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Minimally Invasive Surgery for Necrotizing Pancreatitis: A Case Report

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Abstract

Introduction: Necrotizing pancreatitis management is complex and varies significantly among clinicians. Minimally invasive approaches like transgastric necrosectomy via laparoscopy are emerging as effective treatment options. This case report underscores the technique's efficacy, clinical outcomes, and role in reducing complications. **Clinical Observation:** A 59-year-old male with a history of smoking and alcoholism presented with severe abdominal pain, nausea, and vomiting. Over the following weeks, he developed symptoms including asthenia, weight loss, and melena. Diagnostic workup revealed severe anemia and Balthazar E necrotizing pancreatitis, with significant intra-abdominal fluid collections and signs of infection. After initial conservative management, the patient underwent transgastric necrosectomy via laparoscopy due to deteriorating clinical status. The procedure involved removing necrotic tissue and performing a cystogastroanastomosis and jejunostomy. Postoperative care included fasting, parenteral nutrition, broad-spectrum antibiotics, and enzymatic replacement. The patient recovered well, with reduced necrotic tissue on follow-up imaging, and was discharged twelve days post-surgery [1]. **Conclusion:** Transgastric necrosectomy by laparoscopy is a valuable first-line surgical option for patients with symptomatic necrotizing pancreatitis, particularly in cases without prior interventions. This minimally invasive technique helps reduce major complications and mortality, offering a less invasive alternative to traditional open necrosectomy. The multidisciplinary approach and careful postoperative management were crucial to the patient's favorable outcome. The case highlights the potential of transgastric necrosectomy as an effective treatment strategy in managing complex pancreatitis cases, including those with associated duodenal perforation [2].

Keywords

Necrotizing, Transgastric, Pancreatic, Necrosectomy, Pancreatitis, Case, Report

1. Introduction

Necrotizing pancreatitis (NP) is a severe complication of acute pancreatitis, affecting 10% - 20% of cases and carrying a significant risk of morbidity and mortality, particularly when infection occurs. Management of NP is complex and varies widely, with both surgical and non-surgical approaches in use. Non-surgical management emphasizes supportive care, including aggressive fluid resuscitation, enteral nutrition, and antibiotics in confirmed infections. Recent trends favor a conservative, "step-up" approach, starting with percutaneous catheter drainage (PCD) to control infection and delay surgery [1].

When surgical intervention is required, minimally invasive techniques are increasingly preferred over traditional open necrosectomy due to their lower morbidity and mortality rates. These include video-assisted retroperitoneal debridement (VARD), endoscopic transgastric necrosectomy, and laparoscopic procedures. Transgastric necrosectomy, particularly via laparoscopy, has gained attention for effectively removing necrotic tissue while reducing the risk of complications like pancreaticocutaneous fistula, which is more common with open surgery [3].

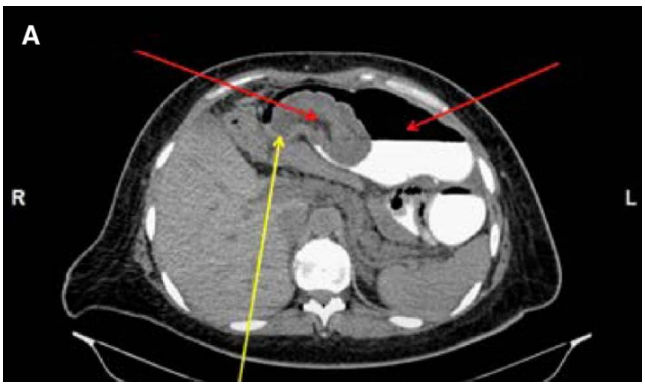
The PANTER trial and other studies support the use of minimally invasive techniques, showing reduced rates of major complications and mortality compared to open surgery [1] [2]. Given the variability in NP presentation, a multidisciplinary approach involving gastroenterologists, surgeons, and radiologists is crucial. This case report highlights the successful use of laparoscopic transgastric necrosectomy, underscoring the importance of minimally invasive techniques in improving patient outcomes.

2. Clinical Observation

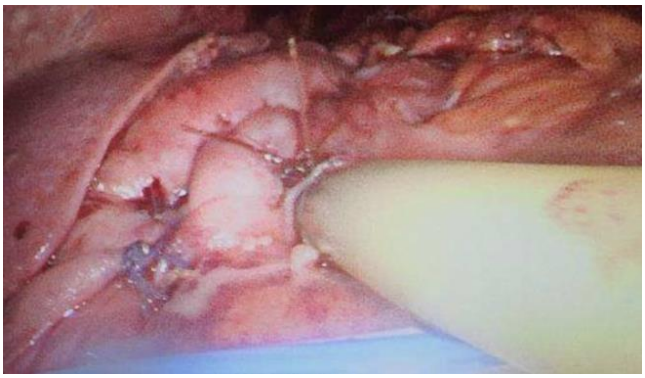
A 59-year-old male gentleman with a past smoking history (3.5 packs/year) and alcoholism (around 220 g/week), without any other medical condition or previous surgical history.

Two months before our initial the evaluation, he experienced abdominal pain located in the epigastrium, rated an intensity 10/10, transfictive, accompanied by nausea and vomiting. He sought a private medical assistance, where unspecified symptomatic treatment was provided. Six weeks later, he began to experience asthenia, adynamia, early satiety, postprandial fullness and weight loss of around 12 kg. He presented melena on two occasions, making him go to the emergency service of our institution. A diagnostic approach revealed severe anemia with a hemoglobin level of 6 mg/dL, leading to the transfusion of globular packets. A

contrast-enhanced abdominal computed tomography (CT) scan was performed, which showed evidence of Balthazar E necrotizing pancreatitis, for collection in head, body and tail of the pancreas, as well as towards the anterior pararenal space and the transverse mesocolon. The intra-abdominal fluid collection, characterized by the presence of gas inside and peripheral enhancement, measured approximately 13.7 × 11 × 3.2 cm, with a volume close to 250 cm^3; additionally, a suggestive image of a solution of continuity at the second portion of the duodenum of 6.5 mm. It has been made into it was done with an oral supplement without evidence of contrast leakage [4].



(A)



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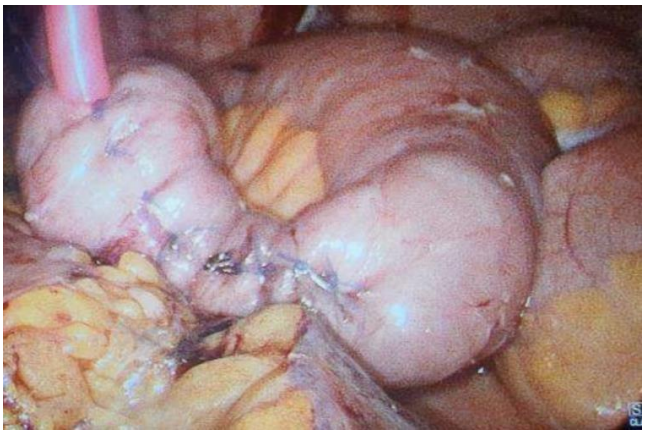

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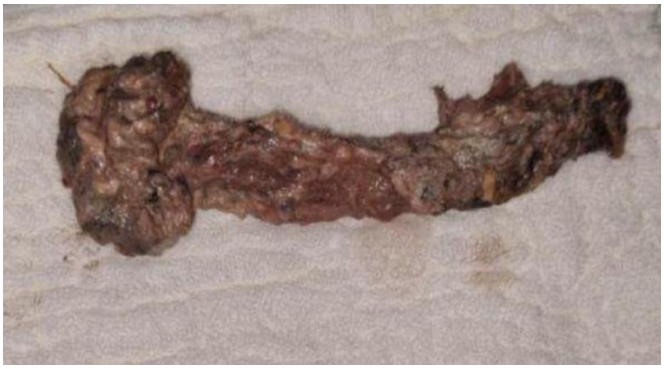

(D)

Figure 1. (A) Placing a Foley catheter as a gastrostomy for gastric diversion, for closing the anterior wall of the stomach, as well as draining pancreatic contents. (B) Jejunostomy 60 cm from the angle using the Witzel technique (tunneling of a catheter to prevent leakage from the jejunostomy). (C) Jejunostomy 60 cm from the angle using the Witzel technique (tunneling of catheter to prevent leakage from the jejunostomy). (D) Necrotic tissue shows almost entirely the pancreatic gland.

A consult with the general surgery service described the patient as afebrile, hemodynamically stable, cardiopulmonary patient without compromise, with a distended abdomen, which was soft, depressible, and without pain on palpation and signs of peritoneal irritation. Conservative management was initiated, including placing a central venous catheter and starting parenteral nutrition. A consult with the gastroenterology service was requested for a transgastric puncture.

An upper endoscopy was performed and revealed erosive gastritis, Forrest III ulcers in the antrum of 2 and 4 cm, and site of perforation in the second portion of the duodenum. During the procedure, the patient presented ventilatory deterioration and hemodynamic instability, requiring orotracheal intubation. We proceeded with urgent surgical management, performing a diagnostic laparoscopy that demonstrated a hydropic gallbladder with an inflammatory pattern, leading to cholecystocentesis was performed. A transgastric pancreatic necrosectomy was performed by laparoscopy involving removal of purulent material and necrotic tissue, followed by abundant irrigation.

Mechanical cystogastroanastomosis was performed, face closure gastric anterior in two planes with absorbable Vicryl suture 2-0 and gastrostomy (**Figure 1(A)**, **Figure 1(B)**), placing a 24 Fr Foley catheter and serous invagination with 2-0 chromic catgut. It was taken to perform jejunostomy with the Witzel technique in an extracorporeal manner through the umbilical port (**Figure 1(C)**). The abdominal cavity was washed and two closed drainages were placed: the first led to the gallbladder bed, stomach and splenic fossa, and the second to the parietocolic slide and pelvic cavity. Port wounds were closed by planes and fixation of drains (**Figure 1(D)**). Postoperative management was given, such as fasting, parenteral nutrition, broad-spectrum antibiotics, and enzymatic replacement with adequate answers.

On the seventh postoperative day, it was decided to start a jejunostomy diet

with adequate tolerance. On the tenth postoperative day, an abdominal CT scan was performed, observing residual tissue from the portion of the tail with irregular hypodense images with presence of gas and thin wall that enhances the contrast medium, with approximate measurements of 7.6 × 1.5 × 1.1 cm and volume of 6.5 cm3 approximately. On the twelfth postoperative day, it was decided that a hospitalary discharge would be decided due to favorable clinical evolution, with close follow-up by outpatient consultation [5].

3. Discussion

According to the American Gastroenterology Association, acute pancreatitis is one of the most common gastrointestinal diseases encountered in clinical practice [6]. Among these cases, 10% - 20% may be complicated by necrosis of the pancreatic gland. This subset of patients can experience a prolonged and complex clinical course, with mortality rates reaching up to 20% - 30% if the necrotic tissue becomes infected [6]. The diagnosis of necrotizing pancreatitis is suggested by an unexpectedly prolonged disease course, hemodynamic instability, fever, lack of response to medical treatment, and the presence of fluid collections on computed tomography (CT) [1]. The progression of this necrosis can lead to severe adverse outcomes, particularly when infection ensues.

Effective management of necrotizing pancreatitis requires a multidisciplinary approach involving surgeons, gastroenterologists, radiologists, critical care specialists, infectious disease experts, and nutritionists, as demonstrated in our case. A key aspect of successful management is the timely and accurate assessment of the disease at all stages, followed by the formulation of an optimal treatment plan that includes careful postoperative care. The PANTER trial demonstrated that a stepwise approach using minimally invasive techniques significantly reduces the rate of major complications and mortality, as well as long-term complications, healthcare utilization, and overall costs in patients with confirmed or suspected infected necrotizing pancreatitis. This multicenter study clearly shows that a phased, minimally invasive approach, compared to open necrosectomy, lowers the rate of major complications or death [1] [7].

In our case, transgastric necrosectomy was utilized, a minimally invasive surgical option that has been shown to be effective in managing symptomatic pancreatic necrosis, particularly in patients who have not undergone previous interventions such as drainage or necrosectomy [8]. As highlighted by Driedger *et al.* (2020), transgastric necrosectomy presents a lower risk of inappropriate pancreatic debridement and reduces the likelihood of postoperative complications, such as pancreaticocutaneous fistulas, which are more common with traditional open necrosectomy [6]. **Table 1** compares the advantages and disadvantages of each method, as outlined in the 15th edition of "Current Diagnosis and Treatment Surgery", further underscoring the benefits of this minimally invasive technique [8].

The laparoscopic approach used in transgastric necrosectomy not only allows for a less invasive procedure but also leads to improved postoperative recovery

and reduced hospital stays. This case report emphasizes the importance of minimally invasive techniques in managing necrotizing pancreatitis and highlights their broader applicability in other conditions, such as acute gallbladder perforation [9].

Table 1. Surgical approaches for necrotizing pancreatitis with their respective advantages and disadvantages.

Procedure	Advantages	Disadvantages
Open Transperitoneal Necrosectomy **Transgastric Necrosectomy**	- Easy access. - No external drainage system is required. - The endoscopic approach has reduced morbidity compared to open necrosectomy. - The surgical approach allows for rapid debridement and simultaneous cholecystectomy.	- High rates of morbidity and mortality. - Requires a clear anatomical window of the posterior stomach. - The endoscopic approach generally requires multiple reinterventions.
Video-Assisted Retroperitoneal Debridement	- Does not require a transgastric window. - Reduced morbidity compared to open transperitoneal necrosectomy. - Surgeons are familiar with the instruments.	- Increased wound complications compared to endoscopic sinus tract debridement. - Requires a retroperitoneal drainage unit. - Pancreatic fistula.
Endoscopic Sinus Tract Debridement	- Flexibility in access (transperitoneal, retroperitoneal, intercostal). - Reduced morbidity compared to open necrosectomy or video-assisted retroperitoneal debridement.	- Requires familiarity with the equipment (rigid endoscopic or intraoperative fluoroscopic). - Often requires multiple reinterventions. - Pancreatic fistula.

While the outcomes in this case were favorable, it is important to acknowledge the inherent limitations of the case report methodology. Case reports are valuable for highlighting unique clinical experiences and providing insight into specific treatment approaches. However, they inherently limit the ability to generalize findings to a broader population [10]. The results observed in this particular case should be interpreted with caution, as they may not be universally applicable to all patients with necrotizing pancreatitis [10] [11].

Furthermore, it is crucial to discuss the potential risks and complications associated with transgastric necrosectomy, even though none were observed in this specific case. Transgastric necrosectomy, like any surgical procedure, carries risks such as gastric perforation, hemorrhage, infection, and the formation of pancreatic fistulas. These complications, while not present in our patients, are recognized risks that clinicians must consider when selecting this approach for other patients [10] [11].

By acknowledging these limitations and potential risks, this discussion provides a more balanced and comprehensive analysis of the treatment method used. It emphasizes the need for cautious optimism when applying novel surgical techniques and underscores the importance of individualized patient care [11].

4. Conclusion

Acute pancreatitis is one of the most common gastrointestinal diseases encountered

in clinical practice [10]. Although it is a low percentage of cases that are associated with necrosis of the pancreatic gland as a complication, it is important to carry out a stepwise approach to reduce the composite endpoint rate of major complications or death among patients with pancreatitis necrotizing and infected necrotic. Transgastric necrosectomy is a procedure that our patient received and it is an excellent option for first-stage surgery for pancreatic necrosis symptomatic [12]. Furthermore, precise surgical techniques and long-term outpatient follow-up are mandatory to obtain optimal results for patients. Determining the best approach reduces morbidity and improves postoperative recovery. To conclude, the present case and its method of treatment is an appropriate option in the context of duodenal perforation [12].

Declaration

The patient kindly consented to the use of their medical records for publication.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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