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作成者（著者）	Yoichi, Nakamura / Ryohei, Watanabe / Miwa, Katagiri / Yoshihisa, Saida / Natsuya, Katada / Manabu, Watanabe / Koji, Asai / Toshiyuki, Enomoto / Takaharu, Kiribayashi / Shinya, Kusachi
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Review Article

Percutaneous Endoscopic Gastrostomy and Percutaneous Transesophageal Gastrotubing for Palliative Treatment of Malignant Bowel Obstruction: A Review

Yoichi Nakamura[1, 2)*] Ryohei Watanabe[2)] Miwa Katagiri[2)]
Yoshihisa Saida[2)] Natsuya Katada[2)] Manabu Watanabe[2)]
Koji Asai[2)] Toshiyuki Enomoto[2)] Takaharu Kiribayashi[3)]
and Shinya Kusachi[2, 3)]

[1)]Palliative Care Team, Toho University Ohashi Medical Center
[2)]Division of General and Gastroenterological Surgery (Ohashi), Department of Surgery, School of Medicine, Faculty of Medicine, Toho University
[3)]Division of Chest Surgery (Ohashi), Department of Surgery, School of Medicine, Faculty of Medicine, Toho University

ABSTRACT: We performed a systematic review of the therapeutic effects of percutaneous endoscopic gastrostomy (PEG) and percutaneous transesophageal gastrotubing (PTEG) for decompression in patients with terminal cancer. We searched the PubMed and Japanese *Igaku-Chuo-Zasshi* databases for studies of PEG or PTEG for decompression in patients with malignant bowel obstruction (MBO). Previous systematic reviews, randomized controlled trials, observational studies, and case series were included. None of the systematic reviews included a high-quality meta-analysis. There were no randomized controlled trials. Our review included 17 observational studies of PEG and nine observational studies of PTEG. Among a total of 795 patients, the rate of successful PEG tube placement for MBO decompression was 95.1%. Among a total of 187 patients, the rate of successful PTEG placement was 97.3%. The overall rates of patients who experienced relief of distressing symptoms of MBO after PEG and PTEG were 87.0% and 97.0%, respectively. Among 441 patients who underwent PEG and for whom follow-up data were available, 75.3% were able to resume oral intake. The combined rates of complications after PEG and PTEG were 16.3% and 16.2%, respectively. There have been no high-quality studies of PEG or PTEG, but such studies are expected in the future.

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KEYWORDS: percutaneous endoscopic gastrostomy, percutaneous transesophageal gastrotubing, malignant bowel obstruction, palliative care

Malignant gastric outlet and bowel obstruction is a complication that develops in patients with abdominal and pelvic malignancies. The symptoms of malignant bowel obstruction (MBO) include nausea, vomiting, pain, and diffi-

1, 2, 3) 2–17–6 Ohashi, Meguro, Tokyo 153–8515, Japan
*Corresponding Author: tel: +81–(0)3–3468–1251
e-mail: you1mac@mac.com
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Table 1 Primary malignancies in study participants

Primary malignancy	PEG n = 573 (%)	PTEG n = 79 (%)
Gastric cancer	39 (6.8)	52 (65.8)
Colorectal cancer	78 (13.6)	8 (10.1)
Cholangiocarcinoma	8 (1.4)	0 (0)
Pancreatic cancer	66 (11.5)	7 (8.9)
Gynecological cancer	323 (56.4)	6 (7.6)
Ovarian cancer	249 (43.5)	5 (6.4)
Urological cancer	9 (1.6)	0 (0)
Other primary cancer	50 (8.7)	6 (7.6)

PEG: percutaneous endoscopic gastrostomy, PTEG: percutaneous transesophageal gastrotubing

culty eating or drinking. Patients with recurrent disease and MBO face a difficult decision regarding treatment options. In many cases, the goal of treatment is relief of symptoms and enhanced quality of life. Gastrointestinal bypass surgery, resection, or colostomy may be performed as surgical treatments, and self-expanding metallic stents can be used to relieve MBO symptoms.[1] However, these procedures are sometimes contraindicated because they are excessively invasive or because of the prognosis or general condition of the patient. Although pharmacological management — including administration of antiemetics, corticosteroids, anticholinergics, and somatostatin analogs — may improve some MBO symptoms, the benefits are limited.[2, 3]

In general, when surgery and stent placement are not indicated, mechanical decompression is achieved by inserting a nasogastric tube (NGT) into the intestinal tract of patients with MBO. Long-term NGT placement is not recommended because of the associated risks, including discomfort, erosion of the nasal cavity, and aspiration pneumonitis. Thus, NGTs should be inserted and removed intermittently.

Percutaneous endoscopic gastrostomy (PEG) was initially developed as a method of enteral nutrition.[4] In 1986, Malone et al[5] reported on percutaneous radiologic gastrostomy for decompression of the intestine, and Stellato and Gauderer[6] first described decompression PEG in 1987. In 1994, Oishi et al[7] described percutaneous transesophageal gastrotubing (PTEG), an alternative route of access into the gastrointestinal tract in patients for whom PEG is contraindicated.

When intestinal decompression using an NGT is likely to be useful for symptomatic relief, and when the treatment plan requires weekly insertion of an NGT, both PEG and PTEG are options for achieving decompression.

This systematic review examined the clinical therapeutic effects of PEG and PTEG for decompression in patients with terminal cancer.

Methods

On 22 March 2016 we searched the PubMed and Japanese *Igaku-Chuo-Zasshi* databases for articles describing PEG and PTEG procedures performed for decompression in patients with MBO. The following search term was used to retrieve articles from PubMed: ["PEG or percutaneous endoscopic gastrostomy or percutaneous transesophageal gastrotubing" AND "ileus or bowel obstruction or decompression or venting"]. Articles were retrieved from the *Igaku-Chuo-Zassi* database, by searching for ["gastric fistula or gastrostomy or percutaneous transesophageal gastrotubing" AND "bowel obstruction or gastrointestinal obstruction or decompression" "except conference abstracts"]. Previous systematic reviews, randomized controlled trials, observational studies, and case series were included in the review; case reports were excluded. A systematic review and a review of the titles and abstracts were performed as the primary screening, and a review of the full texts was performed as the secondary screening. We planned to conduct a meta-analysis of the target articles. Standardized data abstract sheets were prepared, and the data extracted included the study design, study quality, intervention, and outcomes. All articles were independently examined by two reviewers (YN and RW). Only articles written in English or Japanese were included in the review.

Results

Study design

Using the above-mentioned search method, 275 and 329 studies were extracted from the PubMed and *Igaku-Chuo-Zasshi* databases, respectively. After reviewing the titles and abstracts, we performed a review of the full texts. None of the systematic reviews included a high-quality meta-analysis, and there were no randomized controlled trials. Our review included 17 observational studies of PEG (three prospective studies and 14 retrospective studies) and nine observational studies of PTEG (one prospective study). Table 1 summarizes the primary cancers. Tables 2 and 3 summarize the number of patients,[8–33] percentage of successful placements, effects on symptoms, diet toler-

Table 2 Outcomes of PEG placement for malignant bowel obstruction[8-24]

Author	Successful placement	Symptom relief	Diet tolerated	Complications	Median survival (average)
Zucchi et al[8]	142/158 (89.9%)	122/158 (77.2%)	110/158 (69.6%)	41/158 (25.9%)	57 days
Issaka et al[9]	89/96 (92.7%)	81/96 (84.4%)	–	9/96 (9.4%)	135 days
Kawata et al[10]	71/76 (93.4%)	53/55 (96.4%)	–	15/76 (19.7%)	63 days
Teriaky et al[11]	7/7 (100%)	6/7 (85.7%)	5/7 (71.4%)	1/7 (14.3%)	119 days
Keung et al[12]	51/51 (100%)	–	21/51 (41.2%)	–	54 days
Vashi et al[13]	73/73 (100%)	73/73 (100%)	–	10/73 (13.7%)	(83.7 days)
Takeda et al[14]	43/43 (100%)	35/43 (81.4%)	–	1/43 (2.3%)	(90.8 days)
Pothuri et al[15]	94/94 (100%)	86/94 (91.5%)	80/94 (85.1%)	18/94 (19.1%)	(8 weeks)
Jolicoeur et al[16]	24/24 (100%)	18/24 (75.0%)	22/24 (91.7%)	9/24 (37.5%)	42 days
Nose et al[17]	11/11 (100%)	10/11 (90.9%)	–	1/11 (9.1%)	72 days
Scheidbach et al[18]	17/17 (100%)	17/17 (100%)	–	–	(21 weeks)
Campagnutta et al[19]	30/32 (93.8%)	27/32 (84.4%)	27/32 (84.4%)	2/32 (6.3%)	74 days
Cannizzaro et al[20]	21/22 (95.5%)	21/22 (95.5%)	21/22 (95.5%)	1/22 (4.5%)	74 days
Marks et al[21]	26/28 (92.9%)	–	–	0/28 (0%)	(1 month)
Adelson et al[22]	13/14 (92.9%)	11/12 (91.7%)	–	2/14 (14.3%)	62 days
Herman et al[23]	41/46 (89.1%)	46/53 (86.8%)	46/53 (86.8%)	–	66 days
Stellato et al[24]	3/3 (100%)	3/3 (100%)	–	1/3 (33.3%)	–
Total	756/795 (95.1%)	609/700 (87.0%)	332/441 (75.3%)	111/681 (16.3%)	

PEG: percutaneous endoscopic gastrostomy

Table 3 Outcomes of PTEG placement for malignant bowel obstruction[25-33]

Author	Successful placement	Symptom relief	Diet tolerated	Complications	Median survival (average) (days)
Aramaki et al[25]	33/33 (100%)	30/33 (90.9%)	–	1/33 (3.0%)	73
Murakami et al[26]	41/42 (97.6%)	–	–	6/42 (14.3%)	–
Udomsawaengsup et al[27]	16/16 (100%)	16/16 (100%)	–	3/17 (17.6%)	–
Aragane et al[28]	5/5 (100%)	4/5 (80%)	–	3/5 (60%)	52
Mackey et al[29]	7/7 (100%)	7/7 (100%)	–	1/7 (14.3%)	–
Hoshikawa et al[30]	24/28 (85.7%)	24/24 (100%)	–	1/28 (3.6%)	–
Oishi et al[31]	48/48 (100%)	48/48 (100%)	–	14/48 (29.2%)	(76.6)
Furuta et al[32]	–	–	–	0/9 (0%)	–
Kato et al[33]	8/8 (100%)	–	–	3/8 (37.5%)	48
Total	182/187 (97.3%)	129/133 (97.0%)	–	32/197 (16.2%)	–

PTEG: percutaneous transesophageal gastrotubing

ance, adverse events, and median survival time in patients undergoing PEG and PTEG, respectively.

Procedure success rates

The rate of successful PEG placement was 89.1% to 100%. Among a total of 795 patients, the overall rate of successful PEG tube placement for MBO decompression was 95.1%. Among these patients, 573 had obvious primary lesions. The most frequent primary cancer was gynecological cancer (56.4%), followed by colorectal (13.6%), pancreatic (11.5%), and gastric (6.8%) cancers. Ascites was present in 54.1% (158/292) of patients.

The rate of successful PTEG placement was 85.7% to 100%. Among a total of 187 patients, the overall rate of successful PTEG placement was 97.3% (182/187 patients). The most frequent primary cancer was gastric cancer (65.8%), followed by colorectal (10.1%), pancreatic (8.9%), and gynecological (7.6%) cancers.

Rates of symptom relief and diet tolerance

The rate of symptom relief after PEG was 75% to 100%. The overall rate of patients (in all studies) reporting relief from distressing MBO symptoms was 87%. The rate of patients who obtained symptomatic relief after PTEG 80% to 100%. The overall rate of symptomatic relief after PTEG was 97%. Among the 441 patients who underwent PEG and for whom follow-up data were available, 75.3% were able to resume oral intake. However, few studies evaluated resumption of oral intake in patients who underwent PTEG, although one study noted that patients who underwent PTEG were able to eat watery cooked rice (rice gruel; 20:1 water:rice ratio).

Complications

The incidences of complications after PEG and PTEG were 0% to 37.5% and 0% to 60%, respectively. The overall rates of complications (in all studies) were 16.3% (111/681 patients) after PEG and 16.2% (32/197 patients) after PTEG. In all studies, skin damage from leakage of digestive fluids and infection at the tube insertion site was common. One (0.2%) patient with an abdominal abscess died as a result of PEG. No deaths occurred among patients who underwent PTEG.

Median survival time

Overall median survival time was 42－135 days after PEG and 48－73 days after PTEG.

Discussion

Before considering PEG or PTEG, physicians should first consider the indications for surgical treatment (*e.g.*, resection, bypass surgery, colostomy) and endoscopic stent placement. The optimal procedures for non-curative relief of symptoms caused by advanced malignancy should be used for surgical palliation. In a prospective study of more than 1000 palliative surgical procedures, Miner et al concluded that symptom relief is possible in selected patients, but that new or recurrent symptoms may limit the duration of relief.[34] Patient factors associated with poor surgical outcomes include advanced age and poor nutritional status, performance status, psychological health, and social support.[35]

Resection of an obstruction or bypass surgery might be indicated for patients who can adequately tolerate general anesthesia and have a predicted life expectancy of several months, after accounting for postoperative recovery.

Stent placement, which has significantly improved during the past several years, is a useful, relatively noninvasive therapy for eliminating stenosis in patients with MBO due to gastrointestinal obstruction at a single site that is reachable by upper or lower gastrointestinal endoscopy. In Japan, use of esophageal, gastroduodenal, and colonic stents was approved in 2010, and these stents are now available for use in clinical settings. Stent placement is a treatment option for patients whose general condition does not allow surgical treatment, those who decline surgical treatment, and those with a limited life expectancy (over the next few months).[1]

Among patients with MBO for whom surgery and stent placement are contraindicated, mechanical decompression of the intestinal tract usually involves insertion of a nasointestinal tube (NGT; ileus tube), after assessing the degree of convenience and invasiveness. Long-term nasointestinal tube insertion is associated with discomfort,[36] and nasointestinal tubes should not be left in place for extended periods of time because of the associated risks, including discomfort, erosion of nasal cavity mucosa, and aspiration pneumonitis. NGTs should therefore be inserted and removed intermittently as an alternative to long-term insertion of a nasointestinal tube.

PEG has been used since 1980 to facilitate enteral nutrition in patients with dysphagia.[4] For patients who have difficulties with PEG, PTEG creates a route for a feeding tube by inserting a tube into the esophagus from the neck.[7] Both procedures are also used to achieve decompression in terminal cancer patients with MBO.

To avoid adverse effects associated with long-term placement of a nasointestinal tube, PEG or PTEG can be considered for decompression after administration of the appropriate drugs and when intestinal decompression with a nasointestinal tube is useful for achieving symptom relief in a patient with a relatively good life expectancy (several weeks to several months).

PEG is a treatment option for patients who experience symptom relief after placement of a NGT. Percutaneous endoscopic gastrojejunostomy (PEG/J), which involves insertion of a tube into the small intestine from PEG, is another treatment option for patients who require an intestinal tube. Kawata et al reported that symptom relief can be expected by switching to PEG/J when PEG results in insufficient decompression.[10]

Our review showed that the success rates for PEG (95.1%) and PTEG (97.3%) were high, as were the rates of symptom relief after PEG (87%) and PTEG (97%).

It is likely that the centers included in the analyzed re-

ports frequently used PEG and PTEG for decompression. The median survival time after PEG or PTEG in those centers was 42－135 days; thus, survival is more accurately described as "several weeks" rather than "a few short months". When this is used as a guide, PEG or PTEG is indicated for patients with a life expectancy of several weeks or longer. It may be desirable to forego PEG or PTEG for patients with shorter life expectancies, because of the patient burden associated with the procedures and the possibility of adverse events. In any case, prognosis should be considered before performing these procedures.

PEG and PTEG did not substantially differ in the rate of successful decompression of the gastrointestinal tract, the rate of symptom relief, or the incidences of complications. Both procedures are safe and achieve a high rate of symptom relief. However, PEG and PTEG may differ in relation to reinitiation of oral intake. Oral intake of liquids and solids was possible among 75.3% of patients who underwent PEG; however, there were no data on oral intake among patients who underwent PTEG.

Oral intake was reinitiated in most patients who underwent PEG, perhaps because PEG was not initially required for these patients. In addition, some studies included patients who did not receive appropriate medication. The need for NGT placement and medication control should be reviewed in a future study.

Ovarian cancer was common among patients receiving PEG, and gastric cancer was common among those undergoing PTEG. We believe that this was the case because there are many cases of PEG adaptation for gynecologic cancer, which often involves gastrointestinal obstruction in the pelvis, and because PTEG is possible after gastrectomy.

PEG is preferable to PTEG because it is less expensive, both from the perspective of health care economics and because it is covered by Japanese national health insurance.

Conclusion

Before use of PEG and PTEG for decompression, the treatment team should clarify the surgical indications, determine indications for stent placement, assess the necessity of a nasointestinal tube (after reviewing medication history and infusion volume), and determine whether a nasointestinal tube would be useful for symptom relief. This systematic review of studies of PEG and PTEG for MBO identified no high-quality studies of the two procedures, although such studies are expected in the future.

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