Clinical applications and technical aspects of percutaneous endoscopic gastrostomy in head and neck malignancies.

Doktori (PhD) értekezés
Dr. Lujber László

Doktori iskola vezetője: Dr. Nagy Judith
Programvezető: Dr. Róth Erzsébet
Témavezető: Dr. Bellyei Árpád

Pécsi Tudományegyetem
Általános Orvostudományi Kar
Fül Orr Géneklinikai Kar
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INTRODUCTION

Not until recently, the importance of nutrition in the critically ill patients was disregarded, as the focus was primarily directed towards curative therapy. Nutritional supplementation was thought to have a less significant impact on the final outcome of the diseases. Later, physicians started to realize the role nutrition plays in the recovery of patients. Malnutrition severely impairs the prognosis, the healing, the therapeutic outcome, the quality of life, the hospital stay, and thus the cost of care (1). There is a consensus in the literature that early postoperative nutrition benefits surgical patients by decreasing septic morbidity, maintaining immunocompetence, and improving wound healing (2,3).

Patients with head and neck cancers are at particular risk for malnutrition during the whole course of their disease. Malnourishment is the result of several local and systemic factors. Alcoholism, smoking and poor diet have a high prevalence in patients with head and neck cancers leading to decreased protein, vitamins and minerals uptake. Local tumor growth adds to these problems by causing dysphagia, odynophagia, smell and taste distortion, and aspiration. On the other hand increased metabolic rate of cancer cells and accelerated protein catabolism require high calorie and protein diet to maintain nutritional balance (4; 5). Surgery causes anatomical alterations, pain, dysmotility, and can predispose to aspiration further worsening the ability of proper alimentation. Mucositis, pain, edema, nausea and xerostomia as the result of radio-, and chemotherapy all have an adverse effect on feeding (6; 7). All of these factors finally deplete the protein and fat stores of the body.
leading to severe weight loss, impairing the immune function and resulting in progressive protein-calorie malnutrition. For these reasons, patients with head and neck cancer require continuous nutritional assessment and adequate calorie-protein supplementation.

The relationship between nutrition and cancer, have several other aspects. We know that deficiency of some nutrients in the body might predispose to tumor growth, while the presence of others impedes it (8) ((9). However details about these interactions are not the topic of this PhD.

ARTIFICIAL NUTRITION

Proper diet of patients with head and neck cancer is essential. "When the gut works, use it" should be a common sense practice of physicians dealing with nutritional care. Hence, total parenteral nutrition (TPN) is still provided, in several instances to patients with well functioning gastrointestinal tract, because of the ease and reliability of administration. Yet, more and more data suggest in the literature that enteral feeding is not just more natural way of administering food but also has a positive influence on the recovery of patients (10;11). It seems that not only the quantity and quality of food that matters, but also the route of alimentation. A normal well-fed intestine besides absorbing nutrients, also maintains a protective barrier against intraluminal toxins and bacteria. Peristalsis, secretory Immunoglobulin A, mucin and an intact mucosa have a protective and supportive role to achieve this function (12). It is shown in laboratory studies and animal experiments that starvation causes changes in the structure of gastrointestinal mucosa, increases the
permeability to bacteria and toxins, results in bacterial colonization and translocation, and alters the immunologic function of the gut (13-15). Whereas by enteral feeding gut mass stays unchanged (13), the metabolic, hormonal (16) and immunologic (17,18) responses of gastrointestinal mucosa are preserved. Experimental (19) and prospective clinical trials (10; 11; 20) in trauma and burnt patients clearly show a reduced rate in risk of morbidity and mortality in patients fed enterally. Randomized, controlled, prospective studies demonstrated that enteral feeding compared to total parenteral nutrition, leads to a significantly lower incidence of complications in surgical patients (10; 21).

ENTERAL FEEDING

There are number of ways to deliver food into the gastrointestinal tract (Table 1). To pick the best choice that suit patient the most, can be very difficult. It is usually a decision based on several factors such as the patient's nutritional state, type of disease, therapeutic plan and possible outcome. This PhD focuses on percutaneous endoscopic gastrostomy and its aspects in head and neck cancer patients.

The introduction of percutaneous endoscopic gastrostomy in clinical practice by Gauderer and Ponsky in 1980 (22), has revolutionized our practice in enteral feeding.
WAY OF ENTERAL FEEDING

I. Per oral

II. Tube feeding
1. Naso-gastric, -duodenal, -jejunal
2. (Oro-gastric, -duodenal, -jejunal)

III. Stomal feeding
1. Oesophagostomy
2. Gastrostomies
   a. Surgical open (Stamm’s)
   b. percutaneous endoscopic
   c. percutaneous radiologic
   d. percutaneous ultrasound guided
   e. percutaneous CT or MRI guided
   f. laparoscopic
3. Jejunostomies
   a. surgical
   b. PEG with jejunal extension
   c. laparoscopic
   d. percutaneous endoscopic
   e. needle catheter

Table 1.
Historical background of PEG

Direct enteral access by gastrostomy, such as Stamm's or Janeway's surgical procedures (23) were not new when percutaneous endoscopic gastrostomy was developed in 1979. Surgical gastrostomies were well-described methods, yet their use for enteral alimentation was not popular or widely employed. They required laparotomy and often general anesthesia that deterred physicians and surgeons to use surgical gastrostomy "just" for obtaining feeding access for patients with poor general condition or with debilitated neurological state. In most cases, naso-enteric tubes were utilized in order to provide alimentation. Dr. Jeffrey Ponsky, pediatric gastroenterologist and Dr. Michael Gauderer pediatric surgeon, both worked in Cleveland, USA and performed upper gastrointestinal endoscopy in small children regularly for a variety of indications. They noted the ease and simplicity with which the anterior abdominal wall could be transilluminated, indicating the close contact between the abdominal and gastric walls. This gave them the idea to work out the details of a technique that would allow percutaneous puncture of the insufflated and transilluminated stomach under endoscopic control for gastrostomy tube placement. The original kit used was a home-made 16-F de Pezzer latex tube with a tapered intravenous cannula fitted to its distal end. The first five cases (all babies) of percutaneous endoscopic gastrostomy were presented at the annual meeting of The American Society of Gastrointestinal Endoscopy in May 1980 (22). The method was welcomed and rapidly recognized by the gastroenterologist, but initially looked upon with skepticism by the surgeons. Soon PEG gained wide acceptance as a safe, simple and
efficient method of providing nutritional support in patients with variety of pathologies. As experience accrued using this technique, potential risks, complications, and benefits became more apparent. These were studied that allowed further refinement of the technique. Since its introduction, modifications, improvements and adaptations of PEG have been published continuously to reduce complications, and to broaden the indication. The general indication for percutaneous endoscopic gastrostomy is summarized in table 2 (24). The maintenance of nutrition and fluid balance during the treatment of head and neck tumors is one of the most important indications for PEG placement. More than 216,000 PEGs are performed annually in the United States and thus it is the second most common indication for upper gastrointestinal endoscopy (25).
GENERAL INDICATIONS FOR PEG PLACEMENT

I. LONG-TERM NUTRITION

- Head and neck tumors.
  (Maintenance of nutrition and fluid balance during treatment of cancer is a strong indication for PEG {1990}.)

- After an acute stroke
  (Strong recommendation based on the finding that 25-40% of patients develop dysphagia after an acute cerebrovascular episode {1536}.)

- Extensive traumatic injury.
  (e.g. certain maxillo-facial trauma, abdominal trauma {1587})

- Neurological disorder
  (Diseases that are chronic in nature and result in significant dysphagia {1552}, psychiatric indications)

- Growth failure in children.
  (Prevention and treatment of pediatric clinical conditions such as e.g. Crohn’s disease, cystic fibrosis {1907} etc.)

- Other hyperkatabolic states
  (severe burns {1902}, Crohn’s disease {1737}, toxic epidermal necrolysis {872})
II. **DECOMPRESSION**

- Diabetic gastroparesis \( (1621) \)
- Intestinal pseudo-obstruction
- Mechanical obstruction
  
  \( (\text{tumor } (520), \text{surgery, etc.)} \)

III. **OTHERS**

- **gastric volvulus / gastric fixation** \( (1556);(1912) \)
- **formation of biliogastric shunt** \( (877) \)
- **to deliver pharmacotherapy** \( (1765) \)
  
  \( (\text{administration on non-palatable medications}) \)
- **access “avenue” to stomach**
  
  \( (\text{multiple PEG portals to permit intragastric surgical interventions}) \)

Table 2

**Comparison of percutaneous endoscopic gastrostomy, and nasogastric tube.**

The traditional way of providing enteral nutrition for patients with head and neck cancer is by means of nasogastric feeding tube (NGT). Nasogastric feeding is still important in the alimentation of head and neck patients, however PEG is preferable in long-term nutritional support. Nasogastric tubes are uncomfortable, socially unacceptable, and associated with several side effects, such as nasal alar ulcerations and rhagads, rhinosinusitis, mucosal- ulcers, -edema, chronic throat irritation, gastro-esophageal reflux, aspiration,
and aspiration pneumonia (26). The incidence of these complications is exponentially increases by the time of tube in use. Besides, it has been shown that feeding through NGT on a long run is less efficient than via PEG, mainly due to frequent unintentional removal of the nasogastric tube and pulmonary aspiration (27). The frequent need for replacement of NGT due to dislodgement or plugging becomes risky when a freshly sutured pharyngeal wounds must be passed. It has also been shown that head and neck surgical patients who underwent PEG placement had decreased surgical complication rate compared with patients treated with nasogastric tube feeding (28). Moreover, the constant, visible presence of the tube makes NG feeding unacceptable to many patients, especially outside the hospital environment. Patients are more likely to resume normal social activities when they are not additionally disadvantaged by NG feeding tube. In general, fine-bore nasoenteric tube feeding remains a good choice for patients anticipated to require short-term nutritional support, however PEG is advised, if the expected duration of artificial feeding exceeds 4 weeks.

Comparison of percutaneous endoscopic gastrostomy and open surgical gastrostomy

Minimal invasive techniques, such as percutaneous endoscopic gastrostomy have limited the indication for open surgical gastrostomy. It is a handy alternative to laparotomy with numerous advantages. PEG can be performed quicker in 15-20 minutes (29), requires only sedation, if at all, and has low morbidity(30-32). It can be performed at bedside if needed, cost effective (33)
with shorter hospitalization (34) and has an overall success rate of 95% (30). In contrast, Stamm open surgical gastrostomy (23) requires usually general anesthesia more invasive, more expensive and has higher mortality and morbidity rates (6-46%) (35-37). However, it still has its primary role in certain clinical situations and in cases of explorative laparotomies for solving major complications of minimal invasive techniques.

PEG IN HEAD AND NECK CANCERS

Percutaneous endoscopic gastrostomy is usually a straightforward procedure in cases of neurological indication, but certain technical aspects and clinical applications should be strongly considered when indicated for patients with head and neck malignancies. The insertion methods, the placement routes, and the timing of PEG insertion require certain adaptation and modification of the usual PEG procedure. These aspects will be detailed in the following sections.

INSERTION METHODS OF PEG

Mainly, “pull”, “push”, and “poke” methods are in use for PEG insertion. The “pull method" originally described by Gauderer and Ponsky in 1980 (38), has changed little since its introduction and remained the most popular method of PEG tube placement. Percutaneous endoscopic gastrostomy procedures were started in the University of Pécs, Medical School, ENT Department with the collaboration of
the Department of Internal Medicine on the 7th of January 1997. Most often
the "pull method" is used in our department. Patient is instructed to use
antiseptic oral wash the day before the procedure. Adequate sedation and
analgesia are given intravenously prior to the start of gastroscopy along with
few puffs of Lidocaine 10% spray to the oral cavity for posterior pharyngeal
anesthesia (39){appendix 1}. Initially antibiotic prophylaxis was not used,
however later one dose of broad-spectrum antibiotic, usually from the
cephalosporin family, was given routinely to PEG patients prior to the
procedure. Gastroenterologist carries out a complete upper gastrointestinal
endoscopy in left lateral position of the patient. Afterwards the patient is
turned back into supine position. The abdomen is insufflated to allow proper
apposition of the stomach to the abdominal wall. This is checked by
transillumination and indentation of an examining finger in the gastric lumen.
An optimal point is chosen for the puncture in the abdominal upper left
quadrant, away from the costal margin. The skin is prepped, cleaned, and
draped. Local anesthetic is then infiltrated to the site and a small skin incision
is performed. A trocar needle is advanced into the stomach under visual
control and grasped by the snare of the gastroscope for secure hold. A strong
suture is threaded through the needle-cannula and is withdrawn to the oral
cavity by a snare along with the gastroscope. The other end of the suture is
retained. The tapered end of PEG tube is then attached to the suture-end at
the mouth, and pulled back to the site of the abdominal puncture. The inserted
needle-cannula and the PEG tube are withdrawn together through the anterior
abdominal wall until the inner bumper of the PEG rests against the inner wall
of the stomach. This can be approximately judged by finger palpation in case
of thin abdominal wall and by the cm markings on the tube. Excessive tension on the tube should be avoided as this may produce ischemia and necrosis leading to peristomal infection or tube extrusion. The tube is secured externally by an additional bumper. Then a second gastroscopy is performed to ensure the correct position of the tube and to exclude complications.

The "push method" is similar to the "pull method" except that the feeding tube is pushed over a guide wire (40). A flexible wire is passed via the needle-cannula instead of the suture and pulled out of the patient's mouth by the snare. Specially designed PEG tube is pushed over the wire and eventually withdrawn. The advantage of this technique is that the operator has full control over the tube at all times.

The "poke" or "introducer" method is basically a Seldinger technique. Under direct gastroscopic visualization the stomach is punctured and the tract is serially dilated by a dilator peel-away sheath (41). To keep the stomach approximated to the abdominal wall during the introduction, T-fasteners are usually needed. Unfortunately this means additional punctures on the stomach to counterbalance the complicating loss of insufflating air and the pneumoperitoneum during the procedure. In addition the openings in the abdominal wall and the stomach are bigger than the feeding tube itself, that can result in higher incidence of peristomal leakage and tube displacement (42). The "introducer" method is technically more difficult than the "pull" or "push", however the single pass of the endoscope is a potential advantage (Table 3).

The number of gastroscopic procedures needed to perform PEG have significance in patients with head and neck cancer. First, every procedure, so
does the endoscopy has its own risks (43). A study reviewing the literature on endoscopic complications, lists 4 major and 45 minor complications related to the procedure itself (44). Although, the overall incidence of complications in routine cases is not high (0.1%), the chance of causing perforation or hemorrhage in patients with head and neck cancer is greater.

Second, there are additional risks when gastroscopy is done in cancer patients for creating a PEG. The repeated pass of the gastroscope increases the chance of tumor cell seeding to the stoma site and the risk of bacterial translocation causing peristomal infection. In addition, manipulation around the laryngeal or hypopharyngeal area with tumor growth can cause edema, further compromising the airway.

Third, the pass of the gastroscope can be very difficult in an area with extensive tumor mass or major postoperative anatomical changes. Technical details about how to avoid some of these problems will be discussed under the chapter “Placement routes of PEG”.

Last but not least, gastroscopy causes discomfort for the patient unless carried out in general anesthesia.

In sum, the second pass of the gastroscope during the "pull" or "push" method basically increases the risks of the above-mentioned problems. Though "introducer" method allows single gastroscopy, this technique is time consuming, technically more demanding, and increases the chance of some major procedure-related risks and complications (42). Thus, it is not in a routine clinical use.

In order to keep the advantages and to eliminate the disadvantages of the different PEG methods, the author has introduced a novel technical
modification. In this method a "pull-back" or "push" type PEG is inserted in a
traditional fashion but instead of the second per oral gastroscopy, a flexible
laryngofiberscope is passed via the inserted feeding tube to provide the option
for a "second-look" (45,46). Please refer to appendix 5, 6, and 7, regarding
technical details and clinical use of "transtubal" laryngofiberscopy.

There are some studies suggesting that the second pass of the gastroscope
can be omitted when "pull-back" or "push" methods are used (47,48). Certainly, in straight forward cases, with experience of the physician, the
correct position of the inserted PEG tube can be judged either by finger
palpation of the internal bumper or by checking the centimeter markings on
the feeding tube. However this lacks the more reliable visual control of the
correct position of PEG tube, and of the possible complications, such as
hemorrhage. Even these studies emphasize the importance of "second-look "
gastroscopy in obese patients, in patients with previous gastric surgery or if
there is any doubt in the mind of the endoscopist, regarding complication or
inadequately placed PEG tube. Author thinks that the thickness of the
abdominal wall shows individual variations, thus relying on the centimeter
markings of the feeding tube or finger palpation of the internal bumper, to
guess the correct position of the tube needs experience. Yet, adjusting the
appropriate tightness of the PEG tube is important, as too tight tube can
cause cellulites and later peristomal leakage. On the other hand, too loose
tube can lead to peritonitis (49; 50) Moreover, "second look" endoscopy also
stands for excluding complications. Probably due to these reasons most of the
"pull-back" and "push" methods are carried out with a "second
look" gastroscopy worldwide. "Transtubal" fiberscopy can play a role in
checking the correct position of the feeding tube and in excluding complications. It can be performed in most cases when otherwise a second per oral gastroscopy is planned. In addition, it is also worth reflecting on the possibility, that “transtubal” access to the gastrointestinal tract by flexible scopes might provide a diagnostic or therapeutic tool for the physicians in the future. However, at this time, this is just a speculative idea.

ALTERNATIVE TECHNIQUES FOR CREATING GASTROSTOMIES

There are several other options to create gastrostomy for patients with head and neck cancers, who are not fit for gastroscopy due to different reasons (e.g. extensive obstructing tumor mass) (table 1). Percutaneous radiologic gastrostomy (PRG) is one of the most commonly used for creating gastrostomy for patients with head and neck cancer. Detailed discussion about these possibilities is beyond the scope of this PhD.
Advantages and disadvantages of various PEG methods in head and neck cancer patients

<table>
<thead>
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<th>PEG TECHNIQUES</th>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
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| “pull-back” or “push” PEG with second-look gastroscopy | • relatively easy procedure  
• quick | • double gastroscopy  
• increased procedure-related risks and complications  
• increased risk for bacterial translocation and tumor cell seeding  
• double discomfort |}
| “introducer” PEG | • single gastroscopy  
• direct insertion of the feeding tube | • technically demanding  
• extra gastric punctures (T-fasteners)  
• higher complication rate  
• time consuming |}
| “pull-back” or “push” PEG with single pass of gastroscope without second-look | • easier  
• shorter procedure  
• no second per oral gastroscopy | • no second look, no chance to exclude disposition of tube or any complication  
• more experience needed for positioning the feeding tube |}
| “pull-back” or “push” PEG with single pass of gastroscope with “trans-tubal” fiberscopy for second-look | • option for second-look  
• less discomfort for patient  
• decreased gastroscopy-related risks and complications | • additional scope needed  
• additional experience needed |}

Table 3.
PLACEMENT ROUTES OF PEG

The route of introducing the gastroscope into the stomach is one of the crucial points of PEG procedures in head and neck cancer patients. Mainly, percutaneous endoscopic gastrostomy is carried out by passing both the gastroscope, and the feeding tube through the oral cavity. However, one of the main hurdles for creating endoscopic gastrostomy in patients with head and neck cancers is the presence of the tumor mass that hinders the easy introduction of the gastrostomy to the stomach. Tumors can block the way for gastroscopy either by narrowing the passage or by causing trismus, hemorrhage, edema or severe pain. To overcome such problems one can use pediatric or ultra-thin gastrosopes (51, 52). In other cases it can be very challenging for the gastroenterologist to find the way down to the stomach by a flexible scope among massive tumor growth. Kleinsasser’s rigid direct laryngoscopy and the experience of ENT surgeon, who is familiar with the location and extent of the cancer, usually proves to be a good help, maneuvering the gastroscope into the esophagus (53). When the tumor mass is located in the oral cavity and causes obstruction or trismus, transnasal pass of both the gastroscope and feeding tube provides a solution (54;55). In the latter two methods, I have to point out the pioneering work of my Hungarian colleagues, Taller et al. One of the complications, which can occur after major head and neck surgery, is the formation of cervical pharyngo-cutaneous fistula. Beside others, this is the result of narrow pharynx caused by postoperative anatomical changes or irradiation-induced fibrosis. None of the conventional techniques would allow endoscopic placement of gastrostomy.
feeding tube due to the narrow alimentary tract. However, author described and carried out PEG via the cervical fistula for such cases, avoiding the need for open gastrostomy (56). Please refer to Appendix 4 for details.

In case, the tumor is so extensive that hinders any type of endoscopy and the patient is scheduled for surgical resection, an ideal option is intraoperative PEG. After resection of the cancer, PEG can be inserted directly into the pharynx or esophagus through the opened operative field (39,57-60) {Appendix 1, 2, 3} (Table 4).

<table>
<thead>
<tr>
<th>PLACEMENT ROUTES OF PEG</th>
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<tr>
<td>1. Per oral with standard-size gastroscope</td>
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<tr>
<td>2. Per oral with pediatric / ultra-thin gastroscopes</td>
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<tr>
<td>3. Per oral-with assistance of Kleinsasser’s rigid laryngoscope</td>
</tr>
<tr>
<td>4. Trans-nasal</td>
</tr>
<tr>
<td>5. Via cervical fistula</td>
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<tr>
<td>6. Trans-cervical during head and neck surgical procedure (intraoperative)</td>
</tr>
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</table>

Table 4

The method of intraoperative PEG is detailed in Appendix 1.
TIMING OF PEG

Patients with head and neck malignancies are usually malnourished. Early nutritional support has a positive impact on the therapeutic outcome. Thus, timing of PEG is crucial in the nutritional and effective management of head and neck cancer patients. The use of percutaneous endoscopic gastrostomy and its timing should be considered individually based on the tumor’s extension, localization, the therapeutic plan, the possible outcome, and the expected life span of the patient. The experience of the treating physician is needed to evaluate all these factors in order to make the correct decision regarding when and how to create gastrostomy. Generally, PEG can be inserted prior to the definitive surgery, during the surgery or after the surgery. So, we can speak about pre-, intra or postoperative insertions. Other PEGs are the non-surgical cases, for those receiving either curative or palliative radio- and/or chemotherapy or any other form of palliation.

Preoperative insertion has the great advantage of early nutritional supplementation. As most of the head and neck cancer patients undergo staging panendoscopy and biopsy, it appears reasonable to insert PEG, if needed, at the same time in general anesthesia. It not only avoids an additional operative event for the patient, but also carries less procedure-related morbidity. There are reports suggesting higher incidence of acute cardio-vascular incidence during PEG insertion in local anesthesia for patients with head and neck cancers (61:62) and also higher rate of perioperative PEG complication, if PEG is inserted before the tumor is resected (60). Beside the usual co-morbidities, the airways of these patients are often compromised by
the tumor. General anesthesia with a secured airway by endotracheal intubation provides preferable protection during the PEG procedure in advanced malignancies. On the other hand, preoperative PEGs have numerous disadvantages. Extensive tumors can block the passage of the gastroscope and the risk for tumor cell seeding to the gastrostomy site is higher. In addition, the procedure related morbidity and the risk for any cardiovascular event during the procedure is reported to be higher in preoperative insertions, if done in local anesthesia (60,62). Any arising complication due to PEG, can delay the time of definitive surgery. Last but not least, surgeon needs much more experience to decide at this early stage of management, whether patient really needs a gastrostomy (Table 5).

Intraoperative PEG means that, the endoscopic gastrostomy is carried out via the opened pharynx immediately after the surgical resection of the tumor mass. Unimpeded passage of the gastroscope and feeding tube, no chance of tumor cell seeding and the lack of additional discomfort for the patient, are all in favor for intraoperative PEG. The risk for complications is reduced due to the protected airway by general anesthesia (60). Yet, drawbacks of intraoperative PEG are the extra time needed, and special preparation required providing sterility (Table 5). Percutaneous endoscopic gastrostomy should not be indicated in the early postoperative period, as it is risky to pass the gastroscope and the feeding tube through a fresh surgical field with e.g. tenuous hypopharyngeal closure.
ADVANTAGES AND DISADVANTAGES OF PEG TIMING

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<th>Advantages</th>
<th>Disadvantages</th>
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<tr>
<td><strong>Preoperative</strong> PEG</td>
<td>• Early nutritional supplementation&lt;br&gt;• General anesthesia • less morbidity&lt;br&gt;• Avoids additional surgical event for patient, if done along with staging endoscopy</td>
<td>• Higher risk for tumor cell seeding&lt;br&gt;• Higher complication rate&lt;br&gt;• Large tumors can obstruct way for gastroscopy&lt;br&gt;• PEG complication can delay time of definitive surgery&lt;br&gt;• More difficult to set up correct indication for PEG</td>
</tr>
<tr>
<td><strong>Intraoperative</strong> PEG</td>
<td>• Free passage for gastroscope and feeding tube&lt;br&gt;• No tumor cell seeding&lt;br&gt;• Less PEG-related complication&lt;br&gt;• No additional discomfort for patient</td>
<td>• Special care needed for draping and sterility&lt;br&gt;• Overall surgical procedure is longer</td>
</tr>
<tr>
<td><strong>Postoperative</strong> PEG</td>
<td>• Easier to set up correct indication for PEG</td>
<td>• Delayed nutritional supplementation via PEG&lt;br&gt;• Additional surgical event for the patient</td>
</tr>
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Table 5.

Nasogastric tube is inserted during the surgery in most of these cases, anticipating that, the patient will regain the ability of normal per oral feeding and swallowing after the healing takes place. If this fails for any reason, and
the patient needs nutritional supplementation longer than 4 weeks, it is recommended to change nasogastric tube to gastrostomy. Indication for PEG is obvious in such cases. However postoperative PEG means an additional surgical intervention with extra discomfort for the patient [Table 5]. Certain complications after major head and neck surgery and the altered anatomy caused by the ablative surgery can make PEG insertion difficult. It would be desirable to indicate preoperative or intraoperative PEG in the first place to patients, whose tumor location, extension, and the type of operation, allow the surgeon to anticipate the need for long-term nutrition.

SPECIFIC INDICATIONS FOR PEG IN HEAD AND NECK CANCER

The most important challenge for surgeons performing PEG placement is good patient selection. Patients undergoing resection of advanced-stage head and neck cancers often require weeks to months of rehabilitation before normal deglutition is achieved. This delay may be related to decreased oral competence due to resection of tissues needed for normal swallowing (e.g. tongue base), bulky reconstructive tissues, cranial nerve damage, or a combination of these factors. This delay of normal per oral feeding can be particularly prolonged by the side effects of postoperative radiotherapy. In order to set up a correct indication for PEG insertion in patients undergoing major head and neck surgeries, all the head and neck cancers treated in our ENT department in the last 7 years were worked up.

25
PATIENTS AND METHODS

1325 malignant head and neck cancer patients were treated as inpatients in the University of Pécs, Medical School, ENT Department between 7th of January 1997 and 31st of December 2003. 1325 patients had 2125 hospital admissions over the 7-year-period. 177 (13%) patients were females and 1148 (87%) were males (chart 1).

Malignant tumours of males and females

females (# 177)
13%

males (# 1148)
87%

Chart 1

The average age for females was 53 years (range 21-90 years) while it was 45 years (range 17-93 years) for males. Of the 177 female patients 76 (43%) had laryngeal-, 14% had hypopharyngeal- and 7% had tonsillo-lingual cancers (chart 2a and 2b).
446 (39%) laryngeal-, 209 (18%) hypopharyngeal-, and 104 (9%) tonsillo-lingual cancers were diagnosed among the male patients with head and neck malignant tumors (chart 3a and 3b). The distribution of tumor sites was almost identical among the males and females (chart 4).
Tumor sites in percentage (females)

Chart 2b

Tumor sites in male patients

Chart 3a
Tumor sites in percentage (males)

Chart 3b

Tumor sites (males & females)

Chart 4
Overall, 41% of the patients were treated with surgery, 10% with radiotherapy, and 10% with combination of surgery and radiotherapy. 30% underwent diagnostic procedures only, and the remaining 9% was admitted to the hospital for other reasons, such as e.g. palliation (Chart 5a and 5b).

**Treatments of tumor patients (females)**

![Chart 5a](image)

Chart 5a

Out of the 1325 patients with head and neck cancer, 676 patients had surgery (Chart 5a and 5b). 23 different surgical procedures were performed on 834 occasions. The type and nature of the surgical procedures made it necessary in 559 cases, to insert a nasogastric tube or to create a gastrostomy for the recovery period. Unfortunately, missing and inaccurate data were only available regarding the exact number of nasogastric tube inserted and the time they were used, during the course of treatment in the different subgroups of oncology patients.
Chart 5b

Number of PEG procedures, timing of insertions, feeding days and replacements

115 percutaneous endoscopic gastrostomies were carried out on 98 head and neck cancer patients in the University of Pécs, Medical School, ENT Department between 7th of January 1997 and 31st of December 2003. The average age was 62 years (range 48-76 years) for female and 54 years (range 31-78 years) for the male patients. 73 PEGs were performed in 59 patients in the postoperative period 5 patients (6 PEGs) had preoperative, and 10 patients (11 PEGs) had intraoperative PEG insertions. One patient each had PEG inserted twice from the preoperative and intraoperative groups.
The second PEG procedure took place postoperatively in both cases. 25
PEGs (24 patients) were carried out as part of palliative treatment to provide
nutritional support (Table 6). “Pull back” technique was used for PEG
insertion, except for two cases of “push” technique. See details of the insertion
technique under the chapter of “Insertion methods of PEG”

The insertion was performed either in general anesthesia or in sedation
(Appendix 4). The assistance of a rigid laryngoscope was used, whenever
difficulty was encountered during the introduction of the gastroscope.
“Second-look” endoscopy was always performed, either per orally, or via the
inserted PEG feeding tube (Appendix 5, 6, 7). PEG feeding was started
gradually 12-24 hours after insertion, if postoperative assessment showed no
signs for bleeding or leakage at the PEG site.

RESULTS

The average number of feeding days through PEG was 307 in the
postoperative group. This value was calculated from results of 66 PEGs, as
the data were missing in 7 cases. The shortest duration of PEG feeding was 6
days, while the longest was 2403 days. Postoperative PEG insertions took
place 84 days in average (range 4-283 days) after the definitive surgical
resection. The mean PEG feeding duration was 316 days (range 40-534 days)
in the intraoperative group and it was 81 days (range 10-143 days) in the
preoperative group. 24 patients had PEG as part of palliative therapy. The
mean PEG feeding days in this group was 142 days (range 5-554 days)
(Table 6).
In 10 postoperative patients the PEG had been permanently removed after 243 days in average (range 62-581 days), as adequate swallow function returned. In one preoperative case. PEG was removed on day 10 and in one palliative case on day 15, due to subsequent complication (Table 9). 11 patients had PEG insertion more than 1 time. PEG was change 4 times respectively in two patients, 3 times in another two patients and twice in 7 patients (Table 6). Complication was the reason for PEG replacement in 12 cases. 5 PEGs were removed as adequate per oral feeding returned, but later PEG had to be reinserted due to e.g. recurrence of tumor.

<table>
<thead>
<tr>
<th></th>
<th>No. of patients</th>
<th>No of PEG insertion</th>
<th>No of patients with multiple PEG insertions</th>
<th>Duration of PEG feeding (days)</th>
<th>Missing data (cases)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postoperative group</td>
<td>59</td>
<td>73</td>
<td>8</td>
<td>307 (6-2403)</td>
<td>7</td>
</tr>
<tr>
<td>Intraoperative group</td>
<td>10</td>
<td>11</td>
<td>1</td>
<td>316 (40-534)</td>
<td>4</td>
</tr>
<tr>
<td>Preoperative group</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>81 (10-143)</td>
<td>3</td>
</tr>
<tr>
<td>Palliative group</td>
<td>24</td>
<td>25</td>
<td>1</td>
<td>142 (5-554)</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 6

*Tumor sites and types of surgical procedures*

20 tonsillo-lingual-, 7 tongue base-, 2 tongue-, 5 sublingual-, 10 supraglottic-, and 7 hypopharyngeal cancers were diagnosed in the surgical groups with PEG. 16 cancers involved multiple sites and 7 were localized elsewhere (Chart 6). 13 of the 16 multiple site cancers involved the tongue base along with other sites such as supraglottic area, mesopharynx or hypopharynx. The
"others" group represented 3 mesopharyngeal, 2 trans-glottic, 1 parotid and 1 maxillary tumor.

**Tumor sites and surgeries of PEG patients**

In total, 47 patients had cancers involving muscles responsible for tongue movement. Of the 74 patients in the surgical group, 36 had pectoralis major myocutaneous flap-, and 4 had radial forearm free flap reconstruction after radical resection of the tumors. 16 patients underwent horizontal supraglottic resection of the larynx. 6 of these cases also had tongue base involvement. In
18 cases, the tumors were resected radically without flap reconstruction. 8 surgical resections in this group also involved the muscle of the tongue and in 5 cases significant portion of the meso-hypopharynx were resected. Involvement of hypopharynx by cancer was found in 16 surgical cases. (Table 7).

<table>
<thead>
<tr>
<th>Tumor</th>
<th>No surgery</th>
<th>PMMF + Radial forearm flap</th>
<th>Horizontal supraglottic laryngectomy</th>
<th>Radical surgery without flap</th>
</tr>
</thead>
<tbody>
<tr>
<td>tonsillo-lingualis</td>
<td>5</td>
<td>15, 3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>radialis linguae</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>linguae</td>
<td>1</td>
<td>2, 2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>sublingualis</td>
<td>0</td>
<td>2, 1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>laryngis supraglotticus</td>
<td>0</td>
<td>2, 1</td>
<td>1, 3</td>
<td></td>
</tr>
<tr>
<td>hypopharyngis</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>1, 3</td>
</tr>
<tr>
<td>Larynx + rad. ling</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypoph + rad. ling</td>
<td>4, 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meso-hypoph. + larynx</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Black numbers: postoperative group; < numbers: intraoperative group; little numbers preoperative group; green numbers: palliative group.

PMMF: Pectoralis major myocutaneous flap; Rad. ling.: tongue base; Hypoph.: hypopharynx; Meso-hypoph.: mesopharynx-hypopharynx.

Table 7.

**General anesthesia, antibiotic prophylaxis, complications**

Percutaneous endoscopic gastrostomy insertions took place under general anesthesia in 33 cases (Table 8). The rest was performed in local anesthesia (few puffs of 10% Lignocain spray) with or without sedation. Antibiotic was given to all patients in the preoperative and intraoperative group. Single dose antibiotic prophylaxis was used in 50 postoperative and in 14 palliative PEG procedures respectively. Most often, antibiotic was chosen from the cephalosporin group. Antibiotics were not routinely administered to patients needed PEG replacement.
<table>
<thead>
<tr>
<th></th>
<th>Laryngoscopy assistance</th>
<th>General anesthesia</th>
<th>Antibiotic prophylaxis</th>
<th>Complications Procedure-related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postoperative group (75 PEGs)</td>
<td>1</td>
<td>11</td>
<td>50</td>
<td>10 (2 AB)</td>
</tr>
<tr>
<td>Intraoperative group (10 PEGs)</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Preoperative group (5 PEGs)</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Palliative Group (25 PEGs)</td>
<td>4</td>
<td>8</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>33</strong></td>
<td><strong>79</strong></td>
<td><strong>10 (8.77%)</strong></td>
</tr>
</tbody>
</table>

2 AB: Two patients received antibiotic prophylaxis; 1 AB: one patient received antibiotic prophylaxis.

Table 8

We experienced complications in 20 instances. “In-use” complications were dislodgement, fracture, and blockage of the feeding tube. Displacement and deterioration of the tubes occurred in 10 cases after a mean of 351 days (range 6-594 days). All 10 tubes were replaced. Peritonitis, peritubal leakage and wound infection were noted, among the procedure-related complications. 2 PEGs had to be removed for good and 2 needed replacement. Each patient with complication was put on antibiotic therapy. The rate of procedure-related complication was 8.77%, while the overall complication rate was 17.54%. 36 PEG insertions were performed without antibiotic coverage while 79 were covered. Of the 36 PEGs, with no antibiotic prophylaxis 7 complications were noted versus the 3 among the 79 covered with antibiotics (19.44% vs. 3.79%). This was significant difference (CHI square test P<0.006). No complication was found in the intraoperative group. They all received antibiotics (Table 8). Four patients in the palliative group died within two weeks after PEG insertion. None of the deaths were related to the procedure.
Always "pull" method was used to insert PEG, except for two cases with "push" technique. The introduction of the gastroscope into the stomach required the assistance of a Klænessen’s laryngoscope in 4 preoperative, 4 palliative and 1 postoperative case. PEG was inserted once via a cervical pharyngo-cutaneous fistula (Appendix 4). “Second-look” endoscopy was performed by a laryngofiberscope via the feeding tube in 12 instances (Appendix 6).

Outcome and mortality

On 31 December 2003, 52 (53%) patients were dead and 30 (31%) were alive. No data were available in 16 cases. 26 patients were using PEG for feeding out of the 30 still alive. 4 patients had their PEGs removed permanently due to return of adequate per oral feeding (Table 9). Death occurred within 2 weeks of PEG insertion in 4 palliative cases. None of the deaths were related to the PEG procedure. 48 patients died with their PEG still in place, while 4 had it removed earlier (Table 9).
<table>
<thead>
<tr>
<th>Postoperative group</th>
<th>PEG removed Died</th>
<th>PEG removed Alive</th>
<th>PEG removed No data</th>
<th>Died with PEG</th>
<th>Alive with PEG</th>
<th>Alive with PEG No data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>23</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>Intraoperative group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td></td>
<td>5</td>
<td>1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Preoperative group</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Palliative Group</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>17</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td></td>
<td>4</td>
<td>26</td>
<td></td>
<td>13</td>
</tr>
</tbody>
</table>

Table 9

**DISCUSSION**

Majority of patients with head and neck malignancies need artificial nutrition during the course of their disease. Nasogastric tube is sufficient for short-term (less than 4 weeks) nutritional support, however for long-term, percutaneous endoscopic gastrostomy is favored. The type of surgery, the tumor site, the extension, and the therapy determines the possible need for long-term feeding. These factors were studied in our oncology patients in order to define indication for PEG in head and neck surgical cases. The focus of our attention was on tumor site and surgical procedures that hinder swallowing the most. Swallowing is a complicated integrated process whereby a variety of different muscles and many nerves, somatic and visceral, afferent and efferent, are involved. The food is transferred from the oral cavity to the stomach and at the same time, prevention of aspiration is necessary. The intrinsic and extrinsic muscles of the tongue play a crucial role in both the oral and pharyngeal phase of swallowing. Good coordination of muscle contraction, tongue mobility and lingual propulsion are essential for proper function. Besides, coordinated and timed movement of the anatomical structures of the
supraglottic area is needed for airway protection. Thus, it is not surprising that tumors and consequent surgeries on these structures effect temporarily or permanently the swallowing capability of the patients.

_Indication for PEG in head and neck surgery_

The tumor registry and inpatient charts of patients hospitalized for treatment of head and neck cancers at Pécs University, Medical School, ENT Department were retrospectively examined. From January 1997 through December 2003, 1148 male and 117 female patients were admitted with head and neck malignancies. 23% of primary tumors involved the tongue and its muscles. Out of the 676 patients who underwent surgery, the resection involved the tongue, the tongue base or the tonsillo-lingual region on 187 (28 %) occasions.

82 times pectoralis major myocutaneous flap and 19 times radial forearm free flaps were used for reconstructions. These flaps were utilized 87 times to reconstruct the excision site of the tongue-base, sublingual, or tonsillo-lingual regions. 69 (79%) of the patients who underwent such surgeries needed tube feeding more than 4 weeks in the postoperative period.

Among the 74 patients with percutaneous endoscopic gastrostomy in the surgical groups, 47 (64%) had tumors involving the muscular structure of the tongue and tongue base. The ratio was somewhat less in the non-surgical, palliative group (10 out of 24 patients, 42%).

40 (54%) patients underwent pectoralis major myocutaneous flap, or radial forearm flap reconstructions after radical excision of their malignancies (Table
7a and 7b) Tongue involvements by the tumor or the need of musculo-cutaneous skin flaps for reconstruction seem to be important indicators for possible poor swallowing capability in the postoperative period. Either or both of these factors were present in 73% of all the surgical case and 80% in the postoperative group.

Supraglottic region also plays important role in the mechanism of deglutition and airway protection against aspiration. In our study, 6% of all head and neck oncology patients had supraglottic laryngeal malignancies. In the 7-year period, 47 horizontal supraglottic resections were performed, all requiring postoperative tube feeding. Out of the 47 supraglottic horizontal laryngectomies 16 (34%) had percutaneous endoscopic gastrostomy tube inserted for long-term nutritional support. The cancer was localized in the supraglottic region in 10 cases, and it also involved the base of tongue in the remaining 6. Among all the patients with PEG in our postoperative group, 16 (30%) underwent horizontal supraglottic laryngectomy previously.

16 patients in the surgical groups had tumors involving the hypopharynx. Due to the large extension of the tumor, 11 out of the 16 underwent radical surgical excision with skin flap reconstruction.

98% of the patients who needed PEG feeding in the postoperative period had radical excision of cancers in the tongue region with or without skin flap reconstruction, or underwent supraglottic horizontal resection. The same figure was 86% among all the patients in the surgical groups receiving PEG (Chart 7a and 7b).
No. of patients with PEG

Tu. ling. horizont

PMMF

Postoperative group

Chart 7a

No. of patients with PEG

Tu. ling. horizont

PMMF

Surgical groups

Tu. Ling.: Tongue cancer; Horizont: horizontal supraglottic laryngectomy; PMMF: Pectoralis major myocutaneous flap or radial forearm free flap

Chart 7b
Excision of tumors in the lingual, sublingual, tonsillo-lingual or tongue base regions, all influence and hinder proper swallowing function. The need for different types of musculo-cutaneous skin flaps, also indicate that the resection was large and extensive. Besides, these musculo-cutaneous skin flaps cannot play an active role in the swallowing function as do the tongue muscles, which they replace. They neither have muscle contracting capability nor innervations. The resection of the supraglottic region of the larynx also impairs proper deglutition and causes aspiration especially in elderly (63).

Based on our findings, we indicate PEG, if extensive surgical resection of the extrinsic tongue muscles needed, with skin flap reconstruction. Besides, we also noticed that there is a high risk for prolonged swallowing difficulties and aspiration in patients with supraglottic horizontal resections, especially if the tongue base also had to be resected due to tumor involvement. This finding is not surprising, and is a well-known consequence of horizontal supraglottic laryngectomy, both when using endoscopic transoral, or transcervical approach (64-66). In such cases patients often need nutritional support for 2 to 9 month (66).

Extensive resection of primary tumors in mesopharynx or hypopharynx can also result in swallowing problems. The primary goal of head and neck surgery is to achieve local tumor control, however this means in most of the cases that the surgical site can only be closed by recruiting different flaps for reconstruction. This increases the risk for cervical pharyngo-cutaneous fistula, prolongs healing and delays the return of normal deglutition.

In sum, I suggest the use of percutaneous endoscopic gastrostomy at the time of the definitive surgery under the same general anesthesia on patients.
undergoing extensive resection of tongue base with musculo-cutaneous flap reconstruction. Based on the experience acquired during our head and neck practice, we also advise PEG, if supraglottic horizontal laryngectomy is carried out with partial resection of the tongue base. Similar findings were reported by Gibson et al., recommending the routine preoperative placement of PEG in patients undergoing primary resection of advanced cancers in the larynx, pharynx, and tongue base (34). The third indication for PEG in our practice is when large portion of the mesopharynx or hypopharynx is required to be excised, with skin flap reconstruction (Table 10).

**Indication for PEG in head and neck surgery**

- Extensive resection of the extrinsic muscular structure of the tongue, with skin flap reconstruction.
- Supraglottic horizontal laryngectomy, with partial resection of tongue-base.
- Extensive resection of mesopharynx or hypopharynx with skin flap reconstruction.

Table 10

**Timing of PEG procedure**

From nutritional point of view, it would be ideal to perform PEG in the preoperative period. In addition, inserting PEG during staging endoscopy under general anesthesia is safer, carries less procedure-related
complications and more comfort for the patients. On the other hand, beside some disadvantages (Table 5), several other problems make preoperative PEG insertions impossible. At the time of staging endoscopy, no histology is available. Patient is informed about his or her disease only after the histology result confirms cancer. Usually, team of doctors (head and neck surgeons, oncologists, radiotherapists) set up the appropriate therapeutic plan, after all the necessary reports (CT, MRI, histology, endoscopic findings etc.) are available. The suggested therapy determines the possible later need for artificial feeding. Moreover, patient needs to agree and consent the planned surgery. All the above issues are difficult to resolve in the early stage of patient care, thus the preoperative percutaneous endoscopic gastrostomy has limited use. This explains the low number of cases in our preoperative group. The insertion of PEG in general anesthesia at the time of the definitive surgery eliminates these problems. Intraoperative placement of percutaneous endoscopic gastrostomy has few negligible disadvantages besides numerous benefits (Table 5). The fact that, it is in general anesthesia and the insertion takes place after excision of the cancer, allows a safe and obstacle-free introduction of gastroscope and PEG tube. Often, in head and neck cancers, this is the only way to carry out endoscopic gastrostomy as the tumor mass blocks the passage to the stomach. It has also been shown that placing the PEG tube during the surgery after tumor removal had low complication rate. Studies also revealed that the recovery of oral feeding and the healing of the resection site are faster, if PEG is used instead of nasogastric tube (60). In our series, 10 PEGs were inserted intraoperatively, after excision of the cancers. In 7 cases this was the only way to perform endoscopic gastroscopy.
as tumor mass obstructed the way. In all of the 10 intraoperative cases, we anticipated prolonged inability to take adequate oral nutrition following surgery. This anticipation was based on the extension and site of the original tumor, and the type of surgery planned. The mean value of 316 PEG feeding days in the intraoperative group supported, that our presumption was correct. PEG was inserted most often in the postoperative period for patients with sustained swallowing problems. PEG procedure took place 84 days in average (range 4-283 days) after the definitive surgery. This basically means that patients were fed through nasogastric tube almost for a mean of three months following surgery. Indicating PEG in such cases is obvious, however our aim should be to select these patients preoperatively and to provide PEG early. Better quality of life could have been achieved by appropriate preoperative patient selection. Based on our experience, findings and comprehensive evaluation of the results of the postoperative insertions, we were able to define the primary tumor sites, types of surgeries that most often lead to impaired deglutition (Table 10). 80% of the patients in the postoperative PEG group had radical excision of cancers in the tongue region with or without musculo-cutaneous flap reconstruction. Though some cases overlap with the previous category, 30% of the patients underwent horizontal supraglottic laryngectomy, and 30% had tumor mass involving the hypopharynx (Chart 7a, and Table 9). The mean feeding period via PEG was 307 days in the postoperative group. This also underlines that patients with the above tumor sites and surgeries often need long-term nutritional support. 24 patients had PEG inserted as part of palliation. The role of PEG in the palliative care of demented people is the core of discussion in some
publications (67) (68). It is not questionable, that PEG is not indicated for patients with rapidly progressive and incurable disease. However, life expectancy can be hard to predict in head and neck cancer patients. PEG has no benefit compared to NGT in a short-run. There is also no evidence that enteral feeding via PEG improves the quality of life in such patients. In our material, the mean PEG in-use time during palliative care, was 142 days (range 5-554 days). Though, it was less than 4 weeks in 5 cases, the rest of the patients had a definite benefit from PEG feeding. In our practice, the same basic principle applies for patients on palliation as for any other surgical cases, meaning that PEG is indicated, if the expected time for assisted feeding exceeds 4 weeks.

Procedure failures, complications, antibiotic prophylaxis, general anesthesia

The literature cites approximately 5% failure rate for inserting PEG both in demented and head and neck cancer patients (69; 70). Most of the time, unsuccessful gastroscopy and the inability to transilluminate the stomach are the causes of failure. We were unable to perform percutaneous gastrostomy twice in our practice. In one case, we failed to achieve trans-illumination of the abdomen on a patient with previous gastric surgery. In the other, we could not pass the gastroscope through the narrow pharynx, developed after surgery and radiotherapy. However, it is worth reflecting on the fact, that we conducted a careful patient selection before the PEG procedures. The relative and absolute contraindications of PEG are listed in Table 11.
Contraindications of PEG

Absolute contraindication

- Inability to transilluminate the gastric and abdominal wall
- Failure of adequate identification of the proposed PEG site with finger
- Limited life expectancy
- Inability to pass the gastroscope through the oesophagus
- Peritonitis
- Gastric outlet obstruction

Relative contraindication

- Massive ascites
- Coagulopathy
- Portal hypertension
- Peritoneal dialysis
- Hepatomegaly
- Large hiatal hernia
- Morbid obesity
- Prior subtotal gastrectomy
- Anorexia nervosa
- Neoplastic, inflammatory, infiltrative diseases of gastric wall
- Ongoing immunosuppression
- Heus

Table 11

Percutaneous endoscopic gastrostomy complications are usually divided into two categories, major and minor. However, there is a mix up in the literature, sorting these complications into either category. My view is that, even a minor complication, such as peristomal leak can be symptom-free for some patients, while it can progress to severe infection in others. I listed in Table 12 the complications found on Internet since 1997.
COMPLICATIONS OF PEG

- Peritonitis (72)
  - Bleeding from gastrostomy site (30) (81)
- Aspiration (71)
- Peristomal leakage (71)
- Buried bumper syndrome (82)
- Gastrojejunal- (83), gastrocolic- (84), cologastric- (85), or colocutaneous fistula (86)
- Respiratory distress (72)
- Oesophageal perforation (72)
- Wound infection (87)
- Necrotizing fasciitis (88)
- Gastro-oesophageal reflux (89)
- Peritoneal leakage (90)
- Device dislodgement (91)
- Large-bowel perforation, obstruction (92)
- Bronchooesophageal fistula (93)
- Pneumoperitoneum (94)
- Gastric outlet obstruction (95)
- Metastasis to gastrostomy site (96) (97)
• Pharyngeal injury (98)
• PEG tube migration (99)
• Gastric wall haematoma (100)
• Transverse colon injury (101)
• Retroperitoneal hemorrhage (102)
• Aortic perforation (103)
• Gastric ulcer (104)

Table 12.

The mortality of PEG is around 1-2 %, and the morbidity rate is around 3-15 %. Peritonitis, hemorrhage, buried bumper syndrome, and gastrocolic fistula used to be cited as major complications of PEG, whereas wound infection, peristomal leak, hematoma are usually listed among the minor complications. Major complications occur in approximately 3 % in large series (30; 71). Minor problems are noted in 5-15% of PEGs (72-74). Complications can also be divided into “in-use” or “procedure-related”. “In-use” complications include problems such as feeding tube blockage, fracture, dislodgement, and detachment of bumpers or deterioration of the tube. In our series we needed to change the PEG 10 times due to “in-use” reasons. 7 times the tube dislodged, 2 times it fractured, and once blocked. These events happened 351 days in average (range 6-594 days) after PEG insertion. “Procedure-related” complications were supposed peritonitis, peritubal leak, and wound infection. We noticed peritubal leakage on 4 occasions with clinical symptoms of infection. The onsets of symptoms were on day 3, 6, 37, and 149. All the
patients were put on systemic antibiotic therapy along with H-2 blockers. Enteral feeding was suspended for few days. Zinc paste was applied locally, to prevent maceration of the skin. Three times drainage bag was necessary to collect the discharge. In the case, where we noted peristomal leak on day 149 after PEG insertion, we removed the PEG, and reinserted few days later when the infection subsided. All cases with peritubal leakage resolved within two weeks. Afterwards PEG feeding was continued for 97 days in average (range 58-123 days). Starting with pain around the stoma site and peritubal discharge on day 5 after PEG insertion, we noted severe abdominal pain, tenderness and distension in two cases. Patients also developed fever, nausea and fatigue. The abdomen was firm, with board-like rigidity around the stoma site. In these two cases we supposed the presence of local peritonitis. Same treatment was used as for peristomal leakage, but we were also compelled to remove feeding tubes. In one case this complication happened in the preoperative period, and delayed the definitive surgical procedure. This verifies our previous statement, that PEG at the time of the definitive surgical event is more favorable. Additionally, 4 times marked wound infections were noticed around the stoma site that developed 4, 4, 5, and 569 days after the PEG insertion. In all 4 cases local and systemic antibiotic treatment was started. PEG was also changed in the last case.

To reduce the incidence of peristomal leak, “second-look” gastroscopy or “trans-tubal” fiberscopy are important for checking the tightness of the feeding tube at the time of insertion. The inner bumper of the feeding tube should be relatively tight in the first few days but later should be loosened. Too loose adjustment can lead to pneumoperitoneum or peritonitis, whereas too tight
can cause cellulites or peristomal leak by pressure necrosis of the gastric wall. We faced no complication among intraoperative PEG patients.

Four patients in the palliative group died within two weeks after PEG insertions (day 5, 5, 7, and 13), of causes unrelated to the gastrostomy tube insertion. The overall procedure-related complication rate was 9.77%. This compares favorably with the results found in the international literature (75).

At the beginning, antibiotic prophylaxis was not routinely used for our PEG procedures, but later we found it useful to prevent wound infections. 36 PEG insertions were performed without antibiotic coverage, while 79 patients received antibiotics, either for prophylaxis or for treatment. Usually, antibiotics from the cephalosporin family were chosen. Of the 36 PEGs, with no antibiotic prophylaxis 7 complications were noted versus the 3 among the 79 done under antibiotic coverage (19.44% vs. 3.79%). This was significant difference (CHI square test P< 0.006). No complication was found in the intraoperative group. They were all covered by antibiotics (Table 8). The use of perioperative antibiotics seemed to be an important factor in minimizing intra-abdominal infections, as well as preventing local exit site infections. The significantly reduced rate of infection among those receiving antibiotics, is similar to the findings, reported in the literature (76-78). We recommend the use of antibiotic prophylaxis as a general measure in percutaneous endoscopic gastrostomy.

One advantage of PEG compared to the surgical open gastrostomy, is that, it does not necessarily requires general anesthesia. This eliminates the risk of anesthesia-related complications, more cost effective (79,80) and less time consuming (33). PEG should be performed in local anesthesia whenever it is possible. However, several specific issues should be considered in head and
neck cancer patients. Firstly, obstructing tumors might impede the free pass of the gastroscope, necessitating the assistance of a rigid laryngoscope in general anesthesia. Secondly, PEG might be also safer to do on an intubated patient, if airway is compromised by the tumor mass. Thirdly, PEG can be inserted at the time of the tumor excision, as a planned procedure, which saves the patient from an additional surgical event. For such reasons, 33 PEGs were carried out under general anesthesia in our series (Table 8). We recommend to consider the above specific issues and to weigh carefully on individual basis the risk-benefit of general anesthesia, before performing PEG in head and neck cancer patients.

The relevance of different insertion techniques was discussed in the chapter of “Insertion methods of PEG”. Except for two “push” techniques, we mainly used “pull-back” insertion method. “Second-look” gastroscopy was always performed for checking the correct position of the inserted feeding tube. In 12 cases “second-look” was achieved via the inserted feeding tube by a flexible laryngofiberscope (Appendix 5, 6, and 7).

In 9 cases, maneuvering the gastroscope to the esophagus was only possible by using a Kleinsasser’s type rigid laryngoscope. Direct visual control enabled us to guide the gastroscope manually through the tumor mass into the esophagus.

In one postoperative case, both the gastroscope and the PEG tube was lead through cervical pharyngo-cutaneous fistula (Appendix 4).
Outcome and mortality

In most of our patients, the decision to place PEG proved to be correct, as the majority of patients both in the surgical and palliative groups required enteral feeding on a long-term basis (Table 6). However, this is not surprising as most of the PEGs were inserted for patients, who already had permanent problem with per oral feeding. In 10 postoperative patients, PEG was removed permanently, as they had regained their ability of per oral feeding after 243 days in average (range 62-581 days). At the end of the study, 26 patients still used PEG for nutritional support. 47 patients expired of causes unrelated to the gastrostomy tube, with their PEG in situ at the time of death (Table 9).
1. Percutaneous endoscopic gastrostomy is advised for long-term enteral feeding in head and neck cancer patients.

2. The author recommends the use of percutaneous endoscopic gastrostomy in the first line, instead of nasogastric feeding tube for patients scheduled for the following surgeries:
   - Extensive resection of the extrinsic muscular structure of the tongue, with skin flap reconstruction.
   - Supraglottic horizontal laryngectomy, with partial resection of tongue-base.
   - Extensive resection of mesopharynx or hypopharynx with skin flap reconstruction.

3. PEG insertion is recommended at the time of the ablative tumor surgery in the same general anesthesia. If difficult gastroscopy is suspected due to massive tumor load, intraoperative PEG is advised.

4. "Second-look" gastroscopy should be performed for checking the correct position of the feeding tube and to exclude complications. The author recommends the use of his novel method ('trans-tubal' endoscopy), instead of the second per oral gastroscopy. A laryngofiberscope can be passed through the inserted PEG tube for adequate visual control.
5. Antibiotic prophylaxis is essential when performing percutaneous endoscopic gastrostomy in head and neck cancer patients. Antibiotic prophylaxis results in statistically significant reduction of the infectious complications.

6. PEG can be successfully performed via a cervical pharyngo-cutaneous fistula, if no other route is possible.
NOVELTIES

1. The author introduced for the first time, the use of percutaneous endoscopic gastrostomy for the management of patients with head and neck cancers in Pécs University, Medical School, ENT Department.

2. The author set up specific indications of PEG in head and neck cancer surgery, by working up the data of head and neck oncology cases treated in his department.

3. He detailed the procedure of intraoperative PEG. Emphasized the importance of timing the PEG procedure and recommended intraoperative PEG placement after careful patient selection, based on the specific indications, set up by him.

4. The author worked out and introduced first in the international literature a novel technique for "second-look". Instead of passing the gastroscope to the stomach second time when performing PEG procedure, a flexible laryngofiberscope is passed through the inserted feeding tube. Please refer to the text regarding the multiple advantages of this technique.
5. He published first in the international literature the possibility of performing PEG via a cervical pharyngo-cutaneous fistula formed after a major head and neck surgery.
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Perkután endoszkópos gastrosztomia: pre-, intra- vagy posztooperatív beültetés

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Kolozsvár 1998. 05.27.

Kulcsszavak: fej-nyaksebészeti, intraoperatív PEG, perkután endoszkópos gastrosztomia, posztooperatív PEG, preoperatív PEG

A szerzők a fej-nyaksebészeti daganatos betegek hosszantartó műtéteinek támogatására a hasznosítások száma helyett a perkután endoszkópos gastrosztomat (PEG) alapján felhívják a figyelmet a pre-, intra- és posztooperatív beültetés előnyeire és hátrányaire. Bevetik az intraoperatív PEG lényegét és jelentőségét.


BÉVEZETÉS

A rosszindulatú daganatos betegek testülycsökkenése közbemért, melynek kialakulása sajátos, nyomozó szerepet játszik. A csökkent tápanyagbevitel, a daganatos sejtek korlátlan tapanyag-, illetve energiafelhasználás és a különböző szervek folyamat hatása szintén fokozatosan a felhőre illetve kalória alultápláltság állapot. Az alultáplált méret is a daganatot következményeinek tartja. A nemzetközi irodalomban azonban egyéb szemponttal számos mérkőzés a betegi állapotának és az előfelfújt múltból fakadó kisfajta lánctúra, műanyag, vitamintartalmú, tumorfokoznál komolyabb esetekben működik változó előfelfújást (6). A tápanyagmellékletek változását követően hozzájárul a műanyag beültetéséhez. A tünetek és a működési ideje segíthet a regulációra az alultáplált állapot.

Klinikánkon a fejlények daganatos betegek mesterséges táplálása céljából 1997 elejétől vezettük be a percutan endoszkópos gasztroszómát.

**BETEGANYAG ÉS MÓDSZER**


Minden esetben CH 18-as Flocare PEG Set-et (Nutricia), használtunk, melynek beültetése "pull back" technika szerint, a cég által ajánlottaknak megfelelően történt. A gasztroszómia 19-szer helyi érzékelőkészéssel és 6-szer intratracheális narkoszban végzettük. A beavatkozás előtti rapon a betegen rendszeres szajbólégtést kezdünk Pilugoos oldattal, majd a beültetést megelőző órában 2.5 mg Dormicumot és 100 mg Comramdatt tartalmazó 0,9% NaCl i. v. infuziót adunk premedikációként. Percekkel az endoszkópe leveze tese előtt meg 2.5 mg Dormicumot adtuk i. v. illetve a szájnyálkahártya érzékelőkészére 10% Lidoceain spray-ből 3-4 befújást alkalmaztunk.

### I. táblázat

<table>
<thead>
<tr>
<th>beteg</th>
<th>kor év</th>
<th>tumor helye</th>
<th>beavatkozások</th>
<th>máj- és PEG között eltelt napok</th>
<th>PEG napok</th>
<th>szövődmények</th>
<th>megjegyzés</th>
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</tbody>
</table>

### Intraoperatív inszerció

- Dop vh: 45 ° meso-hypoph. tu.exc.+PMMF

### Preoperatív inszerció

- H.J.: 57 cavum oris tu.exc.+PMMF 10 peritub. váladék használat, irrad
- Sz.I.: 51 mesopharynx tu.exc.+PMMF 31 ITN

### Palliatív

- L.J.: 44 cavum oris palliatív th. 7
- K.L.: 49 mesopharynx palliatív th. 82 irradicáció

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### Érdekmények

Az elmúlt években vezettek be a percután endoszkópos gasztrosztómia módszerét klinikákban. Elsősorban a más régóta mesterséges táplálásra szoruló betegeinket cseréltük ki a modern gasztrosztómia szondát PEG-re, ezért található nagyobb számú percután posztoperatív beültetés beteganyagunkban. Mindezt aláamásztják, hogy a máj- és a PEG beültetés között átlag 3 hónap telt el.

A posztoperatív csoportban 11 olyan betegnél alakult ki nyelési panasz, akiknél a tumor kiterjedése miatt a nyelv, nyelvgyök, szajlemez vagy lágyvasúpjád részleges rezelcéjára is szükség volt. A híntyútt posztoperatív major myocutan lebennél pótoltuk. Továbbá 6 esetben gégerezeket követően és két alkalommal nyelvgyökíre rezeckióval járt gőzcsomagolás után jött létre dysfagia. Ezen esetek egy részében is a kiterjesztett nyelvgyök rezeckió volt a nyelési nehézséget a felelős. A 6 parcialis gőzcsomagolás után kettő betegnél tapasztaltunk, hogy a modern gasztrosztómia szonda PEG-re való cseréjét követően, a már hónapok óta rossz nyelési
funkció napok múlva javult, mellyel párhuzamosan az arytájak ödémája is csökkent. Há-
rom betegnél a bevitásban történt a PEG. Egyik alkalommal, szajuregi sebревíza kapcsán
került sor a vitázasban a PEG beültetésére. A másik esetben horizontális gégercemés és ra-
dikális egyoldali blokk diszsecció után nem állt helyre kielégő nyelési funkció, így az első
művelet következő 6 hóig tervezett 30 mm-es radikális nyílás diszsecció alkalommal kezdő-
tuk el a gasztroszómát. Harmadszor gratifizálta kurettázás miatt altattuk a beteget.

A két intraoperatív esetünkben a preoperatív gasztroszkopiat lehetetlenné tette a mese-
ző hypopharynx hátsó és részben oldaló falán előforduló tumoros szöveteszenvedélet. A
művelet végzéséhez a rekonstruáló lépések előtt végeztük el a gasztroszkópmintát úgy
hogy a gasztroszkópelemek a műteti területen keresztül közvetlenül a rezekált nyelési kezelő-
elemekhez helyeztünk. Az eszköz felezése után ugyanakkor egybe nyomást fejtettünk ki az
aszefahagymahomályos ezzel, hogy az eszköz gyorsan a lefektetett végződést jelzi.

A perkután punctión és fonal kivezetés követően a tápózódás az átvágást és a gyn-
mon keresztül húzott vissza és vezetett ki retrograd módon a bőrönd át. Mindkét esetben
szövődménymentes volt a gyógyítás.

Kiterjedt submucosalis tumoros ferfi betegnél preoperatív történt a PEG elkeserűse,
abcdefghijkl a beteg táplálóág állapotának javítása céljából. A beültetést követő 4. napon azonban elő-
szor a szonda körül húrgyllődést majd gynomíghtalál preferálását, ezért követően
pedig lokális porotonis jeleit észlelünk. Konzervatív kezelés ellenére a folyamat megpróbált,
őgy az eszmény alatt megnyúlt az egészség.

A másik preoperatív esetben a „preoperatív” jelző csak éppen hogy megújulja a helyét,
hasznos a beültetés a művelet előtt, az intubáció követően történt.

További 2 alkalommal palliatív terapia részeként készítettünk perkután gasztrosz-
ómákat. A 25 betegnél összesen a perkutan endoszkópos gasztroszámát át történő táplálási
napok száma 3876 nap (tágabb 181) volt. A leggyakrabban 10, a leggazdagabb 416 nap
kérés szerinti szövődményt 4 alkalommal (16%) tapasztaltunk. Ez az urány össze-
hasonlítva a nemzetközi irodalomban létrehozott, elfogadhatóan mondható (8). Minden
esetben a beültetést követő 4-5. napon lokális bóréreakcióval járó szonda körüli gyomor-
ladád úrulást észleltünk. Ilyenkor a betegeket néhány napig parenterálisan tápláltuk és
a PEG-en át antacidumot illetve antibiotikumot adtunk. A korábban említett eset kivételé-
vel, a szövődmények 2-3 nap alatt a körülbelül gyakran szálltudok.

Nyaki füzfura a preoperatív és az intraoperatív esetekben nem alakult ki. A posz-
toperatív csoporthatéko nagyban néhány esetben éppen a meglevő nyálkapoly gyorsabb záróda-
nak elkerülése érdekében döntöttünk a PEG mellett. Eddigi tapasztalatunk szerint keve-
sőbb nyaki füzfura alakul ki illetve ezek záródása gyorsabb PEG esetén.

MEGBESZÉLÉS

Klinikánkon évente nagy számban folyik a fej-nyaksebészeti daganatos betegek múlté-
ti, sugár- és citózatikus kezelése illetve gondozása. Számos betegnél a múlt- kiterjes-
tettsége, a sugárterápia vagy a tumoros folyamat előrehaladott állapot miatt nyelési ille-
vé rága képtelenség alakul ki. Az elmúlt években jelentősen megváltozott a betegek mesterséges táplálására nazoasztikus szövet betegsége.

Ennek ismert határánál miatt, ma már nyilvánvaló, hogy a 4–6 hét múlva további
enteral táplálás esetén perkutan gasztroszómát a modern eljárás. A pre-, intra- vagy
postoperatív beültetés lehetősége azonban számos keretet vet fel.

A kis esetek közé tartozik a kis tapasztalatokat még ismételtek, de nyilvánvaló, hogy a preoperatív
beültetéssel korán megkezdhető táplálás miatt jobb táplálás adott beteg kerül mű-
tére. A beavatkozást előrezzelt előtt a „staging” endoszkópia során, ami úgy nem
elent külön megterhelést a beteg számára. Előfordulhat azonban, hogy PEG kapcsán szavodó érdeklődés esetén, a műtét a tervezett időpontját kitölő, rövid idő elteltével kellett halasztaniuk. Tehát a műtét előtti PEG-készülék leszüntetésével, a gasztrostópusítás és a tüdőnílusszal kezdtek meg. Az inkontinencia a PEG-beültetést követően kifejezett formáció alapján kezdett gomorrápoló korú 4. (4, 12). Az indikációthez is felhasználása a preoperatív személyeshez a legnagyobb.

<table>
<thead>
<tr>
<th>Preoperatív PEG</th>
<th>Intraoperatív PEG</th>
<th>Poszoperatív PEG</th>
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</thead>
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<tr>
<td>előnye</td>
<td>hártya</td>
<td>előnye</td>
</tr>
<tr>
<td>korán elkészült enterális táplálás</td>
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<td>nincs akadály</td>
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<tr>
<td>ITN-ben, staging endoszópszkópia sorra elvégzett</td>
<td>tumorosztás transzplantáció lehetsége</td>
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<td>suffosztáció kialakulhat</td>
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<td>nélküli idejének hosszabbodása</td>
</tr>
<tr>
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<td>&quot;pull&quot; és &quot;push&quot; technika előnyei egyesíti</td>
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<tr>
<td>nehezébben állítható fel az indikációja</td>
<td>nem terhelí a műtéti terület</td>
<td></td>
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</table>

tően valamilyen lehetségtelenségre terjed sor (pectoralis major myocutan- vagy szabad lehely). Különösképpen a kiterjedt nyelv-, nyelvgyök-, szajfenék- vagy lágyzsajzpad rezkciója esetén javasoljuk a preoperatív PEG megfontolását, hiszen nagy a valószínűsége, hogy a beteg normális nyelvési funkciónja maradéktalanul sahasson le vissza és így a részben vagy egészen mesterséges taplálásra szorul.

Irodalmi adatok szerint a PEG a műtéti területet tehermentesíti, a sebgyógyulás gyorsabb és kevésbé nyaki feszülta alakul ki. IV stádiumú fej-nyakú tumor műtétek után gansztrazikus szonda betegségek 42%-ban, míg PEG-gel rendelkező betegek 25%-ban alakul ki nyaki sípoló. A fentiek által a hospitalizációs idő és a kórházi költségek is csökkennek (2).

Megfigyelésünk szerint számos esetben a gansztrazikus szonda állandó irritációja idéz a szajfentek és ezáltal nyelvi paraszt tart fent, ami megszűnik PEG-re való áttérés után. PEG esetén a betegek kedélyállapota is jobb.

Összegzés
1. 4-6 hétnél tovább tartó enterális taplálás esetén PEG javasolt.
2. A „pull-back” technika szerinti PEG beültetés kevés szövődménnyel járó, gyors és biztonságos módra.
3. A posztoperatív esetekből levonható tapasztalataink alapján, kiterjedt nyelv, nyelvgyök és szajfenék vagy lágyzsajzpad rezekció során már az első lépésben javasoljuk a PEG beültetését.
4. Gégecsonkáslon átesett idős betegek nyelvi képessége javul, amennyiben az állandó irritáció lezárják a gansztrazikus szondát percutan endoszkópos gansztrostómára cseréljük.
5. Gansztroszkópos akudályt jelentő tumoros folyamat jelenlétekor intraoperatív beültetés is szóba jön.

Irodalom
SUMMARY

Lajzer L., K. Szároszy, Gy. Fábián, J. Pest: Percutaneous endoscopic gastrostomy: pre-, intra- or postoperative implantation

In the course of treatment of patients with head- and neck tumours who are undernourished, the adequate feeding is extremely important.

The authors recommend the percutaneous endoscopic tube to feed patients with head- and neck tumours surgically during a long period. They have done 29 successful PEG implantations between 5th January 1997 and 25th February 2000, in 26 cases preoperatively, 2 postoperatively, according to the “pull through” technique. The average age of the patients was 56 years (between 40-76). The average nourishing time with PEG was 158-190 (166) days.

The authors had to manage implantations in 2 cases preoperatively, in 2 cases intraoperatively and, in 19 cases postoperatively. In 2 cases, implantation was done without neck-operation with protective purpose. They observed complications in 4 (16%) cases.

Beginning of artificial nourishing to improve condition of ill-fed patients, the authors recommend PEG already in the preoperative period. PEG is recommended as the first step especially in cases, where the malignant tumour sits widespread in the tongue, radix of the tongue, in the floor of the mouth or in the soft palate, which conditions require reaction.

They call the attention to advantages and disadvantages of pre-, intra- and postoperative implantation. The authors review the essence and importance of intraoperative PEG.

ZUSAMMENFASSUNG


APPENDIX 2
Percutaneous endoscopic gastrostomy

Summary. The authors recommend the use of the percutaneous endoscopic gastrostomy for the long-term nutrition of patients with head and neck cancer. 58 successful percutaneous endoscopic gastrostomy tube insertion was performed on 48 male and 9 female patients between the 7th of January, 1997 and 31st of December, 1999. The age of the patients were 57 (40–78) years in average. The mean value of days using gastrostomy feeding tube was 371 (5–1079). insertions took place at times both preoperatively and intraoperatively, and 44 times in the postoperative period. In 6 cases the insertion was part of the palliative therapy with no surgical intervention. Either "pull" or "push" methods were used after inserting the gastroscope into the stomach through the mouth or the fistula of the neck, or via the resected pharynx or by the help of direct laryngoscopy. Complications were detected in no (10/17) cases. As a conclusion from the postoperative cases, the authors recommend either pre- or intraoperative insertion of percutaneous endoscopic gastrostomy feeding tube in case of major surgery involving the tongue, tongue base, floor of the mouth, the soft palate or the pharynx.

Keywords: artificial nutrition, head and neck surgery, percutaneous endoscopic gastrostomy

Betreffung

Valonsorben abl. tápóldozásra készülő betegek megterelő egészségének taposására nemzetközi és helyi szakmai kapcsolatban, de egyéb disciplinálokban is rendkívül fontos. A tapasztalati állapot a gyógypedőhez hatékony értemelést, erről eredményez, hogy az egészség környezete, ügyfél és a beteg melletti rehabilitációra az ismétlő adott változásban a percutaneous endoscopic gastrostomy (PEG) megterelő egészségének taposására nemzetközi és helyi szakmai kapcsolatban, de egyéb disciplinálokban is rendkívül fontos. A PEG-történet gyakorlatban a nasogastrostomia szorzással használható a békétthelyi, személyi tervezésben és a szerencsés egészség taposására a PEG kapcsán javasolt javaslatok.


Betegek és módszerek

A PEG-történet 1980-ban kezdődött az amputált, helyi egészségügyi és kórházi reabilitációs elérveket elsősorban elvégzett percutaneous endoscopic gastrostomia módszerén, például "pull back"-es technikája szerint [1]. A magyar előadásokban a békétthelyi megterelő egészség taposására a PEG kapcsán javasolt javaslatok.
(tolkai PEG Nutricia és Flexflo Abbott) használva. Olyan endoszopikus műtéti eljárást alkalmaztunk, ahol nem volt növekedés. A mesterséges máj alvás szükséges volt, de a mesterséges májban szükséges volt növekedés. A kezelés során a mesterséges májban a szükséges mennyiségot kapott. A kezelés során a mesterséges májban a szükséges mennyiségot kapott.

Megbeszélések

A figyelmeztetési okot tartalmazó dokumentumot a PEG-ét meghoztuk. A PEG-szolgáltatók feladata nem volt Számvédelmi eljárások. Legegyszerűbb a rekelvő hallgatásra járás a lehetséges vélemény nézete alapján nem kellett az individuális állásfoglalásokat (4, 7, 12, 15) A PEG tágulszámú diagnózis szükséges volt. A diagnózis esetén a nem szükséges megmondható, de legfeljebb 10-14 nap kellett ideiglenesen a testre készulni az endoszcopiás gyakorlatokat.

Eredmények

gyaluralysis lends itself as a last resort in the management of the nasogastric tube insertion. A better optimization of the nasogastric tube insertion can be achieved by placing the nasogastric tube into the stomach at least 15 cm from the incision. If the nasogastric tube has to be inserted further, the nasogastric tube should be inserted through the percutaneous endoscopic gastrostomy (PEG) technique. This method is particularly useful in patients with severe head and neck cancer who have difficulty swallowing or who have undergone prior radiation therapy. In these patients, the PEG technique can be performed through a small incision in the neck, allowing access to the stomach without the need for a major surgical procedure. This method has been shown to be effective in improving swallowing and nutritional status, thereby improving quality of life in these patients.
APPENDIX 3
A perkután endoszkópos gastrostoma szerepe a fül-orr-gégészetben

LEHÉR LÁSZLÓ ÉS SÁRROSY KATALIN


Kielégítő tápláltsági állapot elengedhetetlenül szükséges a megfelelő kezeléshez, a gyors szégyenynuláshoz, a szövődmények kialakulásának csökkenéséhez és ezáltal a beteg mielőbbi rehabilitációjához.

A mesterséges táplálás módjai

I. Parenteralis
II. Enteralis
   1. orális
   2. nasogasticus nasojejunalis szonda
   3. pharyngostoma
   4. oesophagostoma
   5. gastrostoma
      • hagyományos sebészi
      • PEG (percután endoszkópos gastrostoma)
      • LG (laparaszkópos gastrostoma)
   6. jejunoszomata
      • hagyományos sebészi
      • TKJ (füktetéter jejunoszomata)
      • PFJ (percután endoszkópos jejunoszomata)
      • LJ (laparaszkópos jejunoszomata)
A tej-nyak diagnostikai betegnek jelentős részének a per oram tokozott tápanyagbevételével éppen a betegség lényegéből adódóan nem lehetséges. Fő-orr-gégészeti gyakorlatban mesterséges táplálás céljára leggyakrabban nasogastricus szonda alkalmazzuk. Előnye, hogy gyorsan non-invasív módon levezethető és olcsó.


A PLG indikációit, a beültetés modjait és szövődményeit már korábban tárgyalta. Jelen fejezet csak a fő-orr-gégészeti vonatkozásokat emeli ki.

**A PEG-beültetés technikái**

1. „pull” technika
2. „push” technika
3. „poke” technika

A három különböző technika gégészeti vonatkozása az, hogy míg az első két módszerek a gásgastrostópot általában két alkalommal vezetjük le és a tápszonda a tumoros vagy már operaélt tápszomára szakasszal érintkezve jut a gyomorra (Gauderer et al., 1980; Sacks et al., 1983), addig a harmadik kissé ugyan bonyolultabb „poke” technikánál (Russel et al., 1984), ami tulajdonképpen egy Seldinger módszer, gásgastrostópia csak egyszer történik és a tápszonda közvetlenül a hasad bőrénél átszúrásával kerül a gyomorra, így nem érintkezik az operált vagy tumoros tápszomák szakasszal.

**A PEG-beültetés időpontja**

1. praoperatív beültetés
2. intraoperatív beültetés
3. postoperatív beültetés
<table>
<thead>
<tr>
<th>Præ- / intra- vagy postoperatív beültetés előnyei, illetve hatányaikt az I. táblázatba foglaltuk össze (Lujher et al. 1999)</th>
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<tr>
<td><strong>Præoperatív PEG előnye</strong></td>
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<td><strong>határnya</strong></td>
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<td>táplálás</td>
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<td>ITN-ban,</td>
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<td>kitolja a mutat</td>
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<td>tervezett idejét</td>
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<td>nehezebben</td>
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Rövidítések: ITN: intratrahealis nárcrosis
PEG: perkután endoszkópos gástrostomia

A præoperativ beültetéssel korán megkezdhető táplálás miatt jobb tápláltsági állapotot beteg kerül műtétre. A beavatkozás elvégzhető altatásban a főj-nyak daganatoknál gyakran szükséges „staging” endoszkópiát során, ami így nem jelent külön megterhelést a beteg számára. A beteg tápláltsági állapotá javítható amíg a szövetszíni créda növekszik (6-8 nap). Előfordulhat azonban, hogy PEG-kapszul szövődmény alakul ki, mely a tervezett mutat időpontján kitolja, rontva a beteg gyógyulási esélyét. További határnya a mutat előtti PEG készítésnek, hogy a gasztroszkop, illetve a kapszulá levezetése tumoros környezetben történik, ami a sufléccto kialakulásának (Riley et al. 1992) és a tumor transzplantáltodásának (Schneider et al. 1997) esélyét növeli. Ritkán, de előfordul, hogy főj-nyak daganatok betegeknek PEG-beültetést követően bormetasztázis alakul ki a készült gyomorsipoly körül. Az indikáció helyes felállítása a præoperativ eseményben a legnehezebb.
A PE-G-beültetés módjai

1. helyi érzéstelenítés (általában postoperatív beültetés)
2. narcosis (általában prak- vagy intraoperatív beültetés)
   2.1. staging endoszkópia részeként
   2.2. kiterjedt tumorok esetén (fődalom)
   2.3. transnasalis levezetés
   2.4. laringoszkóppal asszisztált levezetés
   2.5. intraoperatív beültetés


Speciális fej-nyak sebészeti indicatíók

Minden műtét alapvető célja, hogy a legmesterszakmai és onkológiai radikális módszerek mellett megfelelő funkcionális eredményt érjön el. Cél az, hogy a rákellenekbevitel, a rákgyógyítás és a rákgyógyítás módon történjen. Elsősorban kiterjedt daganatos radikális műtéti kezelésére követően a sebész minden igyekszik ellenére átírható vagy tartós ragasi-nyelési diszfunkciók maradhatnak vissza.
Alábbiakban foglaltam össze azokat az eseteket, ahol a szükséges reszektció miatt tartós funkciókiesés várható.

I. Szájüregi tumorok
1. Nyelv-, nyelvgyök-, szájfenék vagy lágyszájjad kiterjedt reszektciója (tartós nyelési panasz)
2. Lebényvei végzett rekonstrukciók (nosszamato sejgyúgyulás)
3. Mandibulotomia, illetve reszektció (tárgasi nélkülözés)

II. Meso- és hypopharynx tumorok
1. Garat-, illetve nyelőcső kiterjedt reszektciója
2. Garat-, illetve nyelőcsőpótlás egyéb formáit

III. Gégetumorok
1. Partialis gégereszekciók válogatott esetekben (idős beteg, kiterjesztett re- szektciók).

Beteganyag és módszer


Az insertio „pull”- vagy „push”-technika szerint történt. A gastrostomiát 34-szer helyi érzéstelenítésben és 13-szor intratrachealis narkózisban végeztük. A beavatkozás előtti napon a betegnél rendszeres szájöblögetést kezdtünk Phlogosol oldattal, majd a beültetést megelőző órában 2,5 mg Dormicomot és 100 mg Contramalt tartalmazó 0,9% NaCl i.v. infúziót adtunk premedikációként. Helyi érzéstelenítés esetén percekkel az endoszkóp levezetése előtt még 2,5 mg Dormicomot adtunk i.v., illetve a szájnyálkahártya érzéstelenítésére 10% Lidocain spray-ből 3-4 befűjást alkalmaztunk.

A beavatkozást 43 férfi- és 4 nőbetegen végeztük, átlagéletkoruk 57 (40-78) év volt. Közülük 25 szájüregi, 12 garat-, 9 gége- és 1 egyéb tumoros beteg volt. Két esetben præoperative, 4-szer intraoperative és 33 alkalommal postoperative zajlott a perktán endoszkópos gastrostomia. Nyolc betegen palliatív kezelés részeként került sor a PEG-beültetésre. 22 esetben a tumorexcisziót követően ki- alakult szövethiányt pectoralis major myocutan lebényeli, 2 alkalommal alkari radialis szabad lebényeli pótoltuk. 12 esetben végeztünk gégereszekciót. 11 betegen történt pre- vagy postoperatív telecobalt iradiáció.

48
Eredmények


Összegzés

A PEG a nasogastricus szondával szemben a műtéti területet nem terheli, így gyorsabban a sebgyógyulás és kevésbé a nyaki fistula (Gibson és Wenig 1992). A PEG csatátkíalgatással jobb és könnyebben tolerálható.

A hagyományos sebészeti gastrostomiával szemben olcsóbb, kevésbé invasív, am-bulanter elvégzhető, valamint kisebb a szővődmény kialakulásának lehetősége.

Egyes műtőcikkek indikációja kiszélesíthető.

Irodalom


Inserting a Percutaneous Endoscopic Gastrostomy Tube via a Cervical Fistula Formed After Major Surgery on a Patient With a Head and Neck Tumor

Lazlo Unger, MD; George Latham, MD; and Joseph Prior, MD

SUMMARY
Several percutaneous endoscopic gastrostomy techniques have been described. The introduction of percutaneous endoscopic gastrostomy (PEG) by Gauderer and Ponsky in 1980 has become widely accepted. In addition to the standard technique, other techniques have been described. In this article, we report a novel technique for inserting a PEG tube through a cervical fistula to provide access to the stomach.

CASE REPORT
A 58-year-old man sought treatment for a 3-month history of dysphagia and a one-month history of dysphasia and oral thrush. He had been a heavy drinker and smoker for 35 years. He presented with a history of swallowing difficulties, postnasal drip, and a sensation of a lump in his throat. On examination, he had a 3 cm mass in the base of the tongue with ulceration and a 2 cm mass on the right side of the tongue. A biopsy revealed squamous cell carcinoma of the left posterior tongue. The patient was treated with chemotherapy and radiation therapy.

However, despite treatment, the patient continued to experience symptoms. Therefore, a PEG tube was inserted through the cervical fistula to provide access to the stomach. The procedure was performed using the described technique. The patient tolerated the procedure well and has had no complications since the procedure.
MATERIALS AND METHODS

With the patient under general anesthesia, multichannel
monitors were applied on the left upper and lower parts
of the body. A left neck incision was made, and the
pedicle of the neck flap was brought out. The flap was
then moved to the defect area. The neck incision
was closed in layers. The patient was extubated and
awakened without any complications.

RESULTS

The patient's postoperative course was uneventful.
A wide range of laboratory tests, including blood
pressure, heart rate, and respiratory parameters,
were within normal limits. The patient was discharged
from the hospital on the third postoperative day.
No complications were noted during the postoperative
period.

Fig. 1. Upper and lower parts of the body were
monitored.

Fig. 2. Neck incision and closure.

Fig. 3. Neck flap reconstruction.
DISCUSSION

Numerous techniques are available for achieving percutaneous endoscopic gastrostomy. The route of irrigating the gastrostomy tube into the stomach is one of the critical points of the procedure. In most cases, general anesthesia and PEG placement is easy and safe.

However, in the presence of tumors, tumor extension, or anastomotic changes, the transoral approach, endoscopic guidance, radiologic methods, or intraoperative procedures must be considered to insert PEG successfully. In this case, the entrance of the hypopharynx was extremely narrow because of radiation-induced fibrosis and postoperative anastomotic changes. This imposed normal swallowing and probably causing the formation of strictures. None of the above-mentioned endoscopic procedures were thought to be appropriate for percutaneous gastrostomy. Nonendoscopic, radiologically controlled procedures could have been the method of choice; however, they would require a different medical team and training, and timing than the endoscopic interventional gastrostomy seemed to be integrated for the long-term nutritional support as well. In summary, eliminating the cervical traction, gastroscopy, and PEG placement were easy, quick, and less time-consuming.

Back PEG insertion with anatomic changes under other traditional endoscopic techniques.

REFERENCES

APPENDIX 5
SUMMARY

Objective and Study Site: A prospective cohort study of patients undergoing fiberoptic nasopharyngoscopy to assess the prevalence of laryngeal webs.

Methods: In a prospective cohort study of patients undergoing fiberoptic nasopharyngoscopy, the presence of laryngeal webs was determined. A standardized protocol was used to define and classify the presence of laryngeal webs. The study site was a tertiary care hospital where fiberoptic nasopharyngoscopy is routinely performed.

Results: A total of 100 patients were included in the study. Laryngeal webs were identified in 20% of the patients. The presence of laryngeal webs was more common in males than females (25% vs. 15%). The study also revealed that patients with a history of smoking were more likely to have laryngeal webs compared to non-smokers (30% vs. 15%).

Conclusion: Laryngeal webs are a common finding in patients undergoing fiberoptic nasopharyngoscopy. Further studies are needed to investigate the underlying causes and potential treatment options.
Second Look Endoscopy by a Laryngo-Fiberoscope Passed Via the Feeding Tube of the Percutaneous Endoscopic Gastrostomy

László Lüker and J. Pilet

Summary: The most commonly used techniques for percutaneous endoscopic gastrostomy (PEG) require two passes of the gastrooscope. The aim of this study was to clarify whether the second per oral gastroscopy can be replaced by passing a laryngofiberscope through the previously inserted PEG feeding tube. Twelve patients with head and neck cancer undergoing "pull through" PEG procedures were included in this prospective study. Instead of the second per oral pass of the gastro-intestinal fiberscope, a laryngofiberscope was passed through the inserted feeding tube to assess the correct position of the PEG internal disc. To gain more deflection to the tip of the instrument, a string was led through the instrument channel and was brought back to the hand of the examiner outside the instrument. Pulling the string provided a greater angulation to the end of the scope and gave thus a good view. In all twelve patients, the "trans-tubal" endoscopy was successful and provided a good second look to judge the position PEG internal disc. The procedure caused no inconvenience for the patient. "Trans-tubal" endoscopy is a simple, safe and painless procedure to assess the position of the PEG feeding tube without having to pass the gastro-intestinal fiberscope a second time. Key Words: PEG—Laryngofiberscope Second look Via feeding tube

INTRODUCTION

The use of percutaneous endoscopic gastrostomy (PEG) to provide nutritional support for patients with dysphagia has been widely accepted since its first introduction by Gaulthier and Ponsky in 1980 (1). Most techniques require the introduction of the gastroscope twice during the same procedure (1,2,3). The second pass of the gastro-intestinal fiberscope checks the proper position of the tube and excludes complications. Gastroscopy is a routine procedure in experienced hands, but it may be difficult in patients with large tumors or anatomic changes caused by surgery or irradiation. In addition it is unpleasant for the patient if done under local anesthesia. Nevertheless, the second pass of the gastroscope might increase the risks and complications of the procedure such as contaminating the feeding tube with oropharyngeal bacteria (4,5) and causing stomal tumor cell seeding in patients with head and neck cancer (6,7,8). Several methods and modifications have been devised so far to reduce the number of complications, to overcome the difficulties of per oral gastroscopy in obstructive cases and to minimize the discomfort for the patient (9-15). We describe a technique that can replace the second per oral gastroscopy, might reduce the frequency of procedure-related complications and reduce the discomfort for the patient, yet provides a good assessment of the internal disc of the PEG feeding tube.

MATERIALS AND METHODS

Twelve head and neck cancer patients (12 men, aged 40-78 years) required percutaneous endoscopic gastrostomy to provide long-term nutritional support. The patients were selected randomly and there were no any specific inclusion or exclusion criteria set up. In all cases "pull back" technique was carried out under local anest...
RESULTS

In all twelve patients the "trans-testual" endoscopy could be carried out and allowed a second look to assess the position of the feeding tube and to control the site of placement in the stomach. We observed no tendency of dislocating the feeding tube with the "trans-testual" fibroscope in the first 4 cases when peroral gastrosopy was also performed additionally for extra visual control. Adjustments of the internal disc could be made to achieve optimal approximation of the gastric and abdominal walls. In three cases the original fixation seemed to be too tight, so it had to be loosened. The procedure caused no pain or discomfort for the patient. The introduction and the maneuvering of the laryngo-fibroscope through the feeding tube was easy. No complications were observed during or after the procedure. There was no need to carry out a second per oral gastroscopy as part of the usual PEG procedures for controlling the position of the feeding tube.

DISCUSSION

"Pull-through" and the "push-on-wire" techniques are the most commonly used procedures for PEG. The need for a second per oral gastroscopy in these methods increases the likelihood of procedure-related risks and complications such as oropharyngeal bacterial contamination and distal cell feeding at the site of the feeding tube in head and neck cancer patients. In addition large tumor mass and anatomical changes as the consequence of surgery or radiotherapy, can cause difficulties in passing the gastroscopy to the stomach, along with the usual discomfort for the patient, if done under local anesthesia.

The present study describes a technique of single per oral gastroscopy, which also provides an option for a second look. Our aim was to clarify whether the second per oral gastroscopy can be replaced by an endoscopic examination through the inserted feeding tube to judge the position of the internal disc. To maneuver the scope through the feeding tube and to visualize the internal disc we needed an endoscope thin in circumference with deflection of its tip more than 180 degrees. As none of the laryngo-fibroscopes available on the market meet both these criteria at the same time, we increased the flexibility of our scope by using a string led through the instrument channel which allowed the examiner to bend the tip further. For the smooth pass of the scope a PEG device featuring a central hole in line with the axis of the tube was selected. In all cases we were able to visually control the site of the PEG internal disc by "trans-testual" endoscopy. There was no need for second per oral gastroscopy.
SECOND LOOK ENDOSCOPY VIA PEG FEEDING TUBE

except the first 4 cases where we used the per oral gastro-
toscopy to follow and document our procedure. Numerous
techniques have been devised so far to minimize the
risks and discomfort for the patients during PEG. Intrac-
duccor technique [16] is one that allows single pass of
the endoscope but this is a time consuming and more
complicated procedure carrying the risk of some major com-
pli cations related to the technique [3, 4, 7]. Some authors
suggest omitting the control gastroscopy to reduce the
drawbacks associated with the second pass of the gas-
troscope [18], but this lacks the option of second look.
The advantage of our method is that it requires single per
oral gastroscopy, provides an option for second look and
reduces the discomfort caused for the patient by the con-
tral gastroscopy. In addition it is easier to pass the scope
into the stomach in cases of obstructed and narrow ali-
mentary tract. Although it has not been studied in the
present paper, this technique is likely to reduce the
chances of bacterial contamination and tumor cell seed-
ing. The need for an extra scope is certainly a disad-
antage however a laryngo-fiberscope is considered to be
a basic instrument nowadays in most of the ENT endo-
sopic units dealing with PEG.

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Second-Look Endoscopy During Percutaneous Endoscopic Gastrostomy by Passing a Laryngofiberscope Through the Inserted Feeding Tube

Percutaneous endoscopic gastrostomy (PEG) (1) has been widely accepted as a means of providing nutritional support for patients with head and neck cancer. However, in some patients, a second-look gastrostomy was required to check that the feeding tube has been correctly positioned and to exclude complications (2), and many endoscopists carry these out. However, percutaneous gastrostomy may be difficult in patients with large tumors or anatomical changes caused by surgery or irradiation. In addition, the procedure is unpleasant for the patient when it is done under local anesthesia, and also, every pass of the laryngoscope can increase the incidence of some procedure-related risks and complications, such as contamination of the feeding tube with oropharyngeal bacteria (3), and sternal tumor cell seeding (4, 5).

In order to minimize these problems, a laryngofiberscope (Karl Storz, Tuttingen, Germany) was passed via the PEG feeding tube to obtain a second look, instead of a second peroral gastroscopy (Figure 1). To provide a greater deflection at the tip of the scope, a line was led through the instrument channel with one end fixed to the channel port and the other end brought back outside the instrument to the band of the examiner, thus the scope could be maneuvered using both the hand-piece of the instrument and the line, enabling the scope to be turned easily towards the internal disc of the PEG for a visual check. After traditional "pull-back" PEG with local anesthesia, we have kept the stomach insufflated, and in 12 instances we have passed the laryngofiberscope via the inserted feeding tube, after applying some lignocaine gel for lubrication. In all cases we were able to visualize the internal disc. This method avoids the discomfort for the patient of a second peroral gastroscopy, provides an alternative route for gastroscopy when the peroral approach is difficult, and reduces the possibility of some complications.

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