CT-Guided Percutaneous Gastrostomy without Preliminary Placement of a Nasogastric Tube

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Title Page

Title: CT guided percutaneous gastrostomy without preliminary placement of a nasogastric tube.

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Abstract: Formal percutaneous radiologic gastrostomy (PRG) procedures require preliminary gastric room air inflation through a nasogastric tube (NGT) to safely perform gastric puncture. However, in case of upper aerodigestive obstruction, NGT placement can be impossible even using hydrophilic angiography catheter and wire to cross over the stenosis. This brief report describes percutaneous CT-guided gastrostomy with a 2-stick approach in 13 patients without nasogastric insufflation. Technical success was 100% with a number of 1.8 (± 1.0) punctures access the gastric lumen. Traversal of the colon and liver with a 22G needle was necessary in 4 and 1 patients, respectively. There were no major complications. Minor complications were in 6 patients (46%). CT guided percutaneous gastrostomy is technically feasible with minimal morbidity.

Introduction

Percutaneous radiologic gastrostomy (PRG) is a widely used technique for enteral nutrition and bowel decompression which usually requires inflation of the stomach via a naso-gastric tube (NGT). Patients with head and neck and esophageal cancers present a challenge as passage of a standard NGT or even a 5 French angiographic catheter may not be possible. The aim of this study was to describe the safety and efficacy of CT guided percutaneous gastrostomy in patients with decompressed stomachs in whom a nasogastric tube could not be placed. A 2-stick

approach, initial cannulation of the stomach with a 22G needle and carbon dioxide insufflation and second 18G needle was used with gastropexy.

Materials and Methods

This single institution retrospective study was approved by the IRB. Between November 2014 to March 2018 passage of a standard 8 French nasogastric tube and subsequently a 5 French angiographic catheter with a hydrophilic guidewire by an interventional radiologist under fluoroscopic guidance was not possible in 13 patients (Ages 54-92, male n =8) referred for percutaneous gastrostomy. First causes for gastrostomy were primary head and neck cancer (n=9) and esophageal cancer (n=4).

All patients were kept fasting for 12 hours and received 1 g of ceftriaxone IV 30 minutes before procedure. Glucagon 10 mg was administered to reduce gastric motility immediately before the procedure.

A CT scan of the upper abdomen was to evaluate the percutaneous track to the stomach lumen (Fig 1). Following sterile preparation and injection of 1% lidocaine subcutaneously, a 12 cm, long 22G needle (Cook, Bloomington, Indiana) was used to access and inflate the gastric lumen with carbon dioxide under CT fluoroscopy. In those patients without a visible gastric lumen, the needle was advanced through both anterior and posterior walls and then withdrawn slowly while injecting carbon dioxide by hand (Fig 2 and 3). When CT confirmed intra gastric location of the fine needle tip, a further 300 mls of carbon dioxide were injected inflating the stomach, apposing the anterior gastric and abdominal walls (Fig 4). Four gastropexy sutures (Halyard Health, Alpharetta, Georgia) were then deployed. The gastric lumen was accessed with

18-gauge needle under CT guidance and the tract dilated with placement of a 20 French peel away sheath, through which a 16 French button gastrostomy (MIC-KEY, Ballard, Draper, Utah) was inserted.

Enteral feeding was commenced within 24 hours of gastrostomy placement. All patients were reviewed prior to hospital discharge and again at 15 days, 1 month and 3 months. Procedure complications were classified as major and minor according to SIR guide lines (1).

Results

Technical success for gastrostomy placement using the 2-stick technique was 100%. In 8/13 patients traversal of both anterior and posterior gastric walls with a 22G needle was necessary because the gastric lumen was not visible on CT. The initial fine needle tracks were transcolonic (N = 4), transhepatic (N = 1) and through the intercostal space (N=1) and these were well tolerated. Successful initial access to the gastric lumen was achieved with a mean of 1.8 (± 1.0) needle passes with an overall, mean procedure duration of 20.9 minutes (± 13.3) minutes.

There were no major complications. Minor complications occurred in 6 patients (46%) which included carbon dioxide infiltration of the gastric wall (n=5) (Fig3 and local bleeding (n=1).

Discussion

This report describes a successful 2-stick technique for performing percutaneous gastrostomy under CT guidance in 13 patients in whom neither NG tube or fluoroscopic guided angiographic catheter placement for gastric inflation was possible.

There were no major complications despite initial traversal of the colon and liver with a fine needle in four patients and one patient respectively.

While previous publications describe CT-guided gastrostomy, satisfactory gastric inflation was achieved by a variety of methods including NG tube, (2, 3). In patients without NG access, Heberlein described fluoroscopic guided access by direct puncture of a physiologically present gastric air bubble in 24/85 patients and puncture of an effervescent-induced large gastric air bubble in the remaining 61 patients. (4). In a recent abstract, Yi et al performed US guided gastric puncture with 21G needle, followed by infusion of normal saline into the stomach, in 11 patients without nasogastric access (5). The US-guided puncture was then used for gastropexy followed by adjacent percutaneous gastrostomy/gastrojejunostomy.

The 2-stick technique has previously been described for percutaneous nephrostomy of nondilated renal collecting systems (6). After intravenous administration of iodinated contrast material, a 22-gauge needle was inserted into the opacified renal pelvis, and double-contrast pyelography was performed by using air or carbon dioxide to allow visualization and distention of the nondependent calyces for definitive renal access with an 18-gauge 5-F sheath-needle set.

The use of CO₂ is preferred over air for gastric inflation because of more rapid resorption from the peritoneal cavity and the lower risk of embolism to the portal vein. However, several reports of air embolization to the portal veins following blunt abdominal trauma and barium enemas, have described the condition as clinically benign (7).

Because of tube passage through the oropharynx, the pull placement technique for percutaneous gastrostomy has been associated with a high incidence of peristomal infectious complications (4%-30%), resulting in recommendations for routine prophylactic antibiotics for this procedure (SITR rec). In our study ceftriaxone was given prophylactically for visceral perforation such as traversal of colon with a fine needle (8).

In summary, percutaneous CT-guided gastrostomy using a 2-stick technique is safe and effective in patients without nasogastric access.

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Figure.1: CT image shown non-contact between the gastric anterior wall and abdominal wall.

Figure.2: 22-gauge fine needle punctured into the gastric lumen.

Figure.3: 20mL of carbon dioxide was injected into the gastric lumen through the fine needle. A small amount of carbon dioxide gas leaked into the gastric wall.

Figure.4: The stomach was insufflated. A direct contact region between gastric anterior wall and abdominal wall was created.