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# Use of a large-diameter 30-French venting gastrostomy tube is effective and safe for symptom palliation in patients with malignant bowel obstruction

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## Abstract

**Background** Treatment options for malignant bowel obstruction are limited, particularly in poor surgical candidates. Standard percutaneous endoscopic gastrostomy (PEG) tubes used for venting are of small caliber, limiting success. This study examines outcomes in patients who received larger-caliber 30-Fr PEGs for treatment of malignant bowel obstruction.

**Method** Retrospective chart review for all patients who received a large-caliber venting PEGs for malignant bowel obstruction in a series of patients at a single institution.

**Results** Thirty-six patients were included. The most common primary cancer diagnoses were ovarian (22%), mucinous appendiceal (19%), and colorectal (17%). Symptom relief was achieved in all patients (100%). Four patients (11%) sought medical care for recurrent symptoms due to an incorrect venting technique. Large-caliber venting PEGs were placed on the first admission for obstruction in 17 patients (47%), and were used to replace standard caliber PEGs in 8 patients because of persistent symptoms (22%). Significant ascites was observed in 12 patients (33%), but paracenteses were performed in only 3 of these patients prior to PEG placement. Most large-caliber venting PEGs were placed during hospital admission (34/36, 94%), and facilitated hospital discharge (33/34, 97%). Two significant (6%) and 2 minor adverse events (6%) occurred.

**Conclusions** This study demonstrates the efficacy and safety of large-caliber venting PEGs for malignant bowel obstruction. This facilitated hospital discharge in almost all patients and prevented readmissions when a correct venting technique was utilized; these PEGs were also effective in patients who had failed standard PEG tube venting.

**Keywords** Malignant bowel obstruction, venting gastrostomy, palliative care, Aspire A-tube

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## Introduction

Complete or partial bowel obstruction can develop as a result of several types of advanced intraabdominal malignancy, causing patients to experience nausea, vomiting, poor oral intake, pain, and

abdominal distension [1]. This may have a significant impact on quality of life, often near the end of a patient's life. Treatment options include conservative medical management, surgical resection/bypass, and endoscopic techniques such as luminal stenting and placement of a venting gastrostomy tube. Patient factors, such as overall performance status, whether one or more obstructive levels are present and goals of care, impact the treatment selected.

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Conflict of Interest: None

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Patients who are poor surgical candidates because of advanced disease, deconditioning and multiple levels of occlusion may benefit from medical management plus placement of a venting gastrostomy tube. Gastrostomy tubes traditionally used for venting in patients with malignant bowel obstructions were originally designed for liquid tube feeds and range in caliber from 14-24 Fr. This technique has been shown to be safe and effective, although symptom relief is variable in some studies [2-6].

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A large-diameter 30-Fr percutaneous endoscopic gastrostomy (PEG) tube with fenestrated tail has been used for gastric venting for weight loss and may provide better symptom relief compared to standard PEG tubes in the management of malignant bowel obstruction [7]. This retrospective case series describes the outcomes when this large-caliber PEG was used

for the management of malignant bowel obstruction in a series of patients at a single institution.

## Patients and methods

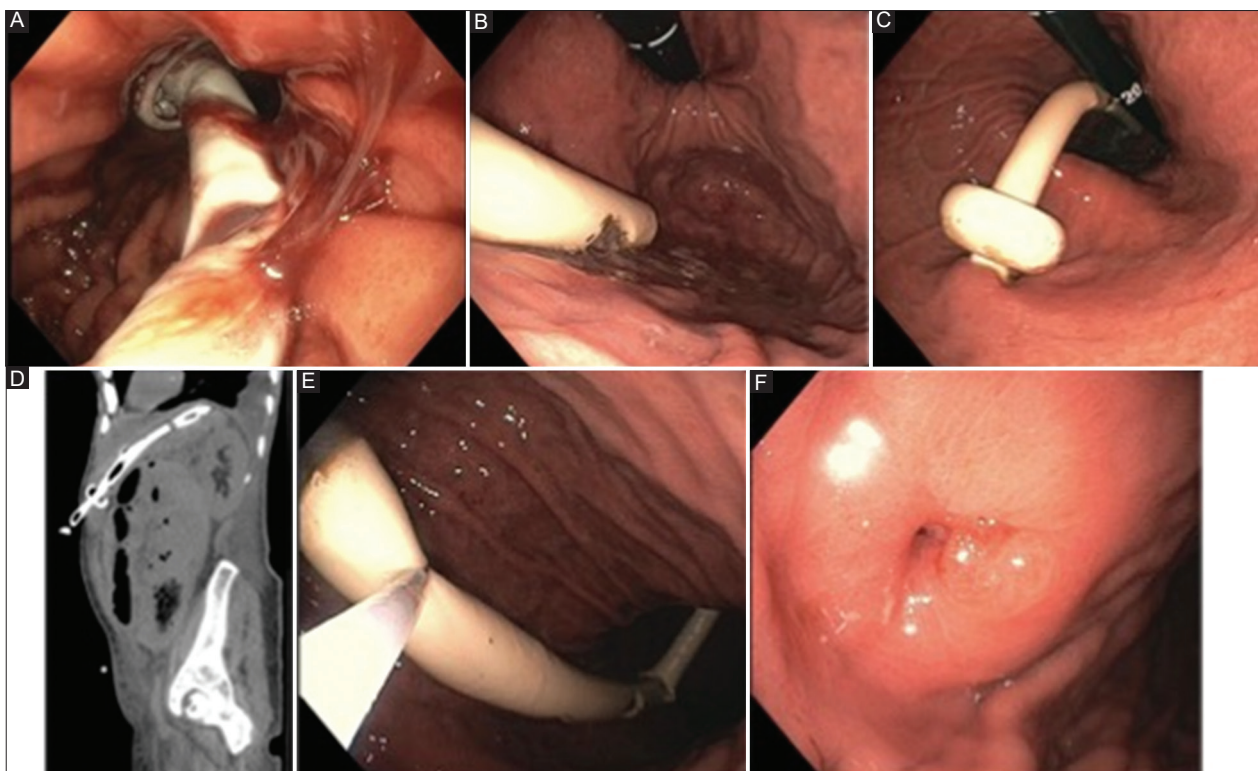
A review of the electronic medical record at University of California San Diego Health was performed to identify patients who received a 30-Fr Aspire PEG tube for the management of malignant bowel obstruction (AspireAssist; Aspire Bariatrics; King of Prussia, PA). The electronic medical record was used to obtain demographic, procedural, and clinical data. The AspireAssist is a modified PEG tube initially approved by the Food and Drug Administration to enable weight loss by requiring extensive chewing of food followed by venting around 30% of stomach contents after a meal [8]. The device is a large-caliber 30-Fr PEG tube with a long intragastric portion (15 cm) that has 5 6-mm side holes (Fig. 1). It is designed for use with an external connector, which attaches to a low-profile button on the abdominal wall to facilitate sanitary drainage of stomach contents. The device was later approved by the United States Food and Drug Administration for palliation of malignant bowel obstruction. For this purpose, the PEG tube is used without the external connector.

The PEG tube is placed using the standard pull PEG technique, with PEG supplies obtained from a standard pull PEG kit. Cross sectional imaging, if available, was reviewed prior to placement in all patients. All tubes were placed by gastroenterologists with

specialized training in advanced/interventional endoscopic procedures. Patients and their caregivers were then instructed on its use for venting as needed for symptom relief, using either intermittent gravity drainage, continuous passive drainage into a drainage bag, or active aspiration with a 60-mL slip-tip syringe. If patients were able to advance their diet to solids, they were instructed to chew their food carefully and thoroughly to facilitate drainage through the A-tube. In those patients who developed symptomatic improvement and PEG removal was requested, the tube was cut externally and removed endoscopically from the stomach with a snare.

## Results

A total of 36 patients who received large-caliber venting PEGs were identified. Their mean age was 59 years ( $\pm 14$  years, range 28–83 years) and 72% of these patients were female (Table 1). The primary cancer diagnosis leading to malignant bowel obstruction was ovarian cancer (22%), mucinous appendiceal (19%), and colorectal cancers (17%). When ovarian cancer was combined with other gynecological malignancies, including uterine, cervical and fallopian cancers, the total percentage of cases was 33%. The frequency of other primary cancer diagnoses can be seen in Table 1. In 30 cases (83%), the patient presented with symptoms and imaging findings of a small bowel obstruction. Other clinical presentations included gastric outlet obstruction in 3 patients (8%)



**Figure 1** Placement of large-caliber venting percutaneous endoscopic gastrostomy (PEG) tube. (A) View of new PEG tube in gastric body. (B, C) Retroflexed views within stomach showing usual course of PEG tube extending proximally toward the gastric fundus. (D) Sagittal computed tomography image depicting course of PEG tube. (E) Removal of gastrostomy tube. (F) PEG tract after removal of tube

**Table 1** Patient characteristics (n=36)

Patients (n=36)	Value
Age, years	59±14 (range 28-83)
Sex	
Female	26 (72.2)
Male	10 (27.8)
Primary cancer diagnosis	
Ovarian	8 (22.2)
Appendiceal	7 (19.4)
Colorectal	6 (16.7)
Gastric	3 (8.3)
Small bowel	2 (5.6)
Unknown	2 (5.6)
Uterine	2 (5.6)
Adrenal	1 (2.8)
Breast	1 (2.8)
Cervical	1 (2.8)
Fallopian	1 (2.8)
Pancreatic	1 (2.8)
Urothelial	1 (2.8)
Presentation	
Small bowel obstruction	30 (83.3)
Gastric outlet obstruction	3 (8.3)
Ileus	2 (5.6)
Large bowel obstruction	1 (2.8)

Results presented as mean ± standard deviation or n (%)

who were not candidates for luminal stenting or surgery, large bowel obstruction in 1 patient (3%) who failed luminal stenting and was a not candidate for surgery, and prolonged refractory ileus in 2 patients with colon and appendiceal cancers (6%).

Adequate symptom relief (nausea, vomiting, oral feeding intolerance, distension, and abdominal pain) was achieved in all 36 patients, as evidenced by follow-up notes in the electronic medical record and/or the lack of readmission for symptoms consistent with malignant bowel obstruction (Table 2). There were 4 patients (11%) who presented to the emergency department with recurrent obstructive symptoms following large-caliber venting PEG placement; however, in all cases the patients experienced relief with use of the venting PEG and were given additional instruction on the correct use of the device for adequate venting. These patients were not admitted to the hospital. Large-caliber venting PEGs were placed on the first admission for bowel obstruction in 17 patients (47%) after failure of conservative medical management, and were used to replace previously placed standard caliber PEGs due to persistent symptoms in 8 patients (22%) who failed conservative medical management followed by venting with the standard caliber PEG. Clinically significant presumed malignant ascites was observed in 12 patients (33%), but paracenteses were performed in only 3 of these patients prior to placement of a large-caliber venting PEG tube. The majority of large-caliber venting PEGs were placed during inpatient stays (34/36, 94%), and facilitated hospital discharge in almost all cases (33/34, 97%). None of the patients included in this study underwent surgical treatment for malignant bowel obstruction.

The average length of time from the cancer diagnosis to the date of large-caliber venting PEG placement was 980 days (±1046, range 45-4682). When patients who had primary cancer diagnoses

**Table 2** Large-caliber percutaneous endoscopic gastrostomy (PEG) tube procedure characteristics and outcomes (n=36). PEG here refers to large-caliber PEG only. Note: admissions for obstructive symptoms were all relieved with the use of a venting PEG and patients received additional instruction in the use of their PEG for adequate venting

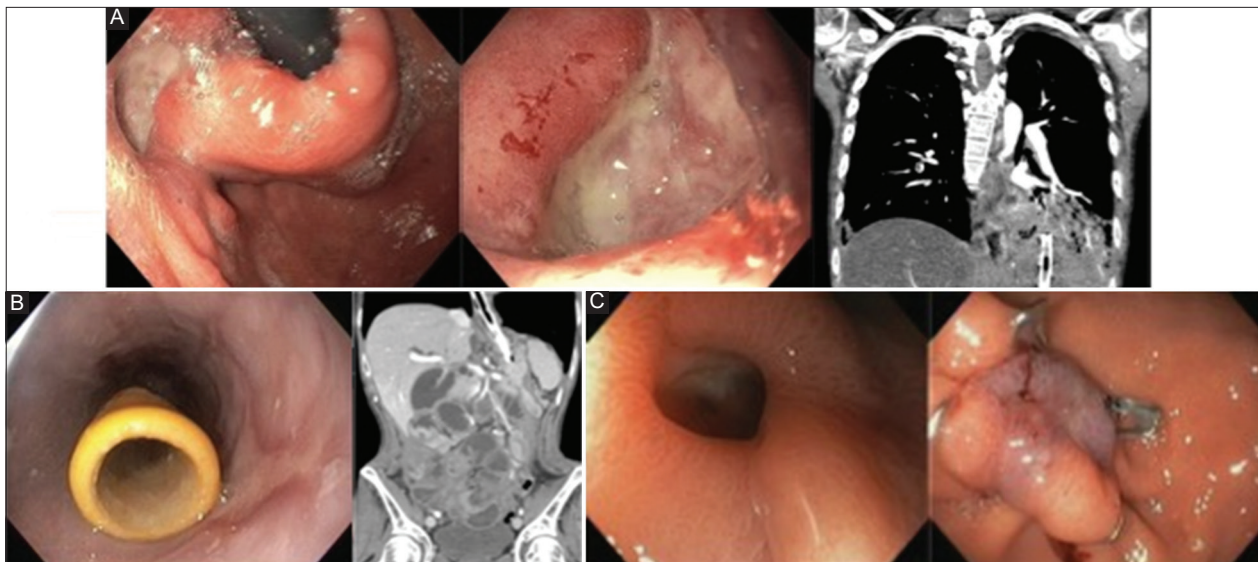
Characteristics	Value
Symptom relief	36 (100)
Readmissions for obstructive symptoms after PEG	4 (11.1)
PEG placed on first admission for bowel obstruction	17 (47.2)
Prior standard PEG requiring upsizing because of persistent symptoms	
Yes	8 (22.2)
Significant ascites (moderate to large on computed tomography)	
Yes	12 (33.3)
Paracentesis performed prior to PEG placement	3 (8.3)
PEG placed while inpatient	34 (94.4)
PEG placement facilitated discharge	33 (97.1)
Time from cancer diagnosis to PEG placement (days)	
All malignancy types	980±1046 (range 45-4682)
Excluding gynecological and appendiceal mucinous cancers	470±449 (range 45-1767)
Time from PEG placement to death (days)	
All malignancy types	112±146 (range 4-630)
Excluding gynecological and appendiceal mucinous cancers	57±54 (range 4-213)
Only gynecological and appendiceal mucinous cancers	194±197 (range 7-630)
Adverse events	
Significant	2 (5.6)
Gastric perforation	1 (2.8)
Sepsis	1 (2.8)
Minor	2 (5.6)
Gastrocutaneous fistula	1 (2.8)
Migration into distal esophagus	1 (2.8)

Results presented as n (%) or mean ± standard deviation (range)

with longer life expectancies, such as appendiceal mucinous adenocarcinoma and gynecological malignancies, were excluded, the time from cancer diagnosis to the time of large-caliber venting PEG placement was 470 days (±449, range 45-1767). The mean time from venting PEG placement to death was 112 days (±146, range 4-630). When patients with appendiceal mucinous adenocarcinoma and gynecological malignancies are excluded, the time from venting PEG placement to death was 57 days (±54, range 4-213).

Two significant adverse events were encountered after PEG placement (6%), both in patients who initially were discharged with symptom relief following large-caliber venting PEG placement (Fig. 2). The first was perforation of the gastric fundus at the site of a malignant gastric ulcer. On abdominal computed tomography, the large-caliber PEG was found to be protruding through the gastric fundus perforation, the left diaphragmatic crus, and into the left lung base. The patient





**Figure 2** Complications related to large-caliber venting percutaneous endoscopic gastrostomy (PEG) tube. (A) Venting PEG passing through perforated gastric ulcer. (B) Tube projecting into esophageal lumen seen endoscopically and on computed tomography. (C) Gastrocutaneous fistula after PEG removal closed with an over-the-scope clip

was admitted and started on broad spectrum antibiotics; comfort care measures were instituted, and the patient died shortly afterward. The second major complication was sepsis in a patient with trace ascites admitted to the hospital and transitioned to hospice. The source of sepsis was suspected to be a large necrotic intraabdominal mass or, less likely, the development of PEG site infection, as there was some erythema at the PEG site.

Two minor adverse events were encountered after PEG placement (6%). The first was the development of a gastrocutaneous fistula following PEG removal in a patient with *pseudomyxoma peritonei* who requested that the PEG be removed after marked symptom improvement. The fistula was closed successfully with endoclips to prevent further fistula drainage. The second minor adverse event was migration of the tail of the PEG tube into the distal esophagus of one patient. The tube was repositioned endoscopically into the stomach and clipped to the gastric wall successfully without further issues.

One patient experienced durable resolution of obstructive symptoms without use of their venting PEG, so the tube was removed and the tract was prophylactically closed with 3 endoclips. Another patient's PEG was removed within a few months of placement at their request and the PEG site was prophylactically closed with an over-the-scope clip. This patient later developed recurrent small bowel obstruction again requiring hospitalization, and a second large-caliber venting PEG was then placed.

## Discussion

The Aspire A-tube, a large-caliber 30-Fr venting PEG with a 15-cm fenestrated intragastric tail, is effective for symptom palliation in patients with malignant bowel obstruction. All

patients in this study who received this device experienced symptom relief when adequate venting was performed. At the time of initial large-caliber venting PEG placement or upsizing, the majority of patients were admitted to the hospital for malignant bowel obstruction. Almost all were then able to be discharged home after symptom relief. There were 4 patients who later presented to the hospital with recurrent obstructive symptoms as a result of inadequate venting technique following large-caliber PEG placement; however, all had symptom resolution following additional instruction on appropriate use of the PEG. Otherwise, no patients were readmitted with ongoing or recurrent obstructive symptoms. Therefore, this strategy may improve the quality of life in patients with advanced malignancy.

The use of this device for malignant bowel obstruction was safe, with only a small number of adverse events noted in this cohort of patients. The fact that the fenestrated tail of the 30-Fr PEG tube extends proximally into the stomach should be kept in mind, as one patient with a malignant gastric fundus ulcer at the site of primary gastric adenocarcinoma developed a perforation through which the PEG protruded. Also, because of its length, the tail of the venting-tube can migrate into the distal esophagus. One should be mindful of the potential effects of the long intragastric tail when selecting a site for placement of the PEG to the extent that this can be controlled. The tip of the intragastric tail can be shortened prior to placement or after placement using endoscopic scissors, if necessary, based on the patient's anatomy. As with standard PEG placement, peri-procedural antibiotics should be administered to minimize the risk of infection.

The main limitation of this study is that it is a retrospective review. Furthermore, only patients who had large-caliber venting PEGs placed were included in this study, so it does not provide information on patients who received standard (24 Fr or smaller) PEG tubes, those patients who were deemed poor candidates for PEG placement, or cases where the PEG placement procedure was aborted due to lack of a favorable placement window. However,

anecdotally, there were very few cases where the procedure was not successfully completed when planned.

In summary, this study demonstrated the safe and effective use of large-caliber venting PEG placement for the management of malignant bowel obstruction. Studies with a large number of patients and comparison to standard PEG and other treatments are necessary for further investigation.

### Summary Box

#### What is already known:

- Malignant bowel obstruction is a challenging consequence of certain types of intraabdominal malignancy
- Current management includes nasogastric decompression, endoscopic therapies, and surgery
- Current venting gastrostomy tubes are limited by their small diameter

#### What the new findings are:

- Large-caliber gastrostomy tubes are being used for weight loss purposes in bariatric patients
- These tubes can be adapted for use in palliative venting in patients with malignant bowel obstruction
- The use of large-caliber venting gastrostomy tubes for this purpose is safe and effective

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