Keywords: Percutaneous endoscopic gastrostomy/Complications/Granulation
This article has been double-blind peer reviewed

Complications arising from the insertion of percutaneous endoscopic gastrostomy tubes can be life-threatening so nurses should be able to identify and manage them

PEG tubes: dealing with complications

In this article...

- Description of PEG tubes and who needs them
- Complications that can arise after PEG insertion
- How to manage complications

Authors Hardip Malhi and Rosie Thompson are nutrition nurse specialists; both at the University Hospitals Birmingham Foundation Trust.

Abstract Malhi H, Thompson R (2014) PEG tubes: dealing with complications. *Nursing Times;* 110: 45, 18-21.
A percutaneous endoscopic gastronomy tube can be used to deliver nutrition, hydration and medicines directly into the patient's stomach. Patients will require a tube if they are unable to swallow safely, putting them at risk of aspiration of food, drink and medicines into their lungs. It is vital that nurses are aware of the complications that may arise when caring for a patient with a PEG tube. It is equally important that nurses know how to deal with these complications or from where to seek advice. This article provides a quick troubleshooting guide to help nurses deal with complications that can arise with PEG feeding.

In March 2010, the National Patient Safety Agency issued a rapid response report on the early detection of complications after inserting a percutaneous endoscopic gastrostomy tube (PEG). Between October 2003 until January 2010 the NPSA received 11 reports of death and 11 reports of severe harm relating to PEG tubes (NPSA, 2010). The NHS Litigation Authority received 23 claims between October 2003 and January 2010, of which seven were related to patient deaths (NPSA, 2010). These reports identified that "red flag" symptoms (Table 1) were not recognised, and there were delays in recognising complications in the first 72 hours after gastrostomy insertion. A case study in Box 1 illustrates the importance of correct insertion.

BOX 1. **CASE STUDY: THE DEATH OF AN ADULT POST PEG INSERTION**

"The patient remained an inpatient for two days after PEG [percutaneous endoscopic gastronomy tube] insertion, but was discharged despite abdominal pain and leakage of gastric contents from the gastrostomy site. They were re-admitted four days later and internal leakage was confirmed. Despite corrective surgery and ITU [intensive therapy unit] care they died three weeks later."

Source: National Patient Safety Agency (2010)

The National Institute for Health and Care Excellence (2006) has recommended that the multidisciplinary healthcare team provides patients and carers with training to manage their own PEGs. Occasionally some patients are unable to do this, for example, during times of illness that require hospital admission or immediately after a tube is inserted. It is vital that nurses managing these tubes are able to recognise and manage complications and know how to get assistance.

What is a PEG and who needs one?

A PEG delivers nutrition, hydration and medicines directly into the patient's stomach (Fig 1). PEG stands for:

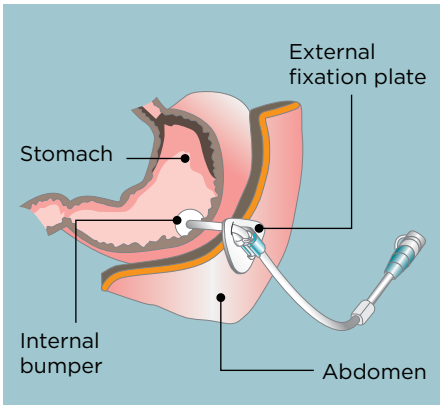
- Percutaneous – inserted through the skin;
- Endoscopic – the procedure used to insert the tube;
- Gastrostomy – the opening into the stomach from the abdomen.

PEG tubes are needed by patients who

5 key points

1. People with percutaneous endoscopic gastrostomy tubes can be in hospital or living at home
2. PEG insertion is carried out when the patient is sedated, not under a general anaesthetic
3. Complications that can occur include infection and tube blockage
4. Patients and carers must be taught how to care for the PEG and keep the insertion site clean
5. Patients should be told who to contact should complications occur after discharge

FIG 1. **PEG PLACEMENT**



Catherine Hollick adapted from picture courtesy of University Hospitals Birmingham Foundation Trust

have difficulty swallowing, placing them at risk of aspirating food and fluids into the lungs. At-risk groups include patients who have had a stroke or neurological trauma (head injuries) or those who have long-term neurological conditions such as multiple sclerosis and motor neurone disease. These patients are likely to need a PEG for the long term. Patients who have cancer of the head or neck may require PEGs in the short term while they are having treatment, as swallowing is likely to be temporarily affected.

In 2010, 3,430 patients living in the UK were registered with the British Artificial Nutrition Survey as receiving home enteral feeding (BANS, 2011). Of these, 75% were fed via a PEG tube. Most of the patients (63%) were over 60 years old and 41% were aged over 70 years (BANS, 2011). This age profile suggests these patients are more likely to require some level of assistance.

PEG insertion

PEG insertions are usually carried out in an endoscopy department with the patient under sedation rather than under a general anaesthetic. An endoscope (camera) is passed through the patient's mouth and into the stomach. The stomach is inflated with air to improve visibility and the inflation moves the stomach wall closer to the anterior abdominal wall. When the endoscope is in the stomach the light at the end of it shines through the skin; at this point, the lights in the room are dimmed so the endoscopy light can be detected through the abdomen and used to help identify the position of the stomach. Local anaesthetic is administered into the insertion site, then a small incision is made, into which a cannula is inserted; through this, a wire is passed into the stomach.

Forceps are inserted through the endoscope to grab the wire and, as the endoscope is removed, the wire is also brought out of the patient's mouth. The PEG is attached to this wire then pulled from the stomach end, moving the tube down the oesophagus and out through the incision made in the stomach. The tube is held in the stomach by an internal retention disc, commonly known as an internal bumper. An external fixation plate, clamp and connector are then fitted onto the tube to ensure the PEG is secure (Fig 1).

Safety concerns

The NPSA strongly recommends using a high-visibility warning label on procedure reports and/or in medical notes to identify potential issues that may arise after gastrostomy insertion (Fig 2). It also recommends that systemic observations including blood pressure, pulse, temperature and oxygen saturations be carried out regularly and according to local policy after PEG insertion to detect signs of deterioration.

If complications are identified, feeding and medication delivery down the tube should be stopped immediately and advice sought from the medical team responsible for the patient's care. If complications occur after discharge, patients should be advised to attend their local accident and emergency department immediately.

Patients discharged within 72 hours of PEG insertion must be made aware of the red flag complications and be given contact numbers for local out-of-hours services they can call for urgent advice (NPSA, 2010). Patients discharged 72 hours or more after insertion are advised on who to contact for advice if they experience any problems. This could be the medical team, nutrition nurse or dietitian, depending on the services available at their local hospital. Patients should be given the relevant contact details on discharge, and advised to attend their local accident and emergency department if the feel the situation is urgent.

Symptoms of pain, leakage of some gastric fluid around the PEG tube, and bleeding after PEG insertion are all normal and expected; it is the severity of the symptoms that determine whether medical intervention is needed. It is important for patients and nurses to know who to contact if they are unsure, and to be aware of the difference between what is normal and abnormal. Normally a small amount of leakage can be expected to last for a few days after insertion but this should not be excessive (not requiring a dressing change more than twice a day) and should stop by itself. If the leakage is continuous and there are large volumes along with pain or problems using the tube, medical advice should be sought.

To explore the cause of problems that arise and plan appropriate management the NPSA (2010) suggests considering either:

- A CT scan;
- Contrast study (dye is inserted through the PEG and X-rays are taken to see if the dye goes into the stomach);
- Surgical review.

TABLE 1. "RED FLAG" COMPLICATIONS POST GASTROSTOMY INSERTION

Complication	Symptoms	Possible cause
Peritonitis (inflammation of the abdominal wall)	Abdominal pain/distension Leakage of gastric contents Pain on feeding/flushing Pyrexia Tachycardia	Leakage of gastric contents into peritoneum Enteral feed leaking into peritoneum Infection
Bowel perforation (puncture of the bowel)	Abdominal pain/distension	Puncture of bowel during insertion
Bleeding	Bleeding around the site; heavy external bleeding can indicate serious internal bleeding	Puncture of gastric blood vessels during insertion
Pneumonia/respiratory depression (chest infection/difficulty breathing)	Altered respiratory rate Low oxygen saturation Increased oxygen requirements Chesty cough	Sedation used during procedure Aspiration of stomach contents into the lungs
Wound infection	Discharge/redness around site Pyrexia	Bacterial contamination of the stoma site

FIG 2. EXAMPLE OF A STICKER

IF THERE IS PAIN ON FEEDING, OR PROLONGED OR SEVERE PAIN POST-PROCEDURE, OR FRESH BLEEDING, OR EXTERNAL LEAKAGE OF GASTRIC CONTENTS, STOP FEED/MEDICATION DELIVERY IMMEDIATELY. OBTAIN SENIOR ADVICE URGENTLY

Surgical review, CT scan or contrast study may be required

Source: National Patient Safety Agency (2010)

Managing complications

It is essential that nurses are aware of the issues highlighted by the NPSA alert so they can identify and manage the following complications.

Aspiration

Aspiration of stomach content/feed into the lungs can occur during insertion of the PEG tube because the oesophageal sphincter that stops gastric contents from refluxing into the oesophagus is held open by the endoscope. This can allow fluid in the stomach to enter the lungs; the risk is reduced by keeping patients nil by mouth for at least six hours before the procedure. It can also occur if patients lie flat during feeds, allowing feed to reflux up into the oesophagus. To avoid this, the patient should be sitting/tilted upwards to 30° when receiving feed or medications (Best et al, 2008). Aspiration can also occur between feeds if the patient is known to suffer with reflux problems. These patients are advised to lie at an angle of up to 30° between feeds to reduce this risk.

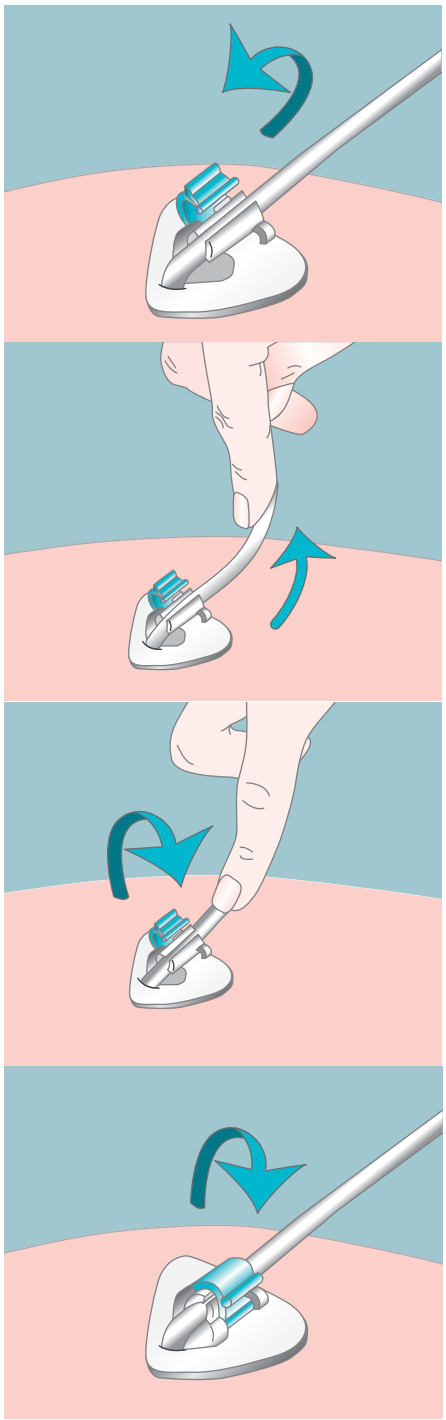
Blockage

PEG blockages occurs in about 20% of cases (McClave and Neff, 2006) and are mainly caused by inadequate flushing regimens after administration of feed and medicines (McClave and Neff, 2006; British Association for Parenteral and Enteral Nutrition and British Pharmaceutical Nutrition Group, 2003). The medicines and feeds can also block the feeding tube.

Blocked tubes are detrimental to patients and costly to replace. They prevent patients receiving their medications and feed, causing dehydration and potential complications from the effects of omitted medications. If the tube becomes irreversibly blocked, it may need to be changed; this means the patient will have to have an unnecessary procedure, so it is easier to prevent blockages than to fix them (Remington and Simons, 2013).

To prevent a blockage associated with drugs, BAPEN and BPNG (2003) recommend flushing the tube with 30ml of water before and after medication administration and at least 10ml between each medicine to clear the tube. Should the tube become blocked, BAPEN and BPNG (2003) suggest using warm water as a flush. A push–pull plunger technique can be used to break up the blockage and allow the tube to be flushed. Rolling the tube between the thumb and forefinger before and while it is being flushed can also help to break up the blockage (Remington and Simons, 2013). Using fruit juices and carbonated drinks is ineffective as they can cause blockages to curdle, making it more difficult to unblock the tube. The technique described for blockages caused by medicines should also be used to unblock tubes that are blocked with feed.

FIG 3. **CORRECT POSITION FOR EXTERNAL FIXATION PLATE**



Leakage

Leakage of feed/gastric contents around the PEG site can occur due to poor positioning of the external fixation plate (it is not flush to the skin) after insertion. Leakage may also occur if the tube is too small for the stoma, as gastric contents can leak around the tube. This could happen in patients who have had routine tube changes and a smaller size tube has been placed into the stoma. Over a few days the stoma shrinks to fit better around the tube, which means the leakage should stop.

An incorrectly positioned external flange will allow the internal bumper to come away from the stomach wall and leakage can occur. An incorrectly placed external fixation plate – more than 0.5cm from the skin – will allow the tube to move in and out of the stoma and gastric content to leak out of the stoma.

To prevent leakage, pull gently on the PEG until you can feel resistance from the internal bumper. To secure the PEG, slide the external fixation plate down the tube towards the skin, resting no further than 0.5cm away from the skin (Fig 3), thus forming a seal. If a dressing is used to absorb leakage, select a thin dressing such as gauze and secure the flange against it to prevent further leakage. If the leakage is persistent, applying a barrier cream can protect the skin from the gastric content.

Constipation can cause leakage around the site due to a build-up of pressure within the gastrointestinal tract that prevents the contents of the stomach from passing into the bowel. It is important to prevent constipation before it occurs, so bowel movements should be monitored. Patients living at home should be asked to monitor their bowel movements and know what action to take if there are any problems.

Site infection

The most common complication is infection at and around the insertion site; this occurs in around 30% of cases (McClave and Neff, 2006). Infection can occur as a result of poor hygiene when handling the tube; the internal and external flange being too tight has also been associated with higher rates of infection (Ghevariya et al, 2009).

Infection can present as inflammation around the site, coupled with discharge and pain or discomfort. A swab should be taken if the site has clinical signs of infection.

When at home patients and carers are advised to clean insertion sites at least once a day with tap water and ensure the area is well dried afterwards. In hospital, nurses should follow their local dressing policy for cleaning wounds. The number of times per day that sites need to be cleaned will depend on the amount of leakage; a dressing may be required to

absorb any moisture from the wound. If an infection is confirmed by a swab, appropriate antibiotics should be prescribed.

Granuloma formation

A granuloma is a nodule of granulation tissue at the PEG insertion site (Fig 4) and is an immune response by the body to a foreign body that it is unable to eliminate. Granulation tissue is vascular and bleeds easily (Remington and Simons 2013); it is unsightly, can be painful and is an infection risk. It can also produce exudate, which can make the skin sore.

A common cause of granuloma formation is incorrect positioning of the external fixation plate, which may allow the tube to move freely. This movement causes friction at the site and initiates the production of granulation tissue.

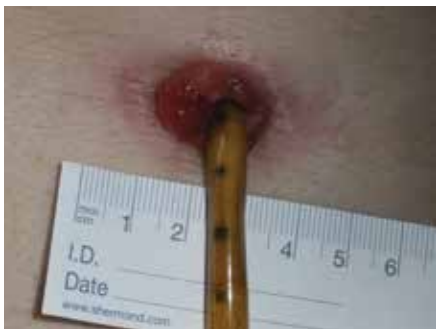
The evidence base for the management of granulomas is weak (Warriner and Spruce, 2012); however, there are recommendations based on clinical expertise. It is vital to check the external fixation plate is in the correct position and that patients and/or carers know the correct position. A barrier cream can be used to protect the skin from any exudate that may come from the granuloma. The amount of times the site needs to be cleaned and dressed per day will depend on the amount of exudate; a swab can be taken if an infection is suspected.

The National Nurses Nutrition Group (2013) recommends the use of an antimicrobial-impregnated foam dressing, which should be changed as required. It is advised that the treatment plan should be reviewed after one week or as per local guidelines. The NNNG good-practice guidelines (2013) also give further guidance on how to progress treatment if this first plan is unsuccessful. Warriner and Spruce (2012) have looked extensively into the management of granulomas and have devised a flowchart to inform patient care.

Buried bumper syndrome

Buried bumper syndrome is caused by the external fixation plate being placed too tightly against the patient's skin, which causes the internal bumper to erode into the lining of the stomach (Ramdass and Mann, 2013). The incidence of buried bumper has been reported by Venu et al (2002) to be 1.6% in patients who have a PEG tube. The reason for the PEG insertion and the type of tube used does not affect incidence (Pop, 2010). If buried bumper is undetected it can cause complications such as gastric bleeding, perforation of the stomach, peritonitis and even death (Anagnostopoulos et al, 2003).

FIG 4. **GRANULOMA AT PEG SITE**



Buried bumper syndrome is usually the result of poor care after insertion and is typically a late complication occurring more than three months after insertion. However, it may occur within one month of PEG insertion and can reoccur once healed (Lee and Lin, 2008); Venu et al (2002) have reported cases in which the bumper has become buried eight days after insertion.

A tube with a partially buried bumper can still be used for feeding but once a bumper is completely buried feeding is not possible because the tip of the tube where the feed enters the stomach is blocked. Removal of the tube can be complicated and patients may require surgery.

The signs of a buried bumper include:

- A tube that does not move in and out of the stoma;
- Problems with constant alarming from the pump to say that feed is not being administered or there is an obstruction;
- Difficulty with flushing the tube or not being able to do so;
- Leakage around the site when trying to flush the tube.

Nurses, patients and carers can take efforts to avoid buried bumper syndrome by rotating the tube 360°, pushing it about a thumb's length (approximately 4cm) into the stomach, then pulling it back to its original position and securing it; this is known as advancing and rotating the tube. Patients/carers are asked to do this at least once a week to prevent tissue growing over the tube; however, nurses should be aware that patients can still develop buried bumpers despite doing this.

PEG repairs

The design of PEGs allows for a certain amount of repair to be done to extend their life. All parts of the tube, aside from the tubing itself and the internal bumper, can be replaced if needed. It is important to know how to access spare parts you may need. This information will be held in different places depending on the services available in your area for example, by dietitians and nutrition nurses.

Conclusion

A large number of patients in both hospitals and the community have PEGs. Nurses caring for these patients need the appropriate knowledge and skills to ensure they can manage complications effectively; failing to do so can have a detrimental effect on nutrition and medicines administration, and may also result in the patient experiencing a life-threatening problem. **NT**

References

Anagnostopoulos GK et al (2003) Buried bumper syndrome with a fatal outcome presenting early as gastrointestinal bleeding after percutaneous endoscopic gastrostomy placement. *Journal of Postgraduate Medicine;* 49; 4, 325-327.

Best C et al (2008) Enteral nutrition. In: Best C (ed) *Nutrition: A Handbook for Nurses.* Chichester: Wiley-Blackwell.

British Artificial Nutrition Survey (2011) *Annual BANS Report 2011: Artificial Nutrition Support in the UK 2000-2010.* tinyurl.com/BANSreport2011.

British Association for Parenteral and Enteral Nutrition, British Pharmaceutical Nutrition Group (2003) *Administering Drugs via Enteral Feeding Tubes: A Practical Guide.* tinyurl.com/Drugsenteralfeeds

Ghevariya V et al (2009) Complications associated with percutaneous endoscopic gastrostomy tubes. *Annals of Long-Term Care.* 17: 12. tinyurl.com/complicationsGastrostomy

Lee TH, Lin JT (2008) Clinical manifestations and management of buried bumper syndrome in patients with percutaneous endoscopic gastrostomy. *Gastrointestinal Endoscopy;* 68: 3, 580-584.

McClave S, Neff RL (2006) Care and long-term maintenance of percutaneous endoscopic gastrostomy tubes. *Journal of Parenteral and Enteral Nutrition;* 30: suppl 1, S27-S38.

National Institute for Health and Care Excellence (2006) *Nutrition Support in Adults: Oral Nutrition Support, Enteral Tube Feeding and Parenteral Nutrition.* tinyurl.com/NICECG32

National Nurses Nutrition Group (2013) *Good Practice Consensus Guideline: Exit Site Management for Gastrostomy Tubes in Adults and Children.* tinyurl.com/NNNGExitSite

National Patient Safety Agency (2010) *Rapid Response Report NPSA/2010/RRR010: Early Detection of Complications after Gastrostomy.* London: NPSA. tinyurl.com/NPSA-Gastostomy

Pop GH (2010) Buried bumper syndrome: can we prevent it? *Practical Gastroenterology;* 34: 5, 8-13.

Ramdass D, Mann S (2013) Buried bumper syndrome: a challenging complication of PEGs. *Gastrointestinal Nursing;* 11: 6, 43-48.

Remington R, Simons S (2013) The percutaneous endoscopic gastrostomy tube: a nurse's guide to PEG tubes. *Medical Surgical Nurses;* 22: 2, 77-83.

Venu RP et al (2002) The buried bumper syndrome: a simple management approach in two patients. *Gastrointestinal Endoscopy;* 56: 4, 582-584.

Warriner L, Spruce P (2012) Managing overgranulation tissue around gastrostomy sites. *British Journal of Nursing.* 21: 5, S14-S16.

For more on this topic go online...

- Administration of medicines via an enteral feeding tube
- **bit.ly/NTEnteralFeeding**

Picture courtesy of Linda Warriner