Case Report

A minimally invasive multiple percutaneous drainage technique for acute necrotizing pancreatitis

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BACKGROUND: In approximately 20% of patients, necrotizing pancreatitis is complicated with severe acute pancreatitis, with high morbidity and mortality rates. Minimally invasive step-up approach is both safe and effective, but sometimes requires multiple access sites.

METHODS: A 62-year-old woman was admitted with diabetic ketoacidosis, and initial computed tomography (CT) revealed no evidence of acute pancreatitis. She was clinically improved with insulin therapy, fluid administration, and electrolyte replacement. However, on the 14th day of admission, she developed a high-grade fever, and CT demonstrated evidence of acute necrotizing pancreatitis with a large collection of peripancreatic fluid. Percutaneous transgastric drainage was performed and a 14 French gauge (Fr) pigtail catheter was placed 1 week later, which drained copious pus. Because of persistent high-grade fever and poor clinical improvement, multiple 8 and 10 Fr pigtail catheters were placed via the initial drainage route, allowing the safe and effective drainage of the extensive necrotic tissue that was occupying the bilateral anterior pararenal space.

RESULTS: After drainage, the patient recovered well and the last catheter was removed on day 123 of admission.

CONCLUSIONS: Multiple percutaneous drainage requires both careful judgment and specialist skills. The perforation of the colon and small bowel as well as the injury of the kidney and major vessels can occur. The current technique appears to be safe and minimally invasive compared with other drainage methods in patients with extended, infected necrotic pancreatic pseudocysts.

KEY WORDS: Percutaneous drainage; Acute necrotizing pancreatitis; Minimally invasive technique

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INTRODUCTION

In approximately 20% of patients, necrotizing pancreatitis complicates severe acute pancreatitis, and is associated with a mortality rate of 8%–39%.^[1] Secondary infection of necrotic tissue is an indication for intervention;^[2] however, the traditional approach of open necrosectomy to completely remove the infected necrotic tissue is highly invasive with high morbidity and mortality.^[3–5] Alternative less invasive techniques include

percutaneous drainage,^[6] endoscopic (transgastric) drainage,^[7] and minimally invasive retroperitoneal necrosectomy.^[8] These therapies are associated with fewer complications but often require repeat procedures from multiple sites to achieve adequate drainage of all the necrotic tissue, which can cause major bleeding and/or perforation of visceral organs.^[9–11] We report the first case of acute necrotizing pancreatitis that was successfully treated with minimally invasive multiple

Figure 1. Abdominal computed tomography images. Pseudocyst in the omental bursa on computed tomography (CT) scan on the 22nd day of admission (A). CT scan on the 29th day of admission revealed remarkable progress with percutaneous transgastric drainage tube placed in the omental bursa (B). There was no notable change to the pseudocyst in bilateral anterior pararenal space (C, D).

percutaneous drainage using pre-existing access site of percutaneous transgastric drainage.

CASE REPORT

A 62-year-old woman was admitted with diabetic ketoacidosis (pH 7.222; blood glucose, 1 570 mg/dL; positive urine ketones). Initial whole body computed tomography (CT) scan was performed but found no evidence of acute pancreatitis. She was clinically improved with insulin therapy, fluid administration, and electrolyte replacement. However, on the 14th day of admission, she developed a high-grade fever, and CT demonstrated a large peripancreatic fluid collection associated with acute necrotizing pancreatitis (Figure 1A). Intravenous antibiotic treatment with tazobactam and piperacillin was initiated. Percutaneous transgastric drainage was performed and a 14 French (Fr)-gauge pigtail catheter was placed 1 week later, and a copious amount of thick pus was drained.

However, there was little clinical improvement and another percutaneous drainage was planned after a repeat CT demonstrated progressing fluid collections in the bilateral pararenal spaces (Figure 1B-D). Because surgical procedures were considered too invasive in this patient, multiple 8 and 10 Fr-gauge pigtail catheters were placed using the initial drainage route via guide wires (Figure 2 and Figure 3A-D). Because of daily drainage and lavage using a saline solution, hematological evidence of inflammation gradually improved; C-reactive protein (CRP) improved from 19 to 1 mg/dL. The

Figure 2. Percutaneous drainage tubes using the initial percutaneous transgastric drainage access site. Three drainage tubes were placed using initial percutaneous transgastric drainage route.

Figure 3. Computed tomography scan on the 50th day of admission after minimally invasive multiple percutaneous drainage. Three catheters were placed: catheter A ($\triangle$) (patient's left side), catheter B (Δ) (center), and catheter C ($\uparrow$) (right). Each catheter passed through the abdominal skin, the anterior wall of the stomach and the posterior wall, before reaching their final placement. Catheter A ($\triangle$) was placed in the left pararenal space, catheter B (Δ) in the omental bursa, and catheter C ($\uparrow$) in the right pararenal space. The jejunal tube ($\uparrow$) was placed for enteral feeding.

catheter in the omental bursa was removed on day 107 of admission, with the remainder being removed on day 122. She was mobile with a stick by day 160 and was discharged on day 193. After removal of the catheters, there was no recurrence and the CRP remained below 2.0 mg/dL.

DISCUSSION

We report a new technique that safely and effectively controlled infection associated with extensive necrotic tissue in acute necrotizing pancreatitis. Van Santvoort et

al^[9] conducted a multicenter trial comparing a minimally invasive step-up approach with open necrosectomy for necrotizing pancreatitis, and concluded that minimally invasive percutaneous or endoscopic transgastric drainage is the preferred treatment strategy for patients with necrotizing pancreatitis. If necessary, they stated that it could be followed up with minimally invasive retroperitoneal necrosectomy. However, percutaneous drainage requires repeated procedures, which limit its implementation in clinical practice. Freeny et al^[6] first described successful percutaneous drainage of infected pancreatic necrosis. In this report of 34 patients with infected necrosis, each patient required 3 separate catheter sites and 4 exchanges for removal of necrotic material. Bakker et al^[12] conducted a randomized control study in which they compared endoscopic transgastric necrosectomy with surgical necrosectomy for infected necrotizing pancreatitis, and they concluded that endoscopic necrosectomy demonstrated a significantly lower rate of major complications and death. However, this technique also requires repeated procedures to remove a majority of the necrotic materials. Moreover, because it requires both advanced skill and medical equipment, this technique cannot be effectively performed at all institutions in clinical practice, despite strong clinical evidence.^[12,13] Extension into the paracolic gutters may require adjuvant percutaneous/retroperitoneal techniques. Both proposed techniques could require multiple approach sites to drain all necrotic tissue, and therefore could pose a major risk of complication, including major bleeding and/or perforation of visceral organs.

Our technique required only one access site and was therefore less invasive and safer than conventional techniques. The management of acute necrotizing pancreatitis should be tailored according to needs of individual patients, and this new technique may have a broad range of applicability.

In conclusion, the current technique appears to be safe and minimally invasive compared with other drainage methods in patients with extended, infected necrotic pancreatic pseudocysts.

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Contributors: TT, TH, NK, YI and KM treated patients. TT and TH wrote the manuscript. NK, HK, and YK revised and edited the manuscript. All authors read and approved the final manuscript.

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