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Management of Perforated Periampullary Duodenal Diverticulum by Endoscopic Transdiverticular Abscess Drainage Using a Nasobiliary Tube

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Patient: Female, 64-year-old
Final Diagnosis: Intestinal perforation
Symptoms: Abdominal pain
Clinical Procedure: —
Specialty: Gastroenterology and Hepatology
Objective: Management of emergency care

Background: A perforated periampullary duodenal diverticulum is a rare but potentially life-threatening condition. Although surgery is considered the standard treatment, minimally invasive treatment strategies have been increasingly documented in carefully selected patients. Here, we report a case of a perforated periampullary duodenal diverticulum successfully managed by endoscopic transdiverticular abscess drainage using a nasobiliary tube.

Case Report: A 64-year-old woman exhibiting poor performance status was admitted with abdominal pain and fever. Contrast-enhanced computed tomography revealed localized retroperitoneal fluid and gas adjacent to a periampullary duodenal diverticulum, without evidence of generalized peritonitis, leading to a diagnosis of perforated periampullary duodenal diverticulum with a localized retroperitoneal abscess. Conservative treatment involving bowel rest, nasogastric decompression, and antibiotics was initiated; however, follow-up imaging revealed enlargement of the abscess cavity. Given the patient's poor performance status and the technical difficulty of percutaneous drainage, endoscopic drainage was performed on hospital day 8. A 6-French nasobiliary drainage tube was successfully placed into the abscess cavity through the diverticular perforation. The abscess gradually resolved, and the patient was discharged on hospital day 35 without requiring surgery. No recurrence was observed during 13 months of follow-up.

Conclusions: Endoscopic transdiverticular abscess drainage using a nasobiliary tube may be a feasible minimally invasive alternative to surgery in carefully selected patients exhibiting a perforated periampullary duodenal diverticulum associated with a localized retroperitoneal abscess. Further studies are needed to establish its indications.

Keywords: Abscess • Diverticulum • Drainage • Endoscopy, Gastrointestinal • Intestinal Perforation
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Introduction

Periampullary duodenal diverticula are relatively common; however, perforation is a rare, potentially life-threatening complication [1,2]. Although surgical intervention is considered the standard treatment, minimally invasive approaches may be feasible for selected patients with localized disease [3-7]. Experience with endoscopic transdiverticular drainage, particularly using a nasobiliary drainage tube for a localized retroperitoneal abscess, remains limited [6]; appropriate patient selection for this approach is unclear. Here, we report a case of perforated periampullary duodenal diverticulum with a localized retroperitoneal abscess that was treated by endoscopic transdiverticular abscess drainage using a nasobiliary tube.

Case Report

A 64-year-old woman was admitted to our hospital with abdominal pain and fever. Her medical history included coil embolization for a right middle cerebral artery aneurysm and cerebral infarction with residual cognitive impairment. She was receiving dual antiplatelet therapy with aspirin and clopidogrel. Her Eastern Cooperative Oncology Group performance status was 3, and she resided in a long-term care facility.

On admission, her temperature was 38.2 °C. Physical examination revealed tenderness in the right flank without rebound tenderness. Laboratory tests showed a white blood cell count of 9940/μL and a C-reactive protein level of 0.12 mg/dL; no other notable abnormalities were evident. Contrast-enhanced computed tomography (CT) revealed a localized gas and fluid collection in the right anterior pararenal space adjacent to a periampullary duodenal diverticulum, with surrounding fat stranding and no intraperitoneal free air (**Figure 1A, 1B**). Based on these findings, a diagnosis of a perforated periampullary duodenal diverticulum with a localized retroperitoneal abscess was made.

Because the lesion was localized and the patient's general condition was relatively stable, conservative management involving bowel rest, nasogastric decompression, and intravenous piperacillin/tazobactam was initiated. Although the C-reactive protein level peaked at 18.8 mg/dL on hospital day 2 and subsequently decreased, low-grade fever and right flank pain persisted. Follow-up contrast-enhanced CT on hospital day 7 demonstrated progressive enlargement of the retroperitoneal abscess despite conservative treatment (**Figure 2A**).

Given the patient's poor performance status and receipt of dual antiplatelet therapy, surgery was considered high risk. Percutaneous drainage was complicated by the liver and colon obstructing potential access routes. CT on hospital day 7 demonstrated communication between the diverticular perforation and the abscess cavity (**Figure 2B**). Thus, endoscopic drainage was selected as an alternative minimally invasive approach for source control and was performed on hospital day 8.

Endoscopic drainage was performed by a gastroenterologist (B.N.) with the patient under midazolam sedation. Duodenoscopy using a side-viewing endoscope (TJF-260V; Olympus, Tokyo, Japan) revealed mild luminal narrowing of the second portion of the duodenum due to external compression by the abscess cavity (**Figure 3A**). Purulent discharge was observed within the periampullary duodenal diverticulum, and the major papilla appeared to be located inside the diverticulum (**Figure 3B**). After aspiration of purulent material, a guidewire was advanced through a cannulation catheter into the

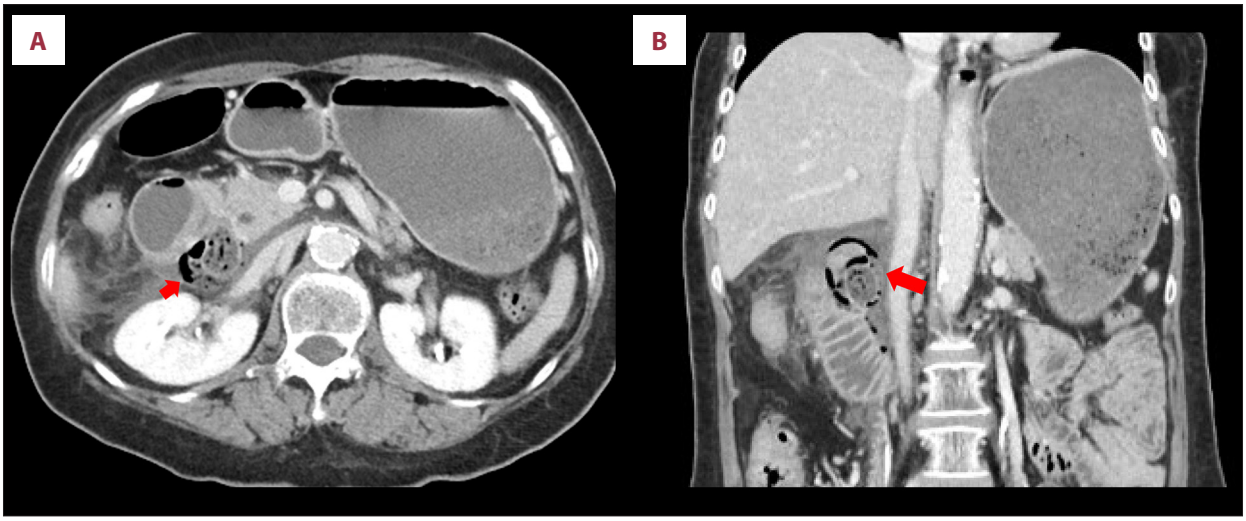


Figure 1. Contrast-enhanced computed tomography at presentation. (**A**) Axial and (**B**) coronal images showing a localized gas and fluid collection (arrow) in the right anterior pararenal space adjacent to a periampullary duodenal diverticulum.

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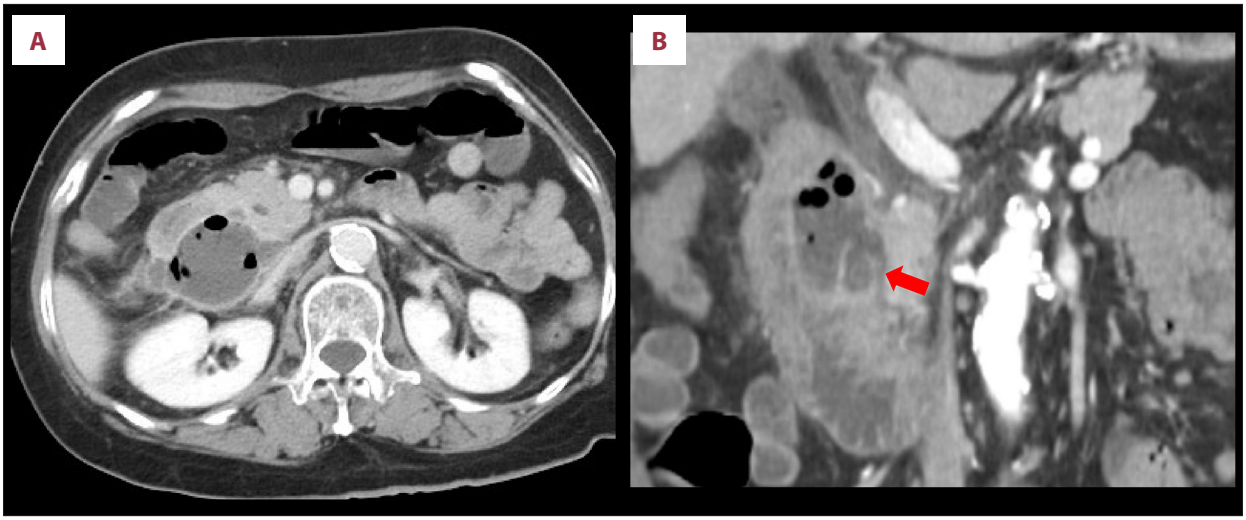


Figure 2. Follow-up contrast-enhanced computed tomography on hospital day 7. (A) Axial image showing progressive enlargement of the retroperitoneal abscess cavity. (B) Coronal image showing communication between the diverticular perforation and the abscess cavity (arrow).

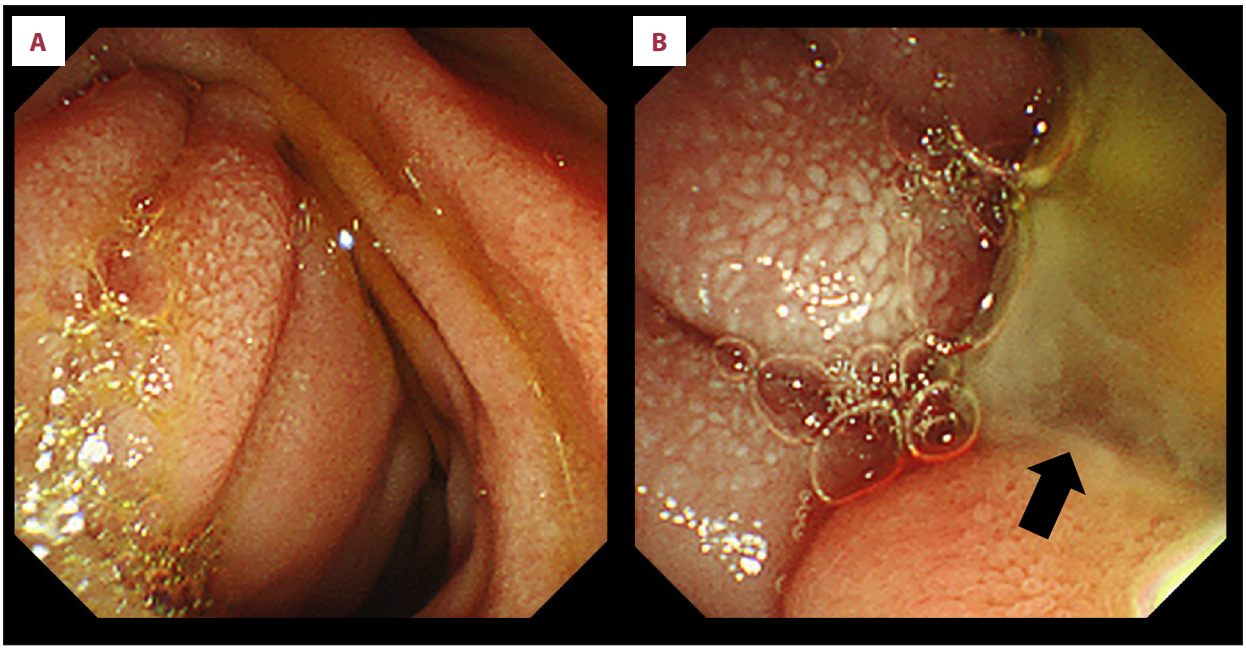


Figure 3. Endoscopic findings. (A) Mild luminal narrowing of the second portion of the duodenum due to compression by the abscess cavity. (B) Purulent material within the periampullary diverticulum (arrow).

diverticulum and then smoothly guided into the abscess cavity (Figure 4A). Finally, a 6-French nasobiliary drainage tube (Flexima™ Nasobiliary Catheter; Boston Scientific, Marlborough, MA, USA) was placed in the retroperitoneal abscess cavity (Figure 4B). The total procedure time was 20 minutes.

Continuous purulent drainage was observed after tube placement. No irrigation or active aspiration of the abscess cavity was performed through the nasobiliary drainage tube. Aspirin and clopidogrel were withheld while the nasobiliary drainage tube was in place. Management comprised bowel rest and central venous nutritional support. Follow-up CT on hospital day 14 showed a pronounced reduction in the size of the abscess cavity. Because shrinkage of the abscess cavity had led to suboptimal positioning of the tube tip, the tube was repositioned within the residual abscess cavity under fluoroscopic guidance; its position was confirmed by contrast injection through the tube. Further cavity shrinkage was confirmed by CT on hospital day 19 (Figure 5A), and tubography via the nasobiliary drainage tube demonstrated resolution of the abscess

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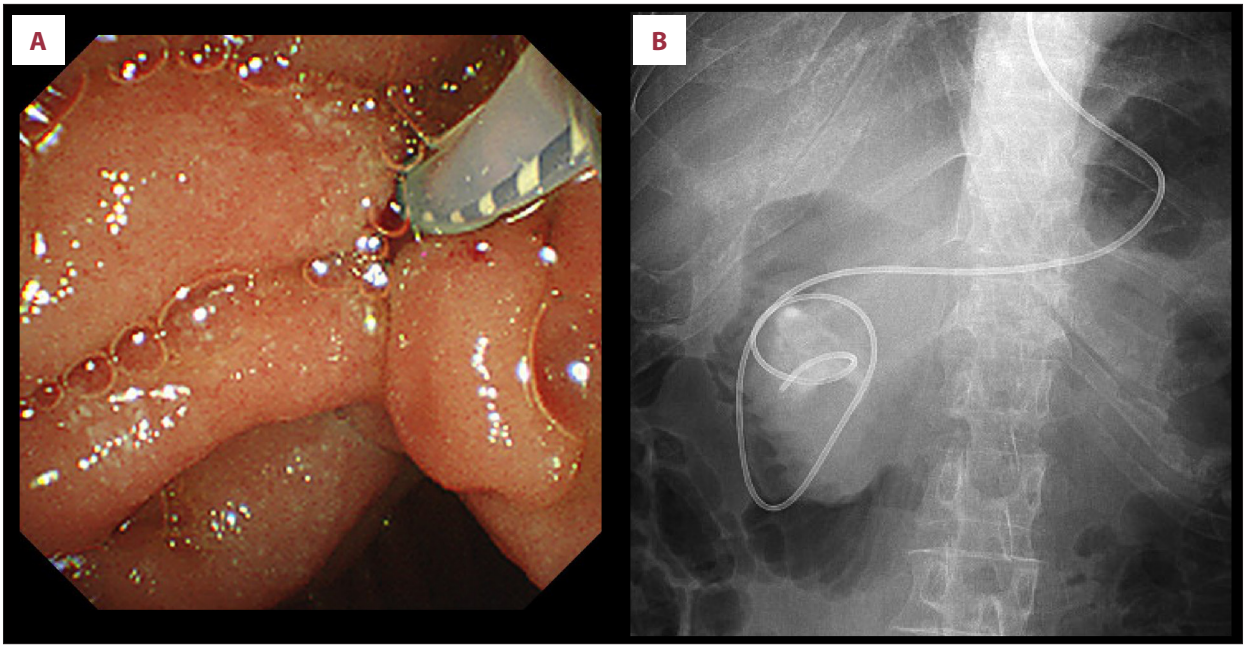


Figure 4. Endoscopic drainage procedure. (A) Advancement of a guidewire into the retroperitoneal abscess cavity through the perforated diverticulum. (B) Fluoroscopic image showing placement of a nasobiliary drainage tube into the retroperitoneal abscess cavity.

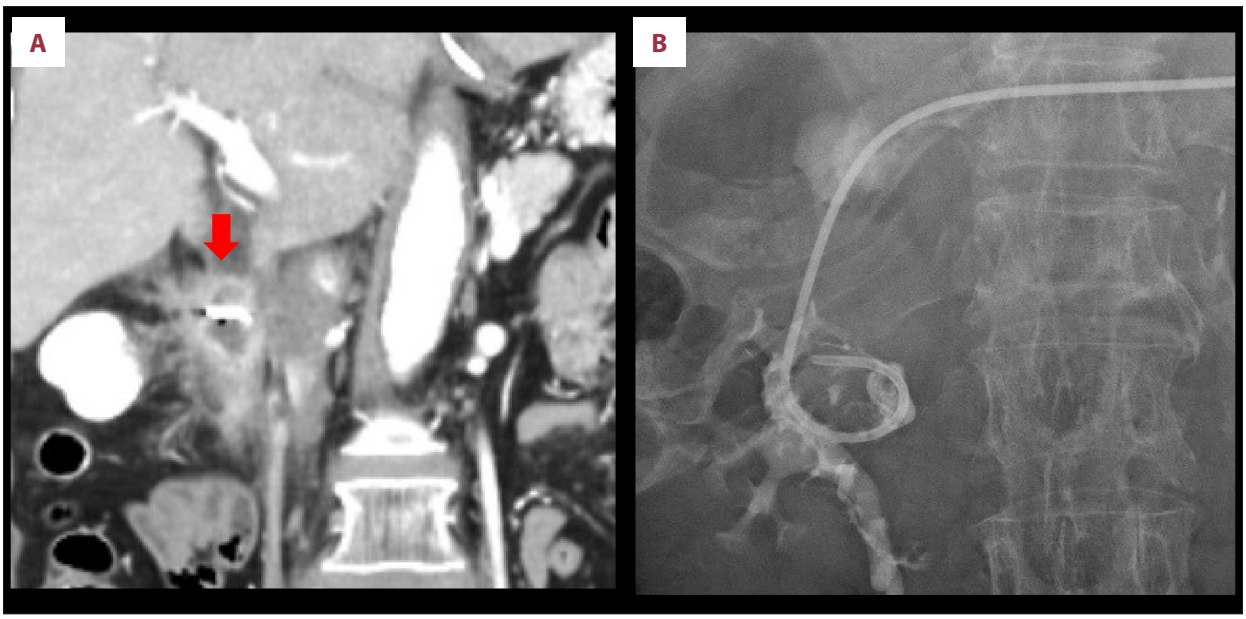


Figure 5. Imaging findings on hospital day 19. (A) Contrast-enhanced computed tomography showing further reduction in the size of the retroperitoneal abscess cavity (arrow). (B) Tubography via the nasobiliary drainage tube showing resolution of the abscess cavity.

cavity (Figure 5B). The nasobiliary drainage tube was then removed. Oral intake was resumed the following day without symptom recurrence. Aspirin was restarted the day after tube removal, followed by clopidogrel 3 days later. The patient was discharged on hospital day 35 and remained recurrence-free during 13 months of follow-up.

Discussion

The periampullary region is the most common location of duodenal diverticula [8,9]. Although most duodenal diverticula remain asymptomatic, complications such as diverticulitis, biliary obstruction, bleeding, and perforation occasionally

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Table 1. Reported cases of perforated periampullary duodenal diverticulum treated with endoscopic drainage.

Author	Year	Age	Sex	Time to drainage, days	Drainage method	Relevant clinical / anatomical context	Time to drain removal, days	Time from procedure to discharge, days	Procedure-related complications
Fan et al [4]	2017	75	F	2	Double-pigtail stent	Clinically stable; persistent symptoms despite conservative treatment	35	Not available	None
Shirobe et al [5]	2017	52	F	3	Double-pigtail stent	Localized abscess; difficult percutaneous drainage	37	19	None
Tamura et al [6]	2017	41	F	7	Nasobiliary drainage tube	Enlarging localized abscess despite conservative treatment	10	11	None
Present case	2026	64	F	8	Nasobiliary drainage tube	Enlarging localized abscess despite conservative treatment; poor PS; DAPT; difficult percutaneous drainage	11	27	None

Abbreviations: DAPT, dual antiplatelet therapy; F, female; PS, performance status.

require treatment; complications occur in an estimated 1% to 5% of patients with duodenal diverticula [10,11]. Perforation is a rare but serious complication because inflammation frequently extends into the retroperitoneal space, often resulting in abscess formation. Given this retroperitoneal location, clinical manifestations may be nonspecific, and diagnosis can be challenging. Contrast-enhanced CT plays an important role in diagnosis by demonstrating retroperitoneal fluid or gas adjacent to the diverticulum, whereas intraperitoneal free air is often absent [8,11].

Standard treatment guidelines for perforated periampullary diverticula have not yet been established. Surgical treatment has been the mainstay of management and may include drainage, diverticulectomy, segmental duodenal resection, or pancreaticoduodenectomy, depending on the degree of local inflammation and tissue damage [8,12,13]. However, these procedures are highly invasive, particularly for older or frail patients. Accordingly, conservative management and less invasive approaches have been reported for selected clinically stable patients [3,7]. Among the reported minimally invasive treatments, only 4 cases [4-6], including the present case, have been successfully managed by endoscopic drainage (stent or tube) alone (**Table 1**). Two cases were managed with internal drainage using a double-pigtail stent; the other 2 cases were treated using a nasobiliary drainage tube. Tamura et al [6] previously reported successful endoscopic drainage using a nasobiliary drainage tube in a 41-year-old patient with a favorable general condition. In contrast, our patient had poor performance status and was receiving dual antiplatelet therapy, which made surgical intervention particularly high risk. Additionally, percutaneous drainage was anatomically difficult, and CT clearly demonstrated communication between the diverticular perforation and the abscess cavity, providing a potential route for direct transdiverticular drainage. Because conservative management failed to achieve adequate source control, as evidenced by progressive enlargement of the retroperitoneal abscess despite antibiotic therapy, endoscopic drainage was selected as an alternative approach for source control. The abscess gradually resolved after endoscopic drainage, and the patient recovered without surgical intervention.

Other endoscopic approaches aimed at promoting defect closure may also be considered in selected patients. Endoscopic negative pressure therapy has been successfully used as a stand-alone treatment for perforated duodenal diverticula [3]. Covered stent placement has also been reported as an endoscopic treatment for perforated duodenal ulcers [14], whereas vacuum-stent (VACStent®) therapy has been used for transmural defects of the upper gastrointestinal tract [15]. In particular, there is insufficient evidence supporting the use of VACStent® for perforated duodenal diverticula; further clinical experience is required to determine its potential role in this setting.

A potential advantage of transnasal abscess drainage using a nasobiliary drainage tube is its ability to provide continuous and effective drainage. Compared with internal stenting, this approach allows direct monitoring of the drained fluid and permits irrigation if required, making it particularly useful in patients with purulent discharge [16,17]. These advantages may potentially be

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useful in the management of localized retroperitoneal abscesses associated with gastrointestinal perforations. Moreover, the ability to perform contrast studies through the tube and adjust its position during follow-up facilitated safe and reliable monitoring of the healing process in this single case. However, the discomfort and inconvenience associated with prolonged transnasal tube placement, as well as the risk of self-removal, should be regarded as potential disadvantages of this approach.

Based on the present case and the limited number of previously reported cases, a localized retroperitoneal abscess, the absence of generalized peritonitis or hemodynamic instability, and clearly identifiable communication between the perforation and the abscess cavity may be considered potential factors supporting the use of endoscopic drainage. Conversely, patients with diffuse peritonitis, hemodynamic instability, or failure of endoscopic drainage may require urgent surgical intervention or other source-control strategies. Nevertheless, management should be individualized according to the patient's general condition, local disease status, and technical feasibility of drainage. Endoscopic drainage has also been reported as salvage or adjunctive therapy after surgical drainage [18], suggesting that its role may extend beyond primary nonoperative management in selected situations. Given that this report describes a single case without a comparator, the effectiveness, safety, and general applicability of this approach cannot be determined. Furthermore, its feasibility may depend on favorable anatomical conditions, including a localized abscess and an identifiable transdiverticular drainage route, as well as appropriate endoscopic expertise. Additional cases are required to better define patient selection criteria, procedural safety, and the circumstances requiring escalation to surgery.

Conclusions

We have reported a case of a perforated periampullary duodenal diverticulum complicated by a retroperitoneal abscess that was successfully treated via endoscopic transdiverticular abscess drainage using a nasobiliary drainage tube. Management should be individualized according to the patient's general condition, local inflammation, and the technical feasibility of endoscopic drainage. In carefully selected patients, this minimally invasive approach may represent a useful alternative to surgery.

Institution Where Work Was Done

Kure Kyosai Hospital, Kure, Hiroshima, Japan

Patient Consent

Written informed consent for publication of this case report and accompanying images was obtained from the patient's legal representative.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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