

# Delayed Perforation From Percutaneous Endoscopic Gastrostomy Tube Placement Involving The Sigmoid Colon: A Case Report And Review Of Complications

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## 1. Abstract

**1.1. Background:** Percutaneous endoscopic gastrostomy (PEG) tube placement is generally a safe and effective method for establishing long-term enteral access in a minimally invasive fashion. Placement through an intervening loop of colon is a surgical pitfall which ultimately requires operative exploration to correct. Delayed perforation remote from the initial PEG placement is not yet described in the literature and represents an unusual but serious form of this complication.

**1.2. Methods:** A single case of delayed perforation of the sigmoid colon after PEG placement through its lumen was reviewed and presented along with a literature review.

**1.3. Results:** A 62 year old male with history of Down syndrome and severe mental retardation, chronic PEG and tracheostomy developed free air during his admission. Subsequent exploratory laparotomy demonstrated that the PEG traversed the sigmoid colon and entered the gastric lumen, with a small perforation along the exit site of the sigmoid colon. Segmental colonic resection with end colostomy was performed without complication, and the gastrostomy was revised in a Stamm fashion. He was able to resume tube feeds prior to hospital discharge.

**1.4. Conclusions:** Intestinal perforation secondary to a misplaced PEG tube can occur in a delayed fashion, even long after the tube is placed and feeding is initiated. Utilization of the "safe tract" method must carefully be employed to minimize the risk of placement through an intervening hollow viscous such as colon or small bowel. Perforation or coloenteric fistulae require surgical intervention to correct.

## 2. Introduction

Percutaneous endoscopic gastrostomy (PEG) has become the procedure of choice for establishing long-term enteral feeding access since it was first introduced in 1980 by Gauderer and others [1]. Largely, this is secondary to excellent efficacy (over 99% by meta-analysis) [2] in conjunction with technical simplicity, ease of tube management, and low cost [3]. In comparison to other techniques for placement of gastrostomy tubes, PEG has garnered the most favorable risk profile with fewer tube dislodgements than radiographically guided tubes [4].

Injury to the bowel with resultant peritonitis is the most dreaded

complication of PEG placement, and fortunately is quite rare. Such an injury can occur if any loop of bowel traverses the peritoneal cavity anterior to the anticipated gastrostomy site on the stomach and is inadvertently entered when attempting to cannulate the gastric lumen. Generally, perforation of the bowel begets peritonitis in the perioperative period, requiring emergent surgery. A rarer variant of bowel injury is gastrocolocutaneous fistula (GCCF), whereby the PEG tube is placed into the stomach through the entire lumen of the colon, however peritonitis does not develop and a subsequent colonic fistula forms. A handful of case reports exist describing this phenomenon [5-9]. Often, this

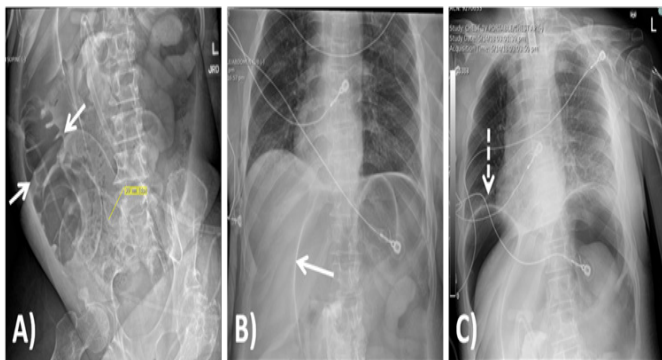
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complication presents months after the initial PEG placement as recurrent emesis and frequent diarrhea, with potential for subacute febrile episodes.

Herein we present an as of yet undescribed case of delayed colonic perforation secondary to GCCF after PEG placement. We then review PEG tube complications and the literature surrounding presentation and management of GCCF.

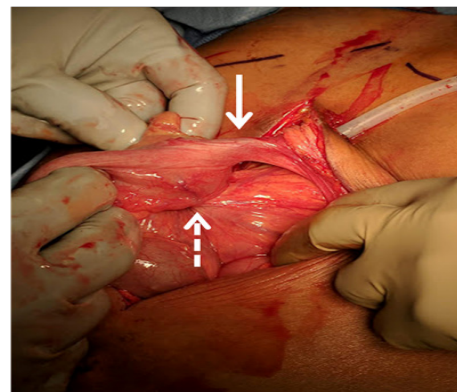
### 3. Case Report

The patient was a 62 year old gentleman with history of developmental delay and prior PEG and tracheostomy placement who presented from a long term care facility with tracheostomy complications. The patient had been tolerating tube feeds for at several years prior to presentation. On hospital day 2, the general surgery service was consulted for new onset tachycardia. Abdominal plain films as well as an upright chest x-ray revealed a large volume of pneumoperitoneum (**Figure 1**). Given these findings, the patient was taken emergently to the operating room.



**Figure 1:** Preoperative plain films obtained prior to laparotomy which were suggestive of free air. A) Supine abdominal film demonstrating Rigler's sign (solid white arrows). B) Additional view demonstrates the falciform ligament sign (solid white arrow). C) Upright chest x-ray reveals massive free air under the right hemidiaphragm (dotted white arrow).

At exploratory laparotomy, a GCCF was noted almost immediately upon entering the abdomen. Examination of the fistula revealed a perforation of the sigmoid colon at the proximal aspect of the sigmoid colon as the PEG exited the anterior gastric wall and penetrated the colonic lumen (**Figure 2**). The fistula was completely taken down, a new gastrostomy tube was placed in a Stamm fashion, and a partial sigmoid colectomy with end colostomy was performed given his poor functional status/wound care needs. The patient tolerated this procedure well and was eventually discharged to his long term care facility tolerating goal tube feeds.



**Figure 2:** Exploratory laparotomy revealed a coloenteric fistula (solid white arrow) with the PEG tube placed through and through the sigmoid colon into the stomach. Perforation occurred at the exit site of the sigmoid colon adjacent to the anterior gastric wall (dotted white arrow).

### 4. Discussion

With over 200,000 PEG's placed annually in the United States since the early 2000's [10], PEG tube placement has rapidly become the preferred method over radiologic and surgically placed g-tubes for securing durable access for enteral nutrition. Though generally considered to be a very safe procedure, multiple case series suggest that complications ranging in severity from minor to major (**Table 1**) occur at rates between 9 and 17% [11,12].

**Table 1.** PEG tube complications

Major	Minor
Intestinal perforation	Surgical site infection
Bleeding	Pneumoperitoneum
Abdominal organ injury	Tube dislodgement
Aspiration pneumonia	Tube clogging
Buried bumper syndrome	Peristomal granuloma
Tumor seeding	
Intestinal volvulus	
Necrotizing fasciitis	

GCCF, whereby the gastrostomy tube is placed from the anterior abdominal wall, through the colon and into the stomach, is a known rare, but major, complication of PEG placement that is estimated to occur in 0.2-0.76% of adult [13-15] and 2-3.5% of pediatric patients [16,17]. GCCF can have devastating effects, however the symptoms and time of presentation vary widely. Though colonic perforation with peritonitis in the immediate post-operative period has been described as a complication of PEG placement [18], in GCCF the fistulous tract which adheres the anterior wall of the stomach to the colon and the colon to the abdominal wall frequently prevents peri-procedural leakage of intraluminal contents into the abdominal cavity. As a result, a malpositioned PEG tube can go unnoticed for weeks and even years [11,19]. In fact, GCCF are often asymptomatic until the bumper of the feeding tube erodes from the lumen of the stomach into the colon, leaving a direct communication between the two hollow viscera by which gastric contents can directly enter the large bowel and vice

versa. It is this communication that leads to the most common presentation of GCCF: profuse diarrhea with enteral feeds and feculent emesis [6,13,20,21]. Other symptoms include weight loss, abdominal pain, intestinal obstruction, and difficulty in tube exchange. Although some patients will remain entirely asymptomatic [16,19,22], these complications can be fatal if not addressed [21,23] and highlight the importance of identifying a GCCF if suspected. To the best of our knowledge, this case is the first in which a GCCF has presented as a delayed colonic perforation. Varying treatments for GCCF have been documented in case reports and are largely determined by the symptoms induced by the fistula itself. Uncomplicated GCCF without peritonitis or abscess can often be managed non-operatively with removal of the gastrostomy tube and bowel rest [24,25]. In cases such as ours, however, that are complicated by frank perforation, peritonitis and/or abscess, surgical management including laparotomy with lysis of adhesions, excision of the colocolic fistulous tract, and/or excision of the diseased portion of bowel [13,24] is often required. In recent years, an endoscopic over-the-scope clip system has been successfully employed to close the gastric or colonic orifices of a fistulous tract with the simultaneous endoscopic removal of the PEG tube [5,26], however this requires that the tract be relatively small and there is not extensive concomitant extraluminal pathology.

A thorough understanding of gastrointestinal anatomy and proper technique during PEG tube placement are imperative for minimizing the risk of GCCF. Notably, the use of good transillumination and the direct visualization of finger indentation upon the anterior aspect of the stomach during needle localization are critical for avoiding this complication. Further, in order to safeguard against instrumenting the colon prior to entering the stomach, the guide needle should be attached to a fluid-filled syringe and continuous back pressure should be applied as the needle is advanced to ensure there's no aspiration of stool or air prior to its tip being visualized in the gastric lumen. Additionally, adequate insufflation must be used during the procedure to displace the transverse colon, which lies anterior to the stomach, from the line of instrumentation without overinsufflating the stomach. Overinsufflation can rotate the greater curvature of the stomach forward, displacing the gastrocolic omentum and the associated transverse colon anteriorly and in the line of needle trajectory [17,24,27]. In complicated cases, such as patients with prior abdominal surgery with associated adhesive disease and distorted anatomy, one might consider performing simultaneous laparoscopy to help confirm that the needle is not introduced into the colon [24].

In cases where GCCF is suspected, diagnosis is best made by fistulogram with gastrograffin contrast [13]. Other imaging modalities that can be used as adjuncts include CT with water soluble contrast, barium enema and direct visualization of the fistula via

upper or lower endoscopy [5,8,28,29].

In summary, although rare, GCCF after PEG placement can cause significant morbidity, including delayed bowel perforation and sepsis. Attention should be paid during PEG placement to minimize risk of instrumenting the colon and imaging should be conducted if there is any suspicion that the feeding tube is passing through the bowel. Treatment will depend on the patient's symptoms but can range from non-operative management, endoscopic fistulotomy, to exploratory surgery.

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