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PEG or PEG Button Replacement: Willy-Nilly or Evidence-Based?



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The percutaneous endoscopic gastrostomy (PEG) is the most common enteral feeding tube for long term nutrition support. Multiple guidelines and teaching materials are available for initial PEG placement. While this is beneficial for PEG placement, there is little evidence-based published literature to guide clinicians for PEG replacement. Rather than a “Willy-Nilly” approach, herein we combine the available evidence, published guidelines and expert opinion on PEG replacement. We review the why, when, what, who, and how of replacing PEGs with emphasis on practical clinical guidance. Optimal management of patients with PEG tubes necessarily requires expert PEG replacement practices to provide the best quality of life for these patients.

INTRODUCTION

Initial percutaneous endoscopic gastrostomy (PEG) placement is a commonly performed procedure for patients unable to maintain nutrition with adequate oral intake and there are multiple professional society guidelines for its use. Approximately 200,000 initial PEG tube placements are performed in the U.S. annually. With such a large number of PEG tubes being placed, correspondingly there are a large number of PEG tubes being replaced as well. Despite this, there are no official recommendations for the replacement of PEG tubes. Appropriate timing, technique and management of PEG replacement is critical to prevent complications and provide maximal benefit of long-term enteral feeding.

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Although this review focuses on replacement of percutaneous gastrostomies placed endoscopically, the information is also applicable for percutaneous gastrostomies placed radiographically as well. In this article we will review the why, when, what, who, and how of PEG replacement based on both expert opinion and available published evidence.¹⁻³

The WHY of PEG Replacement

The “Why” of PEG replacement can be divided into scheduled vs. unscheduled PEG replacement. Scheduled replacement occurs when the PEG is replaced before any significant deterioration or complication resulting in malfunction of the existing PEG has occurred. Scheduled PEG replacement is the preferred and most common form of PEG replacement (Table 1).

Unscheduled PEG replacement occurs when PEG malfunction due to either deterioration of the PEG and/or if complications have occurred

(Table 1). Symptoms of PEG malfunction requiring replacement include: inability to infuse formula/water or medications, peristomal leakage, severe leakage or backflow from the tube itself, and tube displacement. Tube deterioration consists of retention balloon breakage or leakage, valve incompetence on low profile tubes and tube cracking from aging and/or fungal colonization. Complications requiring replacement include: buried bumper syndrome, gastric outlet obstruction from internal bumper migrating and lodging in the pylorus, and severe stoma site pain or unresolving infection despite antibiotics.⁴ Buried bumper syndrome occurs when there is too much pressure between the internal and external bumper and the internal bumper migrates into the stoma tract.

The WHEN of PEG Replacement

The "When" in PEG replacement encompasses when it is safe to replace a PEG tube after initial placement and also how long an existing tube will function before deterioration resulting in malfunction occurs. After initial placement the PEG stoma tract begins to mature in 1-2 weeks and is usually well-formed in 4 weeks (Figure 1,2). This process may take longer in patients with impaired wound healing (ascites, malnutrition, immunosuppressive medications or states, diabetes, obesity). Therefore, PEG replacement after initial placement can be safely performed as soon as 4-6 weeks in most patients. It may need to be longer (up to 3 months) in higher risk patients as described above.⁵ If a tube is inadvertently removed or has a complication requiring replacement before stoma tract maturation, confirmation of correct placement with one of the methods explained later in this article in the "How" of PEG placement is mandatory.³

The directions for use for replacement intervals from the commercial manufacturers in the U.S. vary, but in general ranges are 6-12 months for non-balloon tubes and 3-6 months for balloon tubes. Balloon tubes have inflatable balloons that function as the internal bumper while non-balloon tubes have an internal bumper made of solid silicone rubber in various shapes. Published data demonstrate that non-balloon tubes may function for up to 2 years.² The goal is for patients to have PEG replacements on a scheduled basis (vs.

Table 1. Indications for Scheduled and Unscheduled PEG Replacement

Scheduled Replacement
<ul style="list-style-type: none"> • 3-6 months for balloon tubes • 6-12 months for non-balloon tubes*
Unscheduled Replacement
<ul style="list-style-type: none"> • Tube malfunction <ul style="list-style-type: none"> ○ Occlusion ○ Balloon incompetence ○ Tube cracking/hole ○ Valve incompetence • Complication <ul style="list-style-type: none"> ○ Dislodgement ○ Severe peristomal leakage ○ Persistent infection ○ Buried bumper syndrome ○ Gastric outlet obstruction ○ Fungal infection with tube deterioration

*Published data: up to 2 years

unscheduled), before tube breakage or malfunction/complications occur, although there are no studies comparing scheduled vs. unscheduled replacement strategies. It is the authors' practice to plan for PEG replacement near the end of predicted life of tube (i.e. ~ 12 months for non-balloon and 4-5 months for balloon tubes). We also often prescribe an additional PEG replacement tube (or even a red rubber catheter) for patients to have available at home for balloon tubes in case of balloon breakage or any other event that may result in dislodgement before scheduled replacement. Weekly checking of water volume has also been shown to decrease dislodgement from balloon breakage.²

The WHAT of PEG Replacement

The "What" in PEG replacement is deciding on a solid (non-balloon) vs. balloon internal bolster and standard vs. low profile external configuration. The overriding principle is what is best for the patient and their caregivers in terms of convenience

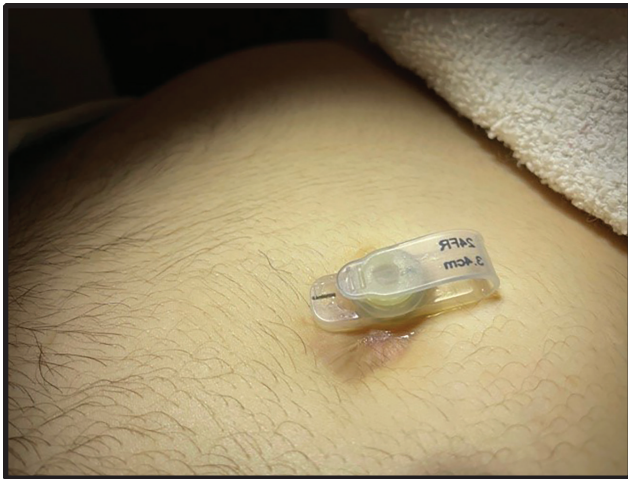


Figure 1. Well-formed stoma with low-profile PEG replacement tube in place



Figure 2. Well-formed stoma site without PEG replacement tube in place

and functionality. A solid internal bolster will last up to twice as long as a balloon internal bolster tube (i.e., 12 months vs. 6 months). However, replacing a solid tube is more complicated as they are removed and replaced using traction (sometimes using a metal obturator with the low-profile non-balloon tubes) involving significant force. This can cause significant pain for the patient and generally performed by a health care professional. Balloon tubes are deflated on removal and inflated on replacement non-traumatically and can be performed by the patient or caregiver in the home setting. Finally, if a patient is on palliative care/hospice, a non-balloon tube with its greater longevity may be preferred so the tube will last the

lifetime of the patient.

The decision on a standard tube vs. a low-profile tube is dependent on what the tube is being used for. If the tube is being used for drainage, then a standard profile tube is preferred since it does not have the anti-reflux valve that low profile tubes have. If the tube is used for infusion or feeding, then factors to weigh include the size of the tube and the dexterity and body habitus of the patient. If the patient is interested in having a low-profile feeding tube then they, or their caregivers, must have greater dexterity to be able to manipulate the feeding tube connectors. A more active or younger patient may prefer a low-profile tube for lifestyle and cosmetic reasons. Commercially available PEG replacement tubes come in various combinations of standard vs. low profile with non-balloon vs. balloon internal bolsters in various length/diameter combinations. The appropriate specific combination of external configuration, internal bolster type, and size/length can greatly improve function and quality of life for patients requiring PEG tubes. Generally, standard profile PEG tubes are placed initially and then can be replaced by low profile tubes at the first replacement or once the tract is matured.⁴

The WHO of PEG Replacement

The “Who” to replace PEG tubes include the patients themselves, family/caregivers, and health care professionals. Health care professionals include dietitians, nurses, advanced practice clinicians and physicians (interventional radiologists, surgeons and gastroenterologists). Patients, family members/caregivers and nurses generally exchange balloon type tubes given their overall ease and safety. The pediatric community has pioneered family members and caregivers performing home tube replacement. Traditionally, the initial tube change is performed by a highly skilled provider in the clinic or other outpatient setting in which the parents/caregivers (or adult patients) are taught and then observed on the correct replacement technique. Additional teaching aids include training dolls/bears, manufacturer and “YouTube” “how to” videos (www.youtube.com/watch?v=maJaKMqIVQg, www.youtube.com/watch?v=Zi8OMxqYEO8). When performing home PEG replacement, if there is any concern for misplacement then patients are instructed to contact

their health care professional or if unavailable go to the emergency department to have a more definitive confirmation method performed. The patient should be evaluated at least yearly to assure the tube and the tube site both look appropriate. Specialty trained physicians, or advanced practice clinicians, also perform standard scheduled replacements and are required for unscheduled replacements. Appropriately trained non-physicians (i.e. nurses) or patients, can safely and far more economically replace established PEG tubes in the home setting.

The HOW of PEG Replacement

As noted previously, there are no guidelines for the “how” to replace PEG tubes, but the general principles include:

- a well-formed mature stoma tract
- good control and appropriate direction of force during replacement, and
- appropriate confirmation of intra-gastric tube position if there are any concerns for misplacement.⁵

Scheduled replacements require no antibiotics and the tubes can be used immediately as long as no complications are suspected. Stoma tract measurement is required when initially replacing with a low-profile tube and can be estimated from the markings and fit of the existing tube. Dedicated stoma tract measuring devices will give more accurate measurements, remembering that the tract length may increase 0.5-1.0 cm when the patient goes from supine to upright position.⁶ Specific manufacturer’s directions for use should always be followed. There is good evidence that percutaneous removal and replacement of PEG tubes is safe and significantly more cost-effective than endoscopic or fluoroscopic methods as long as proper technique, protocols and training are employed.⁷⁻⁹

Replacing existing balloon type PEG tubes are the most straightforward and least likely to develop complications. These tubes will have a port labeled balloon or “bal” if unsure of the type of internal bolster. Ensure that all the necessary supplies are immediately available (Table 2). The exact size (diameter in French and length) tube can be ordered ahead of time for the procedure if replacing with the

Table 2. Supplies for PEG Replacement

- Chux pad
- Gloves
- Gauze pads:
Split drain sponge 2x2 inch, 4x4 inch
- Sterile water
- Syringes:
Luer lock, Slip tip, Catheter tip or Enfit
- Viscous lidocaine (2%)
or Water-Soluble Lube
- Stoma measuring kit (if needed)
- Replacement PEG tubes:
 - Range of expected sizes, or if known, specific replacement size

same size tube. If replacing standard profile tube with low profile tube, the length can be estimated by noting the markings on the existing tube of where it exits the skin when the patient is in the upright position.⁶ Viscous lidocaine is applied at the site and on the new tube as a lubricant. The balloon port is accessed with a slip tip syringe and the water is completely removed. The tube is then removed using a gentle traction on withdrawal. There may be a little resistance where the deflated balloon exits the skin, but there should not be significant resistance to removal. In some cases, there will be gastric fluid, air or formula that may leak from the stoma. The stoma tract can now be measured if there is concern that a different length tube will be required. The lubricated new replacement balloon tube can then be inserted into the tract with gentle force in the direction of the stoma tract. The practitioner will often feel a mild “pop” when the ridge of the deflated balloon enters into the gastric lumen (Figure 3). The balloon is then inflated with the recommended amount of water (from 4-10 mL). The tube should then be pulled until it meets resistance to ensure balloon retention of the tube. The tube can then be aspirated to check for gastric fluid return, though this does not absolutely

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guarantee appropriate placement and gastric fluid return does not always occur despite appropriate placement. It is optional whether patients should be fasting before the procedure; patients not fasted may have more retained gastric fluids or formula. The tube should then easily flush with water and spin in the tract. The external bolster should have 0.5-1.0 mm of distance between the bolster and the skin. The site can then be dressed with a small amount of gauze dressing (i.e., one-two 2x2 or 4x4 pads) or no dressing if the site is not prone to leakage.⁴ As mentioned previously, once observed, this can be completed by patient or lay caregiver.

Non-balloon PEG tubes can also be replaced percutaneously without endoscopy, though more training is required and replacement can cause more discomfort and pain. Therefore, non-balloon replacements are not performed by patients or lay caregivers. Given this kind of PEG replacement, health care providers may elect to use mild to moderate sedation for the procedure. All present commercially available non-balloon tubes have soft, deformable internal bolsters that allow traction removal. The external bolster or tube is grasped tightly close to where it exits the skin and the PEG tube is pulled using firm traction while placing fingers on either side of the tube against the skin. The tube should pop through the abdominal wall with moderate pulling force. Some manufacturers include a metal obturator to help deform and slim the profile of the internal bolster allowing for less traumatic removal. The cut and push method is used less often in which the external portion of the tube is cut and remaining tube is pushed into the gastric lumen. Then the cut internal bolster end is either allowed to pass through the gastrointestinal (GI) tract or is retrieved endoscopically using forceps, snare or basket if there is concern for obstruction distally. This scenario also occurs if the internal bolster breaks off during attempted traction removal. There may be some bleeding and/or gastric fluid leakage at the site. Replacement with a balloon tube then proceeds as above. If a new non-balloon tube is chosen for replacement, an obturator is again used to deform the internal bolster and again the practitioner will often feel a “pop” when the deformed internal bolster enters the gastric lumen (Figure 4a and 4b). There is



Figure 3. PEG balloon replacement with removed existing PEG on left and new replacement PEG to be inserted on right.

a non-balloon option that uses a biodegradable capsule (Applied Medical Technologies, Inc. www.appliedmedical.net) to constrain the internal bolster that is released once deployed inside the gastric lumen (Figure 5a and 5b). Checking for internal bolster retention, aspiration, and flushing proceeds as described earlier.

Confirmation of correct intra-gastric replacement is not required for all PEG replacements although there have been no studies comparing confirmation vs. non-confirmation. The overriding principle is to confirm placement by endoscopic or radiographic means if there is any concern for inadequate stoma tract maturation or misplacement. This may include unusual pain with tube placement, the replacement tube did not go in easily as expected or if the tube doesn't flush and aspirate gastric contents easily. Auscultation of injected air or aspiration of gastric contents are not 100% reliable forms of confirmation, but visualization of gastric contents is commonly used with bedside placement. The “blue sky” and air insufflation methods have been reported to confirm correct replacement. In the blue-sky method, grape juice (originally methylene blue) is infused then witnessed to be aspirated using a syringe. In the air insufflation method, 240 mL of air is injected with abdominal radiograph after insufflation demonstrating the tube clearly seen in the distended stomach. Visualization at endoscopy or radiographically by infusion of gastrograffin (i.e., “tubogram”) are the most reliable methods



Figure 4a. PEG non-balloon replacement: Non-balloon replacement tube with obturator adjacent to tube.



Figure 4b. PEG non-balloon replacement: Non-balloon replacement tube with obturator inserted to deform internal bolster prior to inserting in stoma tract.

of confirmation. However, they are also the most costly and inconvenient.³

The most feared complication of tube replacement is tract disruption with misplacement into the peritoneum. If recognized early, attempts may be made to remove and reposition the tube under endoscopic or fluoroscopic guidance. However, in most cases removal of the misplaced tube, antibiotic administration, and allowing the stoma site to heal is the best course of action. A nasoenteric tube can be used until stoma tract healing has occurred and a new PEG placed later.

However, if frank peritonitis develops, an urgent surgical consult is warranted.

Misplacement into the colon can also occur. In this situation the initial PEG has been placed through the transverse colon into stomach. Often the initial PEG will function well, but upon exchange the replacement PEG is placed into the colon. Symptoms include pain, infection, feculent leakage, and diarrhea. Treatment is removing the misplaced PEG, waiting for the stoma tract to heal and placement of new PEG.¹⁰

Other complications of PEG replacement include bleeding, pain, infection, and peristomal leakage. Peristomal leakage occurs more often in those with underlying medical conditions that predispose them to delayed wound healing. It is important to evaluate for other causes, such as tube displacement, buried bumper, and delayed gastric emptying. It is also important to minimize side-to-side movement of the PEG tube where it exits the skin as that can enlarge the tract. This can be accomplished by changing to low profile tube or external stabilization with a right-angle bumper or clamp. Good stoma care with zinc oxide-based protectants and consult to wound ostomy care are also useful. Prokinetics and proton pump inhibitor use may decrease gastric fluid volume. It is not usually helpful to put a larger tube in the tract, as that will eventually result in a larger stoma with increased leakage. If the tract is mature, one can place a wire through the tract and remove the existing tube for 24-48 hours to allow the stoma tract to partially close. Then another tube is replaced into the tract using wire guidance.^{2,4}

Situations involving PEG replacement that deserve special mention are dislodgement, which can result in buried bumper or complete removal if tubes are dislodged externally, and obstruction, if the tube dislodges or migrates internally. PEG dislodgement with complete removal of the tube before tract maturation must be addressed urgently. If the gastric wall has not adhered to the abdominal wall, peritonitis can occur. Replacement can be attempted endoscopically or radiographically by experienced physicians. Failing that, the patient may require emergent surgical revision, washout, and intravenous antibiotics. If the clinician is unsure of tract maturation, the standard methods above for tube replacement may be used with endoscopic or

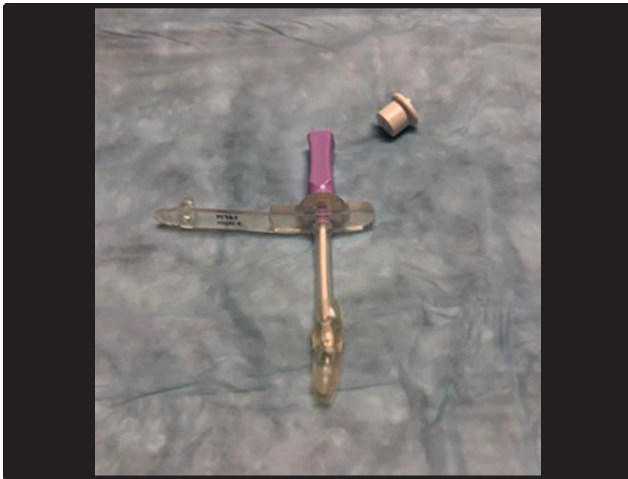


Figure 5a. Biodegradable Capsule Replacement PEG Tube. Internal bolster constrained in capsule.



Figure 5b. Biodegradable Capsule Replacement PEG Tube. Non-balloon internal bolster released with capsule split.

radiologic confirmation of correct tube position.

Buried bumper syndrome occurs when the internal bumper migrates into the stoma tract and is much less likely to occur with balloon tubes. Multiple methods have been described endoscopically to manipulate the buried bumper back into the gastric lumen, but often the simplest method is to remove the buried tube and place a new tube into the existing tract using the pull method. If the tube migrates internally, the internal bumper can lodge and obstruct the pylorus. Once recognized, the tube can usually just be pulled back and the

external bolster reset appropriately. The way to prevent both of these issues is to know, document, and regularly monitor the external bolster position. Other preventative recommendations include rotating the tube daily and pushing the tube in and out ~ 2 cm weekly after stoma tract maturation.²

CONCLUSIONS

PEG replacement is a critical component of enteral access, but there is very limited published data and guidance on its practice. Multiple caregivers including patients, families, and healthcare professionals at all levels may be involved and care from multi-disciplinary teams are required for management of patients requiring PEG tubes. We prefer timely replacement of PEG tubes using appropriate protocols and the techniques described above. Awareness of the data and expert opinion are required to prevent, perform, and manage complications from PEG replacement. This will allow provision of optimal nutritional, hydration, and medication support as well as maximize quality of life for patients living with PEG tubes. ■

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