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Refractory duodenal stump blowout after PPU repair requiring four laparotomies: Pitfalls of early complex reconstruction and need for staged damage control strategies in high-risk patients

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Case Report

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Abstract

A 63-year-old man with diabetes and hypertension presented to emergency department with three days of abdominal pain, septic shock, and diabetic ketoacidosis, with imaging showing pneumoperitoneum and laboratory tests revealing severe metabolic acidosis and markedly elevated lactate. Emergency laparotomy identified a 2-cm duodenal perforation that was treated with primary repair using a Graham patch and peritoneal drainage, after which his initial hemodynamic status improved. On postoperative day six he developed bilious drainage, leading to re-exploration and Billroth II Roux-en-Y gastrojejunostomy; this was followed by recurrent duodenal stump leak, a third operation with tube duodenostomy, and ultimately a fourth laparotomy with stump re-closure and duodenostomy relocation. Despite these repeated interventions and intensive care, the patient's course was complicated by persistent sepsis, jaundice with deranged liver enzymes, bilateral pleural effusions, ventilator-associated pneumonia, suspected ischemic colitis, and progressive multiorgan failure, culminating in death two months after the index operation. This case is unique because duodenal stump blow-out refractory to Billroth II reconstruction, tube duodenostomy, and re-closure has been reported almost exclusively after surgery for advanced gastric cancer rather than benign perforated peptic ulcer disease, and sequential failure of all three strategies in the same patient appears to be extremely uncommon. It underscores that in hemodynamically fragile, septic PPU patients, early complex reconstruction may exacerbate stump failure and morbidity, and that staged external diversion, wide drainage, and early feeding jejunostomy may represent safer alternatives. Key learning points from this case are the need to recognize high-risk features (shock, diabetes, high lactate, large perforation, inotrope requirement), to favor simplified damage-control strategies with aggressive nutritional support, and to pursue early re-exploration when persistent high-output bilious drainage is accompanied by clinical deterioration, even in the absence of clear radiologic evidence of leakage.

Background

Perforated duodenal ulcer remains a life-threatening surgical emergency with reported rate of morbidity (48.5%) and mortality (9.3%) particularly in elderly or comorbid patients (1). Primary suture, Primary suture with pedicled omental flap, Free omental plug sutured into the perforation (Graham patch), closure of the perforation and buttressing with a pedicled omental flap and Use of tacking sutures around the perforation are various methods used. Whatever closure method, the patient's ability to heal seems to depend on presence of shock, sepsis, organ failure, immunosuppression, and PPU size greater than 2.0 cm are all factors associated with worse outcomes, including suture leakage (2). Leak from the ulcer after repair is seen in approximately 12% to 17% of cases (1).

A gastric resection with a Billroth II reconstruction (gastrojejunostomy) remains a common procedure to manage cases of complicated peptic ulcer disease (2). The duodenal stump blowout is a devastating postoperative event with an incidence of 13% and reoperation rate of 8%, most reported after gastrectomy in post-operative gastric cancer patients (3, 4). Stump blow-out is associated with severe

peritonitis, high-output fistula formation, intra-abdominal abscesses, severe malnutrition, pneumonia, prolonged hospitalization, and mortality rates 0f 20% (5).

We present a challenging case refractory duodenal stump blow out following initial Graham patch repair for perforated duodenal ulcer. Despite multiple re operations and advanced supportive measures, persistent leakage occurred, highlighting the complexity of surgical decision making in such scenarios.

Case presentation

A 63-year-old male patient, with history of type 2 Diabetes and hypertension was referred from a primary health care endorsing 3days of abdominal pain and poorly controlled blood glucose. Upon arrival his vital signs showed a temperature of 38.1°C, pulse of 100 beats per minute, and systolic blood pressure of 80 mmHg. On physical examination the patient was conscious oriented, the patient's abdomen was distended, diffusely tender to light palpation with voluntary guarding. The patient's laboratory values were notable for metabolic acidosis with serum lactate 9mmol/L.

Suspecting DKA, the patient was resuscitated and initial investigations revealed free subdiaphragmatic air. Resuscitation was initiated for suspected diabetic ketoacidosis (DKA) with concomitant bowel perforation.

A midline laparotomy revealed 3 L of free gastric content in the peritoneal cavity and a 2cm perforation in the first part of the duodenum. A biopsy was taken from the edge and primary repair with graham patch was done as damage control surgery. The abdomen was irrigated, and a 19-French surgical drain was left in place and the patient shifted to surgical intensive care unit (SICU) intubated to receive supportive care. The patient was stable and extubated and inotropic support was off within 24 hours. Postoperatively, the patient was given broad-spectrum antibiotic therapy and a proton pump inhibitor (PPI). Helicobacter pylori testing was deferred due to high false-negative risk during PPI therapy. The biopsy result showed perforated duodenal mucosa with transluminal exudate and focal Brunner's gland hyperplasia.

On post op day 4 the patient developed atrial fibrillation requiring administration of amiodaron and intravenous heparin. On post Operative day 6 the bile appeared in the drain, indicating duodenal leak. The patient underwent a second laparotomy with Billroth II Roux-en-Y gastrojejunostomy, keeping in consideration more suitable as it offers secure closure and better long-term physiology than another simple re patch or pyloric exclusion with gastrojejunostomy. Initially stable postoperatively, bile again appeared in the drains 4 days after the surgery.

CT scan abdomen and pelvis with oral and intravenous contrast showed fat stranding around the duodenal stump without contrast leak from the anastomosis with no bowel obstruction (Fig. 1). Conservative management with octreotide and Total parenteral nutrition (TPN) was attempted but the patient didn't show signs of improvement and prompted a third surgery. A duodenostomy tube was placed to control the duodenal blow out but output persisted.

On day 21 post first surgery, the patient developed bile ooze from the wound site. CT abdomen with oral and IV contrast confirmed duodenal stump blow out as shown in Fig. 2.

The patient underwent a fourth lifesaving laparotomy with closure of the defect and relocation of the duodenostomy tube to the third part of the duodenum. Multiple drains were placed. During the operation, the patient remained hypotensive and intubated as weaning of mechanical ventilation had failed. Inotropes were started (Levophid 5mics) and the patient received 2 units of Packed Red Blood cells (PRBCs) and 6 units of platelet. Intraoperative cultures grew Acinetobacter calcoaceticus- baumannii and Candida parapsilosis. Postoperatively the patient developed Ventilator associated pneumonia (VAP), persistent respiratory acidosis and bilateral pleural effusions.

CT scan abdomen with IV and oral contrast showed wall thickening of the ascending colon, hepatic and splenic flexure, no signs of leak or intra-abdominal collection. Enhanced CT scan of the abdomen and pelvis were obtained utilizing oral enteric and IV contrast on portal venous phase, however poor contrast enhancement is noted shown in Fig. 3.

The patient remained under multidisciplinary care, with cardiologist, internist, physiotherapist, pulmonologist. His condition progressively deteriorated as he developed jaundice with rising bilirubin and markedly deranged liver enzymes, consistent with evolving hepatic dysfunction. This was accompanied by worsening respiratory failure with bilateral pleural effusions and increasing ventilatory requirements and ischemic colitis. Despite continued intensive care, including ventilatory support, hemodynamic management, and broad-spectrum antimicrobials, he succumbed to death 2 months after the initial presentation.

Discussion

Refractory duodenal stump blow-out is rare but highly morbid, and most reported cases occur after gastric cancer surgery rather than benign disease. Previous reports describe duodenal stump failure in patients with a history of Billroth II reconstruction who subsequently developed duodenocutaneous fistula, and in cases undergoing Billroth II gastrojejunostomy for PPU with cicatrized duodenum (6). To the authors' knowledge, duodenal stump blow-out following PPU repair with sequential failure of Billroth II reconstruction, tube duodenostomy, and re-closure in the same patient has not been previously documented, and repeated stump failure has been reported almost exclusively in the context of advanced gastric malignancy rather than benign peptic ulcer disease.

Some of the factors identified for stump blow out are poor nutritional status and uncontrolled comorbid conditions, as well as surgical factors consist of inadvertent devascularization of duodenal stump due to excessive dissection and diathermy use, inadequate surgical closure of duodenal stump, local hematoma, or incorrect abdominal drain placement. Other contributing factors like neoadjuvant therapy, neoplastic involvement of duodenal margin, or postoperative distension of duodenum due to distal obstruction are known risk factors for duodenal blowout (7). In this case, multiple risk factors were present: diabetes, sepsis, malnutrition, repeated surgery, and high-output duodenal fistula.

For stable patients, conservative management remains the preferred strategy. This consists of adequate sepsis control, nutritional optimization, and effective fistula drainage, often achievable via percutaneous or endoscopic methods (5). However, if the patient becomes unstable, or nonoperative management does not allow an adequate fistula drainage or if secondary complications such as intra-abdominal bleeding, sepsis and intestinal obstruction has happened then a surgical approach may be required (8). Broad-spectrum antibiotics and acid-base disorders corrections are highly recommended while use of somatostatin analogue use is debatable.

Several surgical techniques for duodenal stump blowout have been described, including Nissen and Bancroft's closure technique and tube duodenostomy. With advances in interventional radiology, percutaneous drainage to create a controlled fistula has emerged as a promising minimally invasive approach (9). More recently, retrograde decompression with a tube inserted near the duodenal stump using double-balloon endoscopy has also shown success (10).

This case adds to the sparse literature on repeated failure of duodenal stump repair despite aggressive surgical and supportive care, illustrating the importance of considering staged approaches, early feeding jejunostomy, and avoiding complex reconstructions in compromised tissue.

Learning points

Surgeons should avoid rushing to complex reconstruction such as Billroth II Roux-en-Y in hemodynamically unstable and fragile, septic PPU patients; rather focus should be to consider staged external diversion, wide drainage, and early feeding jejunostomy.

Early identification of high-risk features (shock, diabetes, high lactate, large perforation, need for inotropes) should prompt simplified strategies and aggressive nutritional support.

Even when imaging does not demonstrate clear definite leak, persistent high-output drainage and clinical deterioration should trigger early re-exploration.

Declarations

Ethics approval and consent to participate:

Ethical approval was obtained in accordance with institutional policies. Informed consent to participate in this case report was obtained from the patient's next of kin. It was clearly explained that the purpose of this report is to improve surgical practice in patients suffering from perforated peptic ulcer disease.

Consent for publication:

Written informed consent for publication of this case report and the accompanying clinical data and images was obtained from the patient's next of kin. The patient's identity and privacy are fully protected, and all identifying information has been omitted from this report

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Author Contribution

Dr. Uzma Khan conceived and designed the case report, collected and interpreted all clinical data, performed the literature review, drafted the manuscript, and made all critical revisions for important intellectual content. She approved the final version of the manuscript and agrees to be accountable for all aspects of the work.

Data Availability

All data supporting the findings of this case report are contained within the article. Additional de-identified clinical information can be made available from the corresponding author upon reasonable request and in accordance with institutional and ethical regulations.

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Figures



Figure 1

The ingested enteric contrast is reaching the ascending colon with no definite extraluminal leakage. Long segment of edematous wall thickening involving proximal jejunal bowel loops, likely related to postoperative edema. Preserved wall enhancement with no pneumatosis or portal venous gas. Diffuse mesenteric fat stranding with mild abdominopelvic ascites. No drainable fluid collection.

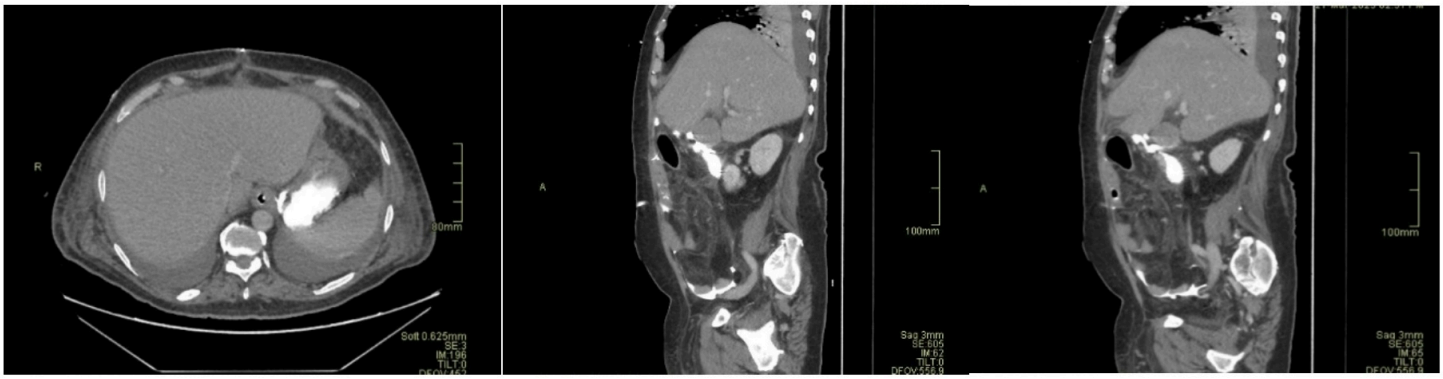


Figure 2

The enteric contrast was injected through duodenostomy tube. There is significant intraperitoneal contrast leakage from the duodenal stump. The gastrojejunostomy anastomosis is intact. No signs of bowel obstruction. No localized abdominopelvic collection.

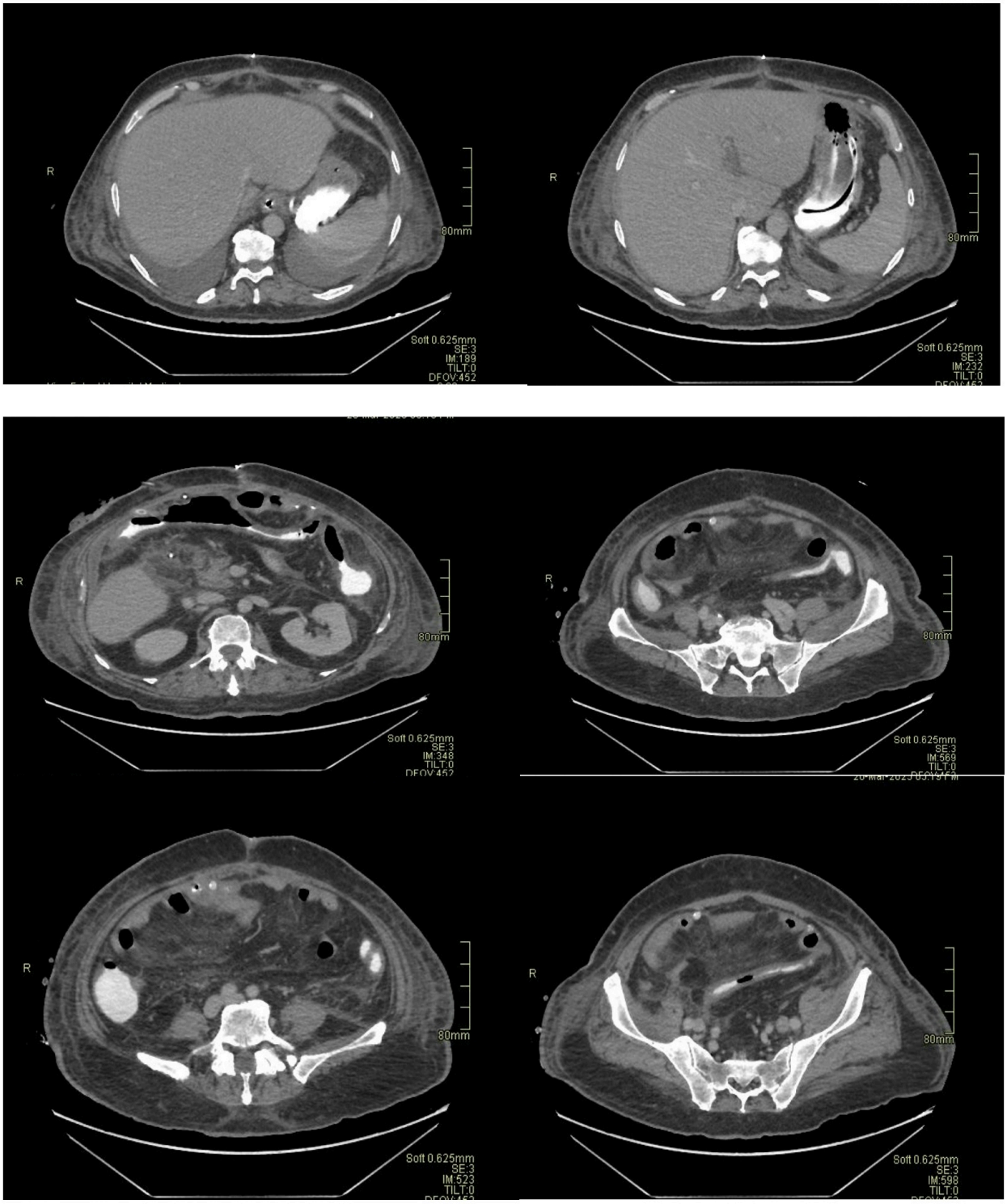


Figure 3

The gastrojejunostomy anastomosis appears intact. Ascending colon and hepatic flexure demonstrates diffuse wall thickening and oedema with reduced wall enhancement (considering the limitation of study), bowel ischemia cannot be excluded.