Percutaneous endoscopic gastrostomy

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ABSTRACT: Sixty-five patients who had endoscopic placement of a feeding tube between April 1984 and November 1987, were reviewed. Mean follow-up was 245 days (range one to 1391 days). The most common indication for gastrostomy insertion was a neurologic disorder (83%). Prophylactic antibiotic (cefazolin) was given to 55% of patients (86% from one hospital). Minor complications (superficial wound infection, tube malfunction, ileus or localized abdominal pain) were seen in 55% of patients. Superficial wound infection, defined as local erythema and/or purulent discharge, was the most common complication (33%). No significant difference was found in the incidence of superficial wound infection between the group receiving prophylactic antibiotic and those who did not. Major complications (gastric bleeding, aspiration, respiratory depression or abdominal abscess) occurred in 14% of patients. The overall 30 day mortality was 23%. In 60% the cause of death was secondary to the underlying illness. No deaths occurred due to prolonged use of the feeding tube. Five patients (8%) regained the ability to eat resulting in tube removal. The authors' experience suggests that percutaneous endoscopic gastrostomy (PEG), perhaps because of the patient population, is associated with significant morbidity and mortality. Prophylactic antibiotics did not alter the incidence of wound infections associated with PEG. However, this may be related to the use of a prophylactic antibiotic (cefazolin) that has relatively poor coverage for *Staphylococcus aureus*, the most common organism cultured. Careful consideration must be given to patient selection prior to undertaking the procedure. *Can J Gastroenterol* 1989;3(1):26-28

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La gastrostomie endoscopique percutanée

RESUME: Le cas de 65 patients ayant subi le placement endoscopique d'une sonde alimentaire entre avril 1984 et novembre 1987 a été examiné. Le suivi était en moyenne de 245 jours (et couvrait d'un à 1391 jours). Dans la plupart des cas, des troubles d'ordre neurologique justifiaient l'insertion par gastrostomie (83%). Un antibiotique prophylactique (cefazolin) a été administré à 55% des patients (86% d'un hôpital particulier). Des complications mineures (infection superficielle de la plaie, malfonction de la sonde, iléus ou douleurs abdominales localisées) ont été relevées dans 55% des

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY (PEG) has become an accepted procedure to establish chronic enteral alimentation in patients who cannot swallow. Since the procedure was first introduced by Gauderer and Ponsky (1) in 1980, several other studies have reported on the procedure and associated complications (2-8). There have been conflicting reports on the benefit of prophylactic antibiotics for PEG (6,9-11). Most studies either fail to define or poorly define the length of patient follow-up. Experience with PEG, including success rate, procedure related mortality, complications and long term follow-up is reported.

PATIENTS AND METHODS

The records of 65 patients, from two hospitals, who had endoscopic placement of a feeding tube between April 1984 and November 1987, were reviewed. Of the 65 patients, 34 were female and 31 were male, with a mean age of 62.7 (range two to 94) years. Thirty-one patients were treated at the Foothills Provincial Hospital and 34 patients at the Calgary General Hospital. Inability to swallow due to neurologic impairment was the primary indication for the procedure (Table 1).

In each case, PEG was performed in hospital according to the procedure outlined by Ponsky et al (3). Intravenous sedation (diazepam) and local anesthetic were used in 63 patients and general anesthesia in two patients. Five patients

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cas. L'infection superficielle de la plaie, définie comme érythème local et/ou écoulement de pus, constitue la complication la plus courante (33%). Aucune différence significative n'a été trouvée pour l'incidence d'infection superficielle entre le groupe ayant reçu des antibiotiques prophylactiques et les autres. Des complications graves (saignements gastriques, aspiration, dépression respiratoire ou abcès abdominal) sont survenues chez 14% des patients. La mortalité totale sur 30 jours était de 23%. Dans 60% des cas, le décès était dû à la maladie sous-jacente. Aucun décès n'est attribuable à l'usage prolongé de la sonde alimentaire. Cinq patients (8%) ayant recouvré la capacité de s'alimenter, la sonde leur a été retirée. Selon notre expérience, la gastrostomie endoscopique percutanée (GEP) est liée à un taux significatif de morbidité et de mortalité, peut-être à cause de la population de patients ainsi traitée. Les antibiotiques prophylactiques n'ont pas eu d'impact sur l'incidence d'infection des plaies associée avec la GEP. Toutefois, ceci est peut-être dû à l'usage d'un antibiotique (cefoxitin) qui a peu de succès contre le staphylocoque doré, l'organisme le plus communément cultivé. Une attention toute particulière doit être accordée au choix du patient avant l'exécution de cette procédure.

TABLE 1
Indications for percutaneous endoscopic gastrostomy

Indication	Number of patients
Neurological disorders	54
Oropharyngeal disorders	4
Failure to thrive	3
Recurrent aspiration	2
Esophageal cancer	1
Inflammatory myopathy	1

at the Foothills Hospital and 31 patients at Calgary General Hospital received pre-operative and postoperative antibiotics, generally cefoxitin. Feedings were started 24 to 48 h postoperatively. Initially, a polymeric formula diet was given by continuous infusion. Later this was changed to intermittent 'bolus' feeds. Patient follow-up ranged from one to 1391 days (mean 245 days). In each case, at the time the review was conducted, the patient or, in event of death, a relative or the family physician, was interviewed regarding long term effects of the feeding gastrostomy.

Statistical methods: Nonpaired *t* test and one-way analysis of variance were used for analysis of variables.

RESULTS

There was no difference in patient age, sex, underlying illness or indication for the procedure at the two hospitals. However, more patients at Calgary General Hospital received prophylactic antibiotics.

The gastrostomy tube was successfully placed in all 65 patients. In two cases the procedure was unsuccessful on the first

attempt due to technical difficulties. A repeat procedure was successful in both cases.

Mortality: The 30 day mortality was 23% (15 patients). Each death was reviewed by a surgeon not associated with the study. Nine patients died from a cause secondary to underlying disease unrelated to the procedure. Aspiration related deaths occurred in five cases. One procedure related death was thought to be due to respiratory depression following the procedure.

An additional 21 patients (31%) died from their underlying illness during the follow-up period of 30 days to 1391 days resulting in an overall one year mortality of 54%. No deaths were related to prolonged use of the feeding gastrostomy.

Morbidity: Complications, which occurred in 45 of the 65 patients (69%), were determined to be major or minor based on the presence or absence of systemic manifestations. Nine major com-

TABLE 2
Complications following PEG

	Number of patients
Major	
Aspiration	6
Respiratory depression	1
Upper gastrointestinal bleed	1
Wound abscess	1
Minor	
Superficial wound infection	22
Transient abdominal wall pain	7
Tube leak/malfunction/dislodgement	5
Ileus	2

plications occurred (Table 2). Aspiration occurred in six cases with five resultant deaths; one patient experienced respiratory depression and died. One patient with a past history of peptic ulcer disease had an upper gastrointestinal bleed requiring transfusion therapy three days after the procedure. Investigation regarding the bleeding source was declined by the patient. Empiric treatment with an H_2 antagonist was started. No further bleeding occurred in two-and-one-half months of follow-up. One patient who had not received prophylactic antibiotics developed a peristomal abscess which was cultured for *Staphylococcus aureus*. The gastrostomy feeding tube was removed and the abscess was successfully treated with drainage and systemic antibiotics. A repeat PEG was successfully performed three weeks later with no difficulty.

TABLE 3
Organisms recovered at the exit site of the gastrostomy tube

	Number of patients
Mixed	7/15
<i>Staphylococcus aureus</i>	10
<i>Pseudomonas aeruginosa</i>	6
Group D enterococcus	3
<i>Staphylococcus epidermidis</i>	2
<i>Klebsiella pneumoniae</i>	1
Hemolytic group B streptococcus	1
<i>Candida albicans</i>	1

Minor complications occurred in 36 patients (55%) and included superficial wound infection (22 patients), transient localized abdominal wall pain (seven), tube malfunction or dislodgement (five) and ileus (two) (Table 2). Superficial wound infection, defined as local erythema and/or evidence of purulent discharge, was the most common minor complication (33%). Cultures were obtained in 15 of 22 patients (Table 3), seven cultures yielded multiple organisms. Most infections were easily treated with local measures. In four cases, treatment with systemic antibiotics was required. Of the 36 patients given antibiotic prophylaxis, 14 developed a superficial wound infection (39%), compared to eight of 29 (28%) who were not given prophylaxis. Although more superficial

wound infections were seen at Calgary General Hospital, this was not statistically significant.

Long term follow-up revealed the formation of granulation tissue at the gastrostomy site in some patients. However, no adverse effects resulted from this. Eight patients had catheter exchange, this was reportedly simple. Five patients (8%) showed improvement in their condition that enabled removal of the feeding tube. In only one case was the tube used for less than one month prior to removal. The tube was removed by pulling it out through the gastrostomy tract, or by cutting the tube and allowing the button to pass.

DISCUSSION

PEG has become an accepted procedure to obtain access for chronic enteral alimentation in patients who are unable to eat but have an intact gastrointestinal tract. In the studies to date, PEG has been found to be effective, generally safe and to provide a favourable result when compared to surgical gastrostomy (5,12).

Present data regarding complications differ somewhat from previous reports (6,8,12,13). This is in part explained by inclusion of symptoms such as transient abdominal pain as a complication which was not reported in previous studies. In addition, requirements for wound infection may have been more inclusive than

previous studies. Major complications were seen in nine patients (14%) and included aspiration, gastrointestinal bleed, respiratory depression and wound abscess.

Several minor complications, including wound infection, have been associated with PEG. Initial studies failed to show that antibiotic prophylaxis altered the incidence of wound infection following the procedure (6,9). However, the studies were uncontrolled and nonrandomized. Jonas and colleagues (10), in a prospective randomized trial, found that cefoxitin was no better than placebo in preventing wound infections associated with PEG. Recently, Jain and others (11) demonstrated that cefazolin significantly reduced the risk for wound infection associated with the procedure. However, the length of follow-up in this study was very short.

To explain these conflicting results, Jain and others (11) suggested that cefazolin may be a better antibiotic than cefoxitin for this situation. They found *Staph aureus* to be the most common organism cultured, as was the case in the present study. Cefazolin has a longer half-life and better coverage for Gram-positive cocci than cefoxitin. This may explain the differing results between these two studies and explain the present results which failed to demonstrate significant benefit from antibiotics.

The present study indicates a 30 day mortality of 23%. One death was directly related to the placement of the tube and five deaths occurred as a result of aspiration of feedings infused into the stomach. In the remaining nine cases, the cause of death was attributed to the patient's underlying illness and was not related to the gastrostomy tube. Other studies have reported similar results (13). The present authors were unable to predict from the data analysis which patients would have a better prognosis.

Long term follow-up in this study showed none of the subsequent 21 deaths to be related to the prolonged use of the feeding gastrostomy tube. Patients, family members and/or family physicians indicated satisfaction with little associated difficulty in the long term use of the tube. It is not possible to draw definitive conclusions about patient nutrition as the study was uncontrolled.

In summary, this experience suggests that percutaneous endoscopic gastrostomy is easy to perform in ill patients but is associated with significant morbidity and related mortality. Since patients are critically ill prior to the procedure, the complication rate is not unexpected. Careful consideration of patient selection, increased physician experience and refinement with the procedure, and appropriate antibiotic prophylaxis may further improve this effective technique.

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