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Case Report

Management of infected necrotizing pancreatitis with open abdomen and negative pressure therapy

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ABSTRACT

Severe acute pancreatitis (SAP) may progress to infected necrotizing pancreatic (INP) and abdominal compartment syndrome (ACS), significantly increasing mortality and requiring prompt intervention. A step-up approach—including percutaneous drainage, endoscopic procedures, and, in severe cases, open surgery with open abdomen management and negative pressure therapy (NPT)—has demonstrated improved outcomes. This article reviews optimal management of complicated SAP and the role of NPT in reducing morbidity and mortality. A 31 years old female developed infected pancreatic necrosis and abdominal compartment syndrome. Initial management included necrosectomy with closed and open drains, followed by primary fascial closure but the patient continued to deterioration. Therefore, she underwent reoperation with surgical debridement and application of NPT technique. The patient recovered without disabling sequelae. Current IPN management prioritizes radiological or endoscopic interventions. However, open abdomen with NPT remains a viable option when minimally invasive approaches fail or are unavailable. Here the NTP shows favorable outcomes despite limited published evidence.

Keywords: Infected pancreatic necrosis, Negative pressure therapy, Barker technique

INTRODUCTION

Severe acute pancreatitis (SAP), defined by persistent organ failure (primarily respiratory, cardiovascular, or renal), carries high morbidity and mortality. Approximately 5–10% of patients develop pancreatic necrosis, which may become secondarily infected pancreatitis necrotic (IPN), increasing mortality to 20–40%.[1-5]

Management of IPN has evolved toward a step-up strategy, starting with minimally invasive techniques (as CT-guided percutaneous or endoscopic drainage).[2] Open surgery is reserved for cases with uncontrolled sepsis, ACS, or massive hemorrhage.[3,4] Surgical decompression is recommended within 4 days of ACS diagnosis if intensive care and interventional radiology fail.[6]

Historically, open necrosectomy with repeated laparotomies was standard but was associated with high morbidity.[7] Current alternatives include subcutaneous linea alba fasciotomy (SLAF) and open abdomen techniques (e.g., Bogotá bag, Wittmann patch, prosthetic mesh).[2]

Open abdomen management with NPT is increasingly relevant. It enhances control of intra-abdominal sepsis, reduces intra-abdominal pressure, mitigates ACS progression, removes pro-inflammatory exudates and bacteria, improves tissue perfusion/oxygenation, reduces bowel edema, and decreases systemic inflammatory

mediators.[4] Optimal NPT requires fluid evacuation, prevention of evisceration, fascial retraction, enteric fistulas, and loss of abdominal compliance.[8]

Sermoneta et al reported successful IPN management via anterior/ or posterior laparotomy, necrosectomy, open abdomen, and NPT (VAC® system) with lumbar drains.[7] Patients treated with NPT showed 50% faster healing, fewer reoperations, and reduced complications versus other open abdomen techniques (Figure 1).

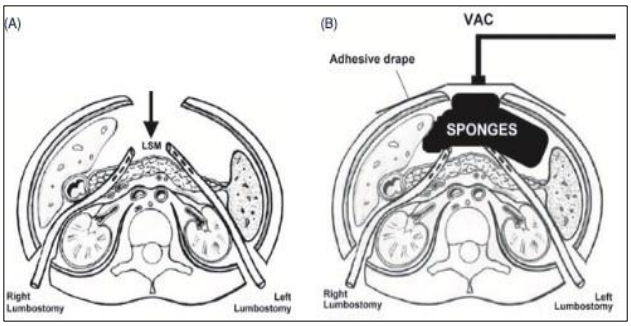

Figure 1: Schematic of anterior/posterior approach with NPT and lumbar drains, adapted from Sermoneta et al.[7]

In 2023 the outcomes of a prospective study reported of 15 SAP/ACS patients found NPT significantly reduced intra-abdominal pressure (IAP), stabilized organ function, and facilitated primary fascial closure in some cases. Despite high mortality (57% at 28 days; 28.5% at 90 days), NPT controlled inflammation and reduced multi-organ failure progression.[1]

Barker's vacuum pack technique—using a polyethylene sheet, absorbent dressing, and continuous suction (−125 mmHg)—promotes secondary intention healing and gradual fascial closure.[10]

While commercial NPT systems offer advanced features (pressure control, instillation, alarms), Barker's method remains effective in resource- limited settings.[10]

Objective

The objective of the study was to report a successful case of IPN managed with Barker's NPT at a secondary-level hospital.

CASE REPORT

A 31-year-old female homemaker, with no significant medical/surgical history, presented to a private clinic with 24 hours of abdominal pain, fever, nausea, and vomiting. Contrast-enhanced abdominal computed tomography (CT) revealed: ill-defined cecal walls with free fluid, extraluminal air foci, right iliac fossa plastron, and extensive intraperitoneal/ retroperitoneal fluid.

Laboratory findings

Hemoglobin 17.4 g/dl, hematocrit 52.8%, platelets 284,000/mm³, WBC 16,100/mm³ (89% neutrophils), PT 31.6s, PTT 16s, amylase 562.7 U/l, lipase 164.2 U/l, AST 104.5 U/l, and ALT 386 U/l. Suspected complicated appendicitis prompted laparoscopy, which revealed 1,000 ml bile-stained fluid and a normal appendix. Conversion to open surgery identified necro-hemorrhagic pancreatitis with omental adhesions, cholelithiasis, dilated extrahepatic bile duct, and hepatic inflammation. Closed drains (Jackson-Pratt® right, Saratoga® left), cholecystostomy (Foley catheter), NG tube, and urinary catheter were placed.

Postoperatively, she received IV crystalloids (1,000 ml/6 hours), ceftriaxone (1 g/12 hours), metronidazole (500 mg/8 hours), and ketorolac (30 mg/8 hours). At 12 hours, she developed severe epigastric pain (EVA 7/10), hypotension (100/60 mmHg), and oxygen desaturation. Despite supplemental O_2 (3 l/min), respiratory failure necessitated transfer to our hospital. Antibiotics were escalated to imipenem (500 mg/6 hours), and fluids were adjusted (1 ml/kg/hour). Hemoglobin dropped to 10.6 g/dl (Hct 33.9%). Repeat CT showed 915 ml right upper quadrant fluid and 172 ml left paracolic fluid with pancreatic necrosis (Figure 2).

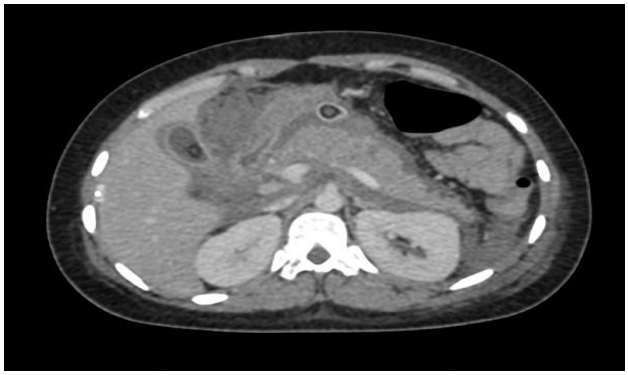

Figure 2: Axial CT showing fluid collection (star) and heterogeneous pancreatic necrosis.

Due to worsening respiratory failure, fever, distension, and peritonitis, reoperation was performed. Findings included purulent fluid, necrotic pancreatic head/neck tissue, and dysfunctional drains. Open abdomen management with Barker's NPT was initiated, followed by three dressing changes (Figures 3a and b).

Clinical improvement occurred within 24 hours: reduced pain, improved respiration, and clean wound. Four NPT changes over 14 days revealed granulation tissue and progressive fascial closure (Figure 4). Laboratory results normalized (Hb 10.8 g/dl, Hct 34.7%, platelets 471,000/mm³, WBC 6,800/mm³, neutrophils 41.8%, AST 23 U/l, ALT 14 U/l, amylase 51 U/l, lipase 30 U/l). The patient was discharged on day 43 with a well-epithelialized

scar. Elective cholecystectomy was planned for 6 months post-recovery.

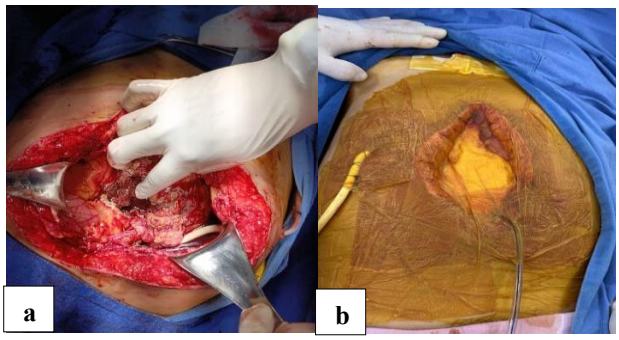

Figure 3: (a) Pancreatic necrosis is observed, with opening of the mental bursa, free pancreatic juice, and a Foley tube attached to the gallbladder for management of cholecystostomy, and (b) open abdomen handled with negative pressure therapy method Barker.

Figure 4: Final abdominal result of the patient treated with TPN Barker method.

DISCUSSION

The management of INP has evolved towards minimally invasive approaches, primarily utilizing endoscopic or interventional radiology techniques, as emphasized in current guidelines.[12,13] These advanced methods, however, are typically feasible only in tertiary care hospitals with specialized infrastructure and expertise. Much of the reported evidence supporting these strategies involves commercially available NPT systems.

Our presented case was complex from the outset, marked by an initial exploratory laparotomy with drainage and primary abdominal closure. This initial surgical approach failed, leading to progression to INP complicated by abdominal compartment syndrome. Consequently, the patient required reoperation, transitioning to open abdomen management with Barker-type NPT and partial fascial closure.

The successful outcome in this complex case using Barker-type NPT aligns with anecdotal reports highlighting its efficacy in resource-limited settings. Our results demonstrate that this specific NPT technique can be a viable salvage therapy when minimally invasive options fail “or” are unavailable due to infrastructural constraints, potentially reducing morbidity and mortality associated with complicated acute pancreatitis in such environments.[15] This finding is significant as it addresses a gap often encountered in non-tertiary centers.

Our findings support the concept that NPT, particularly the Barker method, serves as an effective rescue strategy after failure of initial surgical or minimally invasive management. This aligns with studies by Leppäniemi et al and Bradley et al, who demonstrated improved outcomes with NPT in complex abdominal infections and severe pancreatitis when conventional approaches proved insufficient.[15,16]

While most robust evidence favors step-up minimally invasive approaches (endoscopic/radiologic) as the standard of care in well-equipped centers, our case underscores the practical value of Barker-type NPT where such resources are lacking.[12,13,18] This observation resonates with experiences reported from similar settings, suggesting Barker NPT can offer a lower-tech, yet effective alternative to mitigate poor outcomes.

Consistent with established principles, our experience reinforces that NPT is an “essential component” but "not a standalone solution” in managing critical postoperative complications like INP. Its success hinges on integration within a comprehensive multimodal strategy. This includes rigorous hemodynamic monitoring, meticulous metabolic and nutritional support, source control, and strategies to mitigate systemic inflammation and organ failure principles well-documented in the management of severe acute pancreatitis.[18]

The development of a ventral hernia, as observed in our patient, is a recognized sequela of open abdomen management and NPT, consistent with reported complication rates in the literature.[17] Planned delayed repair, as undertaken here, is the standard approach.

Despite promising results in cases like ours, the optimal timing for initiating Barker- type NPT and its comparative effectiveness against commercially available systems or other modalities in different clinical scenarios remain inadequately defined. Most evidence is derived from case series or retrospective analyses. Consequently, “we strongly advocate for further research, particularly well-designed randomized controlled trials (RCTs)”, to establish definitive protocols, refine patient selection criteria, and optimize the use of NPT, including the Barker technique, across the spectrum of INP severity and healthcare settings.[18]

CONCLUSION

SAP complicated by IPN and ACS presents significant therapeutic challenges. Step-up management

(percutaneous drainage → open abdomen/NPT) is recommended. Barker's NPT effectively reduced morbidity and mortality in this case, despite prolonged hospitalization. It remains a valuable option in resource-constrained environments when minimally invasive approaches fail.

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