

Ulcer Exclusion with Intraluminal Isolation Combined with Distal Gastrectomy for Refractory Bleeding from Suprapapillary Duodenal Ulcers: A Report of 26 Cases

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Research Article

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Abstract

Background

Peptic ulcer bleeding remains a life-threatening emergency. Management of refractory bleeding from suprapapillary duodenal ulcers is challenging due to complex anatomy and high-risk of rebleeding. Conventional surgical procedures are associated with high rates of postoperative hemorrhage and duodenal stump leakage.

Methods

We retrospectively reviewed 26 consecutive patients with refractory bleeding from suprapapillary duodenal ulcers who underwent Ulcer Exclusion with Intraluminal Isolation Combined with Distal Gastrectomy (UEIICDG) at a tertiary general hospital between January 1, 2020, and December 31, 2024. The primary outcomes evaluated were rebleeding, duodenal leakage, biliary obstruction, and 30-day mortality.

Results

The median age of patients was 63.5 years (range, 26–87 years), with 17 males (65.4%) and 9 females (34.6%). Eleven patients (42.3%) presented with first-episode massive bleeding, and 15 (57.7%) had recurrent bleeding. No postoperative rebleeding, duodenal stump leakage, anastomotic leakage, or biliary obstruction was observed. One 87-year-old patient died of multiple organ failure. At a median follow-up of 12 months, no ulcer recurrence or rebleeding was noted.

Conclusions

The UEIICDG technique demonstrated favorable safety and hemostatic efficacy in this cohort of patients with refractory suprapapillary duodenal ulcer bleeding. This simplified modified gastrectomy achieves durable hemorrhage control with minimal postoperative complications and may serve as a viable alternative for high-risk patients when endoscopic therapy fails.

Introduction

Peptic ulcer disease is one of the most common causes of upper gastrointestinal bleeding^[1]. Bleeding from duodenal ulcers located above the duodenal papilla (suprapapillary ulcers) is particularly difficult to manage due to their proximity to the bile duct, pancreatic duct, and major periduodenal vessels^[2]. Erosion of these vessels can lead to massive, life-threatening hemorrhage with a mortality rate of up to 14%^[3].

Endoscopic hemostasis is the first-line treatment^[4, 5]. However, 15–20% of patients develop recurrent bleeding despite adequate endoscopic, medical, and interventional therapy^[4, 5], which we term "refractory bleeding". In such cases, emergency surgery is indicated^[6]. Traditional surgical approaches include distal gastrectomy with oversewing of the ulcer^[7, 8]. However, these procedures are associated with a high-risk of rebleeding because the ulcer remains exposed to digestive fluid and pancreatic enzymes^[7].

To address these limitations, we designed a novel technique: **Ulcer Exclusion with Intraluminal Isolation Combined with Distal Gastrectomy (UEIICDG)**. This study aimed to evaluate the safety and efficacy of UEIICDG in 26 patients with refractory suprapapillary duodenal ulcer bleeding.

Methods

Study Design and Participants

This was a retrospective single-center case series conducted at a tertiary referral hospital. All consecutive patients with refractory bleeding from suprapapillary duodenal ulcers who underwent UEIICDG between January 1, 2020, and December 31, 2024, were enrolled. The study was approved by the Institutional Review Board (Approval No. KYSQ 2020-002-03) and performed in accordance with the Declaration of Helsinki. Written informed consent was obtained from all patients or their legal representatives. This study followed the PROCESS 2020 guidelines for reporting surgical case series^[9]. According to local institutional standards, this retrospective single-center case series did not require prospective clinical trial registration. Clinical trial number: Not applicable.

Inclusion and Exclusion Criteria

Inclusion Criteria

Patients were included if they met both of the following criteria:

1. Refractory bleeding from a suprapapillary duodenal ulcer (located above the duodenal papilla), defined as failure to achieve hemostasis despite:
 - Adequate medical therapy (intravenous proton pump inhibitors, fluid resuscitation, and blood product transfusion as needed)
 - At least one attempt at endoscopic hemostasis (clips, thermal coagulation, or injection therapy)
 - Optional subsequent interventional radiology (transcatheter arterial embolization) if endoscopic therapy failed

2. Recurrent bleeding within 30 days after successful initial hemostasis with standard endoscopic or medical treatment, confirmed by repeat endoscopy or clinical signs of active hemorrhage (hematemesis, melena, or hemodynamic instability)

Exclusion Criteria

Patients were excluded if they met any of the following criteria:

- Duodenal ulcers located at or distal to the major duodenal papilla, confirmed by preoperative endoscopy or intraoperative inspection
- Concurrent duodenal perforation requiring emergency surgical repair, identified by clinical signs (free air on abdominal imaging) or intraoperative findings
- Severe coagulopathy, defined as an international normalized ratio (INR) > 1.5, activated partial thromboplastin time (aPTT) > 2× the upper limit of normal, or platelet count < 50×10⁹/L despite correction attempts
- Terminal illness with an expected survival of < 3 months, determined by the treating physician based on underlying comorbidities
- Concurrent malignancy affecting the upper gastrointestinal tract

Surgical Technique

All procedures were performed by two attending surgeons with >10 years of experience in upper gastrointestinal surgery. Under general anesthesia, patients were placed in the supine position, and an upper midline laparotomy (10-12 cm) was performed to access the abdominal cavity. The surgical procedure was divided into four sequential phases:

Phase 1: Initial Hemostasis and Exposure

- The anterior wall of the gastric antrum and duodenal bulb was opened longitudinally (5-7 cm) to evacuate blood clots and gastric contents
- The bleeding suprapapillary ulcer was identified, and primary hemostasis was achieved using 3-0 absorbable sutures in an interrupted pattern
- Gastrocolic and hepatogastric ligaments were divided using electrocautery, and the distal stomach was fully mobilized to expose the duodenal bulb and pancreatic head
- Peri-ulcer mucosa was carefully coagulated using bipolar electrocautery to reduce gastric acid secretion and promote adhesion formation

Phase 2: Duodenal Isolation and Closure

- A circumferential submucosal suture was placed approximately 5 mm distal to the ulcer using 4-0 PDS suture, completely sealing the duodenal lumen
- A 5Fr feeding tube was inserted through the closure site as a guide to protect the bile duct and pancreatic duct during suturing (removed before final closure)
- The duodenum was transected 2 cm proximal to the ulcer using a linear stapler, isolating the bleeding site within the sealed distal segment
- Special care was taken to avoid injury to the duodenal papilla, with intraoperative cholangiography performed in 8 patients with unclear anatomy

Phase 3: Vascular Ligation and Gastrectomy

- Right gastric, right gastroepiploic, gastroduodenal, and superior pancreaticoduodenal arteries were systematically ligated with silk ties and divided
- Standard distal gastrectomy was performed, removing approximately 60% of the distal stomach including the ulcerated area
- Gastrointestinal continuity was restored via either Billroth II gastrojejunostomy (n=18) or Roux-en-Y reconstruction (n=7) based on patient age and comorbidities

Phase 4: Reconstruction and Drainage

- Retrograde duodenostomy was created in 12 patients with ulcers >2 cm in diameter to decompress the isolated duodenal segment
- A jejunal feeding tube was placed in all patients for early enteral nutrition initiation (postoperative day 1)
- The duodenal stump was reinforced with an omental patch to reduce leakage risk
- Two closed-suction drains were placed: one in the right upper quadrant near the duodenal stump, and another in the left upper quadrant near the gastrojejunostomy site
- Abdominal cavity was irrigated with warm saline, and hemostasis was confirmed before closing the laparotomy incision

All surgical specimens were sent for pathological examination to confirm ulcer diagnosis and rule out malignancy.

Outcome Measures

Primary outcomes included:

- day mortality rate
- Postoperative complications (rebleeding, duodenal stump leakage, biliary obstruction, pneumonia, and myocardial infarction)
- Length of hospital stay

Secondary outcomes included:

- Long-term ulcer recurrence rate (assessed by endoscopy at 6 and 12 months postoperatively)
- Gastrointestinal function (evaluated using the Visick grading system at 12-month follow-up)

Data Collection and Statistical Analysis

Data were collected from electronic medical records, including patient demographics, clinical presentation, laboratory values, endoscopic findings, surgical details, and postoperative outcomes. Continuous variables were presented as median with interquartile range (IQR), and categorical variables as frequencies with percentages. All analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 26 patients (17 males, 9 females) were included in the study, with a median age of 63.5 years (range 26–87). Clinical characteristics are summarized in Table 1. All patients had failed at least two prior endoscopic hemostasis attempts, with a median of 2.5 attempts per patient (range 2–4).

Perioperative Outcomes

- No cases of postoperative rebleeding, duodenal stump leakage, or biliary obstruction were observed
- One 87-year-old patient died of multiple organ failure on postoperative day 14 (30-day mortality rate: 3.8%)
- Median operative time was 135 minutes (range 110–180)
- Median hospital stay was 9 days (range 5–17)
- Postoperative complications included pneumonia (n = 2, 7.7%) and atrial fibrillation (n = 1, 3.8%), all managed conservatively

Long-term Follow-up

- All 25 surviving patients completed 12-month follow-up (100% follow-up rate)
- No cases of ulcer recurrence or rebleeding were documented

- Gastrointestinal function was excellent (Visick grade I) in 23 patients (92.0%), and good (Visick grade II) in 2 patients (8.0%)
- No patients required dietary restrictions or long-term proton pump inhibitor therapy at 12-month follow-up
- A schematic diagram illustrating the key steps of the UEIICDG surgical procedure is shown in Fig. 1.

Characteristic	Value
Age, median (range)	63.5 (26–87) years
Male sex, n (%)	17 (65.4%)
Comorbidities, n (%)	
- Hypertension	12 (46.2%)
- Diabetes mellitus	8 (30.8%)
- Coronary artery disease	5 (19.2%)
- COPD	3 (11.5%)
Number of endoscopic attempts, median (range)	2.5 (2–4)
Hemoglobin on admission, median (IQR)	7.2 (6.1–8.4) g/dL
Transfusion requirement, median (IQR)	4 (2–6) units
Bleeding episodes, n (%)	
- First episode	11 (42.3%)
- Recurrent bleeding	15 (57.7%)

Discussion

Key Findings

This study demonstrates that **UEIICDG** is safe and effective for refractory bleeding from suprapapillary duodenal ulcers. The technique achieves complete intraluminal isolation of the ulcer, preventing exposure to digestive fluid and thereby markedly reducing the risk of rebleeding.

Comparison with Previous Studies

Conventional procedures such as Bancroft, Nisson, and Graham gastrectomy are limited by high rebleeding rates, technical complexity, or risk of biliary/pancreatic injury^[7,8]. In contrast, **UEIICDG** avoids

high-risk ulcer resection and minimizes dissection around the ulcer, thus lowering complication rates^[6,10].

Advantages of UEIICDG

This technique is straightforward to perform with good reproducibility in experienced hands. Direct intraoperative visualization allows effective intraoperative hemostasis. Complete isolation eliminates exposure to digestive enzymes. Low rates of rebleeding, leakage, and biliary obstruction; Retrograde duodenostomy provides safe decompression and monitoring. Suitable for elderly and high-risk patients.

Limitations

This study has several limitations. First, this is a single-center retrospective case series with a relatively small sample size of 26 patients, lacking a matched concurrent control group for direct comparative analysis. Therefore, firm conclusions regarding the superiority of this modified technique over traditional surgical procedures cannot be drawn. Second, the follow-up duration was limited, and long-term recurrent bleeding outcomes require further continuous observation. Third, all operations were performed by experienced gastrointestinal surgeons, so the generalizability of this technique to less experienced operators remains to be verified. Prospective multi-center comparative studies with larger cohorts are needed to confirm the safety and efficacy of UEIICDG.

In summary, the UEIICDG procedure achieves satisfactory hemostatic outcomes for patients with refractory bleeding from suprapapillary duodenal ulcers when endoscopic therapy fails. This modified technique may serve as an alternative surgical option in selected patients. Nevertheless, larger prospective comparative studies are needed to further validate its safety and efficacy.

Declarations

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Xianyan LIU: Data curation, Writing - original draft

Chuiye ZENG: Data curation

Bo WEN: Investigation

Junjie ZHU: Investigation

Yang PENG: Formal analysis

Sheng LI: Conceptualization, Methodology, Writing - review & editing, Supervision

Ethics approval and consent to participate

This retrospective clinical case series was approved by the institutional ethics committee (Approval No. KYSQ 2020-002-03). Written informed consent was obtained from all enrolled patients or their legal representatives.

Consent for publication

Not applicable. All identifiable patient information has been excluded to protect patient privacy.

Availability of data and materials

The datasets generated and analysed during the present study are not publicly available in order to protect patient confidentiality, but are available from the corresponding author upon reasonable request.

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Figures

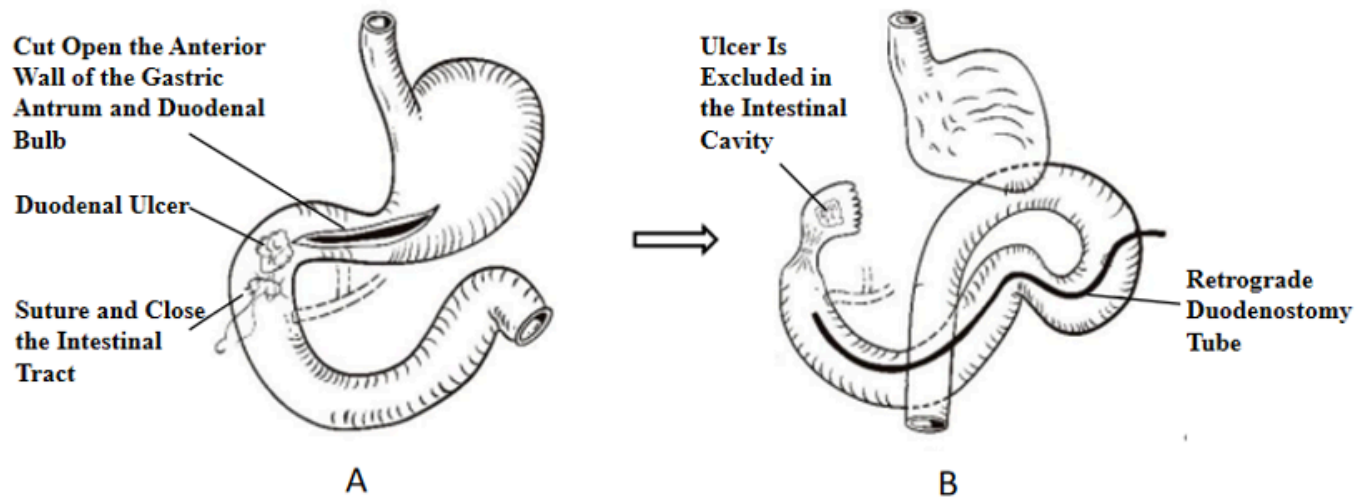


Figure 1

Schematic illustration of UEIICDG (A). Intraoperative steps: laparotomy, clot evacuation, suture hemostasis, circumferential submucosal isolation of the ulcer, distal gastrectomy; (B) Postoperative reconstruction: the ulcer is fully sealed within the duodenal segment, with omental coverage of the duodenal stump and retrograde duodenostomy tube for decompression.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [PROCESSChecklistUEIICDG.pdf](#)