



A BRIEF REVIEW OF DIAGNOSIS OF PANCREATIC DUCTAL LEAK AND DISCONNECTED PANCREATIC DUCT SYNDROME

Gastroenterology

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ABSTRACT

Pancreas is injured by a variety of insults. The response of pancreas to injury is more or less same. However damage to pancreas may lead to a predominant parenchymal injury or predominant ductal injury or a mix pattern. The majority of focus when a patient presents with pancreatitis is on SIRS and collections that develop as a result of pancreatitis. This is important also as these can cause death of the patient. However the damage to pancreatic duct and subsequent complications require a multi-disciplinary approach for management. Often the diagnosis is delayed. This brief review presents the various modalities used for this diagnosis.

KEYWORDS

INTRODUCTION

Pancreas is a vital organ and has plays vital role in digestion. A variety of insults can lead to damage or necrosis of the pancreas including the pancreatic duct. The injury to pancreatic ducts lead to a distinct clinical problem, which has a multi-disciplinary management. The settings in which pancreatic duct disruption occurs are acute or chronic pancreatitis, trauma, surgery or pancreatic malignancies. The consequences of this leak are¹-

Pseudocyst/WOPN- If collection confined to retroperitoneum and lesser sac

External pancreatic fistula which is generally surgery or percutaneous catheter drain related

Internal pancreatic fistula- Spontaneous or iatrogenic communication between gut and pancreatic collection

Pancreatic ascites- Anterior pancreatic duct leak rupturing into peritoneum

Pleural effusion- Posterior leak directs contents superiorly in pleural space via aortic or esophageal hiatus

Disconnected pancreatic duct syndrome or DPDS

Development of DPDS require two conditions

Necrosis of main PD

Preserved and functional pancreatic parenchyma upstream to necrosed main PD

Epidemiology

Various studies have estimated the prevalence of PD leak in different clinical situation. The exact prevalence is difficult to estimate because some patients die before the diagnosis can be made and also because the initial clinical focus is on the management of infection and organ failure rather than on pancreatic duct leak.

PD disruption in acute necrotizing pancreatitis ²			
Study	n	PD disruption	Remarks
Neoptolemos et al	16	7(44%)	Other group with mild AP had no Pd disruption(n=89)
Umho et al	59	18(31%)	ERCP done in 7 days of ANP
Lao et al	144	53(37%)	Increased hospital stay with PD disruption

Ascites and pleural effusion are the least common complications with prevalence of 3.5% in patients with chronic pancreatitis and 6%–14% in patients with pseudocyst. The incidence of disconnected pancreatic duct syndrome is 16% to 46.3%

Diagnosis of Pancreatic duct leak

Biochemical

Amylase/Lipase>1000 in the collection

Imaging

USG Abdomen- Good for cyst characterization but limited by operator dependence.

CECT Abdomen/MDCT/MRCP/Secretin enhanced MRCP/ERCP

Study	n	Comment
Anderson et al ³	11(9 had pd leak)	MDCT Portal phase - 100% accuracy
Toole et al ⁴	16	Helical CT-50% MRCP-67% CT+MRCP-94%
Wong et al ⁵	9	Multiphase CT-98% in parenchymal phase, 100% in portal phase
Drake et al ⁶	31(8 normal, 23 had leak)	MRCP-100% in Normal 91%(21/23) in leak
Gillams et al ⁷	17	Secretin Enhanced MRI- 10/17(59%)

Secretin enhanced MRCP is a recent advancement which can also assist in the diagnosis⁷. Secretin (0.1 mL/kg) (Secrelux, Sanochemia) is injected over 20 sec and changes in the duodenal and jejunal fluid content and size and signal intensity of pancreatic fluid collection is recorded. If there is no PD disruption there is increase in duodenal and jejunal fluid content and there is less than 1 mm transient increase in PD diameter. But if PD disruption is present there is increase in fluid outside duodenum and jejunum.

ERCP is therapeutic and gold standard as contrast is injected with pressure and small leaks which are missed on MRCP is evident on it. However upstream duct in case of complete disruption cannot be evaluated.



Figure 1-Collection compressing the Pancreas and PD entering at acute angle

Figure 2-DPDS with PD entering collection at 90

The diagnostic criteria for DPDS⁸ is a) Necrosis of at least 2 cm of pancreas; shorter segments lead to MPD stricture b) Viable distal pancreatic tissue distal/upstream from the site of necrosis c) Extravasation or total cutoff of contrast material injected into the MPD at ERCP. The upstream duct may (Due to fibrosis of MPD at transection site) or may not be dilated. CECT abdomen has 3 important features a) Large intrapancreatic/peripancreatic collection or necrosis b) Nonenhancement of a section of the pancreatic neck or body c) Viable segment of the distal body or tail of the pancreas. Other findings on CT include duct dilation in the distal segment. When visible, the MPD from the disconnected remnant enters the collection.

The diagnosis of DPDS on imaging is not straight forward and it becomes a diagnostic dilemma that there is actually DPDS or the pancreas is compressed by the collection⁹. However certain imaging feature can help in making a diagnosis. In case of a DPDS there is rim of enhancing pancreas in lower sections and the pancreatic duct enters into collection at 90 degree. Acute angulation between collection and PD suggest collection compressing the pancreas.

ERCP is gold standard for diagnosis of DPDS and pancreatic duct leak¹⁰. However it is never used with diagnostic intent and its main role is if a therapy is planned. In partial disruption, there is contrast extravasation with opacification of distal duct. But in DPDS there is failure to cannulate upstream duct and again there contrast extravasation. The most common site of DPDS is neck (57.8%) followed by distal body-tail (23.1%) followed by mid body (19.2%). The predilection of neck of pancreas for DPDS is because it is a watershed zone. So there is increased susceptibility to ischemic injury.

Recently EUS has been evaluated as a diagnostic modality for DPDS and PD disruption. However the main role of EUS is to assess the morphology of pancreatic fluid collection and delineate its communication with main pancreatic duct. EUS features of DPDS is Well-defined PFC along the course of main PD.

Upstream pancreatic parenchyma as well as PD terminating into PFC Bang et al (n= 21) studied patients with acute pancreatitis and DPDS and found an accuracy of 100 %. EUS has the ability to facilitate early recognition and therapy in DPDS.

Management

After the diagnosis, the management of pancreatic duct leak requires a multi-disciplinary team which involves nutritionist, gastroenterologist, interventional radiologist, pancreatic surgeon, pain specialist and ICU team. It involves draining the collection, establishing the path for pancreatic juice and sometimes resection of part of pancreas.

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