

## Percutaneous endoscopic gastrostomy (PEG) feeding

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### See PRACTICE, p 1081

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Practice: Early detection of complications after gastrostomy (*BMJ* 2010;340:c2160)

News: "Nil by mouth" feeding should be last resort for all patients, experts say (*BMJ* 2008;338:b60)

Percutaneous endoscopic gastrostomy (PEG) feeding, introduced into clinical practice in 1980,<sup>1</sup> is now established as an effective way of providing enteral feeding to patients who have functionally normal gastrointestinal tracts but who cannot meet their nutritional needs because of inadequate oral intake.<sup>2</sup> It is the preferred method of feeding when nutritional intake is likely to be inadequate for more than four to six weeks, and when enteral feeding is likely to prevent further weight loss, to correct nutritional deficiencies, and to stop the decline in quality of life in patients caused by insufficient nutritional intake.<sup>3,4</sup> The beneficial effects of gastrostomy feeding on morbidity and mortality have been described only in certain subgroups of patients.<sup>5,6</sup> Randomised studies in patients after stroke who received gastrostomy feeding have shown improved nutritional outcomes, higher likelihood of survival, and earlier discharge.<sup>6,7</sup> However, gastrostomy tubes are increasingly being requested and inserted for indications where long term outcomes are uncertain.<sup>8</sup> In this review we discuss the indications for, controversies surrounding, and complications of gastrostomy feeding and provide practical advice on the management of percutaneous endoscopic gastrostomies.

### What is a percutaneous endoscopic gastrostomy?

This is a procedure for placing a feeding tube directly into the stomach via a small incision through the abdominal wall. After aseptic preparation of the abdominal wall and prophylactic antibiotics, an endoscope is passed via the oesophagus into the stomach.<sup>w1 w2</sup> A powerful light source within the endoscope and insufflation of air allows the position of the endoscope to be identified through the abdominal wall. Use of a finger invagination technique may also help identify the optimal site. After local anaes-

thetic infiltration, a needle is inserted through the abdominal wall (fig 1A) into the stomach, along with a guide wire which is grasped using a snare via the endoscope (fig 1B). The guide wire, the snare, and the endoscope are then retracted. The guide wire is attached to the end of a gastrostomy tube (fig 1C), pulled back down through the oesophagus and stomach, and brought out through the hole in the abdominal wall (fig 1D). The end of the PEG tube is retained within the stomach cavity, by a wide internal bumper (fig 1E). An external bumper is then fixed to the tube to prevent the internal bumper from moving distally in the alimentary canal. The procedure is usually performed under sedation and takes about 15-20 minutes. Gastrostomy feeding tubes may also be placed using radiological or surgical methods, depending on technical considerations or local availability.<sup>w3 w4</sup>

### What are the benefits of gastrostomy feeding?

Malnutrition affects disease outcomes because it affects every system in the body, leading to both physical and psychological disability.<sup>w5</sup> Percutaneous endoscopic gastrostomy feeding aims to improve nutritional status. Gastrostomy feeding reduces mortality, length of hospital stay, and complications in carefully selected patients who are likely to be or later become nutritionally depleted for longer than four to six weeks.<sup>9,10</sup> Clinical studies have shown clear benefits of PEG feeding after stroke<sup>6,7</sup> (in terms of improving nutritional status and reducing mortality) and in patients with oropharyngeal cancer (in terms of improving nutritional status).<sup>11,12</sup> When compared with other methods of enteral nutrition, such as nasogastric feeding, gastrostomy feeding caused less discomfort and had lower rates of complications such as bleeding, blockage, and dislodgment of the tube.<sup>13,14</sup> Although gastrostomy feeding does not prevent

### SUMMARY POINTS

Percutaneous endoscopic gastrostomy feeding presents complex moral and ethical problems  
Gastrostomy feeding has mortality and nutritional benefits in carefully selected patients  
There is no evidence of improved mortality in patients with dementia who are gastrostomy fed  
Patient selection can be improved by the use of guidelines, protocols, and a multidisciplinary team approach  
Patients referred for gastrostomy should be considered on the basis of their individual needs  
After gastrostomy insertion, signs of a serious complication—pain on feeding and bleeding around or within the gastrostomy tube—should prompt urgent referral to a specialist

### SOURCES AND SELECTION CRITERIA

We searched the Cochrane database of systematic reviews and did a PubMed search (from January 1980 until January 2010) using the keywords "percutaneous endoscopic gastrostomy" and "enteral feeding". We selected well conducted systematic reviews, meta-analyses, and large randomised controlled trials. When no study of these types was available, we considered small randomised control trials, cohort studies, observational studies, and guidelines.



Insertion of percutaneous endoscopic gastrostomy

reflux or aspiration, rates may be lower than in patients fed by a nasogastric tube.<sup>16</sup>

**Who should have a percutaneous endoscopic gastrostomy?**

Cohort studies have shown that 20-50% of hospital patients are malnourished.<sup>15 16</sup> Box 1 provides a broad list of indications for which patients are currently being referred for percutaneous endoscopic gastrostomy. Although clinical studies have shown benefits for PEG feeding in stroke<sup>6 7</sup> and oropharyngeal cancer,<sup>11 12</sup> the appropriateness of gastrostomy insertion in other patient subgroups is controversial. The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) undertook the largest study in the United Kingdom to date, which reviewed mortality after PEG insertion between April 2002 and March 2003. This study found a 6% mortality in a cohort of 16 648 patients. Of those who died, 43% died within one week of PEG insertion, and in 19% of patients PEG insertion was thought to have been futile.<sup>8</sup> We believe that the decision making process for gastrostomy feeding should not be based solely on the referral indication, but that each patient must be considered according to their individual needs.

**What is the role of PEG feeding in dementia?**

We currently have insufficient evidence to support PEG feeding in dementia and other neurodegenerative diseases.<sup>w7-w9</sup> Patients with advanced dementia commonly develop feeding problems that lead to weight loss and nutritional deficiencies. Whether or not to use percutaneous gastrostomies to feed patients with dementia is an emotive and controversial question. This controversy is compounded by the fact that in the late stages of the illness people lack capacity to express their wishes. The British artificial nutrition survey (BANS) found that in 2007, 109 new patients and 582 established patients with dementia were being artificially fed in the community, most by gastrostomy feeding.<sup>17</sup> However, a recent Cochrane review showed no evidence of increased survival; reduced pressure ulcers; or improved quality of life, nutritional status, function, behaviour, or psychiatric symptoms of dementia in patients with advanced dementia who were fed using gastrostomy tubes.<sup>18</sup>

No large prospective studies have examined outcomes of PEG feeding in patients with dementia. A retrospective study of 361 patients found that patients with dementia who had a PEG inserted had higher mortality than other patient subgroups (54% 30 day mortality and 90% at one year).<sup>19</sup> These findings have been reproduced by other investigators, who found that eating problems occurred in 85.8% of patients with dementia before death, which suggests that difficulties with feeding are an end stage problem.<sup>20</sup>

**Optimising referral for PEG insertion**

One method used internationally to optimise referral practice is to employ institutional guidelines that use a standardised referral protocol. Use of a multidisciplinary team in assessing patients and dissemination of evidence allows carers and health professionals to make informed decisions. This approach has been shown (in observational studies) to improve the selection of patients referred for gastrostomy.<sup>21-23</sup>

When considering whether insertion of a gastrostomy tube is appropriate, the question that must be asked is whether gastrostomy feeding would maintain or improve a patient's quality of life. This question must be answered in the context of the underlying diagnosis and prognosis, considering moral and ethical issues, as well as respecting the patient's wishes. Guidelines exist to aid clinicians in making decisions on PEG feeding, but the decision to insert a PEG tube should always be made on an individual basis.<sup>4 w10</sup>

**What are the contraindications to percutaneous endoscopic gastrostomy?**

Few absolute contraindications to percutaneous endoscopic gastrostomy exist. Active coagulopathies and thrombocytopenia (platelets <50×10<sup>9</sup>/l) must be corrected

**Box 1 | Conditions for which patients are commonly referred for insertion of a percutaneous endoscopic gastrostomy tube**

**Neurological indications**

- Cerebrovascular disease
- Motor neurone disease
- Multiple sclerosis
- Parkinson's disease
- Cerebral palsy
- Dementia

**Reduced level of consciousness or cognition**

- Head injury
- Intensive care patients

**Obstruction**

- Oropharyngeal cancer
- Oesophageal cancer

**Miscellaneous**

- Burns
- Fistulae
- Cystic fibrosis
- Short bowel syndromes (such as Crohn's disease)

**Box 2 | Complications of insertion of a percutaneous endoscopic gastrostomy (PEG) tube**

**Immediate (<72 hours)**

**Endoscopy related**

- Haemorrhage or perforation
- Aspiration
- Oversedation

**Procedure related**

- Ileus
- Pneumoperitoneum\*
- Wound infection
- Wound bleeding
- Injury to the liver, bowel, or spleen

**Delayed**

- Gastric outlet obstruction
- Buried bumper syndrome
- Dislodged PEG tube
- Peritonitis
- Peristomal leakage or infection
- Skin or gastric ulceration
- Blocked PEG tube
- Tube degradation
- Gastric fistula after removal of PEG tube
- Granulation around site of insertion of PEG

\*May be a common occurrence, with no serious symptoms.<sup>24</sup>

**CASE SCENARIO**

An 83 year old man with advanced Parkinson's disease was referred to the gastroenterology team for consideration of a percutaneous endoscopic gastrostomy. He had had three episodes of aspiration pneumonia in the previous six months, and his oral intake had declined. The speech and language therapist believed that he had an unsafe swallow and suggested referral for a gastrostomy. The admitting medical team referred him to the nutrition team, who suggested that he might gain no benefits from the procedure, given his frailty, cognitive decline, and comorbidity. Nevertheless, the family was convinced that gastrostomy feeding might benefit him. A limited trial of nasogastric feeding was started, but within four days the patient died. This case scenario is fictitious.

before tube insertion. Anything that precludes endoscopy, such as haemodynamic compromise, sepsis, or a perforated viscus, would be an absolute contraindication to gastrostomy insertion. Relative contraindications include acute severe illness, anorexia, previous gastric surgery, peritonitis, ascites, and gastric outlet obstruction. Crohn's disease used to be considered a contraindication to gastrostomy insertion because of concerns about possible fistula formation around the gastrostomy tract, but an observational study has shown percutaneous gastrostomy to be safe and without increased complications in patients with this disease.<sup>w11</sup>

**How are complications managed?**

The rate of complications after percutaneous endoscopic gastrostomy has been reported as 8-30%.<sup>3 24</sup> Box 2 lists these complications, which may be immediate or delayed. Most gastrostomy insertions are done in hospital, and immediate complications usually occur in hospital. Delayed complications are more often seen in the community setting. If favourable outcomes are to be achieved, prompt decisions should be made as to whether the problem can be managed within the community or whether it requires hospital admission.

**Which complications can be managed in the community?**

Overly granulated stoma sites occur commonly, and we have little evidence to guide management. Cauterisation of the lesion with silver nitrate has been tried, but this may be painful, and cautery may damage the gastrostomy tube. Treating the cause of overgranulation, such as gastric leakage, infection, or a poorly positioned fixation device that is a source of friction, may be more

appropriate. Preventive measures combined with a steroid preparation cream, such as 1% hydrocortisone, may reduce granulation. Infections around stoma sites are fairly common and should be suspected if inflammation or discharge are seen around the stoma site. If infection is suspected, swabs from the peristomal area should be sent for culture and antibiotic treatment given either topically or enterally, depending on the sensitivities of the organism.

Blockage of the gastrostomy tube usually occurs secondary to drugs or feed. The obstruction can sometimes be removed by massaging the PEG tube. If this fails, a push-pull method using a syringe on the end of the PEG tube may help to dislodge the blockage. In cases where these mechanisms fail, enzyme preparations or fizzy drinks may be delivered into the tube. Inadvertent removal of the gastrostomy tube occasionally occurs, and the tube should be replaced with a balloon gastrostomy. These temporary tubes can last up to three months and have a balloon inflated with sterile water, which maintains the tube's position within the stoma tract. A delay in recognising a dislodged tube may result in closure of the stoma, which will require hospital admission and endoscopic reinsertion of the tube. A urinary catheter may be used as a holding measure if necessary to prevent closure of the tract, before permanent insertion of a balloon gastrostomy. Feed related peritonitis is possible after reinsertion of a gastrostomy tube. When uncertainty exists about the position of the replacement tube, then water soluble contrast can be used to determine the position before feeding is restarted.

**Which complications require hospital admission?**

Any complication may require hospital admission. We highlight some serious complications that require relatively urgent hospital admission. Any of the immediate complications noted in box 2 should prompt readmission if the patient has been discharged.

The "buried bumper" syndrome is a rare but serious complication that occurs in 1.5-1.9% of patients.<sup>24</sup> The internal bumper migrates from the gastric wall towards the skin, anywhere along the PEG tract, as a consequence of excessive tension between the internal and external bumper. Symptoms may include pain on feeding, retrograde leakage of feed on to the skin, and rarely gastric perforation. Correction is achieved through removing and re-siting the internal bumper endoscopically or by surgical intervention.

**A PATIENT'S PERSPECTIVE**

I am a 64 year old woman who had a percutaneous endoscopic gastrostomy (PEG) inserted in January 2010. I was diagnosed with motor neurone disease nearly a year ago after I started to lose weight and developed problems with my speech. I am now unable to talk and have to write everything down to communicate. The PEG was inserted after I developed problems with swallowing, which led to an episode of pneumonia. When I was told I might need a PEG, neither my husband nor I had a clear understanding of what this entailed. Further information was obtained from a hospital leaflet and a meeting with a PEG specialist

nurse. The decision to proceed with a PEG was based on medical opinion and the belief that there really was no alternative.

Four weeks on from my PEG insertion, my husband and I are managing the PEG well. I have had no complications, and my weight is being maintained. I have no regrets about having the procedure, and we have contact details should we encounter any problems. Knowledge about PEG feeding varied among the healthcare professionals we met, and a better understanding of this matter would help patients and carers alike.

## TOPICS FOR FUTURE RESEARCH

- Establishing scoring systems for use before percutaneous endoscopic gastrostomy (PEG) to help improve patient selection and subsequent long term outcomes
- Evaluating whether insertion of gastrostomy tube improves the quality of life in patients
- Determining the role of PEG feeding in patients with neurodegenerative disorders
- Conducting cost analysis of gastrostomy feeding versus either oral or nasogastric feeding
- Evaluating whether hand feeding in patients with mid stage to late stage dementia is equivalent to PEG feeding

## ADDITIONAL EDUCATIONAL RESOURCES

## Resources for healthcare professionals

- British Society of Gastroenterology. Guidelines for enteral feeding in adult hospital patients. 1996. [www.bsg.org.uk](http://www.bsg.org.uk)
- National Institute for Clinical Excellence. Nutrition support in adults: oral nutrition support, enteral tube feeding and parenteral nutrition. (Clinical guidance 32.) 2006. [www.nice.org.uk/Guidance/CG32](http://www.nice.org.uk/Guidance/CG32)
- BMA. Withholding or withdrawing life-prolonging medical treatment: guidance for decision making. 2007. [www.gmc-uk.org/guidance/ethical\\_guidance/withholding\\_lifeprolonging\\_guidance.asp](http://www.gmc-uk.org/guidance/ethical_guidance/withholding_lifeprolonging_guidance.asp)

## Resources for patients

- Medline Plus ([www.nlm.nih.gov/medlineplus/ency/article/002937.htm](http://www.nlm.nih.gov/medlineplus/ency/article/002937.htm))—Information about the gastrostomy procedure, risks, and outlook
- CORE ([www.corecharity.org.uk](http://www.corecharity.org.uk))—UK charity providing patients with information about gastrointestinal disease

Patients who have serious complications such as peritonitis or gastric outlet obstruction may present with symptoms of acute or chronic abdominal pain. Red flag signs that should prompt emergency admission are pain on feeding, external leakage of gastric contents, or bleeding within or around the gastrostomy tube.<sup>25</sup>

### What are the ethical and legal considerations in gastrostomy feeding?

PEG feeding raises ethical and legal considerations. Both the Royal College of Physicians and the General Medical Council in the UK have provided guidance on oral feeding and nutrition.<sup>26,27</sup> Artificial feeding is considered a medical treatment in legal terms and requires valid consent before it is started. For consent to be valid the person giving consent must have the capacity to do so voluntarily after being given sufficient information to guide informed choice. When a patient has capacity their wish to consent to or refuse treatment should be upheld, even if that decision may lead to death. When a patient lacks capacity, an independent mental capacity advocate should represent that person. The multidisciplinary team caring for the patient is responsible for giving, withholding, or withdrawing treatment, including artificial feeding and hydration, and it should consider any advance directives, the patient's prognosis, and the likely benefits of gastrostomy feeding when making decisions. A limited trial of feeding may sometimes be used, but strict criteria regarding what

constitutes success should be determined before starting gastrostomy feeding.<sup>28</sup> Where conflicts arise between healthcare professionals or between healthcare professionals and those close to the patient, it may be necessary to seek legal advice or resolution through a local clinical ethics committee.<sup>26</sup>

The National Institute for Health and Clinical Excellence guidelines on dementia highlight the importance of quality of life in advanced dementia and support the role of palliative care in these patients, from diagnosis until death.<sup>29</sup> Best practice in these patients could be to encourage eating and drinking by mouth for as long as tolerated, to use good feeding techniques, to alter the consistencies of food, and to promote good mouth care. When disease progression is such that the patient no longer wants to eat or drink, then rather than inserting a gastrostomy tube, end of life care pathways might be considered. Views held by carers and medical staff may prevent progression to end of life care pathways. A questionnaire survey showed that allied healthcare professionals were more likely than doctors to consider PEG feeding when presented with patient scenarios relating to malnutrition.<sup>30</sup>

### Conclusion

Percutaneous endoscopic gastrostomy feeding is an effective way to deliver nutritional support to people who are unable to meet their nutritional requirements orally. Improved nutritional status and survival have been demonstrated in selected subgroups of patients. Careful selection of patients on an individual case basis may improve outcomes.

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**Patient consent obtained.**

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**ANSWERS TO ENDGAMES, p 1089.** For long answers go to the Education channel on [bmj.com](http://bmj.com)

**STATISTICAL QUESTION**

**One sided and two sided hypothesis tests**

Statements *b* and *d* are true; *a* and *c* are false.

**CASE REPORT**

**Clinical examination for developmental dysplasia of the hip in neonates: how to stay out of trouble**

- 1 The clinical signs are highly suspicious of bilateral hip dislocation (developmental dysplasia of the hip). The left hip "click"/"clunk" suggests a positive Ortolani test, in which case the hip would be reducible. The right hip, by contrast, was irreducible and much more concerning.
- 2 Limited abduction in flexion of one or both hips indicates a hip dislocation until proved otherwise. An ultrasound scan can confirm the diagnosis.
- 3 A Pavlik harness should be used to instigate progressive reduction of the femoral head into the acetabulum. Treatment should start as soon as the diagnosis has been confirmed.



Computed tomogram of the abdomen showing a low attenuation lesion in the posterior parenchyma of an enlarged spleen (arrow)

**PICTURE QUIZ A rare cause of abdominal pain**

- 1 A 6 cm low attenuation lesion can be seen in the posterior parenchyma of an enlarged spleen. A left pleural effusion was also present. The possible causes of a low attenuating splenic lesion include splenic infarction, haematoma, tumour, and complicated cyst. In this clinical scenario, splenic abscess is the most likely cause.
- 2 Haematological disorders (such as haemoglobinopathies), immunosuppressive disorders, metastatic infection, contiguous infection, and trauma predispose patients to splenic abscesses. In our patient, who was an injecting drug user, decreased immunity, intravenous introduction of infection, and a previously infected deep vein thrombosis with haematological spread could have contributed to the development of a splenic abscess.
- 3 Treatment varies with the chronology and severity of the abscess as well as the patient's health status at presentation. Conservative management with empirical broad spectrum antibiotics, which are later tailored to the sensitivities of the organism responsible, may be an option in a chronic and stable presentation. Percutaneous drainage can be considered if radiography shows that the abscess is readily accessible. Surgical options include open or laparoscopic splenectomy and open drainage of the abscess, which may be necessary in more severe cases.