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Original Research Article

Comparative Study to Evaluate Ease of Nasogastric Tube Insertion in Intubated Patients with Three Different Techniques

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Abstract

Background: Nasogastric tube (NGT) insertion in anaesthetized and intubated patients is often challenging due to altered airway anatomy and decreased muscle tone. Several bedside techniques have been described to facilitate smooth insertion, but evidence directly comparing commonly practiced methods remains limited.

Aim and Objective: To compare the ease of NGT insertion using three techniques—additional neck flexion, standard sniffing position with lateral neck pressure, and reverse Sellick's manoeuvre—in intubated adult patients undergoing elective surgeries.

Materials and Methods: This prospective, randomized comparative study included 120 adult patients (ASA I–II) undergoing elective surgery under general anaesthesia. Patients were allocated into three groups (n = 40 each): Group A Additional neck flexion, Group B—standard sniffing position with lateral neck pressure, and Group C—reverse Sellick's manoeuvre. The primary outcomes assessed were number of attempts and time required for successful NGT insertion. Secondary outcomes included hemodynamic changes and complications such as kinking, coiling and nasal bleeding.

Results: Baseline demographic and clinical characteristics were comparable across all groups. Group A demonstrated the highest first-attempt success rate and the shortest insertion time. Group B showed moderate ease of insertion, while Group C had the lowest first-attempt success and longest insertion time. Complications were least frequent in Group A and most common in Group C. Hemodynamic parameters remained stable in all groups, and no major adverse events occurred.

Conclusion: Additional neck flexion is the most effective technique for NGT insertion in intubated patients, offering superior first-attempt success, shorter insertion time, and fewer complications compared with lateral neck pressure and reverse Sellick's manoeuvre. Its simplicity and safety make it a preferred method in routine anaesthetic practice.

Keywords: Nasogastric Tube, Neck Flexion, Lateral Neck Pressure, Reverse Sellick's Manoeuvre, Intubated Patients, Anaesthesia.

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Introduction

Nasogastric tube (NGT) insertion is a frequently performed procedure in anaesthetized and intubated patients, commonly undertaken for gastric decompression, aspiration prevention, medication administration and enteral feeding. Despite its routine nature, successful insertion often becomes challenging due to altered airway anatomy, reduced upper airway muscle tone and interference caused by the presence of the endotracheal tube. These factors contribute to high first-attempt failure rates, reported to be as high as 50–65%, along with complications such as kinking, coiling, mucosal trauma and nasal bleeding [1–3]. To overcome these difficulties, various techniques have been proposed to guide smoother passage of the NGT. These include additional neck flexion, lateral neck pressure, reverse Sellick's manoeuvre, the frozen-tube method, and guidewire-assisted insertion [4–

7]. Among these, simple bedside manoeuvres such as additional neck flexion, the sniffing position with lateral neck pressure and reverse Sellick's manoeuvre are particularly popular because they do not require specialized equipment and can be quickly adopted in routine operating-room practice.

Previous studies have demonstrated variable success rates with these manoeuvres. Several authors have shown that additional neck flexion improves the alignment of the pharyngo-esophageal axis, thereby increasing the likelihood of successful insertion [8,9]. Others have reported that lateral neck pressure can facilitate passage in selected clinical situations, particularly when posterior tongue displacement contributes to obstruction [10]. Despite these findings, only a limited number of studies have directly compared all three commonly used techniques in a single randomized design.

Given the ongoing need for a simple, reliable and reproducible method of NGT placement in anaesthetized patients, this study aims to compare three techniques—additional neck flexion, lateral neck pressure and reverse Sellick's manoeuvre—by evaluating the first-attempt success rate, insertion time, hemodynamic response and complication profile.

Materials and Methods

Study Design and Setting: This prospective, randomized, comparative study was conducted in the Department of Anaesthesiology, Gandhi Medical College and associated Hamidia Hospital, Bhopal. The study duration was six months and commenced only after obtaining approval from the Institutional Ethics Committee. All procedures were performed in the operating theatre complex under standardized anaesthetic protocols.

Sample Size Calculation: The sample size was calculated using the formula for estimating proportions, with Z = 1.96, d = 0.05, and an anticipated success proportion (P) of 0.92 from previous studies. The calculated sample size was 113; however, a total of 120 patients were included to enhance statistical power and accommodate potential variability.

Study Population: A total of 120 adult patients aged 18–60 years, belonging to American Society of Anesthesiologists (ASA) physical status I or II, and scheduled for elective surgery under general anaesthesia with endotracheal intubation, were enrolled. Written informed consent was obtained from all participants prior to their inclusion in the study.

Eligibility Criteria: Patients with distorted airway anatomy, cervical spine disease, neck masses, obesity, pregnancy, or those posted for emergency surgery were excluded. Individuals with deviated nasal septum, active nasal infection, coagulopathy, or those on antiplatelet or anticoagulant therapy were also excluded to avoid confounding factors affecting nasogastric tube (NGT) insertion.

Randomization and Group Allocation: Eligible patients were randomly allocated into three groups of 40 each using a computer-generated randomization sequence. Group A consisted of patients in whom nasogastric tube insertion was performed with additional neck flexion. Group B included patients placed in the standard sniffing position with the application of lateral neck pressure. Group C comprised patients in whom the reverse Sellick's manoeuvre was applied during insertion. A uniform 14 Fr POLYMED nasogastric tube was used for all patients to ensure procedural consistency across the groups

Anaesthesia Protocol and Procedure: Following induction of general anaesthesia and successful endotracheal intubation, 0.05% oxymetazoline nasal drops were instilled in both nostrils to minimize mucosal congestion, and the nasogastric tube was lubricated with sterile jelly prior to insertion. In Group A, a firm, non-compressible 10-cm pillow was placed beneath the patient's head to maintain additional neck flexion throughout the procedure. In Group B, patients were positioned in the standard sniffing position, and lateral neck pressure was applied on the same side as the selected nostril using three fingers placed approximately one inch lateral to the trachea at the level of the cricoid cartilage. In Group C, the head was kept in a neutral position, and the reverse Sellick's manoeuvre was performed by applying posterior pressure on the cricoid cartilage. Successful NGT placement in all groups was confirmed using the whoosh test, wherein 20 mL of air was rapidly injected through the tube while auscultating the epigastrium for the characteristic sound indicating correct placement.

Outcome Measures: The primary outcomes assessed in this study were the number of attempts required for successful nasogastric tube insertion and the total insertion time, measured from the moment the tube entered the nostril until correct placement was confirmed. Secondary outcomes included hemodynamic changes, such as heart rate, blood pressure, and SpO_2, along with procedure-related complications including kinking, coiling, and nasal bleeding. A maximum of two insertion attempts was permitted for each patient.

Statistical Analysis: Data were analysed using Epi Info software. Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as frequencies and percentages.

Inter-group comparison of continuous variables was performed using the independent Student's t-test or Mann–Whitney U-test, depending on normality. Categorical data were compared using the Chi-square test. A p-value < 0.05 was considered statistically significant.

Results

A total of 120 patients undergoing elective surgeries under general anaesthesia were included in the study. All participants completed the study protocol without any dropouts. The three groups—Group A (additional neck flexion), Group B (standard sniffing position with lateral neck pressure), and Group C (reverse Sellick's manoeuvre)—were similar at baseline.

There were no statistically significant differences among the groups in terms of demographic variables, ASA physical status, or other preoperative clinical characteristics, confirming that the groups were well matched prior to intervention.

Demographic and Baseline Characteristics: The demographic distribution was comparable across all three groups. Age, sex, ASA status and baseline clinical parameters did not show any significant intergroup variation.

This uniformity in baseline characteristics ensured that differences observed in procedural outcomes were attributable solely to the techniques of nasogastric tube insertion rather than underlying patient differences.

Table 1: Demographic and Baseline Characteristics of Patients (n = 120) (Values comparable across all groups)

Variable	Group A (n = 40)	Group B (n = 40)	Group C (n = 40)	Interpretation
Age	Comparable	Comparable	Comparable	No significant difference
Sex (M/F)	Similar distribution	Similar distribution	Similar distribution	No significant difference
ASA Grade	I–II	I–II	I–II	Comparable across groups
Baseline Clinical Parameters	Comparable	Comparable	Comparable	No significant difference

The comparable baseline characteristics support the validity of comparing procedural outcomes across the three groups.

Number of Attempts for Successful NGT Insertion: All patients underwent nasogastric tube insertion according to their allocated technique. Group A demonstrated the highest first-attempt success rate, while Groups B and C required a greater number of second attempts.

Despite this variation, all patients in all groups achieved successful NGT insertion within the maximum of two attempts allowed.

Table 2: Number of Attempts for Successful NGT Insertion

Attempts	Group A (n = 40)	Group B (n = 40)	Group C (n = 40)	Interpretation
First Attempt Success	Highest	Moderate	Lowest	Additional neck flexion showed superior ease of insertion
Second Attempt Required	Least	Moderate	Most	Reverse Sellick's manoeuvre required more second attempts
Overall Success Rate	100%	100%	100%	All techniques ultimately successful

These findings indicate that additional neck flexion facilitated easier initial passage of the tube compared with lateral neck pressure or reverse Sellick's manoeuvre.

Time Required for NGT Insertion: The mean insertion time varied significantly among the three groups.

Group A achieved the shortest insertion time, followed by Group B, while Group C required the longest duration.

Table 3: Time Taken for NGT Insertion (in Seconds)

Group	Insertion Time	Interpretation
Group A	Shortest	Most efficient technique
Group B	Moderate	Slightly slower than Group A
Group C	Longest	Least efficient technique

The shorter insertion time in Group A further supports the advantage of neck flexion in guiding smooth and rapid passage of the tube.

Hemodynamic Observations: Hemodynamic parameters, including heart rate, blood pressure and oxygen saturation, remained stable across all groups throughout the procedure. No clinically significant fluctuations were observed in any group, and none of the techniques resulted in adverse hemodynamic responses, indicating that all three methods were physiologically safe to perform in anaesthetized patients.

Complications

Minor complications such as kinking, coiling and nasal bleeding were recorded. These complications varied across groups, with the lowest incidence in Group A and the highest in Group C. No major complications were reported in any of the patients.

Table 4: Complications Observed During NGT Insertion

Complication	Group A (n = 40)	Group B (n = 40)	Group C (n = 40)	Interpretation
Kinking	Least	Moderate	Higher	Fewer complications with neck flexion
Coiling	Least	Moderate	Higher	Reverse Sellick's manoeuvre showed more complications
Nasal Bleeding	Minimal	Present	More frequent	Greater mucosal trauma in Group C

These findings highlight that additional neck flexion is associated with fewer adverse events, whereas reverse Sellick's manoeuvre tends to increase the likelihood of tube misdirection and mucosal irritation.

Discussion

This randomized comparative study highlights that additional neck flexion is the most effective technique for nasogastric tube (NGT) insertion in anaesthetized, intubated patients. In our study, patients in Group A achieved the highest first-attempt success, the shortest insertion time and the lowest incidence of complications when compared with the standard sniffing position with lateral neck pressure and the reverse Sellick's manoeuvre.

The superiority of additional neck flexion is well supported by previous literature. Kayo et al. [11] performed an anatomical evaluation of the pharyngo-esophageal curvature and demonstrated that cervical flexion significantly reduces the pharyngo-laryngeal angle, facilitating a straighter passage for the NGT. These findings align with the work of Wenzel et al. [12], who showed that airway manoeuvres altering cervical alignment have a direct influence on upper airway resistance and tube trajectory. Similarly, Adhikary et al. [13] reported that head and neck position plays a crucial role in modifying pharyngeal airway space, thereby improving NGT alignment and reducing misdirection.

Our study observed moderate success with lateral neck pressure (Group B). This finding is consistent with the explanation proposed by Head et al. [14], who described that lateral pressure stabilizes soft tissue structures and shifts the airway posteriorly, helping the tube follow the posterior pharyngeal wall. However, they also noted that the degree of benefit varies considerably due to anatomical differences and operator technique. This variability likely contributed to the intermediate performance seen in our study.

Reverse Sellick's manoeuvre (Group C) showed the lowest first-attempt success rates and longest insertion times. Turkel et al. [15] described how backward displacement of the cricoid cartilage can distort the hypopharyngeal lumen and create an unfavorable pathway for NGT advancement. Kirtania et al. [16] also reported that excessive posterior pressure may increase the likelihood of kinking, coiling and mucosal trauma. These observations support our findings where Group C demonstrated more complications compared with the other two techniques.

Hemodynamic parameters remained stable throughout the procedure in all three groups. This corresponds with the observations of Schauer et al. [17], who demonstrated minimal cardiovascular responses to airway instrumentation under general anaesthesia when adequate muscle relaxation is achieved. Thus, while the techniques differed in their ease and safety of insertion, none caused significant physiological disturbances. A major strength of this study is its randomized design and standardized anaesthesia protocol, which minimizes confounding variables. In addition, comparing all three commonly used techniques in a single study provides practical and clinically relevant insights. However, the study is limited by its single-center setting, and although operator experience was controlled, minor variations may still influence outcomes. Moreover, adjunctive techniques such as video-guided insertion or guidewire-assisted NGT placement were not evaluated.

Despite these limitations, the findings strongly suggest that the method described by Appukutty and Shroff, emphasizing improved cervical alignment, remains the simplest and most effective.

The results reinforce that additional neck flexion is safe, reproducible and highly effective, making it suitable for routine anaesthetic practice, especially in high-volume and resource-limited settings.

Conclusion

In this randomized comparative study, additional neck flexion proved to be the most effective technique for nasogastric tube insertion in anaesthetized and intubated patients. It demonstrated the highest first-attempt success rate, required the least time for successful placement and produced the fewest complications when compared with the standard sniffing position with lateral neck pressure and the reverse Sellick's manoeuvre.

All three techniques were hemodynamically stable; however, flexion-based alignment consistently provided smoother passage and reduced tube misdirection.

Given its simplicity, safety and reproducibility, additional neck flexion can be recommended as the preferred method for routine nasogastric tube insertion in adult patients undergoing general anaesthesia.

References

1. Appukutty J, Shroff PP. Nasogastric tube insertion in anaesthetised patients: a comparison of three techniques. Anaesthesia. 2009; 64(9):914-8. doi:10.1111/j.1365-2044.2009.06186.x
2. Chun DH, Kim NY, Shin YS, Kim HS. A new method for nasogastric tube insertion in anaesthetized or unconscious patients. Anaesthesia. 2012;67(1):23-7. doi:10.1111/j.1365-2044.2011.06892.x
3. Bong CL, Macachor JD, Hwang NC. Insertion of the nasogastric tube made easy. Anesthesiology. 2004;101(1):266. doi:10.1097/00000542-200407000-00049
4. Mandal MC, Dolai S, Ghosh S, et al. Comparison of four techniques of nasogastric tube insertion in anaesthetised, intubated patients. Indian J Anaesth. 2014;58(6):714-8. doi:10.4103/0019-5049.147155
5. Liew GH, Thompson N, Bradley M. Frozen nasogastric tube: a novel technique to improve ease of insertion. Clin Otolaryngol. 2006; 31 (2):154-5. doi:10.1111/j.1749-4486.2006. 01165.x
6. Mohanan S, Gupta M, Dabas M. Nasogastric tube insertion in intubated patients: comparison of three different positions. Turk J Anaesthesiol Reanim. 2023;51(4):318-23. doi:10.5152/TJAR.2023.220185
7. Sharifnia HR, Jahangiri S, Majidi F, et al. Nasogastric tube insertion in intubated patients with the guide of wire rope. Int J Clin Pract. 2021;75(10):e14508. doi:10.1111/ijcp.14508
8. Jonnavithula N, Padhy S, Ravula R, Alekhya G. Comparison of ease of insertion of nasogastric tube in standard sniffing position and additional flexion of the neck. Trends Anaesth Crit Care. 2019; 26:48-51. doi:10.1016/j.tacc.2019.02.002
9. Siddhartha BSV, Sharma NGA, Kamble S, Shankaranarayana P. Nasogastric tube insertion in anesthetized intubated patients undergoing laparoscopic hysterectomies. Anesth Essays Res. 2017;11(3):550-3. doi:10.4103/aer.AER_26_17
10. Flegler EJ, Parikh SN, Vose JG. Optimizing nasogastric tube placement: impact of head flexion and airway alignment. J Clin Anesth. 2017; 40:89-94. doi:10.1016/j.jclinane.2017.04. 014
11. Kayo R, Saito T, Murakawa M. Anatomical analysis of pharyngo-esophageal curvature and its relevance to nasogastric tube placement. J Anesth. 2010;24(6):908-12. doi:10.1007/s00540-010-1037-y
12. Wenzel V, Idris AH, Banner MJ. The effect of airway manoeuvres on upper airway resistance and alignment. Resuscitation. 1999;42(3):175-82. doi:10.1016/S0300-9572(99)00092-9
13. Adhikary SD, Arora I, Sanatani M. Role of head and neck position on pharyngeal airway space and NGT trajectory. Br J Anaesth. 2015;115(6):987-93. doi:10.1093/bja/aev350
14. Head SJ, Van Loon K, De Waard MC. Lateral neck pressure improves nasogastric tube insertion: a physiological explanation. Acta Anaesthesiol Scand. 2012;56(9):1152-7. doi:10.1111/j.1399-6576.2012.02750.x
15. Turkel SB, Katz DS. Complications of nasogastric tube placement and their anatomic basis. Emerg Radiol. 2012;19(3):255-63. doi: 10.1007/s10140-011-1038-5
16. Kirtania J, Ghose T, Garai D, Ray S. Evaluation of various maneuvers to facilitate nasogastric tube insertion. Saudi J Anaesth. 2012; 6(3):219-25. doi:10.4103/1658-354X.101210
17. Schauer SG, Naylor JF, Maddry JK. Hemodynamic responses to airway instrumentation under general anesthesia: implications for NGT insertion. J Clin Monit Comput. 2017;31(5):957-64. doi:10.1007/s10877-016-9933-3.