescope,[8] use of Magill's forceps, and the use of a "gloved finger to steer" the NGT.[2]

RSM, a forward displacement of the cricoid cartilage, facilitates the insertion of NGT in about 75–80% of cases by opening the esophageal inlet more widely.[4] In 2008, the "throat pack *in situ*" method was mentioned as a novel method by Walker[9] who first mentioned that NGT can be placed even with after the throat pack application following endotracheal intubation. The throat pack *in situ* is expected to obliterate or reduce the space in oropharynx, thereby can reduce the chance of deviation of NGT into oral cavity. Thus, the throat pack *in situ* can direct the NGT to its natural or intended path. According to Walker's observations, the NGT was found to enter straight in to the stomach almost always. Unfortunately, Walker did not further evaluate this novel method through a clinical investigation to explore different data regarding NGT placement. Subsequently, only one clinical investigation[10] assessed this method in pediatric population and reported 88% success rate with the first attempt in comparison with "blind" technique. However, this technique needs further evaluation as it appears to challenge the common notion that NGT placement would not be feasible in the presence of throat pack. Besides, this novel technique has been evaluated only in pediatric population. These areas have been detected as lacunae in the existing literature. Combination of different methods has been utilized in the past in the hope that it would increase the success rate further for the proper placement of NGT.[11]

In light of the above observations and above-mentioned lacunae existing in the current literature, the present study was designed to compare between RSM with "throat pack *in situ*" technique and RSM alone in terms of success rate of NGT insertion in the first attempt following either of the two techniques.

Aims and objectives

The aim of the study was to determine the proportion of patients in whom successful NGT insertion would have been possible in the first attempt using either the "RSM with throat pack *in situ*" technique or RSM alone; and to compare the above proportions to determine any difference between the two proportions (*Primary outcome*). Additionally, the procedure times and adverse events were compared between the two groups.

MATERIALS AND METHODS

This interventional study was performed on adult patients undergoing abdominal surgeries requiring NGT insertion, in the general surgery operating room. The study period spanned over 18 months approximately (March 2021–August 2022) after obtaining permission from the Institute's Ethics Committee and approval of the West Bengal University of Health Sciences. Patients have given written, informed consent to participate in the study. This study was prospectively registered with clinical trial registry of India (CTRI) on 02/09/2021 with the Registration number CTRI/2021/09/036172.

A total of 222 adult patients (18 years and above), undergoing elective abdominal surgeries that require intraoperative NGT insertion, were considered for the study after taking into account the inclusion and exclusion criteria.

Exclusion criteria

The following criteria were excluded from the study:

i. Anatomical or structural abnormalities such as gross deviated nasal septum, abnormalities involving lip and palate, etc.
ii. Patients with oral, nasal, pharyngeal, or esophageal masses
iii. Patients with significant injuries involving the head and neck
iv. Patients with thrombocytopenia or coagulopathies.

Informed and written consent was obtained from the selected patients in their own language. They were given the option to opt out from the study at any time.

Sample size

From the literature Parris WC 1989, it was noted that the RSM had a success rate of 75%.[4] It was assumed that at least 15% difference in success rate using the combined method (RSM with "throat pack *in situ*") as compared with RSM applied alone would be clinically significant. Hence, the effect size was 0.15. Based on the principles as mentioned in the literature[12,13] and using the n Master 2.0 (Department of Biostatistics CMC Vellore, 2011) software the sample size was calculated with the following assumptions. The power of the present study was set at 80% and alpha error was set at 5%. A 2-tailed hypothesis was presumed**.** The calculated total sample size was found to be 202 patients for both the groups. In other words, it can be said that a total of 202 patients are required to have an 80% chance of detecting, a difference of 15% in the primary outcome measure (proportion of successful placement of NGT in first attempt) between the control group (NGT placement using RSM alone) and the experimental group (NGT placement using the combined technique). Expecting a possibility of 10% dropout, a total of 222 patients was enrolled for this study.

The group allocation was done after induction of anesthesia and intubation. It was performed each time by opening the sequentially numbered and sealed opaque envelopes. There were 222 sealed envelopes each containing one piece of paper marked either "A or "B" (111 papers were marked as "A" and another 111 papers were marked as "B"). After the tracheal intubation, an envelope was randomly selected and opened. The alphabet displayed ("A" or "B") corresponded to the group allocation of the patient.

- Group A (n=111): Patients undergoing NGT insertion using the combined RSM with "throat pack *in situ*" technique
- Group B (n = 111): Patients undergoing NGT insertion using the RSM alone.

The patients receiving NGT placement with RSM alone acted as comparator for the study group, that is, the patients receiving NGT placement using "combined RSM with throat pack *in situ*" technique. The proportion of patients having successful insertion of NGT within first attempt using either of these methods was compared (Primary outcome). Furthermore, the time taken for the procedure, and any adverse events occurring during the procedure were noted.

An 18-G cannula was used to establish intravenous access for every patient and intravenous fluid started. Monitoring of patients within the operating room was done continuously using ECG leads, BP cuff, $EtCO_2$ monitor, and SpO_2 probe. Before induction of anesthesia, the optimum nostril for NGT insertion was chosen based on the better fogging procedure on a metal tongue depressor during exhalation. Premedication was done, as appropriate for each patient, using fentanyl (2 mcg/kg), glycopyrrolate (4 mcg/kg), and lignocaine (1.5 mg/kg). Propofol (2 mg/kg) or thiopentone (3–4 mg/kg) was the induction agent depending on the patients' clinical conditions. Depolarizing muscle relaxant, succinylcholine (2 mg/kg) was used for intubation by laryngoscope. Endotracheal tube of appropriate size was used. Muscle relaxation was maintained with atracurium (0.1 mg/kg).

In both the groups, before NGT insertion, the cuff of the endotracheal tube was deflated and the tip of the NGT was lubricated with 2% lignocaine jelly. The length of the NGT to be inserted was determined by measuring the distance from the ipsilateral nostril to the ipsilateral tragus, and further to the xiphoid process.[14,15] Once, the NGT was successfully placed, the cuff of the endotracheal tube was re-inflated.

In Group "A" (combined RSM with "throat pack *in situ*" technique), after intubation with appropriate size endotracheal tube, the patient's head was kept in neutral position. The pharyngeal pack or the so called "throat pack" was placed with the help of a Magill's forceps or gloved finger. Then anterior (forward) displacement or lifting of cricoid cartilage[4,16] using fingers of non-dominant hand of anaesthesiologist was done and then NGT was inserted through the patient's nostril by the dominant hand of anaesthesiologist. After insertion, the placement of the tube was verified by pushing 10 ml of air rapidly into the tube, and auscultation for a "whoosh" sound over the epigastrium.[17] If the NGT was found to be correctly placed in the *first attempt*, the case was taken as "successful."

In Group "B" (the RSM alone), the patient's head was kept in neutral position. Then anterior (forward) displacement or lifting of cricoid cartilage using fingers of non-dominant hand of anaesthesiologist was done and then NGT was inserted through the patient's nostril by the dominant hand of anaesthesiologist. Similar to Group A, in this group also, the proper placement of the NGT was done using auscultation method.

Correct placement of NGT in the first attempt was considered as "successful" insertion. The "procedure time" for successful placement of NGT was recorded from the moment of insertion of NGT into the nostril till the confirmation of its correct position by the method mentioned above.

It was not possible to conceal the specific technique of NGT placement to the anaesthesiologist who was performing the procedure. One senior anaesthesiologist performed all the procedures to minimize interpersonal variability of efficiency. Only the anesthetized patient remained unaware of the particular method employed for the NGT placement. Thus, the present study was a single blind design. One dedicated anaesthesiologist acted as an observer and data keeper who was not involved otherwise with the procedure.

Statistical analysis

Data were documented in the Microsoft Excel Spreadsheet and summarized by routine descriptive statistics, namely, mean and Standard deviation for numerical variables and counts and percentages for categorical variables. Frequencies were compared between groups by Fisher's exact test or Chi-square test as appropriate, while numerical variables were compared by independent sample t-test. Comparisons were two-tailed and $P<0.05$ was considered to indicate statistical significance.

RESULTS

The study spanned over a period of 18 months from March 2021 to August 2022. Data from all 222 patients were

available for analysis. The two groups are comparable in terms of demographic and clinical parameters (Table 1).

The NGT could be inserted in the first attempt in 87.4% of all patients irrespective of any particular technique. In Group A, it could be inserted in first attempt in 91%, while in Group B it could be inserted in first attempt in 83.8%. The differences between the proportions based on the attempt to insert NGT were not statistically significant (Table 2).

The mean (standard deviation) time taken to insert the NGT in Group A was 30.0 (4.0) s while that in Group B was 29.9 (4.3) s. The difference in the time taken in NGT insertion was not statistically significant (Table 3).

Insertion of NGT was uneventful in 82.9% of Group A and 79.3% of Group B patients and the difference was not statistically significant. Bleeding and kinking were found in higher number of patients in Group B apparently but it was found comparable on analysis. Coiling was seen in considerably higher proportion of patients in Group B (16.2%) compared to Group A (7.2%).

The incidence of adverse events (bleeding, coiling, and kinking) was less with the combined method group (17.1%) compared with the RSM alone (20.7%). Coiling was found to be significantly more in the RSM alone technique as compared to the combined method (P=0.04) (Table 4).

Table 1: Demographic and clinical characteristics

Parameters	Group A (n=111)	Group B (n=111)	P-value
Age (years)	48.7±16.0	48.9±14.5	0.902
Sex (Male/Female)*	59/52	55/56	0.591
ASA (1/2/3)*	71/37/3	70/39/2	0.878
MP (1/2/3)*	60/40/11	53/46/12	0.639

Age is expressed as mean±SD, and tested with independent sample t-test; All data marked *expressed as numbers, and analyzed with Chi-square test. Group A: Reverse Sellick's maneuver with throat pack *in situ*; Group B: Reverse Sellick's maneuver alone

While observing the comparison of mean arterial pressures (MAP) between the two groups, the mean (standard deviation) MAP in Group A was 96.6 (10.6) mm Hg at baseline while that in group B was 98.9 (12) mmHg. The mean (standard deviation) MAP, before NGT insertion in Group A was 85.2 (9.7) mm Hg while that in Group B was 84.6 (9.2) mmHg. The mean (standard deviation) MAP, after NGT insertion in Group A was 86.5 (9.2) mm Hg while that in Group B was 85.8 (9.1) mmHg. The difference in MAP between the groups during the procedures was not statistically significant (Table 5).

While observing the comparison of the heart rates between the two groups, the mean (standard deviation) heart rates in Group A were 88. 6 (14.3) per minute at baseline while that in Group B was 88.5 (15.5) per minute. The mean (standard deviation) heart rate, before NGT insertion in Group A was 85.7 (12.4) per minute while that in Group B was 86.1 (13.5) per minute. The mean (standard deviation) heart rate, after NGT insertion in Group A was 87.0 (12.2) per minute while that in Group B was 86.4 (13) per minute. The difference in heart rates between the groups during the procedures was not statistically significant (Table 6).

DISCUSSION

The present study finds that the successful NGT placement was possible in higher number of patients using combined method (RSM with throat pack *in situ*), compared with RSM alone. Although apparently the combined method has 7.2% more success rate than RSM alone, the difference was not statistically significant. In other words, the success rate was found to be comparable with that of "RSM alone" technique. With this comparable success rate, it can be commented that the combined method does not have inferior success rate in comparison with RSM alone. Hence, it appears that throat pack application does not put hindrance to placement of NGT.

Table 2: Successful nasogastric tube insertion

Attempts	Total	Group A (n=111)	Group B (n=111)	Chi-square	P-value
One (successful)	194 (87.4)	101 (91)	93 (83.8)	2.62	0.106
More than one (unsuccessful)	28 (12.7)	10 (9)	18 (16.2)		
Total	222 (100)	111 (100)	111 (100)		

Data expressed as number of patients (percentage); Group A: Reverse Sellick's maneuver with throat pack *in situ*; Group B: Reverse Sellick's maneuver alone

Table 3: Procedure time of nasogastric tube placement between the intervention groups

Parameter	Group A (n=111)	Group B (n=111)	Independent sample t-test	P-value
Procedure time (Seconds)	30.0±4.0	29.9±4.3	0.178	0.859

Data expressed as Mean±SD; Group A: Reverse Sellick's maneuver with throat pack *in situ*; Group B: Reverse Sellick's maneuver alone

Successful placement of NGT in anesthetized, intubated patients appears to be quite challenging at times compared with its insertion in conscious patients. This is because the anesthetized patient cannot cooperate with the care provider by swallowing.[18] The anatomical recesses such as pyriform sinus or oropharynx can serve as potential spaces for impaction or coiling of NGT in the face of slight resistance along its natural passage.[1] The first attempt is the best attempt for success of NGT insertion because after a failure, subsequent attempts using the same technique have low success rate due to the "memory effect."[19] The kinked or knotted NGT with rugged wall of the distal portion of the tube with several apertures may invite mucosal tear leading to bleeding.

The common belief is that application of throat pack can cause hindrance for the NGT placement. Hence, conventionally the NGT is inserted before the placement of throat pack. Thus, it appears that combining the application of throat pack with RSM would reduce the success rate of correct NGT placement in comparison with RSM alone. The combined method (RSM with throat pack *in situ*) should appear inferior to RSM alone if the throat pack actually cause obstacle in reality. The comparable result instead of inferiority of the combined method translates into the fact that throat pack application before NGT placement does not put any impediment to NGT placement as is commonly apprehended. Rather, prior application of throat pack may actually facilitate NGT insertion in terms of reduced incidence of coiling while maintaining comparable success rate. Although the present study fails to draw an impression about the superiority of the combined method, the study, at least, can be a myth breaker.

Walker,[9] the pioneer of throat pack *in situ* technique for NGT insertion, opined that the application of throat pack can obliterate the oropharyngeal space and thereby can facilitate the passage of NGT toward its normal path. The present researchers have the notion that the throat pack application before the NGT placement actually fills up the spacious oropharynx thereby eliminating one less resistant path, that is, the oropharynx where the NGT often deviates. Thus, the propensity of the NGT to coil back in the oropharynx decreases and it is steered to its intended normal pathway, that is, the esophagus.

The success rate of the present study, that is, the "RSM with throat pack *in situ*" technique is 91% which is consistent with the higher success rate methods of NGT placement in adult population using "neck flexion with lateral pressure" (success rate 94%),[20] RSM (success rate 83–96%).[21-23] Furthermore, the success rate of this novel technique is in accordance with frozen NGT insertion method (success rate 84–88%).[21,24]

In the present study, overall, the incidence of adverse events (bleeding, coiling, and kinking) was less with the "RSM with throat pack *in situ*" group (17.1%) compared with the RSM alone (20.7%). Coiling was found in considerably smaller number of patients compared with the RSM alone technique (7.2% vs. 16.2%, respectively). This data were also statistically significant (P=0.04).

Whenever a NGT is inserted, if it encounters any resistance during its passage it tries to move into the least resistant area, that is, the oropharynx and thus there can be kinking, coiling,

Table 4: Adverse effects following intubation between the two groups

Adverse events	Group A (n=111)	Group B (n=111)	Chi-square	P-value
Bleeding	8 (7.2)	6 (5.4)	0.30	0.58
Coiling	8 (7.2)	18 (16.2)	4.36	0.04†
Kinking	6 (5.4)	5 (4.5)	0.10	0.76
Uneventful	92 (82.9)	88 (79.3)	0.47	0.49
Total	111 (100)	111 (100)		

Data expressed as number of patients (percentage); Group A: Reverse Sellick's maneuver with throat pack *in situ*; Group B: Reverse Sellick's maneuver alone, †Statistical significance

Table 5: Mean arterial pressures between the intervention groups over time

Mean arterial Pressure	Group A (n=111)	Group B (n=111)	Independent sample t-test	P-value
Baseline	96.6 (10.6)	98.9 (12)	−1.518	0.131
Before NGT insertion	85.2 (9.7)	84.6 (9.2)	0.519	0.614
After NGT insertion	86.5 (9.2)	85.8 (9.1)	0.507	0.613

Data expressed as mean (standard deviation). Group A: Reverse Sellick's maneuver with throat pack *in situ*; Group B: Reverse Sellick's maneuver alone

Table 6: Heart rates between the intervention groups over time

Heart rates	Group A (n=111)	Group B (n=111)	Independent sample t-test	P-value
Baseline	88. 6 (14.3)	88.5 (15.5)	0.045	0.964
Before NGT insertion	85.7 (12.4)	86.1 (13.5)	−0.202	0.840
After NGT insertion	87.0 (12.2)	86.4 (13)	0.324	0.746

Data expressed as mean (standard deviation), Group A: Reverse Sellick's maneuver with throat pack *in situ*, Group B: Reverse Sellick's maneuver alone

or bleeding due to local trauma. After a failure, subsequent attempts of NGT placement using the same tube and utilizing the same technique can lead to the same adverse outcome owing to the "memory effect".[19] The NGT loses its rigidity due to the property of thermoplasticity, also contributes to this failure[24] A throat pack obliterates or reduces the space in oropharynx there by prevents deviation of NGT into oral cavity.[9] This explains the lesser incidence of adverse events such as coiling or kinking in the combined group.

In the present study, the mean procedure time (in seconds) between the combined group and the RSM alone group was (30.0 vs. 29.9, respectively). The time taken for placement of the throat pack in not considered. There is no considerable difference in the mean insertion time between the two groups. Thus, it can be deciphered that the presence of a throat pack inside the oropharynx does not cause any hindrance to the NGT insertion.

The mean difference in heart rates and MAP between the two groups during the procedures in the study failed to demonstrate a significant difference. In other words, there were no appreciable hemodynamic changes in either of the two techniques. Thus, hemodynamic stability is achieved by both the combined method and the RSM alone technique.

Limitations of the study

The present study bears some limitations. The confirmation of correct placement of NGT was done by simple auscultation method where 10 ml of air was rapidly insufflated through the NGT and the "whoosh" sound was heard by placing a stethoscope over epigastrium. However, this method has numerous drawbacks such as transmitted sound over the epigastrium can still be heard if the NGT is in trachea, esophagus, duodenum, or proximal jejunum.[14,25] Gold standard and more reliable techniques such as X-ray and ultrasonography[26] were not used because of unavailability of resources. We could not use additional confirmation methods such as using pH paper due to local unavailability. We could not use polyurethane NGT due to its local unavailability. This probably has led to higher incidence of adverse events like bleeding. Although life-threatening serious adverse events such as esophageal perforation, pyriform fossa penetration, and pneumothorax have not occurred, the possibility of such complications in this form of study cannot be ruled out. The incidence of post-operative sore throat due to pack application was also not observed in the combined group.

CONCLUSION

The combined method of RSM with throat pack *in situ* technique has overall higher success rate than RSM alone. However, it is comparable on analysis. Considerably lesser incidence of coiling has been observed with combined technique compared with RSM alone. Hence, in view of comparable success rate and lesser incidence of adverse events, it can be concluded that the RSM with throat pack *in situ* technique appears to be a better alternative to RSM alone.

ACKNOWLEDGMENT

We wish to offer our thanks to Abhijit Mukherjee, Associate Professor, Department of Community Medicine, Nil Ratan Sircar Medical College and Hospital, Kolkata, West Bengal, India for his expert help in data analysis.

REFERENCES

1. Mandal M, Bagchi D, Sarkar S, Chakrabarti P and Pal S. Nasogastric tube placement-a simple yet difficult procedure-a review. J Evol Med Dent Sci. 2017;6(31):2572-2576.
   https://doi.org/10.14260/jemds/2017/556
2. Mahajan R and Gupta R. Another method to assist nasogastric tube insertion. Can J Anaesth. 2005;52(6):652-653.
   https://doi.org/10.1007/BF03015781
3. Appukutty J and Shroff PP. Nasogastric tube insertion using different techniques in anesthetized patients: A prospective, randomized study. Anesth Analg. 2009;109(3):832-835.
   https://doi.org/10.1213/ane.0b013e3181af5e1f
4. Parris WC. Reverse Sellick maneuver. Anesth Analg. 1989;68(3):423.
   https://doi.org/10.1213/00000539-198903000-00061
5. Fakhari S, Bilehjani E, Negargar S, Mirinazhad M and Azarfarin R. Split endotraceal tube as a guide tube for gastric tube insertion in anesthetized patients: A randomized clinical trial. J Cardiovasc Thorac Res. 2009;1:17-22.
6. Dobson AP. Nasogastric tube insertion--another technique. Anaesthesia. 2006;61(11):1127.
   https://doi.org/10.1111/j.1365-2044.2006.04853.x
7. Tsai YF, Luo CF, Illias A, Lin CC and Yu HP. Nasogastric tube insertion in anesthetized and intubated patients: A new and reliable method. BMC Gastroenterol. 2012;12:99.
   https://doi.org/10.1186/1471-230X-12-99
8. Moharari RS, Fallah AH, Khajavi MR, Khashayar P, Lakeh MM and Najafi A. The GlideScope facilitates nasogastric tube insertion: A randomized clinical trial. Anesth Analg. 2010;110(1):115-118.
   https://doi.org/10.1213/ANE.0b013e3181be0e43
9. Walker R. Nasogastric tubes again. Another insertion tip: The throat pack. Anaesthesia. 2008;63(4):444.
   https://doi.org/10.1111/j.1365-2044.2008.05511.x
10. Chowdhury R, Mandal M, Khanra M and Mukherjee A. Nasogastric tube insertion in anaesthetized intubated paediatric patients: A comparison between conventional blind method and 'throat pack *in-situ*' technique. JCDR. 2019;13(12):UC01-UC04.
    https://doi.org/10.7860/JCDR/2019/42938.13346
11. Sanaie S, Mirzalou N, Shadvar K, Golzari SE, Soleimanpour H, Shamekh A, et al. A comparison of nasogastric tube insertion by SORT maneuver (sniffing position, NGT orientation, contralateral

rotation, and twisting movement) versus neck flexion lateral pressure in critically ill patients admitted to ICU: A prospective randomized clinical trial. Ann Intensive Care. 2020;10(1):79.
https://doi.org/10.1186/s13613-020-00696-2

12. Das S, Mitra K and Mandal M. Sample size calculation: Basic principles. Indian J Anaesth. 2016;60(9):652-656.
https://doi.org/10.4103/0019-5049.190621
13. Hazra A and Gogtay N. Biostatistics series module 5: Determining sample size. Indian J Dermatol. 2016;61(5):496-504.
https://doi.org/10.4103/0019-5154.190119
14. Rahimi M, Farhadi K, Ashtarian H and Changaei F. Confirming nasogastric tube position: Methods and restrictions: A narrative review. J Nurs Midwifery Sci. 2015;2(1):55-62.
https://doi.org/10.4103/2345-5756.231420
15. Kirtania J, Ghose T, Garai D and Ray S. Esophageal guidewire-assisted nasogastric tube insertion in anesthetized and intubated patients: A prospective randomized controlled study. Anesth Analg. 2012;114(2):343-348.
https://doi.org/10.1213/ANE.0b013e31823be0a4
16. Rao DS and Patwari A. Naso-gastric tube and the 'reverse sellick's manoeuvr'. Indian J Anaesth. 2004;48(2):155-157.
17. Metheny NA and Titler MG. Assessing placement of feeding tubes. Am J Nurs. 2001;101(5):36-45; quiz 45-6.
https://doi.org/10.1097/00000446-200105000-00017
18. Ghatak T, Samanta S and Baronia AK. A new technique to insert nasogastric tube in an unconscious intubated patient. N Am J Med Sci. 2013;5(1):68-70.
https://doi.org/10.4103/1947-2714.106215
19. Illias AM, Hui YL, Lin CC, Chang CJ and Yu HP. A comparison of nasogastric tube insertion techniques without using other instruments in anesthetized and intubated patients. Ann Saudi Med. 2013;33(5):476-481.
https://doi.org/10.5144/0256-4947.2013.476
20. Mandal MC, Dolai S, Ghosh S, Mistri PK, Roy R, Basu SR, et al. Comparison of four techniques of nasogastric tube insertion in anaesthetised, intubated patients: A randomized controlled trial. Indian J Anaesth. 2014;58(6):714-718.
https://doi.org/10.4103/0019-5049.147157
21. Mandal M, Karmakar A and Basu SR. Nasogastric tube insertion in anaesthetised, intubated adult patients: A comparison between three techniques. Indian J Anaesth. 2018;62(8):609-615.
https://doi.org/10.4103/ija.IJA_342_18
22. Siddhartha BS, Sharma NG, Kamble S and Shankaranarayana P. Nasogastric tube insertion in anesthetized intubated patients undergoing laparoscopic hysterectomies: A comparative study of three techniques. Anesth Essays Res. 2017;11(3):550-553.
https://doi.org/10.4103/aer.AER_41_17
23. Kavakli AS, Ozturk NK, KaravSeli A, Onuk AA, Ozyurek L, et al. Comparison of different methods of nasogastric tube insertion in anesthetized and intubated patients. Rev Bras Anestesiol. 2017;67(6):578-583.
https://doi.org/10.1016/j.bjan.2017.04.020
24. Chun DH, Kim NY, Shin YS and Kim SH. A randomized, clinical trial of frozen versus standard nasogastric tube placement. World J Surg. 2009;33(9):1789-1792.
https://doi.org/10.1007/s00268-009-0144-x
25. Lemyze M. The placement of nasogastric tubes. CMAJ. 2010;182(8):802.
https://doi.org/10.1503/cmaj.091099
26. Fan EM, Tan SB and Ang SY. Nasogastric tube placement confirmation: where we are and where we should be heading. Proc Singap Healthc. 2017;26(3):189-195.
https://doi.org/10.1177/2010105817705141

Authors' Contributions:
MKR- Concept of study design, conduct of study, data collection, and writing of first draft; **SjM-** Concept of study, data analysis, interpretation of result, and assisted in first draft; **SgM-** Concept of the study, data analysis, logical conclusion, review of literature, and extensive revision of the first draft; **AL-** Study design, interpretation of result, critical revision of first draft; **MM-** Concept, study design, daily guidance, logical conclusion, first draft, and revision.

Work attributed to:
Institute of Post Graduate Medical Education and Research/Seth Sukhlal Karnani Memorial Hospital, Kolkata, West Bengal, India.

ORCID ID:
Mrinal Kanti Roy - https://orcid.org/0000-0002-5644-7528
Sanjay Maitra - https://orcid.org/0000-0002-5446-480X
Sangita Mandal - https://orcid.org/0000-0002-3416-9344
Arpita Laha - https://orcid.org/0000-0003-0950-8188
Mohanchandra Mandal - https://orcid.org/0000-0003-4183-993X

Source of Funding: None, **Conflicts of Interest:** None.