



Michael Lee
Consultant Interventional Radiologist,
Beaumont Hospital
Professor of Radiology, Royal College of Surgeons
Dublin, Ireland

Percutaneous Gastrostomy and Gastrojejunostomy

Introduction

There are a number of ways to maintain nutrition in patients who cannot tolerate oral food. These include:

- Parenteral feeding via a central venous line
- Enteral feeding via a nasogastric tube or nasoenteric tube
- Gastrostomy (surgical, endoscopic gastrostomy (PEG) or radiologic gastrostomy)
- Direct jejunostomy

Parenteral feeding is useful in patients with short gut syndrome or patients with an inactive gut, but is more commonly used as a short term nutrition boost in patients who have lost significant weight before embarking on major surgery. Parenteral feeding is associated with venous stenosis, occlusion and infection and therefore enteral feeding is preferred, if possible. The advantages of enteral feeding over parenteral feeding include the fact that with enteral feeding, gut integrity and gut mass is maintained, gut stasis is prevented, there is better metabolic handling of food, it is less expensive and has less infectious complications

Nasogastric or nasoenteric tube feeding is suitable for patients who require feeding for less than thirty days. After this time period patients are at risk of developing oesophageal stenosis. If feeding is required for more than thirty days, a gastrostomy procedure is required. Surgical gastrostomy has been performed since the eighteenth century, but is now in decline, due to the development of percutaneous endoscopic gastrostomy (PEG) and percutaneous radiologic gastrostomy (PRG).

The PEG technique involves the placement of a gastrostomy tube with the aid of an endoscope. The stomach is first transilluminated with the endoscope, which defines the point of puncture for gastrostomy tube placement. The tube is then either placed by a push or pull technique.

Indications

The main indications for enteral feeding include patients with swallowing disorders such as those with stroke, multiple sclerosis or motor neuron disease, patients who have increased nutritional requirements such as those with cystic fibrosis and burn patients or patients with upper GI tract obstruction such as patients with oro-pharyngeal or laryngeal cancer. Other indications are rarer. In terms of contraindications colonic interposition, gastrectomy and gastric varices are absolute.

It is also important to consider whether or not the patient's demise is imminent. There is not much point in performing a PRG in patients who are likely to die in a few weeks. Relative contraindications include partial gastrectomy, coagulopathy and ascites. Note: if a gastrostomy tube is to be placed in patients with ascites, the ascites will need to be regularly drained to prevent migration of the tube out of the stomach.

Percutaneous Radiologic Gastrostomy

There are a number of techniques to place radiologic tubes. Fluoroscopy is the mainstay of image guidance. A nasogastric tube is inserted into the stomach for stomach inflation during the procedure. This is the key step in the procedure, in that gastric inflation needs to be maintained during the procedure. A gastropexy (fixing the stomach to the anterior abdominal wall) is performed to form a seal around the gastrostomy tube. These are usually performed with T-fasteners (BALT or Kimberly Clark). After the gastropexy has been performed, the stomach is punctured in the centre of the gastropexy area and a stiff guidewire inserted into the stomach. The tract is dilated and a tube placed.

Current tubes available for radiologic gastrostomy are either derivations of abscess drainage catheters or Foley catheters. These are generally inadequate for long-term feeding. However, they are simple to place. Laterally, interventional radiologists have moved away from placing these tubes and have moved either towards primary placement of button type gastrostomy tubes (Mic-Key, Kimberley Clarke or Corflo Cubby, Corpak) or placement of PEG tubes.

PEG tubes can be placed by interventional radiologists without the use of an endoscope. These are more robust and associated with a much better long-term patency. They also have better fixation devices, so that they do not dislodge easily. The rate limiting step with this procedure is cannulating the GE junction from the stomach. This can be achieved by either puncturing the stomach from the anterior abdominal wall and cannulating the GE junction with an angiographic catheter and hydrophilic guidewire or putting an angiographic catheter and guidewire through the gastroesophageal junction from the mouth and using a snare to achieve a through and through access. Once a through and through access from the mouth to the anterior abdominal wall is created, a pull type gastrostomy tube can be pulled from the mouth through the oesophagus and stomach and out the anterior abdominal wall to create a PEG.

The placement of gastrostomy buttons is a novel technique for gastrostomy. Gastrostomy buttons are preferred by patients, as they are flush with the skin. They are designed for insertion in mature tracks, but can be inserted de novo into immature tracks. T-fastener gastropexy is mandatory. The measurement of track length is also mandatory to devise a correct button length. A kit is provided by one company (Kimberly Clark, Fig. 1) which contains all the equipment necessary for button placement.

Alternatively, a homemade kit can be made up, using an angioplasty balloon to measure the track length and also dilate the track. The button can then be placed over a stiff guidewire, using an inner small fascial dilator to help guide the button over the wire (Fig. 2). In the Kimberly Clark kit, a telescoping dilator with a peel-away sheath, T-fasteners and tract measuring balloon are all included.

Results

Technical success for PRG approaches 100% compared to 97% - 98% for endoscopically placed PEG tubes. However, the rate of blockage and dislodgement is much higher for the old type radiologic gastrostomy tubes (Table 1).

Major complications such as aspiration, peritonitis, perforation, haemorrhage and major wound sepsis occur in approximately 6% of radiologic gastrostomy tubes compared to 10% with PEG tubes and 20% with surgical tubes (Table 2). Minor complications such as dislodgement and superficial wound infection or pain at the site occur much more frequently with radiologic tubes than with PEG tubes (Table 3).

Gastrojejunostomy

We perform gastrojejunostomy when there is a history of reflux, hiatus hernia, gastroparesis or history of aspiration. The key step in gastrojejunostomy is to angle the puncture of the stomach towards the pylorus to facilitate cannulation of the pylorus with a hockey-stick catheter and hydrophilic wire. A gastrojejunostomy tube can then be placed in the jejunum, or indeed a gastrojejunal button can be used (Kimberly Clark)

Table 1: Complications

Author	Pat	Success (%)	Complications (%)		Mortality (%)
			Major	Minor	
O'Keeffe	100	100	0	15	0
Saini	125	99	1.6	9.5	0
Halkier	252	99	1.6	4.4	0.8
Hicks	158	100	6	12	2
Bell	519	95	1.3	2.9	0.4
Ryan	316	99	0.9	3.2	0.3

Wollman et al. Radiology 1995;197:699

Table 2: PEG vs PG

Method	Pat	Success (%)	Complications (%)		Mortality (%)
			Major	Minor	
PG	837	99.2	5.9	7.8	0.3
PEG	4194	95.7	9.4	5.9	0.5
Surg	721	100	19.9	9.0	2.5

Table 3: Radiologic PEG/PIG

	50 PEG (%)	50 PRG (%)	60 RadPEG (%)
Technical Succ	98	100	100
Replacement	12	20	0
Infection	18	2	3.3
Aspiration	10	0	3.3
Blockage	0	10	0

24 radiologic PEG in failed PEGs

Endoscopy detected peptic disease in 21%
- Laasch et al. Clin Rad 2003;58:398-405

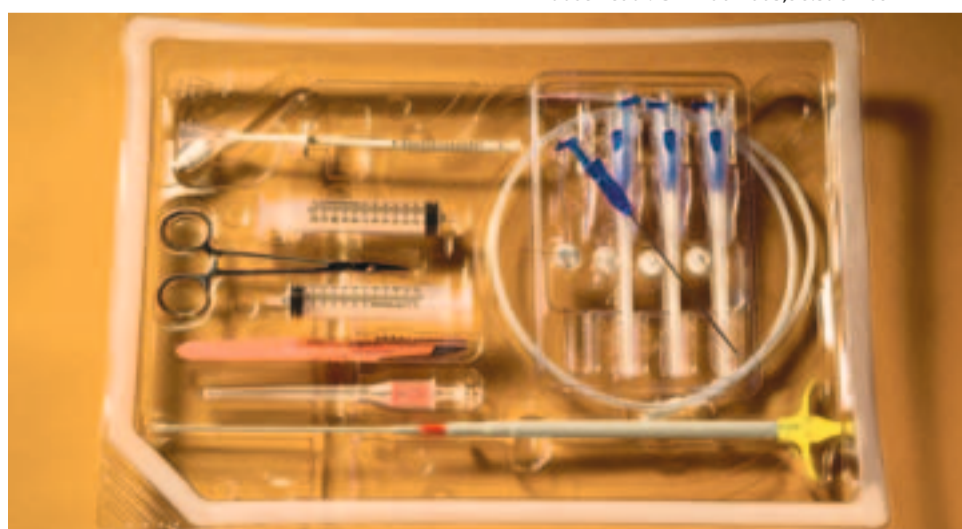


Fig.1: Kimberly Clark gastrostomy button set containing T fasteners, track measurement balloon and telescoping dilator with peel-away sheath. Note the gastrostomy buttons come in different lengths (1.5 to 5 cms) and are chosen after track measurement.