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Percutaneous sonographically assisted endoscopic gastrostomy for difficult cases with interposed organs

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ABSTRACT

Objectives: The aim of this retrospective observational study was to clarify the usefulness and safety of percutaneous sonographically assisted endoscopic gastrostomy or duodenostomy (PSEGD) using the introduction method.

Methods: The information for the sequential 22 patients who could not undergo standard percutaneous endoscopic gastrostomy (PEG) and underwent PSEGD for 3 y was extracted and was reviewed. In standard PEG, we performed pushing out of the stomach from the mediastinum and full distention to adhere the gastric wall to the peritoneal wall without interposing of the intraperitoneal tissues by air inflation and a turning-over procedure of the endoscope, four-point square fixation of the stomach to the peritoneal wall by using a Funada-style gastric wall fixation kit under diaphanoscopy, extracorporeal thumb pushing, and in difficult cases extracorporeal ultrasound guidance, and if necessary confirmation of fixation of the gastric wall to the peritoneal wall and placement of the PEG tube without any interposed tissues by using ultrasound.

Results: Twenty-one patients (95.5%) successfully underwent PSEGD. Early complications (more than grade 2 in Clavien-Dindo classification) just after the procedure occurred in one case (active oozing). We did not encounter a case with mispuncture of the intraperitoneal organs and tissues. Delayed complications occurring within 1 mo were pneumonia in five patients, including death in three cases; bleeding from puncture site in two patients; and atrial fibrilation in one patient.

Conclusion: PSEGD using the introduction method is a useful procedure for difficult patients in whom intraperitoneal organ or tissue is suspected to be interposed between the abdominal wall and stomach.

Introduction

Today, percutaneous endoscopic gastrostomy (PEG) has become a very safe, simple, and common procedure for artificial nutritional feeding for patients who have difficulty with oral intake. In guidelines established by the European Society for Clinical Nutrition and Metabolism [1], some contraindications of PEG are cited, such as interposed organs, marked peritoneal carcinomatosis, severe ascites and peritonitis. Although the guideline mentions that the lack of diaphanoscopy (transillumination of the endoscopic light through the abdominal wall) at the puncture area, the presence of mild to moderate ascites, and previous gastrointestinal (GI) surgery are no longer thought of as contraindications, we often encounter difficult circumstances for PEG for patients in whom intraperitoneal organs or tissues are suspected to be interposed between the abdominal wall and stomach because of the lack of diaphanoscopy and a lack of protrusion of the gastric mucosa by extracorporeal thumb pushing. Ultrasonography-guided gastrostomy is an alternative and additional procedure [2]. High-frequency extracorporeal ultrasound (US; >5 MHz) can detect the gastric wall as a five-layered structure and differentiate it from other GI tracts even if we only detect its anterior wall.

We have tried to use an extracorporeal linear US probe to confirm the gastric wall on the puncture line and to confirm no interposed intraperitoneal organ and tissue on the puncture line. The aim of this study was to clarify the usefulness and safety of our technique of percutaneous sonographically assisted endoscopic gastrostomy or duodenostomy (PSEGD) using the introduction method (Seldinger technique or push technique).

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Patients/material and methods

This was a retrospective observational study. The information for the sequential patients who underwent PSEGD in Unnan City Hospital from 2014 to 2016 was extracted, and their medical records were reviewed. Indication of PSEGD or reason for difficulty for the standard PEG procedure included the ratio of mispuncture of the intraperitoneal organs and tissues, duration of the procedure including endoscopic evaluation of the upper GI tract and placement of the PEG tube, and complications immediately after the procedure and within 1 mo.

This study was approved by the Institutional Review Board of Unnan City Hospital, and personal informed consent concerning the risk for PEG and PSEGD, such as a mispuncture of intraperitoneal organs or tissues, was obtained from the patient or the patient's representative.

PSEGD procedure

The PSEGD procedure was as follows:

1. If necessary in the intramediastinal stomach, full stretching and pushing out of the stomach from the mediastinum into the peritoneal cavity by deep insertion and a turning-over procedure of the endoscope to obtain a wide operative field under the costal arch for the placement of PEG; this technique was previously reported in another article [3];
2. Full distention by air to adhere the gastric wall to the peritoneal wall without interpose or migration of the colon;
3. Four-point square fixation of the stomach to the peritoneal wall by using a Funada-style gastric wall fixation kit (Fig. 1) under diaphanoscopy, extracorporeal thumb pushing bringing protrusion of gastric mucosa (Fig. 2), and, if necessary, extracorporeal US (>5 MHz) guidance (Fig. 3) usually without visualization of the exact tip of the needle;
4. Puncture of the needle introducer of the PEG tube in the center of the fixations (Fig. 1), and
5. Confirmation of fixation of the gastric wall to the peritoneal wall without interpose of the intraperitoneal organs or tissues and placement of balloon of the PEG tube in the stomach b using US (Fig. 4).

We performed this procedure with one gastroenterologic endoscopist and one gastroenterologic surgeon.

Results

Twenty-two patients were enrolled. Of the 22, all but 1 (95.5%) successfully underwent PSEGD. One patient could not undergo PSEGD or standard PEG because of failure of removal of interposed intraperitoneal organ by inflation and stretching of the stomach; the patient died with a small amount of infusion without nutritional support according to desire of her family. In this 3-y period, we performed PEG placement in 276 cases with the standard procedure using the introducer method by Funada-style gastric wall fixation kit.

Indications of PSEGD, or reason for difficulty for standard PEG procedure, were severe esophageal hernia with mediastinal stomach (n = 8), suspected interposition of the lateral segment of the liver (n = 12), a transverse colon (n = 10), small intestine (n = 3), preperitoneal fat and intraperitoneal fat tissues such as those of the omentum or mesenterium (n = 3), and previous gastrectomy (n = 6; Fig. 5, Table 1).

Mean duration of the procedure including endoscopic evaluation of the upper GI tract and placement of the PEG tube was 20 min. Early complications (more than grade 2 in Clavien-Dindo classification) just after the procedure occurred in one cases, which was active oozing from injured mucosa by puncture needle requiring endoscopic clipping. Trivial oozing without the need for active hemostatic procedure occurred in six cases. We did not encounter any cases with mispuncture of the intraperitoneal organs and tissues. Delayed complications occurring within 1 mo were pneumonia in five patients, including death in three of these cases; bleeding from puncture site in one patient; bleeding from an esophageal varicose vein in one patient; and atrial fibrillation in one patient who required drug injection and cardioversion. All of these complications required active treatment (Table 2).

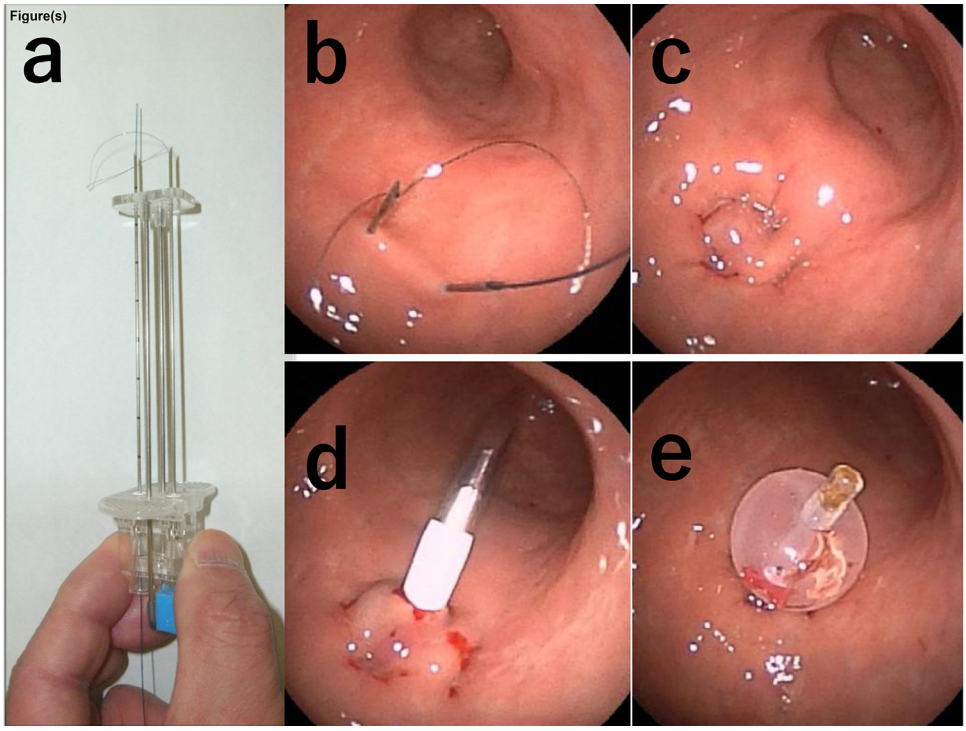

Fig. 1. Our procedure for percutaneous endoscopic gastrostomy using the introduction method: (a) Funada-style gastric wall fixation kit with two parallel thin needles—one for snare wire and another for nylon suture, (b) and (c) four-point square fixation of the stomach to the peritoneal wall using this kit, (d) insertion of the introducer needle with the outer sheath in the center of four-point square fixation, and (e) placement of the balloon catheter for percutaneous endoscopic gastrostomy.