Percutaneous Endoscopic Gastrostomy

Nitin Aherrao*, Deepak Ahire**

Percutaneous endoscopic gastrostomy (PEG) was first described by Ponsky and Gauderer in the year 1980 and was quickly accepted as a useful alternative to surgical gastrostomy and nasogastric tubes.[1] The endoscopic technique requires less instrumentation, reduces the stay in hospital and as a result, the economic cost compared to the surgical technique.[2]

Indications

As a general rule, the implant of a PEG is indicated for those patients that, having a functioning gastrointestinal tract, suffer from dysphagia or any other problem that precludes nutrition by mouth for at least 4 weeks and for which there is no contraindication or inability to the introduction of an endoscope down to the stomach. In practice, the most common cause is represented by the neuromuscular diseases that occur with pharyngo-oesophagic motor impairment.[3] However, it can also be used in patients with obstructive dysphagia, especially secondary to head and neck tumours.[4]

Indications for PEG

- Neurological disorders
  - Stroke
  - Anoxic encephalopathy
  - Alzheimer's disease
  - Multiple sclerosis
  - Parkinson's disease
  - Amyotrophic lateral sclerosis
  - Brain tumours
  - Huntington's chorea
  - Polio
- Obstructive neoplasia
  - Head and neck tumours
  - Carcinoma of the oesophagus
  - Carcinoma of cardia
- Muscle diseases
  - Myotonic dystrophy
  - Dermatomyositis/polymyositis
  - Oculopharyngeal muscular dystrophy
  - Amyloidosis
- Gastric decompression
  - Abdominal carcinomatosis
  - Hyperemesis gravidarum
- Miscellaneous
  - Nutritional complement
  - Tracheo-oesophageal fistula
  - Chronic gastric volvulus
  - Macroglossia
  - Badly tasting drugs (paediatric use)
  - Recurring bronchial aspirations

Contraindications for PEG

- Absolute contraindications
  - Inability to pass the endoscope into the stomach
  - Severe disorders of coagulation and incorrigible
  - Massive ascites
  - Infection of the abdominal wall
  - Peritonitis
  - Neoplastic infiltration of abdominal wall
  - Pyloric or intestinal obstruction
  - Short life expectancy
  - Nervous anorexia

*Gastroenterologist and Endoscopist, **Resident, Bombay Hospital and Medical Research Centre, 12 New Marine Lines, Mumbai - 400 020.

- Relative contraindications
  - Morbid obesity
  - Ascites
  - Portal hypertension
  - Peritoneal dialysis
  - Subtotal gastrectomy

Patient Preparation

The patient should fast for at least 6 h and his/her coagulation tests should be within the haemostatic levels. To reduce the risk of septic complications it is important to administer a dose of a broad-spectrum antibiotic 30 min before the process (e.g., 1 g of intravenous cefazolin) and perform a thorough cleansing and disinfection of the oropharyngeal cavity.[5,6] Informed consent must be properly completed.

Material

To implant a PEG, the material normally used for an upper gastrointestinal endoscopy is necessary. The technique is performed under analgesic sedation. Everything must also be prepared to create a sterile field in the anterior abdominal wall, local anaesthetic, scalpels, a small trocar, a guidewire, a polypectomy snare and the gastrostomy tube.

Implant Technique

The procedure is performed with the patient in supine decubitus position. Before proceeding to place the probe, an endoscopic exploration of the oesophagus, stomach and duodenum is performed in order to rule out any circumstance that contraindicates the implant. As regards the placement of the probe itself, the basic principle consists in insufflating the stomach considerably, so that its anterior wall is in intimate contact with the anterior abdominal wall, thereby achieving a secure area in which to create a gastrocutaneous fistula without interposition of other organs. There are three different methods for the placement of the probe.

Pull Method or the Ponsky-Gauderer Method[1]

The technique is performed with the patient in the supine decubitus position. Having explored the upper digestive tract, the site where the probe will be inserted should be chosen. For this, with the distal end of the endoscope placed in the stomach, insufflation is applied, and after darkening the room, the patient's abdominal wall is inspected to try to visualise the point of maximum transillumination, that it is usually located in the epigastrium slightly to the left. Then pressure with a finger is applied on this point, verifying endoscopically that this action causes a clear imprint in the gastric lumen. The skin is then disinfected, a sterile field is prepared and the selected point is infiltrated with local anaesthesia, making the needle penetrate the abdominal wall and its tip be seen in the stomach. Then, with a scalpel, a skin incision of about 1 cm is made. The next step is to introduce the trocar with its stylet from the outside and through the incision to the gastric cavity, all of this under endoscopic control. Once this is done, the endoscopist will get the trocar using a polypectomy snare. Now the stylet will be withdrawn and the guidewire will be inserted through the trocar until the tip penetrates several centimetres into the stomach. At that time, and manipulating the handle of the snare, the endoscopist

will release his hold on the trocar and catch the guide. Immediately thereafter, the endoscope will be withdrawn, which will drag behind the guide to make it come out of the mouth of the patient. After this, the pointed end of the gastrostomy tube is knocked to the end of the wire that comes out of the mouth, then the wire is tractioned from the opposite end, so that the probe penetrates through the mouth, sliding along the oesophagus and stomach and finally, penetrates the gastric wall and the abdominal wall and appears on the exterior through the incision previously performed. The endoscope is then reintroduced and the tube pulled until the retainer cap of the probe presses against the gastric wall.

Push or Sacks-Vine Method[7,8]

Basically it is similar to the previous one. It differs in the type of probe that is used, which is linked to a long, semirigid and pointed tube, so keeping the guide thread taut, the catheter is inserted by pushing it from the mouth of the patient until it comes out through the abdominal wall. The rest of the process is identical to the pull method.

The Introducer Method or the Russell Method[9]

Using this technique, the endoscope is inserted only once, and also prevents the gastrostomy tube passing through the mouth, which may be desirable in certain situations. The steps are identical to those of previous techniques until the trocar is inserted. From then the guide is introduced, the trocar is removed and several plug-shaped dilators are introduced. Finally a thicker sheath trocar is introduced, through which the gastrostomy tube which is a Foley type passes. Then the balloon is inflated, the sheath is removed, the probe is pulled until it stops and finally is fixed externally with a retainer, as in the other techniques.

Postprocedural Care

During the early days, wound care will be undertaken. Later, cleansing with soapy water once a day will be sufficient. The intake of food can be started immediately after placing the probe but in many hospitals 24 h is waited.

Removal and Replacement of the Probe

If the dysphagia or any other indication that would have led to the implantation of the PEG has disappeared, the tube can be withdrawn. However, 2-3 weeks must have passed after the placement, as this is the time required for the gastrocutaneous fistula to mature, to become fibrous and prevent the passage of gastric contents into the peritoneal cavity after the removal of the probe

Results

The success rate of the technique is greater than 95%.[10] In a large meta-analysis a morbidity and mortality of 9.4 and 0.53% was respectively estimated.[11] In other series the morbidity rate ranged from 9 to 17%, but major complications occur in only 1-3% of cases.[12,13]

Complications

Major Complications

(1) *Haemorrhage:* Produced by accidental puncture of a vessel. If bleeding occurs in the stomach it can be seen as an upper gastrointestinal bleeding, and if it is produced by peritoneal puncture of a vessel as haemoperitoneum. This

complication is more common in patients with portal hypertension.

(2) *Acute peritonitis:* It is produced by the passage of gastric contents into the peritoneal cavity. It has been described in patients whose probe was tried to be changed within 2-3 weeks.

(3) *Bronchial aspiration:* It is the most common major complication. To prevent it, the patient should be positioned at 30° while he/she is fed, and shall be kept in this position for the following 2 h.

(4) *Necrotising fasciitis:* It is the most serious complication but also the less common and is associated with high mortality. It is an infection and subsequent necrosis of the soft tissues of the abdominal wall. It is accompanied by fever, cellulitis and oedema, and subcutaneous emphysema can be observed. It requires treatment with broad-spectrum antibiotics and surgical debridement.

(5) *Gastrocolic fistula:* It occurs when the transverse colon is placed between the gastric wall and the abdominal wall by placing the PEG. It can cause acute symptoms of intestinal obstruction or peritonitis, or evolve in a hidden way, with chronic subocclusive symptoms. Sometimes it causes diarrhoea when nutrition is administered.

(6) *Metastatic tumour implantation at the stoma:* Cases of metastasis of oropharyngeal and oesophageal tumours in the stoma due to the dragging of malignant cells during the placement of the probe have been described.[14]

Minor Complications

(1) *Infection of the stoma:* It is the most frequent complication. It is managed with antibiotics and local treatment.

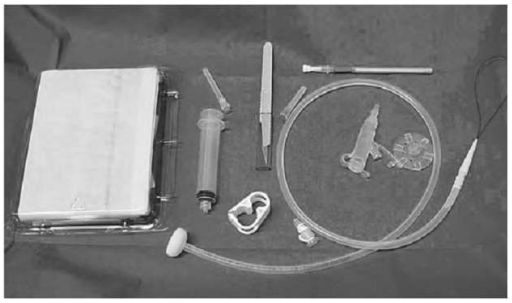
(2) *Extrusion of the probe (buried bumper):* It consists of the migration of the internal retainer towards the gastric wall and sometimes being completely covered by gastric mucosa.

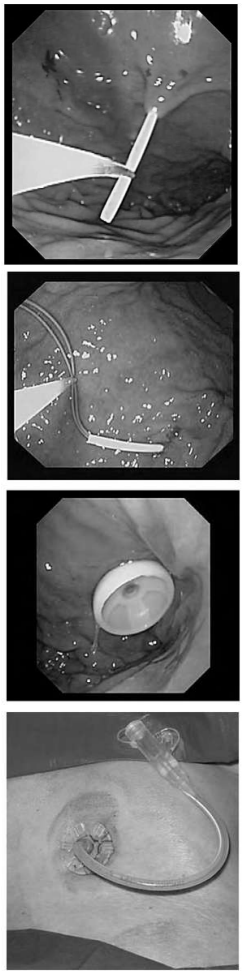
(3) *Overflowing:* It consists on the oozing of gastric contents around the tube, causing skin irritation and interfering with the patient's care and hygiene.

(4) *Miscellaneous:* Haematoma of the abdominal wall or stomach, fever, subcutaneous emphysema, asymptomatic pneumoperitoneum, granuloma of ostomy, catheter obstruction, rupture of the tube and others.

Conclusion

The PEG procedure is technically simple and accessible to any endoscopist, providing quick, inexpensive enteral access with few complications. The decision to place probes for artificial feeding, especially in the final stages of life, must be based on the expectations of the progression of the disease, the chances of obtaining benefits and the desires of the patient and his family





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