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REVIEW

Evolving Therapeutic Roles of Nasogastric Tubes: Current Concepts in Clinical Practice

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ABSTRACT

Nasogastric tubes (NGT) have been in use for over 100 years and are still considered as essential and resuscitative tools in multiple medical specialties for acute and chronic care. They are vital for decompression of the stomach in the presence of bowel obstruction in the critically ill and useful as a conduit for the administration of medications and sometimes for short term parenteral nutrition. The placement of nasogastric tubes is relatively routine. However, they must be inserted and maintained safely and effectively to avoid serious and possibly even fatal associated complications. This review focuses on recent updates in research regarding nasogastric tubes. Cognizance of the recent advances in indications, contraindications, techniques of insertion, confirmation of correct positioning, securement, complications, management of complications, and state of the art research about the nasogastric tube is crucial for practitioners of all medical and surgical specialties.

Keywords: Nasogastric tubes; Bowel obstruction; Nasopharynx; Oropharynx; Palliative care; Chronic care

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Key Summary Points

Although nasogastric tube (NGT) installation is quite common, it must be done correctly and securely to minimize difficulties

The location and tip of the NGT must be validated by radiography after blind installation

Recent improvements suggest that point-of-care ultrasound (POCUS) might be utilized for NGT insertion in the acute care scenario when expertise is available at the bedside

This has been shown to be especially beneficial in intensive care unit (ICU) settings for patients with COVID-19. Patients who have adequate intestinal absorption capacity but are unable to eat orally can seek endoscopic enteral feeding access

Current NGTs on the market often pose difficulties in maintaining stomach decompression during postpyloric enteral feeding or as a postoperative nasogastric enteral feeding tube

The development and testing of dual-purpose nasogastric and nasojejunal tubes to enhance nutrition treatment and patient safety are now underway

The European Society for Clinical Nutrition and Metabolism (ESPEN) and the European Society of Gastrointestinal Endoscopy (ESGE) provide valuable suggestions for more smoothly structuring and standardizing enteral nutrition

INTRODUCTION

Nasogastric tubes (NGTs) are widely used in multiple specialties including surgery (perioperatively), gastroenterology, pediatrics, and palliative care, in both acute and chronic care settings. More than a million NGTs are placed every year in the USA [1]. NGTs have been used for over 100 years and were first described in 1921 by Dr. Abraham Levin. NGTs are tubes inserted through the nose past the nasopharynx, oropharynx, and esophagus to reach the stomach. The main purposes of NGTs include decompression of the stomach in the presence of ileus or intestinal obstruction and the administration of medication or nutrition by enteral feeding to patients unable to tolerate oral intake, such as patients with dysphagia or critical illness [1]. Small bowel obstruction from hernias, ileus, adhesions (band obstruction), neoplasms obstructing lumen, volvulus, intussusception, and other causes can hinder the normal passage of several secretions such as that from salivary glands, gastric juice, hepatobiliary, and enteric secretions. These fluids will accumulate and ultimately cause abdominal distension, pain, and nausea. Eventually, the fluids will build up sufficiently to put the patient at risk for aspiration as they suffer from nausea that will progress to emesis [2]. This review, therefore, focuses on indications, insertion techniques, confirmation of placement, complications, outcomes, and recent advances of nasogastric tubes, which are essential in various medical disciplines.

Compliance with ethics guidelines: This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

INDICATIONS AND CONTRAINDICATIONS

Most commonly, nasogastric tubes are used for gastric decompression in operating rooms during the administration of anesthesia and in the presence of distal bowel obstruction to prevent pulmonary aspiration. Distal obstruction can occur as a result of several causes such as ileus, hernias, volvulus, neoplasms, secretions, or intussusception [1]. The most common nasogastric tube for decompression is a double-lumen tube with a large and a small lumen. The larger lumen is used for suction while the smaller lumen acts as a sump allowing air to enter the system, so the suction tube does not adhere to the wall of the stomach or collapse.

Nasogastric tubes are also often placed in patients with gastrointestinal (GI) bleeding where it may aid in the diagnosis [3]. The outcomes of patients' with GI bleed have not shown to be improved with the placement of a nasogastric tube [4]. There are different types of nasogastric tubes that have been designed depending on the purpose intended. When nasogastric tubes are used for the delivery of medications or for short-term nutritional support, a single-bore small-lumen tube such as a Levin or Dobhoff tube can be used. Both Levin and Dobhoff tubes have a small lumen; however, the Dobhoff has a weight attached to the distal end to aid in insertion past the pylorus [5].

Basilar skull fractures of facial trauma, esophageal tumors causing esophageal obstruction and esophageal trauma, and presence of ingestion of caustic substances are all contraindications to the placement of a nasogastric tube [6]. A relative contraindication is anticoagulation. Placement with endoscopy is recommended for patients with abnormal GI anatomy, hiatal hernia repair, and prior gastric bypass surgery [7].

DETERMINATION OF THE INTERNAL LENGTH OF A NASOGASTRIC TUBE

Blind placement of a NGT for gastric decompression/aspiration prevention is often done intraoperatively. It is also done for diagnostic reasons, medication administration, and nutrition. In an adult, approximately 55 cm of the nasogastric tube must be inserted from the nares to reach the center of the stomach [1]. Accidental intestinal or intraesophageal placement of NGT can result in serious complications; therefore, to achieve good gastric positioning and avoid complications, accurate determination of the internal length of the nasogastric tube prior to placement is essential. Historically, the nose-earlobe-xiphoid distance (NEX) has been used to estimate the insertion length of nasogastric tubes to obtain correct tip positioning usually 3–10 cm under the lower esophageal sphincter. When verification of tip positioning was done by x-ray in a comparison study of NEX with corrected NEX or corrected NEX ($NEX \times 0.38696 + 30.37$) for tube positioning, both methods resulted in incorrectly placed tubes, which could increase the risk of pulmonary aspiration or reflux [8]. Another common method is to loop the NGT over the patient, bring the tip over the patients' xiphoid process, and measure the estimated length of the NGT to be inserted [8]. A systematic review of 12 papers evaluating the accuracy of the methods to determine the internal length of NGT in adult patients was performed by Torsy et al. [9]. Using the methods described to determine the internal length of NGT with blind placement had $<$ 100 percent accuracy. The authors concluded blind placement of NGT is not safe without the position of the NGT tip being verified by radiologic imaging.

NGT INSERTION

Nasogastric tubes are most commonly placed by blind insertion of the NGT through the nose with the patient's head in the neutral position without external manipulation of the larynx or instrumental assistance. Blind insertion is often associated with complications of coiling, kinking, and malposition in 0.5–16% of cases and can result in pleural, pulmonary, and tracheal malposition in 0.3–15% of cases leading to serious complications of pneumothorax and pulmonary abscess formation [9].

Different success rates have been reported with the insertion of NGT by other techniques. Gao-wen et al. [10] conducted a meta-analysis of 17 randomized controlled trials with 2500 participants comparing insertion times, success rates, and complications in anesthetized and intubated patients using different methods of insertion of NGT. These methods included lateral neck pressure alone [11], lateral neck pressure in combination with neck flexion [12], use of a frozen NGT [13], video-assisted and other endotracheal tube guided methods [14], and the reverse Sellick maneuver [15]. In Table 1, we further elaborate on the methods studied in references [11–15]. The reverse Sellick maneuver entails gentle pressure to the anterior neck in an anterior direction at the level of the cricoid cartilage. Gao-wen et al. [10] concluded that compared to the conventional method, all modified techniques of insertion of NGT resulted in a significantly better first attempt success rate of NGT insertion [10]. In intubated or obese patients, insertion of NGT using a wire rope could be beneficial. Sharifnia et al. [16] studied the use of a wire rope guide with chin lift compared to a control group with head flexion as techniques for the insertion of NGTs. They found that there was significantly higher first attempt success in the rope wire guide group for correct positioning. The rope wire guide group had a lower incidence of injury, such as coiling, kinking, and bleeding, related to the procedure.

Unconscious patients are unable to cooperate with the operator in NGT placement, making insertion even more challenging. Commonly reported impaction sites on insertion of a NGT in unconscious patients are the arytenoid and the piriform sinus [17]. In a prospective, parallel, randomized, double -blind control trial involving 110 unconscious patients, Wangmiao Zhao et al. [17] found that backward displacement of the tongue was the first impaction site to block the pharyngeal passage in unconscious patients. Furthermore, the success rate was higher and the complication rate and intubation time were lower for NGT placement in patients positioned in the lateral decubitus versus supine position. Manipulation of NGT into the esophagus by indirect visualization has been described by Sahu et al. [18] using video laryngoscopy. Sahu et al. [18] described NGT placement in intubated and anesthetized patients using video laryngoscopy with glide scope and forward placement by external laryngeal maneuver with high success and with less time. Guidance of the NGT by other means, such as endoscopic, direct surgical with fluoroscopy, or electromagnetic guidance, can also be pursued. Guidance with fluoroscopy achieves about 90%success rate [19].

CONFIRMATION OF NASOGASTRIC TUBE PLACEMENTS

NGTs are needed in patients who are mechanically ventilated and in some non-ventilated patients, and confirmation of gastric position is paramount [20]. Confirmation of the position of a NGT can be accomplished in several ways. The gold standard for confirmation of NGT is chest x-ray. The other modes of confirmation with less accuracy are pH analysis and end tidal CO_2 ($ETCO_2$) detection. Studies to measure the $ETCO_2$ and pH to determine the threshold values to potentially improve the positioning of NGT correctly are ongoing [21]. Taskiran et al. [22] did a methodologic study to evaluate the effectiveness of auscultatory, pH measurement methods and calorimetric capnography for the confirmation of NGT placements [22]. It was determined that all three methods were unreliable to confirm the correct NGT placement; the authors recommended that initial placement of the NGT continues to be confirmed by radiography.

However, confirmation of correct NGT placement by radiologic means is not always possible. This has especially been seen since the start of the COVID-19 pandemic, where frequent NGT evaluations were needed for the prone ARDS patients in the intensive care units (ICU). In these cases, ultrasound has been considered an alternative method with good sensitivity and specificity [23]. Vasiliki et al. [23] used ultrasound confirmation of NGT placement with sagittal and longitudinal epigastric views in a prospective study of 276 COVID-19 ARDS patients. Ultrasonic evaluations were done in the ICU at initial NGT placement in 89.1% of patients, after change in patient positions to prone or supine, or when requested by the ICU team. In one of the ultrasound confirmatory tests, the NGTs could be visualized directly by the presence of two parallel lines in 69.9% of patients. The other ultrasound confirmatory test was the “whoosh” test where a flash could be seen with ultrasound when air was insufflated into the NGT in 69.9% of the patients. The full evaluation for confirmation of the NGT was done in 3.8 ± 3.4 min, with 98.9%

Table 1 Success rates of various insertion techniques for NGT placement

Study	NGT insertion groups	Patients, *n*	Technique	Outcome measure	Conclusion drawn
Vijay Siddhartha et al. [11] A randomized comparative study	A = control	A = 40	A = lubricated NGT insertion through a nostril with a neutral head position	Statistical significance from control not discussed	Both techniques were better than the conventional method. The reverse Sellick's maneuver to insert NGT is a better alternative to the conventional method of NGT insertion
	B = lateral neck flexion	B = 40	B = lubricated NGT was inserted through nostril to a depth of 10 cm. Lateral neck pressure was applied at ipsilateral side as nostril with the neck flexed	First attempt success rate:	
	C = reverse Sellicks	C = 40	C = anterior displacement (lifting) of the cricoid cartilage was done to facilitate NGT insertion	A = 37.5% B = 40% C = 77.5% Three attempts or greater (i.e. Fail) rate: A = 25% B = 22.5% C = 7.5% Mean insertion time ± SD (seconds): A = 25.55 ± 4.52 B = 20.48 ± 4.69 C = 13.05 ± 2.57	

Table 1 continued

Study	NGT insertion groups	Patients, *n*	Technique	Outcome measure	Conclusion drawn
Appukutty et al. [12] A randomized controlled trial	A = control	A = 50	A = lubricated NGT insertion through a nostril with a neutral head position	First attempt success rate: A = 34% B = 66%* C = 82%* D = 82%*	Head flexion with lateral neck pressure is the simplest technique of NGT insertion that has the highest success rate and lowest incidence of complications
	B = ureteral guidewire	B = 50	B = a ureteral guidewire introduced within a 14-F NGT until the tip of the guidewire met the tip of the NGT. Tube insertion was then performed the same method as the control group		
	C = slit endotracheal tube	C = 50	C = the NGT inserted through a nostril and taken out through the mouth, leaving at least 10 cm of NGT at the nostril. Then passed through a longitudinally cut 7.0-mm ETT, so the tip of the NGT was at the level of the Murphy eye. The ETT was inserted blindly into the oral cavity to a depth of 18 cm and the NGT advanced further. The NGT was then freed from the ETT, the ETT removed, and the NGT passed into the esophagus	Three attempts or greater (i.e. Fail) Rate: A = 28% B = 8%* C = 8%* D = 6%*	
	D = neck flexion with lateral pressure	D = 50	D = lubricated NGT inserted through the nostril to a depth of 10 cm. The patient's neck was flexed, lateral neck pressure was applied, and the NGT advanced via the same method as the control group	Mean insertion time ± SD (seconds): A = 56 ± 36 B = 42 ± 29 C = 98 ± 43* D = 31 ± 19*	

Table 1 continued

Study	NGT insertion groups	Patients, *n*	Technique	Outcome measure	Conclusion drawn
Chun et al. [13] A randomized, controlled trial	A = control	A = 50	A = head held in neutral position with head elevation of 5-10 cm by pillow. Lubricated NGT gently inserted via nostril and withdrawn if significant resistance felt or if noted kinking in mouth occurred	Two attempts or fewer success rate: A = 58% B = 88%* Mean insertion time ± SD (seconds): A = 120 ± 133 B = 83 ± 43	Freezing the NGT with distilled water can increase the success rate of NGT insertion
	B = frozen NGT	B = 50	B = NGT was carefully opened to maintain natural curvature and injected with sterile, distilled water and then frozen prior to following the same insertion steps as control		
Kim et al. [14] A randomized clinical study	A = control	A = 35	A = NGT insertion through a nostril to the larynx and then gently inserted while the cuff of the endotracheal tube was loosened and the jaw was gently pulled up slightly	First attempt success rate: A = 37.1% B = 100%* Three attempts or fewer rate: A = 74.3% B = 100%* Mean insertion time ± SD (seconds): A = 96.7 ± 57.5 B = 71.3 ± 22.6* Mean insertion attempts ± SD A = 2.11 ± 0.93 B = 1.0 ± 0.0*	In intubated anesthetized patients, use of a GlideScope with modified Magill forceps will shorten the insertion time and improve the success rate of placing an NGT
	B = GlideScope + Magill forceps	B = 35	B = GlideScope insertion into the mouth to maximally visualize the esophageal entrance, and modified Magill forceps were used to direct the NGT towards the visualized esophageal opening. Then the same steps as the control group were followed		

Table 1 continued

Study	NGT insertion groups	Patients, *n*	Technique	Outcome measure	Conclusion drawn
Mandal et al. [15] A prospective, randomized controlled trial	A = control	A = 50	A = lubricated NGT insertion through a nostril with a neutral head position	First attempt success rate: A = 56% B = 65% C = 75%* D = 86%* Three attempts or greater (i.e. fail) rate: A = 30% B = 12%* C = 10%* D = 4%* Mean insertion time ± SD (seconds): A = 39.05 ± 9.63 B = 38.43 ± 9.22 C = 24.52 ± 6.65* D = 22.39 ± 5.05*	The reverse Sellick's maneuver, neck flexion with lateral neck pressure, or guide wire-assisted techniques are superior alternatives to conventional method for NGT insertion in anesthetised, intubated adult patients
	B = ureteral guidewire	B = 49	B = a 6-F ureteral guidewire introduced within a 14-F NGT until the tip of the guidewire met the tip of the NGT. Tube insertion was then performed the same method as the control group		
	C = neck flexion with lateral pressure	C = 49	C = lubricated NGT inserted through the nostril to a depth of 10 cm. The patient's neck was flexed, lateral neck pressure was applied, and the NGT advanced via the same method as the control group		
	D = reverse Sellick's maneuver	D = 49	D = anterior displacement (lifting) of the cricoid cartilage was done to facilitate NGT insertion		

*Indicates statistically significant difference from control ($p < 0.05$)

sensitivity and 57.9% specificity. With the need for frequent changes in position several times a day in ARDS patients, ultrasound confirmation of correct NGT placement is a feasible and practical tool.

Behera et al. [24] studied NGT tip localization in anesthetized and intubated adult patients using flexible video bronchoscopy. During endoscopy, insufflation of 2 l oxygen through the working channel was helpful in opening of the esophagus. Repeated suctioning was also performed to prevent gastric distension by the insufflation of oxygen. The authors describe the visualization of the entire NGT in the esophagus and stomach using this method. The traditional confirmation by radiography of the position of the NGT was also performed. In patients when radiography is not clear to determine NGT position, use of a flexible video bronchoscope can be advantageous.

Point-of-care ultrasound (POCUS) has been used for confirmation of blindly placed NGTs. However, complications continue to occur during the blind placement, including aspiration pneumonias, pneumothorax, intracranial placement, right atrial placement, and even death [25–27]. A randomized control trial using real-time POCUS-guided NGT insertion [28] had high first attempt success rate, high sensitivity (over 90%) in intubated and non-intubated patients, and significantly decreased passage related complications. A confirmatory radiograph is not necessary when performing POCUS-guided NGT insertion [24, 28].

In summary, health care institutions should develop their own standard procedures for insertion and confirmation of nasogastric tube placement based on the best available evidence [29]. More research is needed on the development of reliable and effective non-radiologic methods applicable for use at the bedside.

SECUREMENT OF NASOGASTRIC TUBES

Several factors affect the outcomes of NGT efficacy, including the method of securing of the NGT. This is especially important in children and adults with comorbidities and age-related illnesses. Other important factors are the length of stay, prior NGT dislodgments, radiographic exposures, adverse skin outcomes, and emergency department (ED) encounters. In adult patients, nasal bridles, devices that wrap around the vomer bone of the nose and clasp the NGT at a desired depth, have been shown to be a safe and effective method to secure a NGT to the nares. In the pediatric population, nasal bridles have not historically been used as widely [30]. Use of nasal bridles to secure NGT compared to standard securing with tape have been studied in children by Lavoie et al. [30], and bridles were found to have fewer NGT dislodgements, radiographic exposures, ED visits, and hospital days [30]. Securing NGT in intubated patients in both adults and children requires considerable attention [31]. Figure 1 shows proper placement of a nasal bridle.

COMPLICATIONS OF NGT PLACEMENT

According to the literature, 2–36% of NGT placements have complications during insertion and removal [1, 32]. The complications include bleeding, kinking, coiling, misplacement, and potential knotting of the NGT. A case report describes the stocking of a knotted nasogastric tube with a hard and granny tie in the nasopharynx. The tube was successfully removed with a pediatric bougie [33].

Misplacement of a NGT is a complication that can be recognized by radiography. In addition to diagnosis of a misplaced NGT, radiography can also help in the planning of a safe removal of the misplaced NGT [34]. Misplacement of a nasogastric tube can occur inadvertently into the pulmonary system. This can lead to major complications including aspiration and respiratory distress [35]. Fourteen guidelines to distinguish pulmonary from gastric placements of NGT were explored. These methods for tube placement testing included radiography, aspirate appearance, respiratory distress, auscultation, enteral access devices, carbon dioxide detection, and aspirate pH. The most accurate testing method was radiography [36].

NGT can cause pressure injury of the nares especially over prolonged use as is often seen in the ICU. An organizational process improvement model was implemented as an intervention to decrease the hospital-acquired pressure injuries related to NGT in a metropolitan hospital with success. The intervention included the creation and implementation of specific and clear guidelines to assess and secure NGT [37]. A simple mnemonic "CLEAN" was used to implement the guidelines. The mnemonic denoted: correct tube position, stabiLize tube, Evaluate area near/under tube, Alleviate pressure, and deNote date and time. After the guidelines were implemented, the incidence of NGT-related hospital-acquired pressure injury decreased significantly when followed for 1 year. Prolonged use of the NGT can result in gastric bleeding by gastric irritation [38]. It is vital to follow evidence-based recommendations for NGT placement to improve clinical outcome [39].

NGT AND NUTRITION

There has been much interest in the importance of early postoperative nutrition. Complications of nasoenteral feeding include aspiration, diarrhea, sinusitis, nasopharyngeal lesions, derangements in metabolism, and intestinal ischemia without significant advantage over gastroenteric feeding [40]. Nasoenteral tubes can be placed post-pyloric—past the stomach and in the small intestine—in contrast to the nasogastric tube, which terminates in the stomach [41].

When the oral route is unsafe or not sufficient, enteral nutrition with the use of nasogastric tube in the short term (about 2 weeks) can be used. The fine-bore, flexible nasogastric feeding tube has been used in elderly patients > 65 years of age with malnutrition or dysphagia [42] as a short-term solution for enteral feeding. This method has been seen to provide benefit to prevent malnutrition but has risk of dislodgement and potential delay in utilizing the NGT while awaiting placement confirmation by x-ray [43, 44].

Patients with chronic dysphagia or severe swallowing disturbances, such as those with cancer, dementia, stroke, and head injury, are often given a long-term NGT for nutritional support. There is a dearth of epidemiological data for use of long-term NGT. A study in Taiwan done by Chung Hsu et al. [45] showed that long-term NGT placement was associated with higher risk of mortality and comorbidities such as acute and chronic respiratory illnesses, especially in stroke patients. In acute stroke patients, it is common to use a NGT as the patients often have decreased consciousness and related dysphagia. NGTs in such patients are most often used for feeding. Another study in acute stroke patients by Rabaut et al. [46] revealed that multiple serious complications could occur with the use of NGT. These included aspiration pneumonia (49.2%), multiple insertion attempts, failed insertions, reinsertions, placement in the wrong positions, resistance, kinking or coiling of NGT, pneumothorax, and death in 36.4% of patients during the hospital admission. It is prudent to include these findings in discussions with families regarding NGT for nutritional support [47, 48]. Implementing nasoenteral feeding tubes such as Dobhoff tubes for longer than immediate use has provided safe and beneficial nutritional support in patients with head and neck cancer in the presence of dysphagia or odynophagia in a retrospective study on 444 patients needing radiation therapy for head and neck cancer. There was a significant decrease in the median weight after Dobhoff was placed during treatment [5].

Patients needing > 30 days (long-term) nutritional support with inadequate swallowing can benefit from a percutaneous endoscopic gastrostomy (PEG) [49]. PEG tubes have been described to last for 1–2 years [50]. There is not agreement on how long a NGT can remain in place for prior to exchanging it to a gastrostomy [51]. Studies have suggested that there is no significant difference in mortality rates or adverse events like aspiration pneumonia when comparing NGT with gastrostomy. PEG is associated with lower rates of intervention failure [52]. Long-term jejunal feeding can be by direct percutaneous endoscopic jenunostomy (DPEJ) or with high success rates with the help of jejenal tubes through the PEG (JET-PEG) [53]. Enteral feeding is more physiologic than

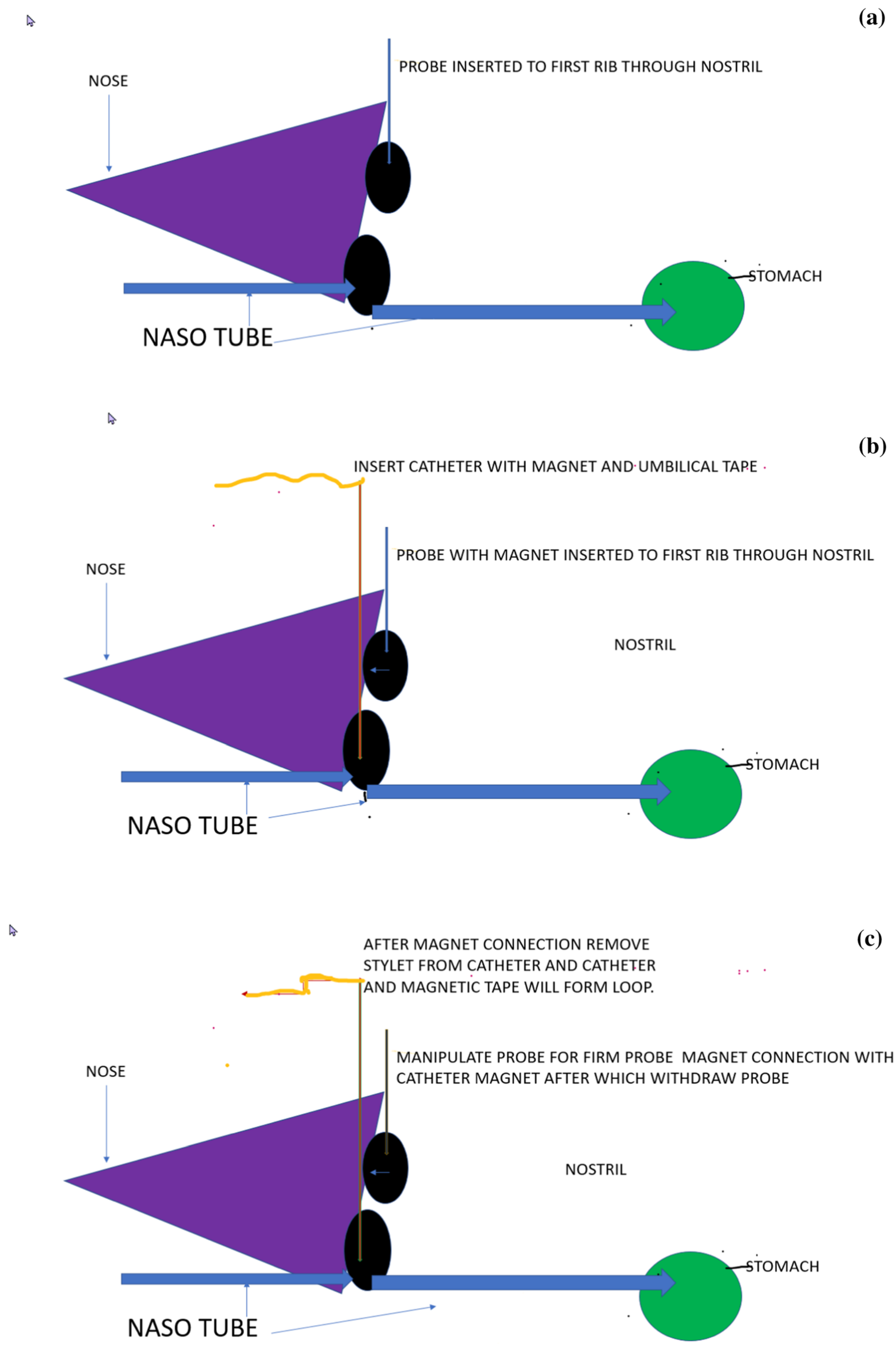

Fig. 1 Placement of nasal bridle. **a** Insertion of probe. **b** Insertion of catheter and probe. **c** Magnet connection. **d** Cut catheter from umbilical tape. **e** Nasal tube and umbilical tapes. **f** Umbilical tape knot with clip over nasotube

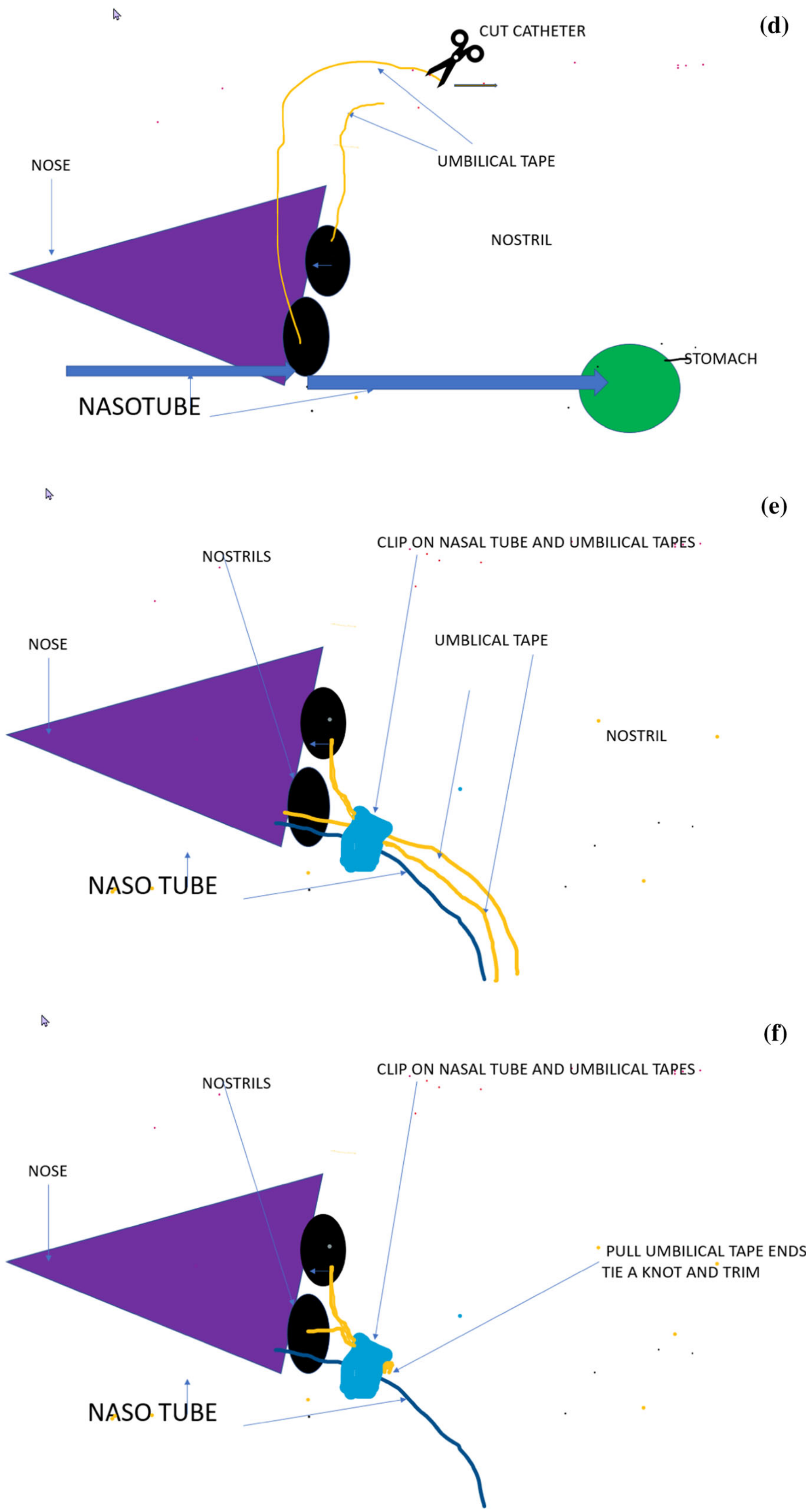

Fig. 1 continued

parenteral feeding and has better outcomes including reduced septic complication [47] along with decreased costs [48]. New designs which could lead to the development of dual purpose nasogastric and nasojejenal tubes to improve nutrition care are in progress [54].

Currently, PEG tube is considered the gold standard for long-term enteral nutrition [55]. The European Society for Clinical Nutrition and Metabolism (ESPEN) [56, 57] and the European Society of Gastrointestinal Endoscopy (ESGE) [58, 59] have recently published guidelines that focus on several topics of enteral nutrition and endoscopy to structure and standardize enteral nutrition to optimally manage patients.

CONCLUSION

NGT placement, though relatively routine, must be performed effectively and safely to avoid the associated complications [39]. After blind placement of the NGT, the position and tip must be confirmed by radiography. Recent advances indicate that in the acute care setting POCUS could be used for insertion of NGT when expertise is available at the bedside. This has been demonstrated to be particularly useful in ICU settings in patients with COVID-19. Patients with good intestinal absorptive capacity but who are unable to ingest food orally could consider the options of endoscopic enteral feeding access. Current NGTs on the market often present challenges for continued gastric decompression during post pyloric enteral feeding or as postoperative nasogastric enteral feeding tube. Design and research of dual purpose nasogastric and nasojejunal tubes to improve nutrition care and patient safety are in progress. The European Society for Clinical Nutrition and Metabolism (ESPEN) and European Society of Gastrointestinal Endoscopy (ESGE) offer useful guidelines to structure and standardize enteral nutrition more seamlessly.

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Compliance with Ethics Guidelines. This article is based on previously conducted studies and does not contain any new studies with human participants or animals performed by any of the authors.

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