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Case Report

Management of acute necrotizing pancreatitis with duodenal fistula

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Abstract

Severe acute pancreatitis (SAP) is often accompanied by severe infected pancreatic necrosis. Gastrointestinal fistula is a common complication during the infectious period of SAP, with the incidence of duodenal fistula coming in second place after colon fistula and a high mortality rate. Percutaneous catheter drainage (PCD) is the most commonly used surgical technique for necrotizing infection in SAP. However, the traditional PCD method cannot achieve adequate source control in SAP necrotizing infection patients with gastrointestinal fistulas. This report describes a case of SAP necrotizing infection complicated with a duodenal fistula treated with trocar-assisted percutaneous abscess drainage combined with manual irrigation. After treatment with double-lumen catheter irrigation and drainage combined with manual irrigation and other standards of care for SAP, the patient's infection symptoms were gradually relieved. A review of abdominal computed tomography and gastrointestinal radiography showed that the intra-abdominal infection was gradually relieved, and the duodenal fistula was completely healed.

INTRODUCTION

Severe acute pancreatitis (SAP) is a special type of acute pancreatitis (AP), accounting for about 20% of AP,^[1] with critical condition, multiple complications, and high mortality.^[2] SAP is often accompanied by severe infected pancreatic necrosis, and gastrointestinal fistula is a common complication in the infectious period of SAP. The incidence of duodenal fistula is second only to that of colon fistula.^[3] Patients with intestinal fistula can develop fluid and electrolyte imbalance, malnutrition, abdominal hemorrhage, septic shock, and even multiple organ dysfunction syndrome (MODS) due to intestinal fluid loss and intra-abdominal infection, leading to a high mortality rate.^[4] Therefore, it is very urgent to control infection in a timely and effective manner.

Keep the infection source under control can be achieved through methods such as percutaneous catheter drainage (PCD), endoscopic surgery, and open surgery to remove necrotic tissue. Studies have

shown that about one-third of patients with infected pancreatic necrosis who receive PCD treatment are successfully cured.^[5] PCD is usually performed under the guidance of computed tomography (CT) or ultrasound and is a relatively safe and less invasive drainage method. However, traditional PCD cannot achieve satisfactory results in patients with necrotizing infection in SAP and gastrointestinal fistula. In our treatment center, trocar-assisted percutaneous abscess drainage (TA-PAD) and double-lumen irrigation-suction catheter are used to effectively control the abdominal infection, and achieve good treatment effects.

This case reports the treatment course of a patient with SAP and a duodenal fistula. We successfully treated the patient using the TA-PAD technique combined with manual irrigation to control infection and other standards of care for SAP.

CASE REPORT

Patient information

This case involves a 33-year-old male patient who presented with severe abdominal pain, nausea, and vomiting after a meal on January 29, 2023. He was admitted to a local hospital and was considered for AP. Laboratory tests showed that his hemodiastase was 976 U/L, glucose was 21.12 mmol/L, and triglyceride was 13.79 mmol/L. Fasting, fluid therapy, antimicrobial management, total parenteral nutrition (TPN), continuous renal replacement therapy, and other treatments were given. However, the patient's general condition did not improve significantly. Given the patient's symptoms and signs of intra-abdominal infection, such as recurrent high fever, persistent anuria, and rising bilirubin levels, he was transferred to Jinling Hospital on February 8, 2023.

Treatments

After admission, abdominal CT and blood tests showed peripancreatic exudation with infection, with white blood cell counts of $20.43 \times 10^9/L$, C-reactive protein of 113.7 mg/L, procalcitonin of 26.66 $\mu\text{g}/L$, and interleukin-6 of 39.16 ng/L. Standard therapy such as TPN and antimicrobial management was provided, but the patient still had intermittent fever. Blood culture indicated the presence of carbapenem-resistant *Klebsiella pneumoniae*, and ceftazidime-avibactam was prescribed. However, the patient still had recurrent fevers.

The patient underwent CT-guided TA-PAD [Figure 1]. After percutaneous puncture into the abdominal cavity with a trocar puncture device, a large amount of abdominal drainage fluids flowed out. The puncture needle core was withdrawn, and a double-lumen catheter was placed through the trocar hole, and the double-lumen catheter was adjusted to the ideal position under the guidance of CT and then fixed on the skin. The culture results of the puncture fluids were *K. pneumoniae* and *Enterococcus faecium*.



Figure 1:

The trocar-assisted percutaneous abscess drainage for the severe acute pancreatitis patient. Under computed tomography guidance, a trocar along with the drip irrigation drainage was inserted. Before puncture, the puncture point, depth, and angle are determined (a), A reexamination showed that the drip irrigation drainage was placed to the desired position

(b)^[6]

Subsequently, the patient's drainage tube emitted intestinal fluids, and the double-lumen catheter angiography indicated a duodenal fistula [Figure 2]. In terms of source control, the duodenal fistula was drained by double-lumen catheter irrigation; due to the large amount of pancreatic necrosis, manual irrigation was further added to drain the necrosis from the abdominal cavity [Figure 3a]. In terms of nutritional therapy, enteral nutrition (EN) through a nasojejunal feeding catheter was provided when the patient's intestinal function has been restored on February 21, 2023. A nasogastric tube was placed to facilitate gastrointestinal decompression, and the gastric fluids drained from the nasogastric tube were collected and reinfused to the digestive tract through the nasogastric tube. The patients were encouraged to perform bedside exercises.



[Figure 2:](#)

The contrast imaging of duodenal fistula. After injection of iodine solution through the drip irrigation drainage for contrast imaging, an abdominal abscess was seen in the upper abdomen, and the intestines were visible, suggesting an enteric fistula (a), Then an oral iodine solution was administered for contrast imaging, revealing that the contrast agent in the stomach was communicating with the previously visualized intestines, suggesting a duodenal fistula (b)^[7]



[Figure 3:](#)

Management and the recontrast imaging of duodenal fistula. Manual irrigation was performed daily. Slowly and evenly injection of normal saline was used to irrigate the fistula tract. The drainage tube was pulled back and forth to allow necrotic tissue and debris to be flushed out of the abdominal cavity (a), A further examination showed that there was a single tract, without abscess cavities and branching channels, and the irrigation water of the double-lumen catheter was clear on weekdays. Then the patient gradually retreated and finally removed the drainage tube (b), After oral administration of iodine solution, the mucosa of the duodenum inferior segment was found to be intact, with no leakage of contrast agent (c)^[8]

A reexamination of the abdominal CT, contrast fistulography, and upper gastrointestinal contrast study showed improvement in intra-abdominal infection. The treatments, including EN through nasointestinal tube, double-lumen catheter irrigation and drainage combined with manual irrigation, gastric tube decompression, and gastric fluid reinfusion, were continued. Three months after the puncture, reexamination revealed that the duodenal fistula had been cured [Figure 3b and c]. After transition to EN by nasogastric tube feeding, the patient had no discomfort and gradually returned to a normal diet and normal community life.

Outcomes and follow-up

The patient followed up regularly for the next 6 months. He had no discomfort symptoms such as abdominal pain, abdominal distension, or fever when the normal diet was recovered. Upper gastrointestinal contrast imaging showed that the duodenal wall was intact, and no contrast agent was leaking outside. The abdominal CT scan did not show any signs of intra-abdominal infection or pancreatic perivascular effusion.

DISCUSSION

This study reports a case of necrotizing infection in SAP. Due to the infection and compression caused by necrotic pancreatic tissue, a duodenal fistula was formed, leading to severe intra-abdominal infection. To control the infection, we used TA-PAD with a double-lumen irrigation suction catheter for treatment. After the formation of the fistula tract, manual irrigation was added. The EN through a nasojejunal feeding begins after the patient's intestinal function has been restored on day 13 of hospitalization. Through the combined treatment of double-lumen catheter irrigation and drainage, manual irrigation, and nutrition support, the abdominal infection was controlled, and the duodenal fistula healed.

SAP often accompanies necrotizing infections. The retroperitoneal "gas bubble" is considered a sign of necrotic tissue infection in SAP; however, it presents only in some patients. CT-guided fine-needle aspiration with Gram stain and culture can confirm the presence of infectious necrosis in SAP.^[6] The duodenum that wraps around the pancreas is prone to forming a duodenal fistula when it is compressed and eroded by necrotic tissue of the pancreas, which not only makes it difficult to provide nutrition but also exacerbates the patient's peritoneal infection. The loss of digestive fluids will also affect the homeostasis of the internal environment. After duodenal fistula occurs, digestive fluid flows through the fistula into the abdomen, corroding blood vessels and easily causing damage to surrounding organs and massive hemorrhage in the abdomen.

Surgical intervention is required when the patient's clinical symptoms worsen or when infected pancreatic necrosis is suspected. In SAP necrotizing infections, PCD is currently the preferred treatment, which can delay surgical treatment for 25%–60% of patients to a more favorable time, or even completely cure the infection.^[6] However, the traditional PCD cannot achieve adequate source control for SAP combined with digestive tract fistula. The main reasons for the poor drainage effects include: (1) There are too many solids to be extracted, (2) Necrotizing tissues and detached fragments block the ducts, (3) Multiple small abscesses that do not drain properly, and (4) The drainage tube used is too thin.^[7]

The TA-PAD irrigation and drainage technology can achieve better drainage results. This technology uses a larger diameter tube instead of the traditional tubes with smaller diameter. With the assistance of continuous negative pressure irrigation and drainage, the drainage tube is less likely to become blocked, and the abscess cavity and necrotic tissue can be cleared more quickly, which is viscous pus, cellulitis, necrotic tissue, and multiple abscesses.^[9] Studies have shown that TA-PAD has a significant advantage over traditional PCD, allowing for shorter hospital stays and reduced hospital costs.^[10]

Patients with necrotizing pancreatitis complicated with digestive tract fistula suffer from large amounts of necrotic tissue and complex branches of diverticulum surrounding the abscess. The application of a double-lumen catheter alone for flushing and drainage is limited in effectiveness. By adding daily manual irrigation for better drainage, the necrotic material can be removed more quickly. It can also flush out pus and necrotic tissue from small branches that are difficult to reach with a double-lumen catheter, resulting in adequate source control.

Nutritional support is also an important method of treatment for SAP. Many guidelines recommend that jejunal feeding should be established immediately after stabilized hemodynamics are achieved for SAP patients. Only when EN is not feasible should TPN be considered. Recent clinical studies have shown that EN not only provides SAP patients with sufficient energy and nutrients but also regulates intestinal gastrointestinal function and intestinal flora balance, protecting the intestinal mucosa from damage. It also regulates the secretion of cytokines in the intestinal cells, alleviates intestinal inflammatory reactions, and reduces the occurrence of MODS during the acute response stage, which is widely used in the clinical treatment of SAP.^[11]

In this case, the patient achieved good therapeutic effects through the treatment of double-lumen catheter irrigation and drainage with TA-PAD placement combined with manual irrigation and EN.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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