

Complications Following Insertion and Replacement of Percutaneous Endoscopic Gastrostomy (PEG) Tubes*

REFERENCE: Platt MS, Roe DC. Complications following insertion and replacement of percutaneous endoscopic gastrostomy (PEG) tubes. *J Forensic Sci* 2000;45(4):833–835.

ABSTRACT: Percutaneous endoscopic gastrostomy (PEG) tube insertion was introduced in 1980 as an alternative to nasogastric tubes and surgically placed gastrostomy tubes. The procedure is indicated in those patients who have an inability to sustain adequate nutrition in the presence of a functioning gastrointestinal tract. We report four deaths that arose within a ten-week period in 1998.

KEYWORDS: forensic science, PEG tubes, enterostomy, gastrostomy, endoscopy, feeding tubes, nutrition

Percutaneous endoscopic gastrostomy (PEG) tube insertion was introduced in 1980 as an alternative to nasogastric tubes and surgically placed gastrostomy tubes (1–3). The procedure reduced surgical time to less than 15 min (range 9 to 30 minutes) and was less costly. In 1984, the procedure cost approximately \$510 whereas surgical placement of the tube cost \$2600 (3–5). Recovery time was faster, and the procedure could be done at the bedside (3–5). General anesthesia was avoided, and the procedure could be performed effectively in elderly patients, particularly those with cardiopulmonary complications. It is now the second most common indication for gastrointestinal endoscopy in hospital patients. Its utilization has increased to greater than 74 000 per year and, between the years 1988 to 1995, rapidly increased in those hospital patients who were 65 years of age or older (6).

The procedure is indicated in those patients who have an inability to sustain adequate nutrition in the presence of a functioning gastrointestinal tract (3,4). The subset of amenable patients includes those with neurological disorders with swallowing deficits; those with oropharyngeal, laryngeal, and esophageal cancer; facial trauma; the need for gastric decompression; and those elderly patients with severe cardiac and respiratory failure.

The procedure may be contra-indicated in those patients with ascites, marked obesity, marked hepatomegaly, subtotal gastrectomy, and gastrointestinal obstruction since, in these circumstances, one is unable to adequately bring the anterior gastric wall in apposition to the anterior abdominal wall (3,4).

¹ Medical examiner, Medical Examiner's Office of Summit County, OH.

² Gastroenterologist, Akron City Hospital, Akron, OH.

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The PEG Procedure

Several methods are used to insert the tubes. These include the pull technique of Ponsky-Gauderer (1,2,7) and the push technique of Sachs-Vine (7,8) as depicted in Fig. 1. The pull technique is performed by inserting a metal stylet through the anterior abdominal wall into the stomach, which has been distended with air through a gastroscope. A silk suture is inserted through a Medicut cannula into the gastric lumen and is ensnared by the gastroscope and pulled out through the mouth. A gastrostomy feeding tube is tied onto the silk suture, and the latter is pulled through the mouth into the stomach. The end of the tube is stabilized at the gastric abdominal wall by retention bumpers (see Fig. 1). Feedings are initiated through the end of the tube external to the abdominal wall. In the Sachs-Vine procedure, a Seldinger needle is inserted through the abdominal wall and the inflated gastric lumen and a guide wire placed through a Seldinger stylet and cannula. The guide wire is snared by the gastroscope and pulled through the esophagus and mouth. A feeding tube is then pushed over the guide wire into the stomach and out of the abdominal wall and stabilized to the gastric and abdominal wall by retention bumpers.

Other methods have been used to insert these tubes. These include the Russell technique, which places a tube via a trocar through the abdominal wall (5), radiologic-fluoroscopic monitoring procedures, and laparoscopic insertion of the tube (9). Recently a "one step button" procedure has become commercially available (10,11). Management of the button procedure requires knowledge of the original pull and push techniques.

Although the use of PEG tubes is increasing, the procedure is not without risk. The overall complication rate is 17% with 3% of a serious nature, usually due to oversedation, aspiration, laryngospasm, peritonitis, or cardiac failure (4,7,8). Other complications include wound infection (5%), peristomal leakage, tube dislodgement, aspiration, bowel perforation, and gastrocolic fistula. The mortality rate at placement ranges from 0.3 to 1%, and the morbidity rate ranges from 3 to 5.9% (4,7,8). There is no significant difference in the perioperative morbidity rate in the push versus pull technique. Surgically placed gastrostomy tubes are known to have a perioperative morbidity rate of 6 to 75%, mainly because of anesthesia and cardiorespiratory complications. The 30-day mortality rate of PEG tube insertion ranges from 9 to 24%, whereas the 30-day mortality rate in surgically-placed tubes ranges from 5 to 37%. These rates, in part, relate to the terminal state of some of the patients.

In Ohio, the coroner or medical examiner takes jurisdiction (12) when unexplained sudden death follows a therapeutic procedure. We found that not all cases of PEG-related deaths were reported. In other jurisdictions, the laws may not even address this issue.

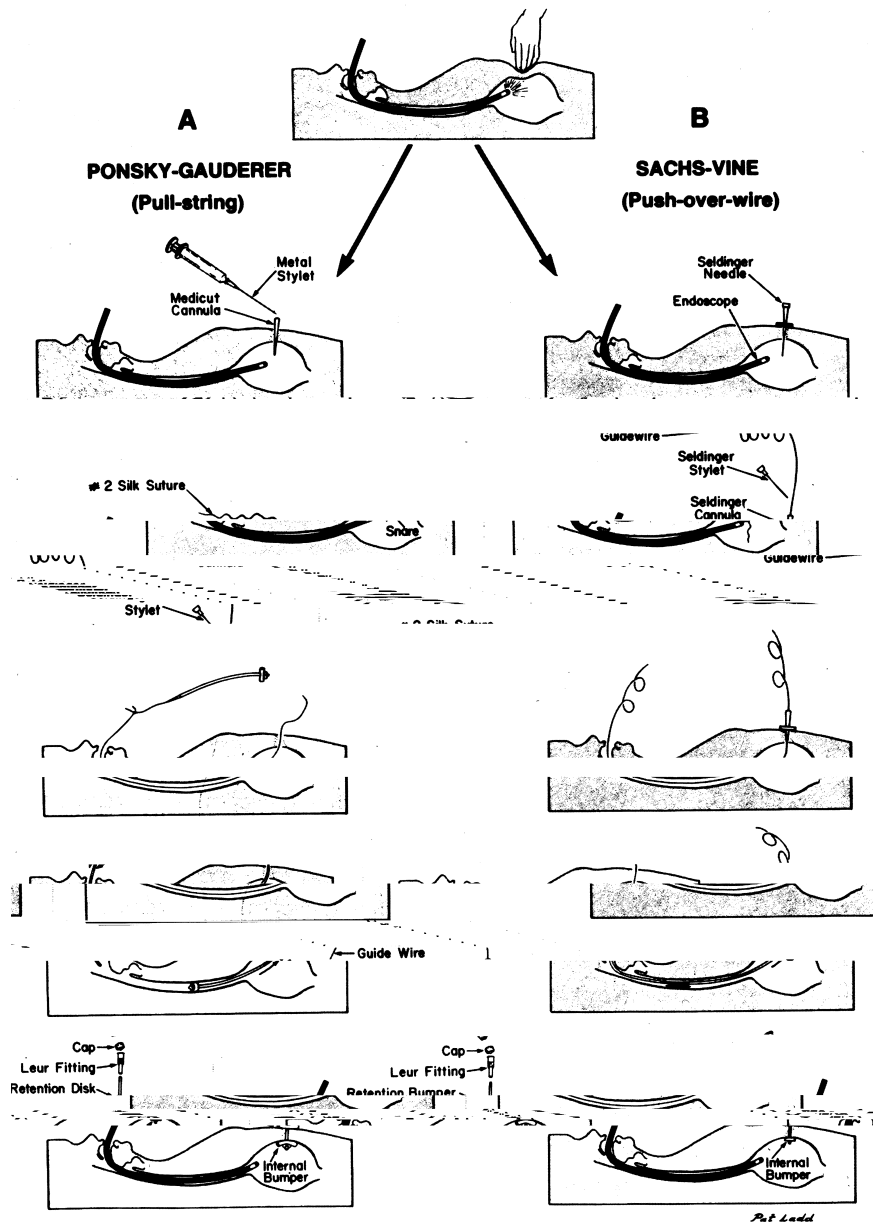


FIG. 1—"Comparison of PEG insertion techniques," from *Gastrointestinal Endoscopy* 1986;32:253-8. Published with permission of the American Society for Gastrointestinal Endoscopy.

Case Presentations

We report four cases with PEG tube complications and death due to peritonitis.

Case One—was a 76-year-old female with Alzheimer's disease, congestive heart failure, and malnutrition. The PEG tube was inserted by a fluoroscopic procedure, and the patient was discharged to the nursing home. Abdominal distention and peritonitis quickly ensued. At autopsy, the tip of the tube was found to have perforated the transverse colon when it was inserted into the stomach.

Case Two—was a 97-year-old female with Alzheimer's disease, congestive heart failure, and pneumonia. When her PEG tube fell out, it was replaced by a nurse through the fistula tract. The patient was fed but sustained abdominal pain, shock, and peritonitis. At autopsy, the tip of the tube was found freely in the peritoneal cavity.

Case Three—was a 21-year-old female with brain damage following Group B beta streptococcus neonatal infection. Her PEG tube became obstructed and was removed. A one-step button tube was inserted, and the patient returned to her facility. After she was fed, she was found dead in bed several hours afterward. At autopsy, the PEG tube was found to have slipped out of the gastric wall fistula into the peritoneum causing peritonitis.

Case Four—was a 76-year-old male who had remote massive cerebral infarction and neurological deficit. When his PEG tube became obstructed in a nursing home, it was removed and replaced by a Foley catheter which was inserted through a mature fistula tract. After the patient was fed, abdominal pain and shock ensued. At autopsy, it was found that the feeding leaked around the gastric wall of the inserted Foley catheter and caused peritonitis.

In none of the cases was the original tube or replacement tube checked for position and proper function after insertion.

The cause of death in each case was ruled as peritonitis (relating to the improper placement of the tube) and the manner of death as accident. Other offices and jurisdictions may adopt other terms for the ruling (13).

Discussion

Although none of the physicians or hospitals were the same, the Medical Examiner's Office elected to intervene because of the close temporal proximity of these cases, which occurred over a 10-week period in 1998. The office shared the postmortem findings related to PEG replacement with local gastroenterologists and several larger nursing homes. As of mid-1999, no new cases have occurred.

The Medical Examiner's Office also communicated with a representative of the American Society for Gastrointestinal Endoscopy (ASGE). This professional organization has published two documents (3,14) dealing with the placement of PEG tubes but has not yet addressed the issue of PEG tube replacement.

We wish to advise the forensic science community of the risk of peritonitis due to faulty PEG tube insertion or replacement incident or due to failure to confirm the position of the tube.

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Additional information and reprint requests:
 Marvin S. Platt, M.D.
 Medical Examiner of Summit County, Ohio
 Medical Examiner's Office
 85 North Summit Street
 Akron, Ohio 44308

ERRATUM

Erratum / Correction of Platt MS, Roe DC. Complications following insertion and replacement of percutaneous endoscopic gastrostomy (PEG) tubes. J Forensic Sci 2000;45(4):833-835.

On page 834, Figure 1 of the above article did not reproduce correctly. Below is the correct reproduction.

The Journal regrets this error. Note: Any and all future citations of the above-referenced paper should read: Platt MS, Roe DC. Complications Following Insertion and Replacement of Percutaneous Endoscopic Gastrostomy (PEG) Tubes. [published erratum appears in J Forensic Sci 2000 Sept;45(5)] J Forensic Sci 2000 Jul;45(4):833-35.

