Journal of Multidisciplinary Healthcare

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Application of Gastric Tube Decompression for Rapid Tip Positioning in Bedside Blind Insertion of Nasoenteric Tubes

Li-Li Yang[1], Di-Na Li[1], Peng Gao[2], Hua Zhang[1], Juan Wang[3]

[1]Department of Emergency, China-Japan Friendship Hospital, Beijing, 100029, People's Republic of China; [2]Department of Medical Affairs, China-Japan Friendship Hospital, Beijing, 100029, People's Republic of China; [3]Department of Hepatobiliary Pancreatic Surgery, China-Japan Friendship Hospital, Beijing, 100029, People's Republic of China

Correspondence: Di-Na Li, Department of Emergency, China-Japan Friendship Hospital, Beijing, 100029, People's Republic of China, Tel +86 18236933790, Email lidnina_lii@126.com

Objective: This study aims to examine the efficacy of gastric tube decompression in rapid tip positioning during bedside blind insertion of nasoenteric tubes.

Methods: Between August 2023 and July 2024, patients who were critically ill in the emergency intensive care unit of a tertiary hospital in Beijing who required nasoenteric tube placement were enrolled in this study. Gastric tube decompression was used to facilitate the tip positioning of nasoenteric tubes inserted blindly (without direct visualization), at the bedside. The accuracy of this method was verified by comparing the results to the "gold standard" of abdominal X-ray imaging. Consistent results indicated successful positioning. Additionally, the number of positioning attempts, time taken, and associated adverse events were recorded as outcome indicators.

Results: A total of 55 patients who were critically ill were included in the study, achieving a positioning conformity rate of 98.18% (54/55). The first-time positioning conformity rate was 94.55% (52/55). The median time for positioning attempts was 21 minutes (18, 28 minutes). The sensitivity was recorded at 100%, and no related adverse events were reported.

Conclusion: Gastric tube decompression can rapidly and accurately determine the position of the nasoenteric tube tip, providing a safe and convenient method with a high accuracy rate. This technique enhances the safety of long-term nasoenteric tube placement in patients who are critically ill and enhances the efficiency of blind nasoenteric tube insertion.

Keywords: bedside blind insertion, critically ill patients, gastric tube decompression, nasoenteric tube, positioning

Introduction

Enteral nutrition is a crucial component in the treatment of patients who are critically ill. Initiating enteral nutrition within 24 to 48 hours of hospitalization is associated with reduced infection and mortality rates and shorter hospital stays.[1] Based on the 2016 American Clinical Guidelines for Nutrition Support in Critically Ill Patients, for patients at high risk of aspiration or those intolerant to oral or gastric feeding, a post-pyloric enteral nutrition pathway should be established.[2] Nasoenteric tubes are commonly used for post-pyloric feeding.[3] Various methods for placing and positioning nasoenteric tubes include X-ray fluoroscopy,[4] endoscopy-assisted placement,[5] electromagnetic imaging-assisted placement,[6] and blind insertion.[7] X-ray fluoroscopy involves transferring the patient to a specialized department from the ICU, exposing both the patient and physician to radiation, and entails higher costs and risks. Endoscopy-assisted and electromagnetic imaging-assisted placements require specialized equipment and trained personnel, with electromagnetic imaging not widely implemented in China, making these methods less feasible for patients who are critically ill. Bedsides blind insertion, while avoiding many drawbacks of these methods, still faces complications like tube misplacement. Misplacement can lead to increased patient discomfort, potential tracheal or pleural cavity damage, delays in nutritional support, and adversely affect the diagnosis, treatment, and prognosis of the patient.[8,9] Thus, accurate

Received: 11 September 2024
Accepted: 29 December 2024
Published: 18 January 2025

confirmation of the nasoenteric tube tip position is crucial for effective enteral nutrition. The anatomical positions of the duodenum and jejunum are mostly located on the posterior abdominal wall. The duodenum is a relatively deep and fixed part of the small intestine, and the jejunum is relatively free. In clinical practice, various methods such as auscultation of the sound of air bubbling in fluid,[10] aspiration of fluid,[11] and ultrasound-guided insertion and positioning[12] are often used to assist in judging the tip position. However, in complex and changeable clinical situations, these methods that rely on the anatomical positioning of the duodenum and jejunum are difficult to accurately monitor the position of the tip of the nasointestinal tube.[13] Therefore, this study attempts to adopt the nurse-led gastric tube decompression method, taking advantage of the special physiological and anatomical characteristics that the air in the small intestine is not easy to reflux into the stomach through the pylorus, to quickly position the tip of the blindly inserted nasointestinal tube.

Subjects and Methods

Study Participants

Patients who were critically ill and were admitted to the emergency intensive care unit of a tertiary hospital in Beijing from August 1, 2023, to July 31, 2024, who met the indications for nasoenteric tube placement were included in the study. The inclusion criteria were: ① Intolerance to nasogastric tube feeding and ineffective prokinetic drug treatment;[14] ② Risk of aspiration; ③ Gastric residue >100 mL with no improvement after more than 24 hours.[15] Exclusion criteria were: ① Recent upper gastrointestinal tract disease, surgery, bleeding, et al; ② Nasal facial fracture or base fracture; ③ Abnormal coagulation function, with activated partial thromboplastin time ≥60 seconds;[3] ④ Interruption of tube placement due to condition changes during the process. Informed consent was obtained from all patients and/or their families, and participation was voluntary.

Research Methods

Establishment of the Nasoenteric Tube Placement and Positioning Team

The team consisted of 2 doctors and 2 nurses, with an average working tenure of (20.96 ± 0.61) years. The team included 1 senior professional title holder, 2 deputy senior professional title holders, and 1 intermediate professional title holder. The chief physician of critical medicine served as the team leader, overseeing quality control. The deputy chief physician of imaging, in collaboration with the chief physician of critical medicine, was responsible for interpreting abdominal X-ray plain film images to determine the tip position of the nasoenteric tube.

The deputy director nurse (Nurse A) was tasked with the placement and positioning of the nasoenteric tube, while the head nurse (Nurse B) provided assistance and was responsible for recording the positioning time and any adverse events. To eliminate potential interfering factors, the nasoenteric tube placement was carried out by these two nurses in coordination. Both nurses were critical care specialists with over 10 years of experience, including more than 5 years in bedside blind insertion of nasoenteric tubes, and each had successfully placed over 20 tubes. They had also completed at least one week of training in the gastric tube decompression positioning method and passed both theoretical and practical assessments. After each placement and positioning, the team analyzed the outcomes to identify reasons for success or failure and adjusted the placement and positioning plan as necessary.

Pre-Placement Preparation

1) Preparation of materials and equipment: The nasoenteric tube used in the procedure was measured 140 cm in length and 10 Fr in diameter, with a lateral hole at the end. The catheter is an X-ray non-transparent polyurethane tube, accompanied by a guide wire. Additional materials included a sterile curved tray, treatment towel, saline, liquid paraffin oil, a 50 mL syringe, gauze, and adhesive tape. The negative pressure drainage device, Ltd. (Figure 1), was a 1000 mL D-type model with a negative pressure attraction of 8±2 kPa. A bedside X-ray machine, model DX-D 100 (5411/400), was also used.

2) Patient preparation: To minimize reflux during tube placement, patients were required to fast for at least 4 to 6 hours. If necessary, 10 mg of metoclopramide was administered intramuscularly 20 minutes prior to the procedure.[16]

3) Gastric tube check: All patients had previously inserted a gastric tube. Before nasoenteric tube placement, the depth of the gastric tube was adjusted so that the loudest sound of air passing over water was heard below the xiphoid

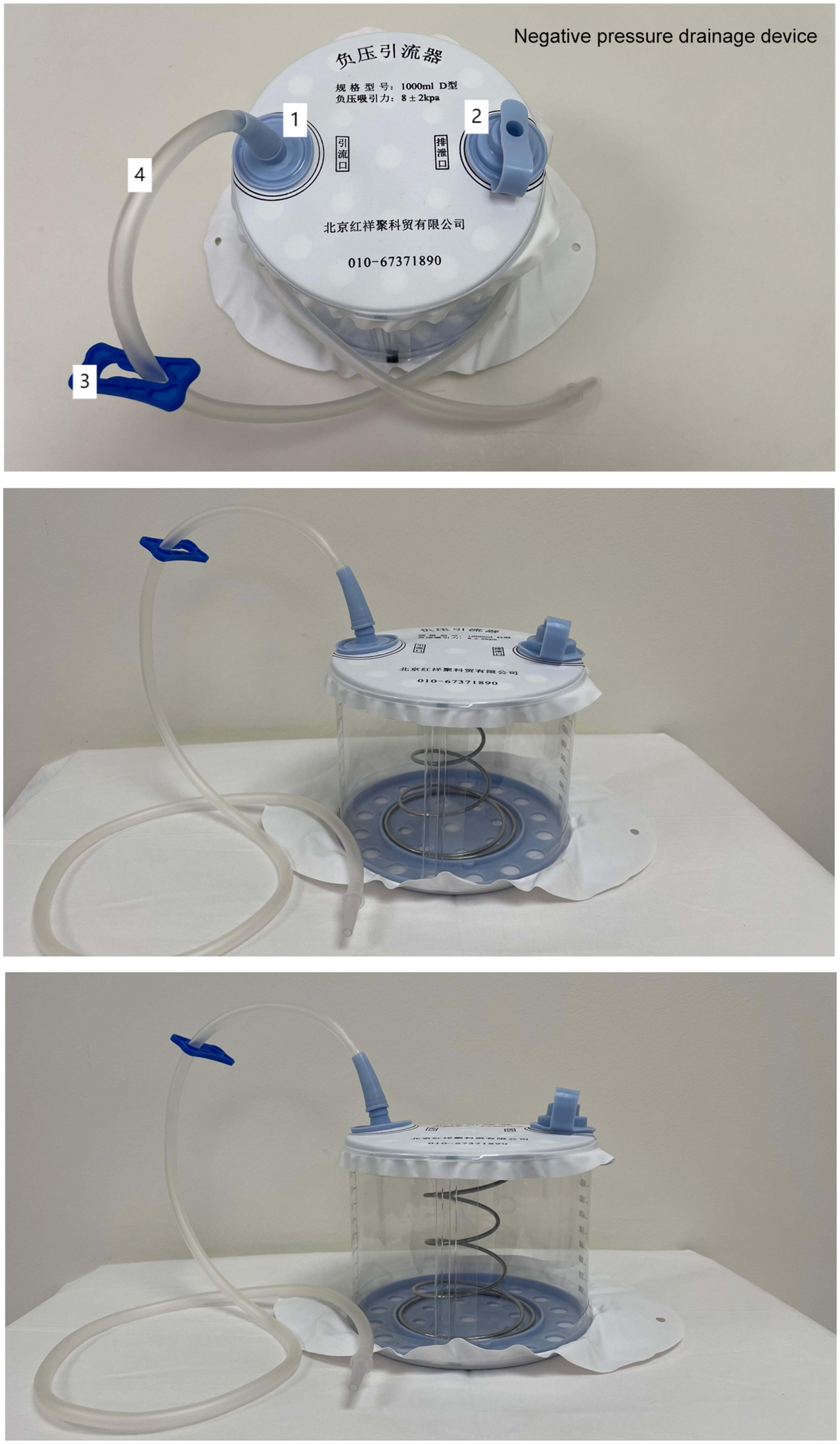

Figure 1 Negative pressure drainage device. 1: Drainage port; 2: Discharge port; 3: Stopcock; 4: Connection tube, the end is connected to the end of the external gastric tube of the patient.

process.[17] The gastric tube was aspirated to ensure no gastric contents were drawn out, and the external end of the gastric tube was connected to a negative pressure drainage device.

4) Measurement of nasoenteric tube placement depth: The length from the tip of the patient's nose to the lobe of the ear and down to the lower edge of the xiphoid process was measured, which is approximately 45 to 55 cm. This measurement corresponded to the catheter depth to the cardia of the stomach. Therefore, the first mark is marked at 44–55 cm from the tip of the catheter, and the second and third marks are marked at 75 cm and 110 cm, respectively, corresponding to the depths at which the catheter passes through the pylorus and duodenum horizontal part.[18–22]

Nasoenteric Tube Placement

The patient was assisted into a position with their head elevated at more than 30° and a right lateral decubitus position, with a treatment towel placed under the jaw.[20] Water was injected into the lumen of the nasoenteric tube to activate the lubricant at the tube end and within the tube. Nurse A then held the catheter with one hand and used forceps to hold the front end of the catheter with the other hand, gently inserting it into the selected nostril and advancing it slowly while the patient continued to breathe. When the tube reached a depth of 10 to 15 cm, patients who were awake were instructed to swallow to assist with the tube placement, while unconscious patients needed to be helped, with one hand lifting the head, bringing the chin close to the sternum. The catheter was then advanced to the first mark, that is, the depth of catheter insertion was 45 to 55 cm, and the position was verified by sound of air passing over water and aspirating gastric juice to measure the pH, confirming that the catheter was in the stomach.[11] As the depth of catheter insertion approaches the pylorus, the second mark, that is about 75 cm, resistance gradually emerges. When the resistance suddenly decreases, the abdominal auscultation method is used for the initial assessment of having passed through the pylorus.[10] The catheter was then advanced to the third mark, at which point it can be assumed that the catheter has reached at least the horizontal portion of the duodenum, adjusted and positioned using the gastric tube decompression method, and secured in place. Based on the results from the bedside X-ray, it was decided whether a second positioning was required. If the second positioning failed, alternative tube placement methods were selected based on the patient's condition.

Gastric Tube Decompression Method for Positioning

1) Negative pressure setting: Following the preliminary assessment that the nasoenteric tube had passed through the pylorus, Nurse B adjusted the negative pressure drainage device to a fully negative pressure state. This involves closing the drainage port valve and the stopcock on the connection tube of the negative pressure drainage device, and then connecting the device to the gastric tube. A fully negative pressure state is defined as a condition where no air is discharged from the negative pressure drainage device, maintaining its content at 0 mL.

2) Quick air injection: Nurse A quickly injected 50 mL of air into the external end opening of the nasoenteric tube using a syringe. Immediately after the air injection, Nurse B opened the stopcock on the connection tube of the negative pressure drainage device, observing and recording the rebound speed and degree of the negative pressure drainage device.

3) Rebound degree measurement: After allowing the negative pressure drainage device to rebound for 5 seconds, Nurse B quickly closed the stopcock and disconnected it from the gastric tube, keeping it sealed. The contents of the negative pressure drainage device were then drawn back with a syringe until it returns to a fully negative pressure state, and the volume of aspirated air was measured.

Criteria for determining whether the nasoenteric tube has passed the pyloric standard by gastric tube decompression method

1) If the negative pressure drainage device fully rebounds within 5 seconds to a degree of less than 20 mL.

2) If the insertion length of the nasoenteric tube exceeds 90 cm, when both criteria are met, it is concluded that the nasoenteric tube has successfully passed through the pylorus. If either criterion is not met, it is concluded that the nasoenteric tube has not passed.

The Principle of the Gastric Tube Decompression Method for Positioning

1) Adjustment of the gastric tube before inserting the nasoenteric tube: The loudest sound of air passing over water during auscultation was made to appear below the xiphoid process, indicating that the tip of the gastric tube is located at

the cardia of the stomach.[21] While keeping the tip of the gastric tube in a high position, aspiration was continued until no gastric contents were drawn out. This avoids the influence of gastric juice, food residue, and other factors on the rebound speed and degree of the negative pressure drainage device.

2) Target insertion depth of the nasoenteric tube: Based on the findings by Jianhua et al, using the progressive water injection method under ultrasound of the gastric antrum, the authors determined that when the nasoenteric tube passes through the pylorus and reaches an insertion depth of approximately 82.37 cm, the cloud sign of refluxing sterile water disappeared, indicating that the sterile water was no longer flowing back.[22] Based on this, the target insertion depth of the catheter passing through the pylorus in this study is greater than 90 cm.

3) Rebound of the negative pressure drainage device: The narrow lumen of the small intestine causes negative pressure generated by aspiration to easily lead to the intestinal closure, making aspiration difficult. In contrast, the stomach behaves oppositely. Therefore, if the tip of the nasoenteric tube has not passed through the pylorus, the air injected into the catheter will quickly escape through the gastric tube and enter the negative pressure drainage device.

Outcome Indicators

Based on the consistency of the determination results with the gold standard, there were four applicable scenarios:

1) True positive: The gastric tube decompression method determined that the catheter passed through the pylorus, and this result is consistent with the gold standard.

2) False positive: The gastric tube decompression method determined that the catheter passed through the pylorus, but this result is inconsistent with the gold standard.

3) True negative: The gastric tube decompression method determined that the catheter has not passed through the pylorus, and this result is consistent with the gold standard.

4) False negative: The gastric tube decompression method determined that the catheter has not passed through the pylorus, but this result is inconsistent with the gold standard.

The Main Outcome Indicators are as Follows

1) Positioning conformity rate: The degree of consistency with the gold standard, including cases where the initial positioning was incorrect but subsequently confirmed to be correct after secondary adjustment was measured. It was calculated as (number of true positives + number of true negatives)/total number of placements.

2) First-time positioning conformity rate: The consistency with the gold standard immediately after the first positioning attempt using the gastric tube decompression method was measured. It was calculated as (number of first-time true positives + number of first-time true negatives)/total number of placements.

The Secondary Outcome Indicators Include

1) Number of positioning attempts: The number of attempts each patient makes using the gastric tube decompression method was measured.

2) Positioning attempt time: The time required from the start of catheter insertion into the nasal cavity to the completion of catheter fixation was measured.

3) Sensitivity: The correct rate of determining the success of the placement, calculated as the number of true positives/(number of true positives + number of false negatives) was measured.

4) Complication incidence rate: The percentage of any adverse events that occur during the positioning process was measured.

Statistical Methods

Statistical analysis was conducted using SPSS 22.0 software. Quantitative data conforming to a normal distribution were presented as mean ± standard deviation, while non-normally distributed quantitative data were represented as median and interquartile range M (Q1, Q3), with group comparisons made using non-parametric tests. Categorical data were described by the number of cases and percentage, with group comparisons made using chi-square tests or Fisher's exact probability method. All tests were two-tailed, with a significance level of $P < 0.05$. The Kappa test was used to assess the consistency between the gastric tube decompression method and the gold standard. A Kappa coefficient ≥0.75 indicated good consistency, 0.75 > Kappa ≥ 0.4 indicated moderate consistency, and a Kappa coefficient <0.4 indicated poor consistency.

Results

General Data

A total of 55 patients who met the criteria for nasoenteric tube placement were included in the study, with no instances of tube placement termination. The group consisted of 36 males and 19 females, with an average age of 66.75 ± 15.26 years. The patient diagnoses included 29 patients with respiratory system diseases, 11 with digestive system diseases, 8 with circulatory system diseases, and 7 with diseases in other systems. The average body mass index (BMI) was 23.45 ± 3.57 kg/m². Additional data is provided in Table 1.

Positioning Situation

Validated by X-ray examination, 54 out of 55 patients had positioning results consistent with the X-ray plain film of the abdomen, resulting in a positioning conformity rate of 98.18% (54/55). The one-time positioning conformity rate was 94.55% (52/55). (Table 2) The median interquartile range for the number of positioning attempts was 1 (1, 1), with a mean ± standard deviation of 1.05 ± 0.23. The positioning attempt time was 21 (18, 28) minutes. Two patients (3.64%, 2/55) underwent positioning with the gastric tube decompression method twice, with a time requirement of 20.5 ± 0.71 minutes for these patients. One patient (1.82%, 1/55) experienced incorrect positioning, potentially due to a waterfall-shaped stomach. During the tube placement process, the tip of the catheter was near the pylorus, and because of the pouch-like backward tilt of the gastric bottom, air could not escape quickly through the gastric tube at the cardia within

Table 1 General Patient Demographic Profile and Univariate Analysis of Positioning Conformity Rate [Number of Case (Percentage)] (n=55)

Item	Number of cases	Tip Positioning Conformity	Test Statistic	P-value
Gender			——	1.00[a]
Male	36	35 (97.22)		
Female	19	19 (100.00)		
Consciousness			——	1.00[a]
Awake	23	23 (100.00)		
Consciousness Disturbance	32	31 (96.88)		
Long-term Use of Gastrointestinal Motility Medications			——	1.00[a]
Yes	46	45 (97.83)		
No	9	9 (100.00)		
Long-term Use of Sedatives and Analgesics			——	0.38[a]
Yes	21	20 (95.24)		
No	34	34 (100.00)		
Artificial Airway			——	1.00[a]
Yes	33	32 (96.97)		
No	22	22 (100.00)		

Note: [a]Fisher's exact probability method.

Table 2 Positioning Effects of the Gastric Tube Decompression Method (n=55)

Gastric Tube Decompression Method	X-ray Plain Film of Abdomen		Total
	Catheter Passed Through Pylorus	Catheter Did Not Pass Through Pylorus	
Catheter Passed Through Pylorus	52	1	53
Catheter Did Not Pass Through Pylorus	0	2	2
Total	52	3	55

5 seconds after injection. Two patients (3.64%, 2/55) had correct positioning but failed tube placement due to physiological structural abnormalities in the stomach, as later revealed by gastroscopy, making blind insertion impossible. The sensitivity was 100%, and the Kappa analysis revealed a Kappa value of 0.79, indicating good consistency between the gastric tube decompression method and the X-ray plain film for positioning the nasoenteric tube in patients who were critically ill. Five patients (9.09%, 5/55) experienced mild nasal and pharyngeal mucosal bleeding, with no serious tube-related complications occurring in any patients during the nasoenteric tube placement and gastric tube decompression method positioning process. The univariate analysis of the positioning conformity rate of the gastric tube decompression method revealed no statistically significant differences concerning patient gender, consciousness state, long-term use of gastrointestinal motility drugs, sedatives, analgesics, or the presence of an artificial airway ($P > 0.05$).

Discussion

Most critically ill patients have poor gastrointestinal peristalsis function and it is relatively difficult to pass through the pylorus. When the catheter tip is close to the pylorus, it is prone to adhering to the wall or folding, which can easily cause false negatives of successful post-pyloric catheterization. Studies have shown[23] that about 1.3%–2.4% of the 1.2 million nasointestinal tubes in the United States each year enter the trachea, and about 0.3%–0.7% cause lung injury. Therefore, no matter how the nasointestinal tube is indwelled, accurately positioning the position of the nasointestinal tube after placement is the key to the success of catheterization. The positioning coincidence rate of the gastric tube decompression method in this study can reach 98.18%, which is higher than the accuracy rate of positioning methods in other studies. This reduces the probability of nurses repeatedly adjusting the nasointestinal tube and repeatedly performing X-ray positioning in actual clinical work. In addition, the one-time positioning coincidence rate of this method is high (94.55%, 52/55). By reducing the number of positioning attempts (1.05 ± 0.23) and shortening the positioning attempt time to 21 (18, 28) minutes, and no serious catheter-related complications occurred during positioning, the catheterization quality of blindly inserting the nasointestinal tube beside the bed for critically ill patients is improved. In daily catheter maintenance, the position of the nasointestinal tube needs to be confirmed regularly. The positioning coincidence rate of the gastric tube decompression method in this study is basically consistent with the gold standard, and this method is simple and easy to learn. Clinical nurses can use this method for rapid and accurate positioning of the nasointestinal tube. Therefore, this method can reduce the frequency of X-ray confirmation when blindly inserting the nasointestinal tube beside the bed for critically ill patients, improve the catheterization quality of blindly inserting the nasointestinal tube beside the bed for critically ill patients, and can be used for the daily catheter maintenance of critically ill patients with long-term indwelling nasointestinal tubes.

Gastric tube decompression can reduce the frequency of X-ray confirmation for bedside blind insertion of nasoenteric tubes in patients who are critically ill

The bedside blind insertion method is currently used in clinical settings for the placement of nasoenteric tubes. Yet, it is associated with a relatively low success rate.[9] Accurate positioning of the catheter tip presents a significant challenge. The routine auscultation method, which relies on the detection of the "gurgling sound" produced by gas passing over water, predominantly depends on the anatomical structure of the gastrointestinal tract. When the strongest sound is heard in the right hypochondriac region, it is assumed that the catheter tip has passed through the pylorus. However, the varied anatomical characteristics and motility of the gastrointestinal tract in patients who are critically ill results in a high probability of misjudgment, with an accuracy rate of approximately 75%.[24] The fluid retraction method, which determines the catheter tip position by measuring the pH value of the retracted fluid, also has limitations. As noted by Gatt et al, the small intestine lacks a storage function and empties rapidly, making it common to fail in drawing digestive fluid during actual procedures.[25] Additionally, medications like antihistamines and proton pump inhibitors can change the pH value of the digestive fluid. This study uses the gastric tube decompression method, leveraging the unique physiological and anatomical characteristics of the pyloric sphincter, where air in the small intestine is unlikely to flow back into the stomach through the pylorus.[26] This method achieved a positioning conformity rate of 98.18%, a Kappa coefficient of 0.79, and a sensitivity of 100%, indicating high accuracy in determining the success of catheter placement. If, during the placement process, the negative pressure drainage device fully rebounds after 5 seconds with a rebound volume greater than 20 mL, the nurse readjusts the position of the nasoenteric tube, thereby avoiding the need for repeated X-ray imaging.

Gastric tube decompression can enhance the quality of bedside blind insertion of nasoenteric tubes in patients who are critically ill

In this study, a univariate analysis of the positioning conformity rate for the gastric tube decompression method revealed no statistically significant differences based on patient gender, consciousness state, long-term use of gastrointestinal motility drugs, sedatives, analgesics, or the presence of an artificial airway. This indicates that the effectiveness of the method is consistent across these variables. Among the 55 patients, 5 (9.09%) experienced mild nasal and pharyngeal mucosal bleeding during the tube placement process. This is a common complication associated with tube placement, and no serious tube-related complications were observed, demonstrating the high safety profile of the method. Additionally, this method offers advantages in terms of placement time. Qimi et al reported a median time of 22.8 minutes (range: 10–60 minutes) for their improved bedside transpyloric spiral nasoenteric tube blind insertion method used on 50 patients with severe pancreatitis.[27] Li et al documented a time consumption of 40.0 minutes (range: 27.0–45.0 minutes) for an auscultation-assisted bedside blind insertion technique involving 81 older patients.[28] In contrast, the gastric tube decompression method in this study achieved a one-time positioning conformity rate of 94.55% and reduced the number of positioning attempts to 1.05 ± 0.23. The method accurately and efficiently determined catheter placement success, reducing the time required for successful nasoenteric tube placement to 21 minutes (range: 18–28 minutes).

Gastric tube decompression can enhance the safety of daily maintenance of long-term nasoenteric tube placement in patients who are critically ill

The group standard for “Intubation and Maintenance of Nasoenteric Tube in Adult Patients” and the “Expert Consensus on Enteral Feeding Nursing for Patients with Severe Neurocritical Diseases” stipulate that X-ray confirmation is required after the initial placement of a nasoenteric tube to verify that the tube tip has passed through the pylorus.[15,18] The “Expert Consensus on Nasal-Jejunal Nutrition Tube Management in Critically Ill Patients” (hereinafter referred to as the “Consensus”) advises that to prevent catheter displacement, the position of the nasoenteric tube tip should be verified at least every 8 to 12 hours, before initiating tube feeds, prior to and after intermittent feeding, and during continuous feeding.[29] However, these guidelines do not specify a precise method for determining the position of the catheter tip.[18,28,30] Relying solely on bedside X-rays for each verification poses challenges like radiation exposure and increased costs, making it impractical in routine clinical practice. The Consensus also does not advocate for routine repeated radiological confirmation of catheter tip placement. In this study, the gastric tube decompression method was used for rapid catheter tip positioning, achieving a positioning conformity rate of 98.18% and a Kappa coefficient of 0.79, which closely aligns with the gold standard. This method, which is nurse-led and performed at the bedside without requiring additional equipment or patient transfer, uses the rebound speed and degree of the negative pressure drainage device to confirm tube position. Consequently, the gastric tube decompression method is a practical approach for daily maintenance of long-term nasoenteric tube placements in patients who are critically ill, enhancing the safety and efficiency of enteral nutrition.

Limitations and suggestions of gastric tube decompression in the application of rapid tip positioning of bedside blind insertion of nasoenteric tubes

This study provides preliminary insights into the use of the gastric tube decompression method for rapid positioning of nasoenteric tubes during bedside blind insertion. The method demonstrated simplicity, speed, and high safety levels; however, it has notable limitations. The sample size was relatively small, and the study primarily involved patients with respiratory diseases, indicating that further validation is needed for its application in patients with other complex conditions. Additionally, the method necessitates the presence of an indwelling gastric tube before nasoenteric tube insertion, which imposes additional preparatory requirements on the patient and may affect patient comfort due to the long-term presence of the gastric tube. The study also identified a case of incorrect positioning, highlighting the need for further research to address its efficacy in patients with atypical gastric anatomy. Furthermore, as a single-center study, it only offers preliminary assessments of the practicality and effectiveness of the gastric tube decompression method. It did not include a control group for comparison with traditional clinical positioning methods. Future research should involve multi-center randomized controlled trials with larger sample sizes to thoroughly assess the positioning accuracy and overall efficacy of this method, thereby providing robust scientific evidence for its clinical implementation and broader application.

Conclusion

The gastric tube decompression method, guided by nursing staff, offers a practical and efficient solution for positioning nasoenteric tube tips at the bedside without the need for additional equipment. This technique is straightforward for nursing staff to learn and implement, addressing common challenges in the daily management of nasoenteric tubes. It converts an otherwise unobservable aspect of nasoenteric tube positioning into an intuitive and measurable indicator, reducing the uncertainty and potential pitfalls associated with blind insertion. This method enhances the accuracy of tube placement, increases the success rate and ensures a higher level of safety in clinical practice. As such, this new procedure is an improvement over the conventional method, has better clinical application value, and deserves to be widely learnt by nurses.

Abbreviations

BMI, body mass index.

Data Sharing Statement

All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

Ethics Approval

The study was conducted in accordance with the Declaration of Helsinki (as was revised in 2013). The study was approved by Ethics Committee of the China–Japan Friendship Hospital (No.2024-KY-210).

Acknowledgments

We are particularly grateful to all the people who have given us help with our article.

Funding

1.National High Level Hospital Clinical Research Funding (2024-NHLHCRF-GL-21); 2.National High Level Hospital Clinical Research Funding (2023-NHLHCRF-GLMS-25).

Disclosure

The authors declare no conflict of interest.

References

1. Chapman M, Peake SL. TARGET Investigators, for the ANZICS Clinical Trials Group. Energy-Dense versus Routine Enteral Nutrition in the Critically Ill. *N Engl J Med*. 2018;379(19):1823–1834. doi:10.1056/NEJMoa1811687
2. McClave SA, Taylor BE, Martindale RG, et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N. *JPEN J Parenter Enteral Nutr*. 2016;40(2):159–211. doi:10.1177/0148607115621863
3. Wang S, Zhang W XX. Advances in research on the positioning methods of the tip of nasoenteral tubes. *Chin J Nurs*. 2022;57(11):1401–1405.
4. Guo W, Zheng R, Xue S, Lv B, Zhang H. Factors associated with fluoroscopy-guided placement of nasoenteral feeding tubes. *Nutr Clin Pract*. 2021;36(4):884–890. doi:10.1002/ncp.10636
5. Tariq N, Ali A, Chen C. Endoscopic Enteral Access. *Surg Clin North Am*. 2020;100(6):1091–1113. doi:10.1016/j.suc.2020.08.009
6. C FC, de Moura DTH, Funari MP, et al. Use of an electromagnetic-guided device to assist with post-pyloric placement of a nasoenteral feeding tube: a systematic review and meta-analysis. *Endoscopy Intern Open*. 2022;10(08):E1118–E1126. doi:10.1055/a-1789-0491
7. Wang Q, Xuan Y, Liu C, Lu M, Liu Z, Chang P. Blind placement of postpyloric feeding tubes at the bedside in intensive care. *Crit Care*. 2021;25 (1):168. doi:10.1186/s13054-021-03587-5
8. Cardona E, Mehta S. Bedside postpyloric enteral tube placement using Kangaroo IRIS technology: a single-center case series. *Nutrition*. 2021;86:111195. doi:10.1016/j.nut.2021.111195
9. Taylor SJ, Karpasiti T, Milne D. Safety of blind versus guided feeding tube placement: misplacement and pneumothorax risk. *Intensive Crit Care Nurs*. 2023;76:103387. doi:10.1016/j.iccn.2023.103387
10. Xiao J, Mao Z, Hua M, et al. Auscultation-assisted bedside postpyloric placement of feeding tube in critically ill patients: a prospective, observational study. *Asia Pac J Clin Nutr*. 2019;28(3):435–441. doi:10.6133/apjcn.201909_28(3).0002
11. Taskiran N, Sari D. The effectiveness of auscultatory, colorimetric capnometry and pH measurement methods to confirm placement of nasogastric tubes: a methodological study. *Int J Nurs Pract*. 2022;28(2):e13049. doi:10.1111/ijn.13049
12. Ye R, Cheng X, Chai H, Peng C, Liu J, Jing J. A systemic ultrasound positioning protocol for nasointestinal tube in critically ill patients. *Crit Care*. 2021;25(1):213. doi:10.1186/s13054-021-03641-2
13. Milsom SA, Sweeting JA, Sheahan H, Haemmerle E, Windsor JA. Naso-enteric Tube Placement: a Review of Methods to Confirm Tip Location, Global Applicability and Requirements. *World J Surg*. 2015;39(9):2243–2252. doi:10.1007/s00268-015-3077-6
14. Singer P, Blaser AR, Berger MM, et al. ESPEN guideline on clinical nutrition in the intensive care unit. *Clin Nutr*. 2019;38(1):48–79. doi:10.1016/j.clnu.2018.08.037
15. Liu F, Gao L, Wang XY, et al. Expert consensus on enteral feeding nursing for neurocritical patients. *Chin J Nurs*. 2022;57(3):261–264.
16. Ouyang X, Qu R, Hu B, et al. Is metoclopramide beneficial for the postpyloric placement of nasoenteric tubes? A systematic review and meta-analysis of randomized controlled trials. *Nutr Clin Pract*. 2022;37(2):316–327. doi:10.1002/ncp.10725
17. Bing X, Yinshan T, Ying J, Yingchuan S. Efficacy and safety of a modified method for blind bedside placement of post-pyloric feeding tube: a prospective preliminary clinical trial. *J Int Med Res*. 2021;49(2):300060521992183. doi:10.1177/0300060521992183
18. Chinese Nursing Association. *T/CNAS 20-2021: Placement and Maintenance of Adult Nasoenteral [S]*. Beijing: Chinese Nursing Association; 2021.
19. Compher C, Bingham AL, McCall M, et al. Guidelines for the provision of nutrition support therapy in the adult critically ill patient: the American Society for Parenteral and Enteral Nutrition [published correction appears in JPEN J Parenter Enteral Nutr. *JPEN J Parenter Enteral Nutr*. 2022;46 (1):12–41. doi:10.1002/jpen.2267
20. Liu F, Gong LC, Wei JX, et al. Summary of nursing practice for enteral feeding via nasoenteral tubes in adult critically ill patients. *Chin Mod Nurs*. 2021;27(15):1973–1979.
21. Boeykens K, Holvoet T, Duysburgh I. Nasogastric tube insertion length measurement and tip verification in adults: a narrative review. *Crit Care*. 2023;27(1):317. doi:10.1186/s13054-023-04611-6
22. Zhang Q, Sun JH, Liu JT, Wang XT, Liu DW. Placement of a Jejunal Feeding Tube via an Ultrasound-Guided Antral Progressive Water Injection Method. *Chin Med J (Engl)*. 2018;131(14):1680–1685. doi:10.4103/0366-6999.235874
23. Zheng Z, Tang S, Shao Z, et al. Development and validation of a nomogram for predicting the placement of nasointestinal tubes in critically ill patients based on abdominal radiography: a single-center, retrospective study. *Heliyon*. 2024;10(17):e37498. doi:10.1016/j.heliyon.2024.e37498
24. Lv YJ, Dai FL, Wei XJ, et al. Application of abdominal trajectory auscultation method in bedside placement of nasoenteral tubes in mechanically ventilated patients. *Chin J Clin Nutr*. 2020;28(3).
25. Gatt M, MacFie J. Bedside postpyloric feeding tube placement: a pilot series to validate this novel technique. *Crit Care Med*. 2009;37(2):523–527. doi:10.1097/CCM.0b013e3181959836
26. Liu Y, Wang Y, Zhang B, Wang J, Sun L, Xiao Q. Gastric-tube versus post-pyloric feeding in critical patients: a systematic review and meta-analysis of pulmonary aspiration- and nutrition-related outcomes. *Eur J Clin Nutr*. 2021;75(9):1337–1348. doi:10.1038/s41430-021-00860-2
27. Huang QM, Lv JS, Liu WJ, et al. Modified bedside blind insertion method of transpyloric spiral nasoenteral tubes and evaluation of application effects. *Chin Mod Nurs*. 2018;24(33):4054–4057.
28. Li L, Li S, Lang BB, et al. Application study of auscultation-assisted bedside blind insertion of nasoenteral tubes in the elderly. *Chin J Pract Nurs*. 2022;38(23).
29. National Emergency Medical Professional Quality Control Center. Beijing Emergency Quality Control and Improvement Center, Emergency Nursing Professional Committee of Chinese Nursing Association. Expert consensus on the management of nasojejunal nutritional tubes in critically ill patients. *Chin J Emerg Med*. 2024;33(6):761–766.
30. Reintam Blaser A, Starkopf J, Alhazzani W, et al. Early enteral nutrition in critically ill patients: ESICM clinical practice guidelines. *Intensive Care Med*. 2017;43(3):380–398. doi:10.1007/s00134-016-4665-0