



## Case Report

# A huge preperitoneal collection following acute necrotizing pancreatitis: A case report and the management approach

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## ABSTRACT

**Introduction and importance:** Fluid collection is a critical complication of acute necrotizing pancreatitis. It is usually formed near the pancreas, but unusual collection sites have also been reported. Anterior extraperitoneal or preperitoneal collections following acute pancreatitis are rare and must be differentiated from pancreatic ascites, which is a collection of fluid in peritoneal cavity.

**Case presentation:** A 68-year-old man with a suspected pancreatic mass presented to the emergency department, complaining of abdominal pain and gradual abdominal distention. He had experienced epigastric pain, nausea, vomiting, progressive abdominal distention, and icterus for two weeks prior to admission. An abdominopelvic CT scan revealed extensive necrotizing pancreatitis with a prominent extraperitoneal collection. The collection had extended from the retroperitoneal space to the anterior extraperitoneal or preperitoneal space and had pushed the abdominal viscera backward. We managed the patient with the “Step-up” approach, and the patient was discharged after four weeks.

**Clinical discussion & conclusion:** Preperitoneal fluid collection can rarely occur following acute necrotizing pancreatitis. Here, we suggested two possible routes for fluid migration from the retroperitoneum to the preperitoneal space. Using minimally invasive techniques such as percutaneous drainage of peripancreatic collections could reduce morbidity and mortality in critically ill patients diagnosed with necrotizing pancreatitis.

## 1. Introduction

Pancreatitis is a condition characterized by the inflammation of the pancreas gland. One of the complications in pancreatitis is the fluid collection categorized by the Atlanta classification into four groups based on the time, the initial cause, and the state of encapsulation. Rarely, it also causes pancreatic ascites or pleural effusion [1]. Diagnosis is based on the patient's history, radiological findings, and fine-needle aspiration in some cases. The therapeutic approach to the pancreatic collection depends on patient's symptoms, the collection location, and the presence of infection [2]. In this study, we present a patient with necrotizing pancreatitis who was first misdiagnosed as pancreas malignancy with ascites due to the severity of symptoms and the uncommon location of the collection. Eventually, the diagnosis of acute necrotizing pancreatitis (ANP) with an extraperitoneal collection, a rare site of collection, was confirmed in the patient. This case report has been reported in line with the SCARE 2020 Criteria [3].

## 2. Case presentation

A 68-year-old man presented to the emergency department of our tertiary referral center complaining of epigastric pain with gradual abdominal distention. The patient had experienced acute epigastric pain, which radiated to the interscapular region, nausea, vomiting, progressive abdominal distention, and icterus for two weeks before hospital admission. Additionally, he had elevated blood sugar in his recent laboratory tests, without a known history of diabetes mellitus. On an outpatient basis, an abdominopelvic CT scan was performed earlier, the result of which had been mistakenly reported as a solid-cystic mass in the head of the pancreas with a necrotizing pattern and ill-defined margins, and moderate ascites. The previous laboratory and radiological findings were in favor of pancreatic malignancy. He was a teacher with no significant past medical, surgical and family history. He neither smoked nor took any drugs. On physical examination, his abdomen was distended, but there was no tenderness or guarding. Moreover, his lower extremities showed a 3+ pitting edema which was bilateral and symmetrical.

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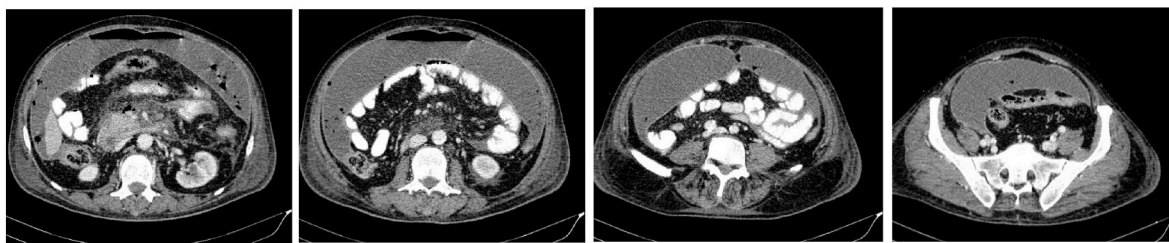


Fig. 1. Massive extraperitoneal collection associated with extended necrotizing pancreatitis and air-fluid level which extended to the extraperitoneal pelvic cavity.

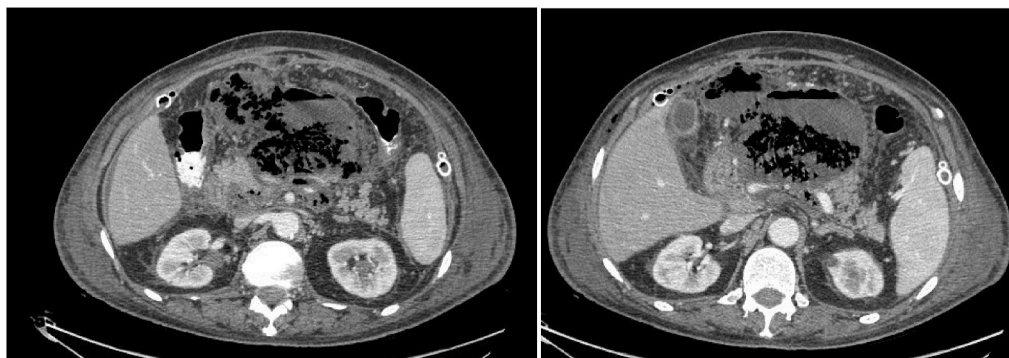


Fig. 2. Abdominopelvic CT scan after extraperitoneal collection drainage.



Fig. 3. Abdominopelvic CT scan after necrosectomy and drainage.

Hydration with intravenous fluids was initiated. Abdominal ultrasonography showed a massive, highly viscous fluid with debris and septations in the abdominal cavity, which was aspirated. The aspirated fluid was thick, green pus mixed with debris. Due to a suspected diagnosis of secondary peritonitis, an abdominopelvic CT scan was performed. An expert radiologist in our hospital reported extended necrotizing pancreatitis with a massive extraperitoneal collection and regional compression effects on the peritoneal organs (Fig. 1).

The extraperitoneal collection was drained with a minimally invasive approach (Fig. 2), and the specimen was submitted for routine bacterial smear and culture. The results were positive for *E. coli* which was sensitive to Imipenem. Consequently, the appropriate antibiotic regimen was implemented.

Ten days later, the draining fluid turned bloody, and the patient became unstable with a heart rate of 140 bpm and systolic blood

pressure of 60 mmHg. Thus, he was emergently transferred to the operating room. After an upper midline laparotomy in a supine position, which was performed by the attending surgeon, the lesser sac was opened, and the infected necrotic tissue was surgically debrided. At the end of the necrosectomy, two large-bore drains - Nelaton and Jackson Pratt (JP)- were placed into the cavity for continuous irrigation and drainage (Fig. 3).

Six days after the operation, the patient became icteric and febrile. The laboratory results showed leukocytosis, hyperbilirubinemia, and a gradual elevation of alkaline phosphatase (up to 1200 IU/L; reference range: 70–306 IU/L) in comparison to the previous results. Abdominal ultrasonography and magnetic resonance cholangiopancreatography (MRCP) were performed, which revealed cholecystitis. Thus, percutaneous cholecystostomy was performed. He was discharged with the cholecystostomy and the JP drain.

The last consequence of necrotizing pancreatitis in our patient was a pancreatic fistula through the JP drain orifice, through which drainage occurred in a low-pressure system. The fistula was resolved after endoscopic retrograde cholangiopancreatography (ERCP) and sphincterotomy. The endoscopic sphincterotomy turned the high-pressure pancreatic duct drainage into a low-pressure one, facilitating the drainage through the major papilla. Moreover, the patient experienced glucose intolerance and steatorrhea postoperatively. Oral pancreatic enzymes (Creon) were used to treat the exocrine pancreatic insufficiency and control the patient's steatorrhea. Outpatient follow-ups continued for ten months, and glucose intolerance and steatorrhea were eventually resolved.

### 3. Discussion

Acute necrotizing pancreatitis (ANP) occurs in 10% of acute pancreatitis patients, contributing to a significant increase in mortality and morbidity [4]. A critical complication of ANP is the fluid collection and pancreatic ascites. Fluid collections are usually formed near the pancreas, situated in the retroperitoneal space. Moreover, extrapancreatic fluid collections might develop in the lesser sac, the anterior or posterior pararenal space, the spleen, and the left hepatic lobe [5]. In

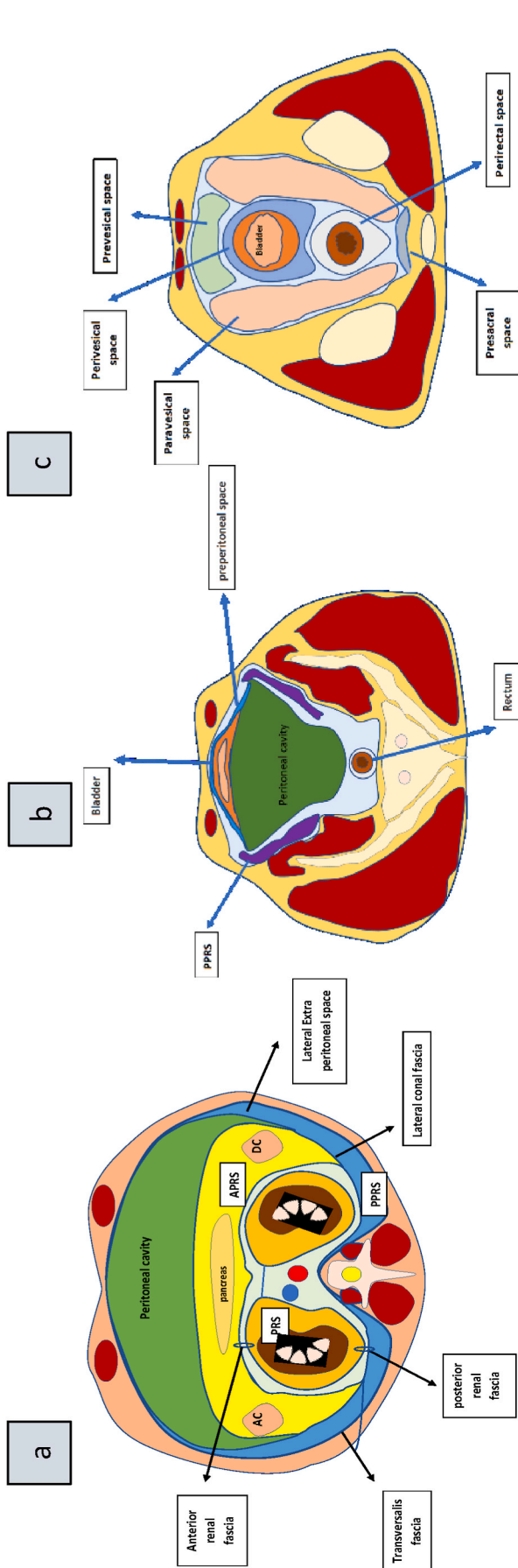


Fig. 4. Anatomy of Extraperitoneal Spaces in Abdominal cavity (a) and Pelvic cavity (b), (c). APRS: Anterior pararenal space (yellow). PRS: Perirenal space (orange). PPRS: Posterior pararenal space (blue). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

addition, unusual collection sites following pancreatitis have been reported, including the mediastinum [5,6], small bowel mesentery, splenic or hepatic subcapsular region, omentum, anterior abdominal wall, pelvis, and inguinoscrotal region [7]. Anterior extraperitoneal or preperitoneal collections following acute pancreatitis are rare and must be differentiated from pancreatic ascites, which is a collection of fluid in the peritoneal cavity.

The retroperitoneal space is bounded anteriorly and posteriorly by the posterior parietal peritoneum and the transversalis fascia, respectively. The retroperitoneal space, which extends from the diaphragm to the pelvic cavity, consists of three spaces at the kidney level [1]: Anterior pararenal space (APS), which contains the duodenum, the pancreas, and the ascending and descending colon [2], perirenal space (PRS) which lies around the kidneys and is an inverted cone-shaped space due to the kidneys' ascent from the pelvis and [3] the posterior pararenal space (PPS) which mostly contains fat tissue. Although closed at the superior ends, the retroperitoneal spaces communicate inferiorly with the pelvic extraperitoneal spaces, including the perivesical space and the PPS (Fig. 4).

The PRS is usually, but not all the time, cut off inferiorly by the merging of the Gerota and Zuckerkandl fascias. Although the perirenal space is usually cut off inferiorly and does not extend into the pelvis, it is possible for the disease processes to spread along the combined interfascial space. The small PPS is bound posteriorly and laterally by the transversalis fascia and the lateroconal fascia, respectively. The PPS, which contains fat tissue, is situated anterior and posterolateral to the quadratus lumborum muscle. The Grey-Turner sign in acute pancreatitis is caused by the spread of disease from the anterior pararenal space to the area between the leaves of the posterior renal fascia and, subsequently, the lateral edge of the quadratus lumborum muscle [8].

According to the previous publications, it is assumed that there exists an anterior route of communication along the umbilical prevesical fascia to a space called preperitoneal space. This space, also called the properitoneal space, is located between the peritoneum and the transversalis fascia. We, therefore, hypothesize that the fluid might have migrated from the retroperitoneal space, along the parietal peritoneum, down to the bladder dome and then had spread upwardly through the preperitoneal space. In addition, another probable pathway can be suggested due to the lateral connections of PPS with the lateroconal fascia and the transversalis fascia. Thus, these two pathways seem to explain the unusual location and the route of preperitoneal collection formation in our patient [9–11] (Fig. 5).

The treatment approach to the collections following ANP depends on the patient's symptoms and the presence of infection. The management of infected pancreatic necrosis has changed over the past decade. In infected pancreatic fluid collections, minimally invasive drainage methods are preferred over early surgical interventions due to the high risk of morbidity and mortality from surgery. A step-up approach with minimally invasive intervention is currently the preferred technique [12]. The step-up approach includes percutaneous drainage, endoscopic transgastric drainage, and minimally invasive retroperitoneal necrosectomy. This approach might reduce the rate of complications and death by minimizing the surgical trauma (i.e., tissue damage and a systemic pro-inflammatory response) in patients who are already critically ill [13]. The step-up approach might have been limited in our case due to the patient's instability which required emergent necrosectomy.

#### 4. Conclusion

The step-up approach is the best method to manage patients with necrotizing pancreatitis, even in cases with huge collection and necrosis.

#### 5. Provenance and peer review

Not commissioned, externally peer-reviewed.



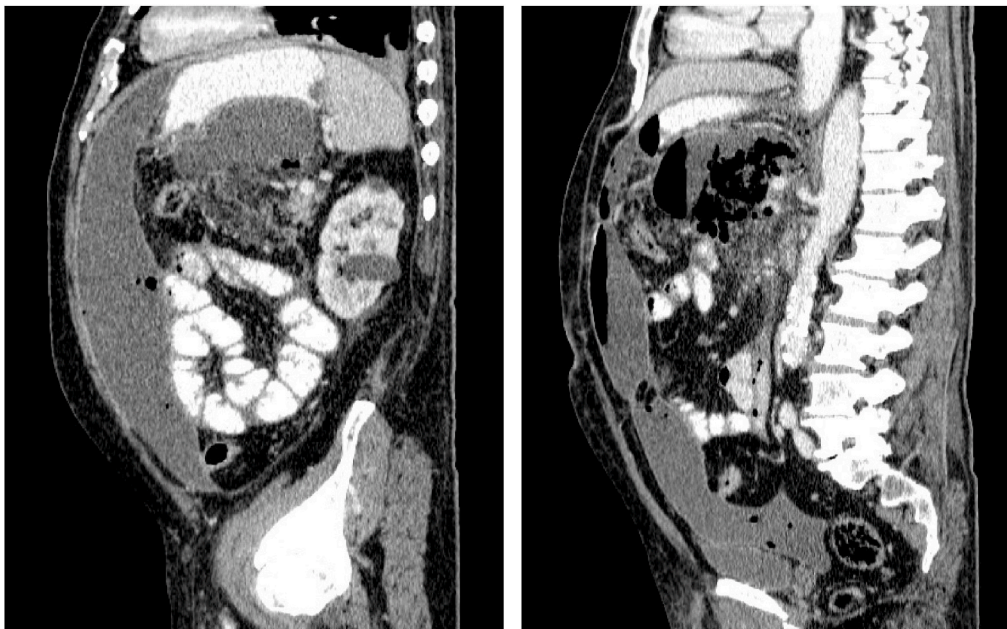


Fig. 5. Sagittal View of the Preperitoneal Collection in the Abdominopelvic CT scan.

#### Ethical approval

Nothing to declare.

#### Funding

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#### Author contribution

Mohammad Ashouri: concept and design, final revision. Kiana Tadbir Vajargah: writing the paper. Narjes Mohammadzadeh: Chief surgeon, final revision. Sepehr Sahraian: writing the paper.

#### Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

#### Registration of research studies

1. Name of the registry: N/A
2. Unique Identifying number or registration ID: N/A
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): N/A

#### Guarantor

Narjes Mohammadzadeh.

#### Declaration of competing interest

All authors state that there are no conflicts of interest.

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