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Percutaneous transgastric interventional radiology-operated duodenoscopy for the identification of duodenal perforation and Graham patch dehiscence

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ABSTRACT

Patients with a Roux-en-Y gastric bypass may be challenging diagnostic and therapeutic dilemmas for gastroenterologists and endoscopists due to anatomic considerations. Pancreaticobiliary limb pathology is particularly difficult to diagnose from standard endoscopic approaches as it often requires double balloon enteroscopy. Percutaneous access and gastrostomy placement into the gastric remnant, however, is a commonly performed procedure by interventional radiology. This report describes the identification of duodenal perforation and Graham patch dehiscence in the pancreaticobiliary limb of a patient with a prior Roux-en-Y gastric bypass who had failed traditional endoscopic measures, using transgastric remnant interventional duodenoscopy and confirmed with methylene blue injection into a periduodenal abscess.

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All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

All authors have read and contributed to the manuscript.

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Introduction

Patients with duodenal pathology and surgically altered duodenal anatomy may present challenges for diagnostic endoscopy [1]. Bariatric surgery, specifically Roux-en-Y bypass, results in the creation of a pancreaticobiliary limb that is not easily accessible with traditional endoscopy [1]. For patients who subsequently develop pathology in the excluded duodenum, including peptic ulcer disease or perforation, it may be difficult to diagnose and treat without open surgery [2]. Endoscopic evaluation of the duodenum via the excluded gastric remnant has been described in a limited capacity [3]. This report describes the identification of a duodenal perforation and Graham Patch dehiscence in a patient with a prior Roux-en-Y bypass surgery, which was inaccessible using traditional endoscopy, using percutaneous transgastric interventional duodenoscopy.

Case report

Institutional review board approval was not required for preparation of this report. A 44-year-old man with a history of Roux-en-Y gastric bypass presented with recurrent duodenal and gastric ulcers. The patient was treated at an outside institution with duodenal Graham Patch repair and placement of a gastrojejunostomy for nutritional needs. The patient was discharged to a rehabilitation facility where his percutaneous feeding tube was removed as he was tolerating an oral diet.

The patient presented from rehabilitation with abdominal pain, fevers, malaise, drainage from the prior gastrojejunostomy site, as well as drainage from his midline surgical incision. Computed tomography of the abdomen with contrast demonstrated a loculated fluid collection adjacent to the second portion of the duodenum with a fistulous communication to the anterior abdominal wall (Fig. 1).



Fig. 1 – Computed tomography image demonstrating a rim-enhancing fluid collection (arrow) adjacent to the duodenum (arrowhead). This was later drained and confirmed to be an abscess.

The patient was brought to the interventional radiology suite for sinus tract evaluation of his suspected enterocutaneous fistula. A 4-French Kumpe catheter (Cook Medical, Indianapolis, IN) was used to cannulate the abdominal wound and contrast (Isovue 300; Bracco Diagnostics, Monroe Township, NJ) was injected under fluoroscopy. A fistulous tract was identified and a 10.2-French multipurpose drainage catheter (Cook Medical) was placed into the periduodenal abdominal fluid collection.

With ongoing abdominal pain, fevers, and continuous drainage from the abdominal drainage catheter, there was concern for duodenal perforation. Traditional endoscopy; however, was not feasible given the prior Roux-en-Y bypass surgery. As a result, the patient returned to the interventional radiology suite for percutaneous transgastric evaluation of the duodenum. The prior gastrojejunostomy tract was accessed using a 4-French Glidecath (Terumo Medical Corporation, Tokyo, Japan) and an angled Glidewire (Terumo Medical) and negotiated into the gastric remnant and subsequently through the pylorus.

After the exchange for an Amplatz wire (Boston Scientific, Marlborough, MA) and the placement of a safety wire, a 16.5-French flexible endoscope (16.5-French diameter, 7.2-French working channel, CYF-5 Flexible Cystoscope; Olympus, Tokyo, Japan) was advanced through the gastric remnant and into the duodenum. Under continuous endoscopic and fluoroscopic guidance, the second portion of the duodenum was inspected, revealing a Graham patch suture dehiscence with purulent material extruding from the extraluminal periduodenal abdominal abscess cavity into the bowel (Fig. 2). Using the side port of the endoscope, the suture dehiscence was cannulated with a guidewire and a glide catheter was placed. Contrast injection opacified the periduodenal abdominal fluid collection (Fig. 3). Under continuous endoscopic visualization, methylene blue (Tocris Bioscience, Bristol, United Kingdom) was injected through the multipurpose drainage catheter within the periduodenal abdominal abscess and was visualized passing from the extraluminal abdominal fluid collection through the bowel perforation, and into the duodenum, confirming communication between the 2 spaces (Fig. 4).

After discussions with gastroenterology and surgery, a 22-French gastrojejunostomy (Halyard Health, Alpharetta, GA) was placed to maximize diversion of intestinal contents away from the perforation, and the abdominal drainage catheter was kept in place.

A fluoroscopically guided abscessogram performed 2 weeks later showed no residual cavity and the drainage catheter was removed. Computed tomography completed 1 month later showed complete resolution of the periduodenal abdominal abscess. The patient was seen in the interventional radiology clinic 3 months later, and complete resolution of abdominal pain, fevers, and malaise was reported.

Discussion

The use of endoscopes in interventional radiology has been limited but offers a potential arena for skill development and practice expansion. Interventional endoscopic choledochoscopy and cholecystoscopy, for example, have become integral com-

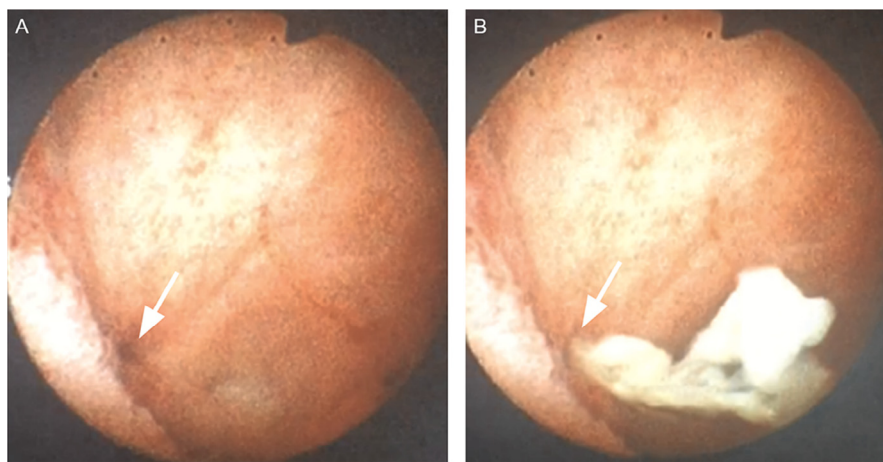


Fig. 2 – (A) Percutaneous interventional duodenoscopy image demonstrating the mucosa of the proximal duodenum. Image A shows a hole or perforation (arrow) at the corner of the partially visualized Graham patch suture outline (upside down V). (B) Duodenoscopy image demonstrates the same perforation (arrow) with a purulent material entering the duodenum from the extraluminal periduodenal abscess cavity.

ponents of some interventional radiology practices, allowing minimally invasive diagnostic interventions throughout the biliary tree and the gallbladder [4–7]. Such endoscopy-based interventions have allowed not only for diagnostic evaluations but also for assisting in obtaining tissue biopsies, removing calculi, and treating biliary strictures [4–7].

The use of percutaneous duodenoscopy has been described in a limited fashion by gastrointestinal surgeons but, to our knowledge, has never been utilized by interventional ra-

diologists [3]. Incorporating interventional duodenoscopy into routine interventional radiology practice may positively advance the field of interventional radiology, allowing for minimally invasive evaluation and treatment of the gastrointestinal system. Interventional duodenoscopy may prove particularly useful in patients with complex gastrointestinal anatomy after prior surgical intervention, effectively limiting access to the duodenum by traditional endoscopy.

This technical innovation describes percutaneous transgastric interventional duodenoscopy for the identification of duodenal perforation and Graham patch dehiscence in a patient with Roux-en-Y gastric bypass anatomy. Such an intervention may effectively prevent the need for exploratory laparotomy, extended hospitalizations, and complications [8].

This report has several limitations. It is a single report at a single institution. Additionally, percutaneous transgastric interventional duodenoscopy was not compared in a direct controlled manner to exploratory laparotomy in the management of duodenal pathology with complex gastric anatomy.

Nevertheless, this report demonstrates the potential benefits of percutaneous transgastric interventional duodenoscopy for the identification of duodenal perforation and Graham patch dehiscence and serves to encourage interventional radiologists to continually reinvent and advance their own practices for the care of their patients.

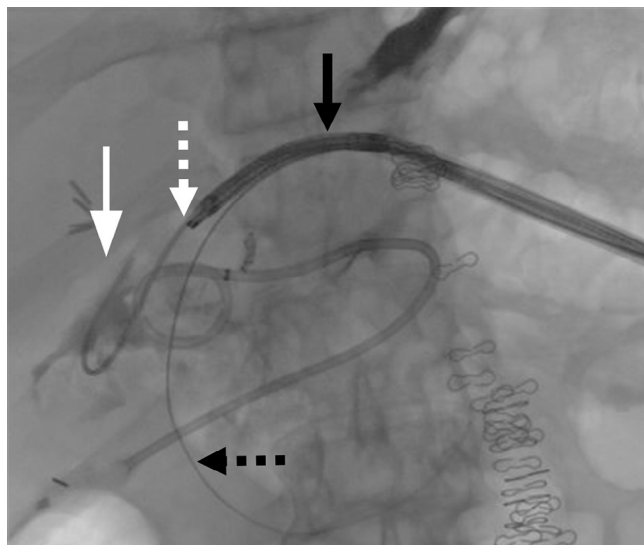


Fig. 3 – Fluoroscopic image demonstrating a 4-French angled Glidecath (dashed white arrow) placed coaxially through the endoscope (solid black arrow) into the perforation at the corner of the Graham patch, cannulating the periduodenal fluid collection (solid white arrow). Contrast injection through the catheter showed a communication with the previously placed pigtail drain. A safety wire is seen within the duodenum (dashed black arrow).

Conclusion

This case suggests that percutaneous transgastric interventional duodenoscopy may be a potentially safe and minimally invasive alternative for diagnosing and treating gastrointestinal perforations in patients with altered gastrointestinal anatomy, obviating the need for invasive exploratory laparotomy [9]. Although further studies are needed to evaluate this technique, percutaneous transgastric interventional duodenoscopy may be a low-risk alternative for the management of duodenal pathology in anatomically compromised patients.

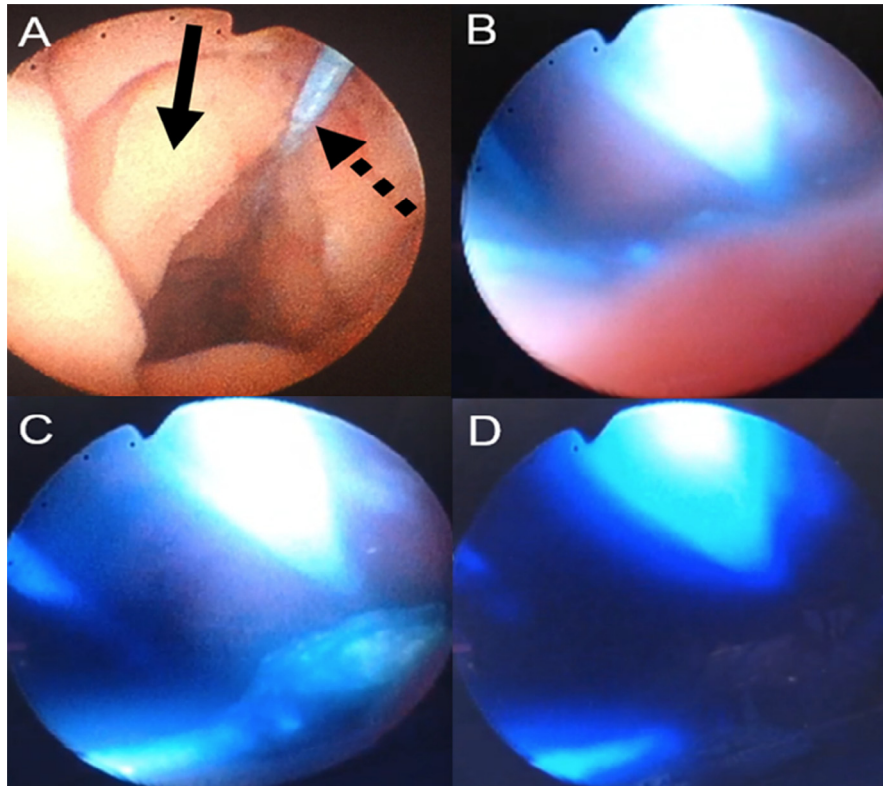


Fig. 4 – (A) Initial image demonstrates mucosal folds within the duodenum (solid black arrow) with a partially visualized Amplatz Super Stiff (Boston Scientific) wire (dashed black arrow). (B-D) Time lapse evaluation of the duodenum as methylene blue dye is injected into the abdominal drainage catheter. Methylene blue dye is seen progressively accumulating within the duodenum confirming the presence of a perforation at the corner of the Graham patch.

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