Contrast-enhanced computed tomography – an effective tool in identifying pancreatic duct disruption in acute pancreatitis: A case series

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ABSTRACT

Pancreatic duct disruption may follow acute pancreatitis, chronic pancreatitis, pancreatic surgery, and trauma. Diagnosis in these patients is usually made by endoscopic retrograde cholangiopancreatographic or secretin-stimulated magnetic resonance cholangiopancreatographic. We report five cases where pancreatic duct disruption was diagnosed by contrast-enhanced computed tomography (CECT). Five patients with acute pancreatitis were studied; three were secondary to alcohol and two were posttraumatic. Three patients developed pancreatic ascites, one developed pancreatico-pleural effusion, and the other had pancreatic pseudocyst. CECT of the abdomen revealed pancreatic ductal injury in all the patients. In one patient with pancreatic ascites, multiple peripancreatic collections and dilated and disrupted pancreatic duct communicating with the peritoneal cavity were noted. The patient of traumatic pancreatitis had a fracture of the head of the pancreas, with peripancreatic collection communicating with the main pancreatic duct (MPD). In the other traumatic pancreatitis, there was a pseudocyst near the head of pancreas communicating with the MPD. CECT can provide a comprehensive assessment in acute pancreatitis including duct integrity, type and location of pancreatic ductal injury and can be an effective noninvasive alternative imaging modality in diagnosing pancreatic duct disruption.

Key words: Endoscopic retrograde cholangiopancreatographic, magnetic resonance cholangiopancreatographic, pancreatic ascites, peripancreatic collection

INTRODUCTION

Pancreatic duct disruption with ascites may follow acute pancreatitis, chronic pancreatitis, pancreatic surgery, or trauma.[1] It is defined as a discontinuity in the main pancreatic duct (MPD) by imaging modalities.[3] Pancreatic duct leak can be a side-branch leak, partial or complete duct disruption. Timely diagnosis of duct disruption, location, and size is essential for choosing the appropriate treatment conservative, endoscopic, or surgical.[3]

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An invasive investigation such as endoscopic retrograde cholangiopancreatographic (ERCP) gives dynamic information about the duct leakage in 31% of patients, whereas magnetic resonance cholangiopancreatographic (MRCP) in 17% of patients.\[4,5\] Although contrast-enhanced computed tomography (CECT) has a limited role in evaluating ductal disruption, sensitivity and specificity has gone up to 91% of patients.\[6\] We present CECT as a simple, noninvasive, alternative modality in diagnosing pancreatic ductal anatomy.

**PATIENTS**

**Case 1**
A 47-year-old chronic alcoholic man presented with abdominal pain and distension for 15 days. The patient had diffuse abdominal tenderness with massive ascites. Ultrasonogram of the abdomen showed parenchymal liver disease with massive ascites, and pancreas appeared normal. All laboratory parameters were within normal range, and serum amylase was 85 IU/L. He was managed conservatively suspecting spontaneous bacterial peritonitis.

However, ascitic fluid amylase was 1015 IU/L and 3059 IU/L on day 1 and day 3, respectively. CECT of the abdomen showed patchy destruction of the head and body of pancreatic parenchyma, MPD disruption, and massive ascites associated with right pleural effusion [Figure 1]. CECT could establish the diagnosis of MPD disruption following acute pancreatitis leading to pancreatic ascites.

**Case 2**
A 26-year-old alcoholic man, with a history of acute pancreatitis, presented with pain abdomen and dyspnea for 1 week. His laboratory parameters were within normal range except for serum amylase of 353 IU/L. Chest X-ray showed right moderate pleural effusion. The amylase level in the pleural fluid was 30,105 IU/L. Ultrasonogram of the abdomen and chest showed peripancreatic collection with atrophy of the pancreatic body and tail.

CECT showed atrophy of the pancreatic tail; pancreatic duct disruption in the body associated with massive right-sided pleural effusion. A small collection was seen tracking along esophageal hiatus to the right pleural cavity effusion. These findings established chronic pancreatitis with pancreatico-pleural fistula with pancreatic duct disruption, thus emphasizing the diagnostic role of CECT.

**Cases 3 and 4**
Two middle-aged male patients presented with a history of 10-day-old abdominal trauma. All the laboratory parameters were within normal limits except for serum amylase values of 3148 and 1188 IU/L. Ultrasonogram of the abdomen showed bulky pancreatic head, peripancreatic inflammation, and peripancreatic fluid collection around the head with no evidence of pancreatic calcification in one patient whereas the other one had a 9 cm × 5 cm well-defined collection in the lesser sac. Both patients were treated conservatively as posttraumatic acute pancreatitis.

CECT abdomen of the first patient subsequently revealed a fracture of the head of the pancreas with 4.2 cm × 0.7 cm collection around the head and proximal body of the pancreas communicating with the MPD, the diameter of MPD was 4 mm [Figure 2] with no calcification. The patient developed pancreatic ascites with ascitic fluid amylase of 19,742 IU/L.

A follow-up CECT abdomen 1 month later, of the second patient, revealed two pseudocysts in the lesser sac – larger one was 9.5 cm × 5.5 cm × 5.3 cm anterior to the head of the pancreas communicating to the MPD which was disrupted.

A diagnosis of pancreatic disruption secondary to trauma leading to pancreatic ascites and pseudocyst could be demonstrated with CECT.

**Case 5**
A 35-year-old chronic alcoholic man presented with acute upper abdominal pain with tenderness in epigastric region and free-fluid abdomen. His blood urea and serum electrolytes were elevated. His serum amylase was 348 IU/L. Chest X-ray appeared to be normal. Ultrasound of the abdomen showed features of acute pancreatitis with pseudocyst of size 14 cm × 7 cm × 5 cm with wall thickness of 4.5 mm and massive ascites. Ascitic fluid amylase was 6278 IU/L.

CECT abdomen showed a thin-walled pseudocyst of size 16.5 cm × 12 cm × 12.5 cm in lesser sac, with ductal disruption near the tail of the pancreas [Figure 3]. MPD measured 4 mm with a few intraparenchymal calcifications. These findings established chronic pancreatitis with pancreatic ascites.

**DISCUSSION**

Disrupted pancreatic duct leaking into peritoneal cavity can present as pancreatic ascites or can communicate with the pseudocyst. Pancreatic ascites accounts for 1% of all ascites cases. Disrupted pancreatic duct by imaging along with the elevated ascitic fluid amylase (>1000 IU/L) clinches the diagnosis of pancreatic ascites. In this case series, two of the patients had a significant rise in ascitic fluid amylase, and CECT documented MPD
disruption. In this case series, in all the 5 cases described, computed tomography was helpful in identifying the ductal disruptions.

ERCP provides dynamic information about pancreatic duct disruptions, visualized as a contrast leak from the pancreatic duct. However, need for a skilled endoscopist, invasive nature of the procedure, and its associated complications such as pancreatitis, infection, duodenal injury and duct disruption limit its use in acute and unstable patients. In addition, it may exacerbate the pancreatic duct leak by contrast injection at nonphysiological pressures.

In secretin-stimulated MRCP, secretin administration may transiently increase the duct diameter with an increase in bowel fluid content. Any increase in fluid outside these duodenal and jejunal regions denote an abnormal leakage of pancreatic fluid and ductal disruption. The sensitivity of secretin MRCP is low (8%), and duct disruption is seen only in 17% of patients. Secretin MRCP should be withheld in an acute setting as secretin aggravates the inflammatory process due to pancreatic stimulation by secretin.

Hence, the usefulness of ERCP and secretin MRCP in acute pancreatitis is to be weighed against their complications. CECT, being noninvasive, can be used during an episode of acute pancreatitis to evaluate the duct, without the risk of aggravation of pancreatitis.

Earlier, CECT was considered an insufficient method for the diagnosis of the type and location of pancreatic ductal injury. Aided with the present-day thin collimation, pancreatic duct disruptions can be identified with 91% sensitivity and specificity. It has the added advantage of imaging other organs also, especially in trauma.

CONCLUSION

CECT can be an effective, noninvasive, alternate imaging modality in diagnosing pancreatic duct disruptions in pancreatitis due to various causes.

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Conflicts of interest
There are no conflicts of interest.

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