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PERCUTANEOUS ENDOSCOPIC GASTROSTOMY

Evidence Based Medicine Guideline

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SUMMARY
Percutaneous endoscopic gastrostomy (PEG) facilitates nutritional support in patients with dysphagia or critical illness, but is associated with specific complications. The optimal timing of placement for these tubes should be based on clinical judgment, experience, and patient condition. PEG tubes are appropriate if greater than 4 weeks of enteral nutritional support is expected.

RECOMMENDATIONS

- **Level 1**
  - **Early feeding within 4 hours of PEG placement is safe.**
- **Level 2**
  - **PEG should be considered in the following situations:**
    - **Anticipated need for ≥ 4 weeks of enteral nutrition support**
    - **Esophageal obstruction**
    - **Neurologic dysphagia**
    - **Supplemental nutrition for patients undergoing chemo- or radiation therapy**
    - **Life expectancy greater than 4 weeks**
- **Level 3**
  - **Timing of PEG tube placement should be based on clinical judgment.**

INTRODUCTION

The first PEG tube was placed in 1980 by Dr. Michael W.L. Gauderer, pediatric surgeon, Dr. Jeffrey Ponsky, endoscopist, and Dr. James Bekeny, surgical resident using a “push” method. Since that time, the procedure has undergone many upgrades and has evolved into the commonly used “pull” method. When placing these tubes, three basic tenets are followed for safe practice: 1) the stomach must be distensible, 2) the endoscopist must be able to identify a blunt push on the stomach from the assistant, and 3) the abdominal wall must transilluminate. If these three tenets are followed, a PEG can be placed without complication or difficulty greater than 95% of the time.

LITERATURE REVIEW

PEG tubes are designed to give patients a reliable, comfortable way to receive enteral nutritional support when oral intake is not feasible. There are clear indications and contraindications for the placement of PEG tubes.

Indications

The need for nutritional support, including the reason for the patient’s feeding difficulty, should be clearly identified. Appropriate indications generally include esophageal obstruction, neurological conditions with dysphagia, inability

LEVEL OF RECOMMENDATION DEFINITIONS

- **Level 1:** Convincingly justifiable based on available scientific information alone. Usually based on Class I data or strong Class II evidence if randomized testing is inappropriate. Conversely, low quality or contradictory Class I data may be insufficient to support a Level I recommendation.
- **Level 2:** Reasonably justifiable based on available scientific evidence and strongly supported by expert opinion. Usually supported by Class II data or a preponderance of Class III evidence.
- **Level 3:** Supported by available data, but scientific evidence is lacking. Generally supported by Class III data. Useful for educational purposes and in guiding future clinical research.

to swallow, and need for supplemental nutrition in patients undergoing chemotherapy or radiation therapy. A comprehensive list of indications and contraindications is listed in Table 1. In the geriatric patient population, there is no proven benefit in markers of nutrition among patients with impaired oral intake who receive PEG tubes (1,2). There is retrospective evidence to support early PEG tube placement in patients with severe traumatic brain injury (TBI) (3). PEG tube placement in severe TBI patients is also more cost-effective than open gastrostomy (4). In patients with metastatic gastrointestinal obstruction, palliative decompressive / venting PEG tubes can significantly reduce symptoms of nausea and vomiting with minimal complications (5).

Contraindications

Multiple authors and consensus statements agree that there are situations where PEG tubes are contraindicated. PEG tubes should generally not be offered to patients who will resume normal oral intake within four (4) weeks. These patients may be managed with nasoenteric feeding tubes as their ability to eat returns. During the procedure, if the surgeon is unable to distend the stomach with adequate insufflation, cannot see finger invagination of the stomach through the abdominal wall, or cannot trans-illuminate the abdominal wall, the procedure should be aborted. A PEG tube should not be offered if life expectancy is less than 4 weeks, there is no chance for physiological recovery, or PEG cannot improve the patient's quality of life (1,2,5,6).

Table 1: Indications and Contraindications for the placement of a Percutaneous Endoscopic Gastrostomy (modified from Friginal-Ruiz and Lucendo) (6)

Patients with potentially reversible diseases where PEG removal is expected once the process has resolved	
Indications	**Contraindications**
Neurological diseases - Guillain-Barre syndrome, stroke, cranial trauma Anorexia nervosa Hyperemesis gravidarum Severe burns Multiple injuries and facial trauma Transplants with prior malnutrition Head & neck tumors requiring chemotherapy / radiotherapy Diseases of the esophagus	Non-swelling esophageal obstruction Active gastric pathology Total gastrectomy Extreme obesity Hostile abdomen from previous surgery
Patients with irreversible diseases, but prolonged survival anticipated, where PEG will improve their quality of life	
Indications	**Contraindications**
Neurological diseases - Amyotrophic lateralizing sclerosis, multiple sclerosis, dementia, Parkinson's disease, Alzheimer's disease, stroke, post-anoxic encephalopathy, brain metastases, brain tumors, polymyositis, brain injury (traumatic or surgical) Progressive muscular dystrophy Head & neck tumors Facial malformations and oropharyngeal neoplasms Dermatomyositis and polymyositis Amyloidosis Cystic fibrosis Short bowel syndrome Inflammatory bowel disease Scleroderma	Colonic interposition Partial or subtotal gastrectomy Massive ascites Portal hypertension (gastric varices) Peritoneal dialysis Active gastric pathology Coagulation disorders Sepsis Cardiorespiratory disease that prevents endoscopy
Patients with terminal and debilitating diseases with a relatively long-life expectancy	
Indications	**Contraindications**
Encephalitis Repeated stroke Advanced malignancies AIDS (terminal stages) Intestinal obstruction by peritoneal carcinomatosis Radiation enteritis Severe acute pancreatitis	

Timing

There is no Level I data associated with the timing of PEG placement except in patients with recent stroke. The prospective, randomized FOOD trial demonstrated that following acute stroke better functional outcomes were seen in patients fed through a nasogastric tube vs. a PEG in the first 2-3 weeks (7). There was no significant difference in survival, however.

Complications

There is a wide host of complications associated with PEG tube placement. Most PEG-associated complications are technical errors and carry a high mortality (8). In one retrospective study, the complication rate was cited at 36%, although most were minor complications (9). The most common complication was PEG tube dislodgment. Common complications are listed in Table 2.

Table 2: Complications of PEG: Causes and Attitudes of Resolution (modified from Friginal-Ruiz and Lucendo) (6)

Problem	Possible Cause	Prevention / Intervention
Necrotizing fasciitis	Necrosis of the superficial fascia	Broad-spectrum antibiotics Surgical debridement
Bleeding from the puncture site or the gastric mucosa	Surrounding vessel injury	Increase traction on the tube to obtain compressive hemostasis If unsuccessful, remove tube and perform endoscopic coagulation
Aspiration	Aspiration of refluxed content from the stomach	Raise the head of the bed Consider adjusting feeding rate
Irritation / infection of the skin surrounding the stoma	Excessive pressure on the stoma Lack of peristomal hygiene Gastric fluid output	Adjust the distance between the external retention ring and the stoma Clean the stoma daily Place a single layer of gauze beneath the retention ring and change daily Consult a wound care / ostomy nurse
Obstruction of the PEG tube	Dried food or product clogging the tube Lack of water flushing after and between food / medication administration	Always flush with water after administration of food or drugs Flush with warm water using a syringe Avoid passing objects through the tube lumen in an attempt to dislodge a clog to prevent tube rupture or perforation of the stomach Administer pancreatic enzymes mixed with bicarbonate solution Replace PEG tube if unsuccessful
Tube dislodgement	PEG tube comes out accidentally or voluntarily	Immediately replace tube
Tube cannot be rotated	Burial of the tube in the abdominal wall	Rotate and push tube gently inward If unable to turn, remove and substitute tube
Nausea / vomiting	High osmolarity of the formula Infusion excessively fast Lactose-intolerance Excessive fat content in the diet	Appropriately dilute the formula Return to previous infusion diet Lactose-free diet Use low-fat diet
Diarrhea	Hyperosmolar solution Lactose intolerance Poor absorption of fats Diet cold	Use isotonic diets and/or dilute hyperosmolar ones Suppress lactose Use low-fat formulas
Constipation	Low-fluid administration Insufficient fiber intake	Administer fluids in adequate amounts Increase dietary fiber
Peristomal granulation	Proliferation of granulation tissue around the stoma	Resection and/or cauterization of tissue

Early versus delayed feeding of PEG tubes

There is evidence supporting early (< 4 hours after PEG placement) vs. delayed (>24 hours after PEG placement) feeding. Several observational studies and RCTs have evaluated the differences between the two groups and a meta-analysis of six RCTs comparing early vs. delayed feeding found no significant difference in complications (10). There was a significant increase in gastric residual volumes on day 1 in the early feeding group, but this did not pose any increase in complication rate. Early feeding is safe and tolerated well by patients.

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