Enteral feeding and percutaneous endoscopic gastrostomy

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Summary
Many patients are unable to eat and others are malnourished. Such patients need nutritional support, and enteral feeding offers one way of providing such support. It may be needed for a short time during acute or critical illness or for prolonged periods in chronic illness. Short-term feeding is usually given through a nasogastric tube, while permanent feeding access is indicated for long-term feeding, most commonly through a gastrostomy. Percutaneous endoscopic gastrostomy (PEG) is a minimally invasive technique for placing a feeding tube and causing minimal discomfort. This article reviews enteral feeding focusing on PEG and considers the after care and complications of this method of feeding.

Approximately 40 per cent of patients are undernourished on admission to hospital (MAG 2003, RCP 2002). This increases with the length of hospital stay – more than 70 per cent are malnourished on discharge, losing an average 5.4 per cent of body weight during hospitalisation (McWhirter and Pennington 1994). These patients are significantly disadvantaged as their recovery is delayed and morbidity and mortality are greater than in well-nourished patients with the same illness (McWhirter and Pennington 1994, RCP 2002). Thus, when inadequate food intake and/or accelerated catabolism cause weight loss and nutritional depletion, nutritional support is required.

The preferred and cheapest way of promoting adequate nutrition is to help patients eat appropriately, but this can be difficult to achieve (Garrow 1994), and nutritional support may be needed to maintain nutritional status. If the gastrointestinal (GI) tract is functional, it should be used to provide support. There is increasing evidence that enteral feeding (food administered through the gastrointestinal tract) is preferable to parenteral (nutrients introduced directly into the circulation or blood stream through a central or peripheral vein) because the enteral route maintains gut structure and physiological and immunological function (Bynoe et al 1988, Cerra et al 1997). This, together with the safety of administration, enhanced nutrient use and reduced cost, provides the rationale underpinning the use of enteral feeding. Enteral nutrition may be required for a short time during acute or critical illness or for prolonged periods in patients with chronic illness. It is estimated that at any one time, 20-25,000 adults and children in the UK are receiving home tube feeding and the numbers are increasing rapidly (BAPEN 2002).

Selection of the route of access for enteral nutrition depends primarily on the anticipated duration of feeding. It may be administered by GI tube via the nasal or oral cavity or by accessing the tract through the abdominal wall (gastrostomy); rarely, feeds are delivered through a pharyngostomy or oesophagostomy.

Short-term feeding

Oroenteric and nasogastric tubes The most common route for enteral feeding is the nasogastric tube, which is used for short-term feeding (less than one month) when gag and coughing reflexes are intact, and gastric emptying is adequate. However, the presence of a tube may interfere with function of the lower oesophageal sphincter. Gastric reflux and regurgitation are common which, when severe – or when gastric emptying is delayed – may lead to vomiting and aspiration (Davis and Shere 1994).

Tubes vary in length between 22 and 60 inches; shorter tubes are used for nasogastric feeding and longer tubes for nasoduodenal or nasojejunal placement. Longer and more flexible tubes may help to overcome the risk of regurgitation and are also useful if the stomach must be bypassed due to obstruction of the pyloric sphincter, proximal bowel fistulae and upper GI tumours (Lord 1997). These tubes can be made of silicone or polyurethane, which are relatively soft; those made of polyvinyl chloride may stiffen over time and in the presence of gastric acid result in irritation and, potentially, perforation of the gastric mucosa (Grant and Martin 2000). Therefore, they require changing every 72 hours, while softer tubes can be left for 30 days reducing the trauma of constant re-insertion.

The smallest diameter tube of an appropriate length is selected, which is determined by measuring from the tip of the nose to the ear and the

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xiphoid process (the smallest of three parts of the sternum). It is inserted into the stomach via the mouth or nose; slight flexion of the neck, encouraging swallowing and rotation of the tube, aids insertion (Camp et al 1990). Verification of tube placement is essential before feeding starts, as accidental feeding into the trachea or bronchi may lead to aspiration and pneumonia. This is most accurately achieved by establishing the pH of tube aspirate (DeLegge et al 1995). There is some debate as to whether the position of fine bore tubes must be confirmed by X-ray.

Long-term feeding

Gastrostomy Placement of a permanent feeding access is indicated for long-term feeding (greater than 30 days), most commonly through gastrostomy. Such tubes may be placed by open surgical techniques, by laparoscopy or percutaneously using endoscopy. However, percutaneous endoscopic gastrostomy (PEG) has become the technique of choice and has largely superseded surgical placement (Laasch et al 2003). It enables easy and quick placement of a feeding tube into the stomach, bypassing proximal mechanical, surgical or functional obstructions and causing minimal discomfort. Open surgical procedures are used only when other approaches are contraindicated; laparoscopic placement is used for those with head, neck or oesophageal cancer (Ho and Ngo 1999).

PEG permits gastrostomy to be used in those who are not suitable for other techniques and has a success rate of between 84 and 96 per cent (Barkmeier et al 1998, Hoffer et al 1999). The main disadvantage is the risk of wound infection due to contamination by oral flora during insertion (see below); antibiotic prophylaxis is recommended (BSG 2001). Other approaches to preventing infection include cleaning the oropharynx with antibacterial solution before and after bolus feeding and after any medications (BAPEN 2003). When the tube is positioned initially starved. If pain is severe, or tube displacement is suspected, abdominal X-rays will confirm the tube’s position.

Aftercare

Though complications are rare, the endoscope may cause oesophageal or pharyngeal trauma. Some patients experience soreness and/or pain during the first 24 hours of insertion or following instigation of feeding when peristalsis causes abdominal discomfort, particularly in those who were previously starved. If pain is severe, or tube displacement is suspected, abdominal X-rays will confirm the tube’s position.

Feeding can be initiated after four hours when it is safe and well-tolerated (McCarter et al 1998) although this may be longer after general anaesthesia, when gastric function may be disrupted. The patient should be positioned on the right side to promote gastric emptying; alternatively 30° elevation of the head and shoulders should be ensured (Taylor and Goodinson-McLaren 1992).

The pull-through (Gauderer-Ponsky) technique involves introducing a guidewire through the abdominal wall which is then pulled towards the mouth by an endoscope, attached to the gastrostomy tube and used to pull the tube into place in the abdominal wall through the skin incision (Ponsky et al 1985). Placement is verified by endoscopic evaluation.

The push-through (Sachs-Vine) method involves threading the gastrostomy tube over the guidewire and pushing this through the abdominal wall from inside (Taylor and Goodinson-McLaren 1992). In either case, the tip is positioned in the gastric antrum. Longer tubes may be placed in the duodenum or jejunum and may be temporary or permanent.

There are a number of different types of gastrostomy tube; some protrude through the abdomen and others lie flush with the skin. Some include a one-way valve to prevent reflux and a silicone dome as an internal anchoring device; others have an external skin disc and an internal balloon anchoring device (Hall 1997). It is important that the tube is secured to prevent unnecessary tugging and persistent enlargement of the stoma and leakage. When the internal or external fixation device is taut against the abdominal wall this may cause severe discomfort and/or cellulitis or bleeding. This, in turn, may lead to periostitis necessitating antibiotic therapy and possible removal of the device.

REFERENCES
Taylor and Goodinson-McLaren (1992)

be successful (Moran and Taylor 1989).

**The insertion site**  
Appropriate care includes ensuring that the entry site is clean and dry; serosanguinous drainage can be expected for the first seven to ten days. Water is usually an adequate cleanser. A sterile, occlusive and moisture-permeable dressing is usually employed. If gastric juices leak through the stoma or drainage is significant, this may cause irritation. The skin requires protection from excoriation, which can be achieved using a skin barrier wafer sealed at the inner edge with karaya gum. When the anti-reflux valve (if present) malfunctions, the gastrostomy device must be replaced.

Pyrexia, inflammation, cloudy drainage or swelling, combined with pain at the insertion site, indicate infection necessitating application of a topical antibiotic and careful cleansing of the skin with soap and water or antibacterial solutions (Grant and Martin 2000).

**Additional problems**  
A number of other problems may be experienced. For example, when a newly-inserted tube becomes dislodged it must be replaced rapidly to prevent closure of the stoma. Migration of the tube towards the oesophagus will cause vomiting and possible aspiration, while downward migration can obstruct the gastric outlet, again causing vomiting, but also abdominal distension and pain. The latter are more common in those with a balloon gastrostomy (Hall 1997). If gastric outlet obstruction is suspected the balloon is deflated, the tube repositioned and the balloon reinfilated.

Dumpling syndrome may occur when feeding into a duodenostomy or jejunostomy, as the regulating mechanism of the stomach is bypassed. Rapid entry of nutrients into the jejunum, and subsequent hypertonicity may lead to hypertonic intestinal contents. These are rapidly diluted by fluid drawn from plasma and extracellular fluid, causing a sharp drop in circulating blood volume (Mahan and Arlin 1992). A sympathetic vasomotor response produces sweating, tachycardia, electrocardiographic changes and weakness accompanied by crampy abdominal pain. Careful regulation of the flow of the feed is needed (Moran and Taylor 1989).

**Benefits of enteral feeding**

Enteral feeding has advantages for patients in that food intake is no longer dependent on appetite or swallowing ability. It can, therefore, be used as the sole source of nutrients or as a supplement to oral feeding, often as an overnight infusion, so that absorption is maintained over the 24-hour period. This is advantageous when weight loss is severe or when intestinal absorption is impaired (RCP 2002). Similarly, gastrostomy feeding can maintain adequate nutrition when patients are unable to swallow and can prevent deterioration of nutritional status; it will not, however, prevent the progression of otherwise intractable disease. Patients should be aware of the reasons for the introduction of enteral feeding, and its purpose and limitations, and always give informed consent for its instigation.

**Psychological aspects of enteral feeding**

Enteral feeding can have a number of psychosocial consequences. The presence of a feeding tube may cause frustration or anger and perceived alterations in body image. It may provoke feelings of loss of control and independence and, for some, it may suggest a return to childhood. For those being treated at home, enteral feeding may necessitate significant lifestyle changes marked by altering family and social activities. Sexual dysfunction and loss of libido are common. However, for other patients, home enteral feeding has been shown to enhance physical functioning and to enable terminally ill patients to return home (Loeser et al 2003).

**Conclusion**

Enteral feeding is an effective means of maintaining nutritional status in hospital and, with appropriate support, in the community. Nurses have an important role in helping patients to come to terms with such feeding and in providing ongoing support.