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MINIREVIEWS

Percutaneous endoscopic gastrostomy tube replacement: A simple procedure?

Varut Lohsiriwat

Varut Lohsiriwat, Division of General Surgery, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand
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Supported by Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand
Correspondence to: Varut Lohsiriwat, MD, PhD, Assistant Professor of Surgery, Division of General Surgery, Department of Surgery, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand. bolloon@hotmail.com
Telephone: +66-2-4198005 Fax: +66-2-4121370
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Abstract

Replacement of gastrostomy tube in patients undergoing percutaneous endoscopic gastrostomy (PEG) is generally considered as a safe and simple procedure. However, it could be associated with serious complications, such as gastrocutaneous tract disruption and intraperitoneal tube placement, which may lead to chemical peritonitis and even death. When PEG tube needs a replacement (e.g., occlusion or breakage of the tube), clinicians must realize that the gastrocutaneous tract of PEG is more friable than that of surgical gastrostomy because there is no suture fixation between gastric wall and abdominal wall in PEG. In general, the tract of PEG begins to mature in 1-2 wk after placement and it is well formed in 4-6 wk. However, this process could take a longer period of time in some patients. Accordingly, this article describes three major principles of a safe PEG tube replacement: (1) good control of the replacement tube along the well-formed gastrocutaneous tract; (2) minimal insertion force during the replacement, and, most importantly; and (3) reliable methods for the confirmation of intragastric tube insertion. In addition, the management of patients with suspected intraperitoneal tube placement (e.g., patients having abdominal pain or signs of peritonitis immediately after PEG tube replacement or shortly after tube feeding was resumed) is discussed. If prompt investigation confirms the intraperitoneal tube placement, surgical intervention is usually required. This article also highlights the fact that each institute should have an optimal protocol for PEG tube replacement to prevent, or to minimize, such serious complications. Meanwhile, clinicians should be aware of these potential complications, particularly if there are any difficulties during the gastrostomy tube replacement.

Key words: Percutaneous endoscopic gastrostomy; Gastrostomy tube replacement; Gastrostomy tube exchange; Gastrostomy tube reinsertion; Complication; Peritonitis; Prevention; Management

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INTRODUCTION

Gastrostomy is indicated when an individual requires long-term prepyloric feeding[1-5]. With an advent of endoscopic procedure, percutaneous endoscopic gastrostomy (PEG) has become more preferential than open gastrostomy thanks to its less invasiveness and better cost-effectiveness[6-11]. Moreover, PEG was associated with significantly faster time to start feeding[12,13]. A PEG tube is usually made of silicone or polyurethane[14-18]; thereby making it very durable and less likely to be damaged by gastric secretion compared to a latex tube[19]. In general, the tract of PEG begins to mature in 1-2 wk after placement and it is well formed in 4-6 wk[20,21]. However, this process

could take a longer period of time in patients with severe malnutrition, immunosuppression, or ascites[22-26]. If a PEG tube is dislodged within a month after placement, it is advised that a repeat endoscopy be performed to replace the tube since the stomach may not well adhere to the abdominal wall, thus resulting in a free perforation[27-29]. Blindly replacing a new tube in this scenario could cause intraperitoneal placement and consequent peritonitis[30].

When PEG tube needs a replacement (e.g., occlusion or breakage of the tube[31-34], or accidental dislodgement of PEG tube[35-37]), clinicians must realize that the gastrocutaneous tract of PEG is more friable than that of surgical gastrostomy because there is no suture fixation between gastric wall and abdominal wall in PEG. Although the incidence of intraperitoneal tube placement in patients with mature gastrocutaneous tract (PEG performed > 30 d) remains unknown, peritonitis after PEG tube replacement has been reported sporadically and it was associated with significant morbidity and mortality[38-46].

PRINCIPLES OF GASTROSTOMY TUBE REPLACEMENT

Although there is no guideline or consensus regarding PEG replacement protocols[47-54], the principles of any PEG tube replacement should include (1) good control of the replacement tube along the well-formed gastrocutaneous tract; (2) minimal insertion force during the replacement, and, most importantly; and (3) reliable method for the confirmation of intragastric tube insertion. Replacing a new tube along the proper tract can be achieved by using a leveler to measure the depth and direction of the tract, exchanging a PEG tube over a relatively short guide wire with or without the assistance of fluoroscopy (the railroad technique, or the modification of Seldinger technique)[55-60], or inserting a new tube under a direct endoscopic view[61,62]. Replacing an old PEG tube with a balloon-tip tube, rather than a mushroom-tip tube or a disc-tip tube, may minimize the risk of gastrocutaneous tract disruption[63-66]. Additional caution should be devoted when replacing PEG tubes in individuals who have non-straight gastrocutaneous tract, who have narrow stoma site, and who have less co-operation.

There are several ways to confirm a proper PEG tube replacement such as aspirating gastric or bilious fluid from the tube, listening to a gurgling sound when flushing air through the replacement tube, and performing a water/saline irrigation test (no resistance or pain when filling the tube with sterile water/saline). These methods are simple but somehow unreliable to indicate whether or not the tube insertion is getting into the stomach. The gold standard to confirm tube position is however to obtain a water-soluble contrast examination through the replacement tube[67-69], or to visualize the internal bolster or balloon *via* an upper gastrointestinal endoscopy[70].

Figure 1 Patient (A 60-year-old woman) developed sudden abdominal pain immediately after percutaneous endoscopic gastrostomy tube replacement. Fluoroscopy of the upper abdomen demonstrated the leakage of water-soluble contrast from a disc-tip gastrostomy tube into the peritoneal cavity (figure courtesy of Dr. Asada Methasate and Dr. Cherdsak Iramaneerat).

STEPWISE APPROACH TO PATIENTS WITH SUSPECTED INTRAPERITONEAL TUBE PLACEMENT

When intraperitoneal tube placement is suspected (e.g., patients having abdominal pain or signs of peritonitis immediately after PEG tube replacement or shortly after tube feeding was resumed), prompt investigation should be performed, either with a water soluble contrast study (Figure 1) or computed tomography scan of the abdomen[41], and tube feeding must be discontinued immediately. In case this situation occurs in an endoscopy room, gastroscopy may show an absence of PEG tube in the stomach which confirms the malposition of gastrostomy tube.

If the investigation reveals gastrostomy tube located in the peritoneal cavity, surgical intervention is usually required such as an exploratory laparotomy with peritoneal lavage for chemical peritonitis (Figure 2). The initial site of gastrostomy may be reused, or closed and a new gastrostomy site be created distal to the former one. Broad-spectrum antibiotics should be given intravenously until clinical grounds and laboratory parameters of infection/inflammation return to normal, mostly within 5-7 d. In a lesser extent of the consequence (i.e., a stable patient with minimal symptoms and signs of peritonitis), non-operative management may be justified[41]. This conservative approach includes the removal of the gastrostomy tube, nasogastric tube decompression, intravenous administration of broad-spectrum antibiotics, and close monitoring of hemodynamic and abdominal signs. A new PEG tube may be placed by endoscopy at a new site in the stomach whenever the patient is completely stabilized.

CONCLUSION

This article emphasizes the potential serious complication for PEG tube replacement, an intraperitoneal placement

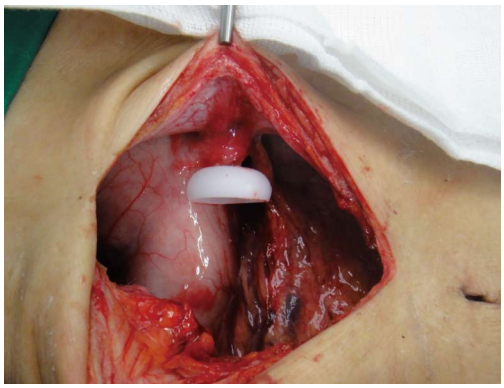

Figure 2 Intraoperative findings of the aforementioned patient showed an intraperitoneal gastrostomy tube, and the separation of mature gastrocutaneous tract close to the stomach (figure courtesy of Dr. Asada Methasate and Dr. Cherdsak Iramaneerat).

and its subsequent peritonitis, which could be associated with significant morbidity and even mortality. Each institute should have an optimal protocol for PEG tube replacement to prevent, or to minimize, such a serious complication. Meanwhile, clinicians should be aware of this complication, particularly if there are any difficulties during the gastrostomy tube replacement.

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