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At the Edge of Survival: Navigating the Complexity of Severe Necrotizing Pancreatitis (with video)

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ABSTRACT

Severe acute pancreatitis presents a clinical challenge due to its rapid progression and potential for multiple organ failure. We present a case study detailing the management of a 43-year-old male with a history of ankylosing spondylitis, axial spondylarthritis, chronic alcohol and tobacco use, admitted with epigastric pain, nausea, and vomiting indicative of severe pancreatitis. Laboratory workup revealed markedly elevated triglycerides and inflammatory parameters and radiological findings were consistent with acute pancreatitis. The patient rapidly deteriorated, progressing with intra-abdominal hypertension, demanding support in the intensive care unit due to multiple organ failures and requiring urgent abdominal decompression. During a prolonged hospitalization of 152 days, the patient was submitted to sixteen abdominal surgical procedures, including decompressive laparotomy, videoscopic assisted retroperitoneal debridement (VARD), right hemicolectomy, and complex abdominal wall closure. Despite successful interventions and hospital discharge, subsequent readmission due to diabetic ketoacidosis highlighted the long-term consequences of this potentially lethal and debilitating disease. This case underscores the efficacy of tailored interventions in severe acute pancreatitis, emphasizing the evolving landscape in its management and the necessity for comprehensive, individualized, and multidisciplinary care extending beyond the acute phase.

Keywords: acute pancreatitis, necrotizing pancreatitis, surgery, compartment syndrome, VARD

INTRODUCTION

Acute Pancreatitis (AP) is an inflammatory disorder of the pancreas, with an annual incidence estimated at 30 cases per 100,000 people, caused mainly by gallstones, alcohol consumption, and hypertriglyceridemia (1,2). According to the Atlanta guidelines, its diagnosis requires two of the following three features: clinical, serological, or imaging findings compatible with AP; and it can be divided between interstitial edematous and necrotizing pancreatitis (5-10%) depending on the absence or presence of necrotic component (3). As for grades of severity, it can be divided between (1) mild AP, without organ failure or

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complications; (2) moderately severe, with organ failure that resolves within 48h and/or complications without persistent organ failure; and (3) severe with a persistent organ failure more than 48 hours with an expected mortality of 36-50%3.

CASE PRESENTATION

A 43-year-old male, with a past medical history of ankylosing spondylitis, axial spondylarthritis, and a history of chronic alcohol and tobacco use, presented to the emergency department with complaints of intense epigastric pain, accompanied by nausea and vomiting. Clinical examination revealed normotension, tachycardia (130 bpm), absence of fever, and notable abdominal distension with guarding. Laboratory investigations indicated a lipemic profile featuring an Amylase level of 444 U/L, triglycerides measuring 7715 mg/dL, and evidence of metabolic acidosis characterized by a pH of 7.32, pCO2 of 18.9 mmHg, HCO3 of 9.5 mEq/L, and a lactate level of 6.9 mmol/L. Due to the lipemic excess, assessment of leukocyte count, C-reactive protein, and lipase was precluded, yielding no other significant findings. Further evaluation via contrast-enhanced computerized tomography (CT) unveiled substantial peripancreatic tissue and organ densification, along with moderate peritoneal effusion (*video 1*).

The patient's condition rapidly deteriorated, culminating in multiple organ failures. Respiratory compromise necessitated immediate intubation, while cardiovascular instability led to necessity of aminergic support. Concurrently, Renal involvement was evidenced by metabolic acidosis, acute kidney injury, and reduced urine output. Hepatic dysfunction, marked by coagulopathy, was also present. The patient was admitted to the intensive care unit (ICU) with an intra-abdominal pressure of 37 mmHg. Due to the rapid organ failure, aggravated by increasing intra-abdominal hypertension, the patient underwent a decompressive laparostomy. After this procedure, laparostomy revisions and repeated application of negative pressure wound therapy were performed in five subsequent sessions. Additionally, due to evidence of an ischemic acalculous cholecystitis on the third surgery, a cholecystectomy was performed. An imagological reassessment via CT scan (*video 2*) delineated approximately 50% volume of pancreatic necrosis alongside multiple intra and retroperitoneal collections, indicative of the extensive and destructive nature of the disease process. During the following weeks, the patient evidenced signs of progressive infection of the necrotic collections, with an increase in the inflammatory markers, fever and degradation of the general status. To address these necrotic collections, the patient underwent five bilateral videoscopic-assisted retroperitoneal debridements (VARDs), starting from the 28th day of hospital stay. To facilitate closure of the abdominal wall, a vertical fascial traction system was implemented during the 7th surgical procedure, enabling successful closure in a subsequent operation three days later. During the 10th surgery, an intraperitoneal abscess with fecal content arising from the hepatic angle of the colon was identified and drained. CT reassessment after the 10th (*video 3*) and 13th surgeries (*video 4*) revealed a notable reduction in the dimensions of bilateral collections. After these procedures, complete resolution of organ failure ensued, leading to the patient's transition from the ICU to the general ward. Subsequently, the colonic fistula was better characterized with an oral-contrasted CT scan (*video 5*) and a colonoscopy, revealing a lateral perforation of the transverse colon communicating with a 5 x 5 cm cavity that required a right colectomy with terminal ileostomy at the 16th and final surgery. Notably, there was a gradual reduction in retroperitoneal fluid collections. After a prolonged hospital stay of 106 days, during which the patient received a regimen comprising 65 days of Meropenem, Vancomycin, Anidulafungin, 14 days of Ceftazidime/Avibactam, and Tigecycline, discharge was authorized. Plans for referral to a continuous care unit for physical rehabilitation were initiated and the patient was discharged on the 152nd day of hospital stay.

Four months later, the patient was readmitted to the ICU with diabetic ketoacidosis, requiring intensive insulin therapy. Currently, the patient remains asymptomatic and continues outpatient follow-up with hepatobiliary and endocrinology teams to ensure ongoing monitoring and management.

DISCUSSION

The presented case exemplifies the intricate and challenging management of complicated cases of severe acute pancreatitis. The rapid progression to multiple organ failures poses a critical challenge in clinical management. This cascade of complications necessitated prompt step-up interventions, including ventilation, fluid resuscitation and aminergic support for distributive shock, and iterative surgical procedures such as decompressive laparostomy and retroperitoneal debridement (3-6). The authors believe that

the rapid and multidisciplinary effort in the initial assessment, management, admission to ICU and abdominal decompression were key the factors for the patient's survival, as supported by current evidence (4,7). Compartment syndrome can be a severe complication of acute pancreatitis and is estimated to appear in 15% of the cases with severe pancreatitis, with an estimated 50% mortality (8,9). The inflammation and swelling within the pancreas can lead to increased pressure within the abdominal compartment, compromising blood flow to surrounding tissues. This compartment syndrome —a condition characterized by increased pressure within a confined space, causing tissue damage and impaired function, can result in diminished blood supply, ischemia and necrosis of muscles and organs. Timely recognition and intervention are crucial to prevent further complications and preserve tissue viability in these cases (10). Management options should start by strategies to reduce intra-abdominal pressure, such as correct patient positioning, pain control and sedation, reducing intra-abdominal volume (stomach and bladder decompression, laxatives), avoidance of positive fluid balance, drainage procedures and lastly surgical decompression (5). Following the findings of the PANTER-study (11), the step-up approach has emerged as the preferred strategy for addressing necrotizing acute pancreatitis (AP), advocating percutaneous drainage as the initial choice.

In this instance, our approach involved multiple Videoscopic Assisted Retroperitoneal Debridement (VARD) procedures, initiated four weeks post-diagnosis, aligning with the recommended timing for pancreatic debridement. This timeline allows for the maturation of necrotic debris and encapsulation of the collections, optimizing conditions for intervention. These procedures yielded a gradual reduction in collections and contributed significantly to improving the patient's clinical status (12).

Ischemic cholecystitis and ischemic colitis represent additional complications that can arise in the context of acute pancreatitis, especially in patients who have developed compartment syndrome (9). The compromised blood flow associated with pancreatitis can extend beyond the pancreas, affecting neighboring organs such as the gallbladder and colon. These conditions present additional challenges in the management of acute pancreatitis, as they require careful assessment and intervention to address the multifaceted nature of the underlying vascular compromise and prevent further deterioration of organ function. Early recognition and prompt treatment are essential to mitigate the risk of complications and improve patient outcomes.

Despite the significant progress and resolution of the acute phase of the illness, the subsequent readmission due to diabetic ketoacidosis highlights the importance of ongoing vigilance and comprehensive outpatient care (13). The interdisciplinary approach involving hepatobiliary, internal medicine, infectious disease, and endocrinology specialists remains paramount in the long-term management and follow-up of the patient's complex medical history.

CONCLUSIONS

In conclusion, this case of severe acute pancreatitis exemplifies the complex and multifaceted nature of this condition, emphasizing the critical importance of a comprehensive and multidisciplinary approach to management. The patient's journey, marked by rapid deterioration into multiple organ failures and subsequent interventions, underscores the gravity and challenges inherent in treating severe pancreatic inflammation. The utilization of a step-up approach showcased the efficacy of strategically timed VARD procedures. This tailored intervention played a pivotal role in alleviating collections and fostering a notable improvement in the patient's clinical trajectory.

Furthermore, this case emphasizes the evolving landscape in the management of necrotizing acute pancreatitis, urging clinicians to reevaluate established paradigms and adapt interventions to individual patient presentations. The successful resolution of complications, albeit with subsequent readmission due to diabetic ketoacidosis, accentuates the necessity for meticulous long-term follow-up and holistic care post-intensive care unit discharge. Moving forward, continued research efforts and a collaborative, multidisciplinary approach remain imperative in refining treatment strategies and enhancing outcomes for patients grappling with severe acute pancreatitis.

Conflict of Interest

There is no conflict of interest.

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Ethical Statement

Written informed consent was obtained from the patients of this case report.

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