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Role of Endoscopic Retrograde Pancreatography (ERP) in Diagnosis and Treatment of Pancreatic Trauma : Case Report

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Abstract **Diagnosis of isolated pancreatic trauma is a clinical challenge because of its retroperitoneal location and no single diagnostic modality is highly specific and sensitive for pancreatic ductal injury. This article presented the benefit of endoscopic retrograde pancreatography (ERP) in diagnosis and therapeutic intervention in two patients who sustained blunt abdominal trauma and presented with equivocal clinical manifestation of pancreatic ductal injury.**

Case 1: **a 20 year-old man sustaining blunt abdominal trauma presented with minimal abdominal symptoms and signs whilst computer tomography (CT) showed features suggesting laceration of pancreatic head area. ERP revealed partial disruption of the main pancreatic duct and injected contrast media accumulated within pancreatic parenchymal tissue. The patient responded very well to conservative treatment and no complication detected during the two years of follow-up.**

Case 2: **a 45 year-old man developed severe abdominal pain which needed six hospitalizations within six months after negative abdominal exploration for blunt abdominal trauma. CT showed a 4x6cm size of pancreatic pseudocyst at the head of pancreas. ERP revealed complete disruption of main pancreatic duct. Endoscopic transpapillary drainage was successfully performed. He had no significant abdominal pain or other complication during four years of follow-up.**

Pancreatic trauma comprises 3-12 per cent of abdominal trauma. About one third of cases are blunt trauma and isolated pancreatic trauma is less than 1 per cent. Overall mortality is 12-30 per cent and morbidity 30-40 per cent. Important factors influencing the mortality and morbidity are associated organ injury and complication attributed to delay in diagnosis and appropriated treatment of pancreatic ductal injury.[1-4]

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The retroperitoneal location of pancreas diminishes the typical clinical feature of peritonitis thereby delay in diagnosis and treatment resulted in increased mortality and morbidity. Late pancreatic complication presented with minimal abdominal symptom and sign for weeks or months have been reported. Early detection of isolated pancreatic injury required high index of suspicion with careful observation and evaluation.[5-8]

Increase serum amylase or isoenzyme amylase is not specific to pancreatic injury, it is also elevated in stomach, duodenal or small bowel injury. All cases of

blunt abdominal trauma had elevated serum amylase in about 60 per cent of patients. Persistent elevation of serum amylase after three days is of more clinical significance in pancreatic injury.[9-10] Negative diagnostic peritoneal lavage can not exclude pancreatic injury. Increase amylase level in effluent lavage fluid is not specific for pancreatic trauma. However, increased serum amylase or positive diagnostic peritoneal lavage combined with equivocal physical examination findings are strongly suggestive of pancreatic injury and thus justify further investigation or exploration.

Ultrasonography (US) has limitation in early detection of pancreatic injury due to inflammatory reaction of peripancreatic tissue and pancreatic parenchymal attenuation evolved in early phase of injury. Overlying hematoma or fluid may obscure parenchymal laceration, it is better visualized in late or complicated cases.[5,7,12] Currently, computed tomography (CT) is the most reliable diagnostic procedure but it also depends upon interpretor's experience, quality of scanner and timing of CT performed. Some CT findings are specific for pancreatic injury but it does not indicate the status of pancreatic duct and it also has false positive and false negative findings.[13,14]

Pancreatography is the best procedure for delineation of pancreatic ductal system. It can be performed during exploration as intraoperative pancreatography or endoscopic procedure.[15] Endoscopic retrograde pancreatography (ERP) can demonstrate main pancreatic duct (MPD) and its branches and also provides therapeutic intervention resulting in avoiding of unnecessary operation.

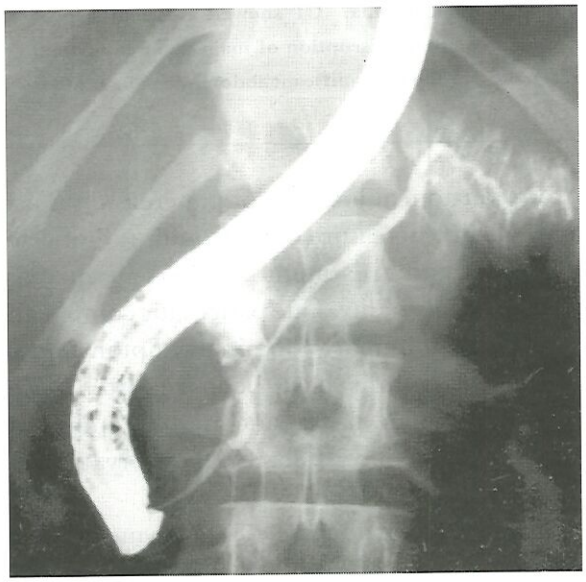


Fig. 1 Partial disruption of MPD, leakage of contrast confined in pancreatic parenchyma without intraperitoneal leakage. Branch duct are well visualization.

Case Report

Case 1 A 20 year old man sustained blunt abdominal trauma from car accident by steering wheel impacted on epigastrium. He developed abdominal pain in 8 hr postinjury and was admitted. On initial evaluation, mild tenderness at epigastrium without sign and symptom of peritonitis was found. Serum amylase at 24 hr postinjury was 1,345 units and ultrasonography showed hematoma at pancreatic head. Conservative treatment was considered by nasogastric intubation and octreotide 100 μg was given subcutaneously every 8 hr. CT performed at 48 hr postinjury revealed disruption of pancreatic head. Because of improvement of abdominal pain and decrease of serum amylase to 237 units on the 4th day postinjury and ERP was performed on the 5th day revealed partial disruption of MPD with contrast accumulated in pancreatic parenchyma (Figure 1), conservative treatment was continued. Patient had good response and was discharged on the 9th day postinjury. No complication was detected during 2 years of follow up.

*Case 2** A 45 year old man sustained blunt abdominal trauma from car accident in early 1997. He was operated at a local hospital, minimal right retroperitoneal hematoma was found. He developed severe abdominal pain which necessitated three hospitalizations during the period of four months after the operation although in each time he responsed to conservative treatment. On the fourth admission, he was transferred to our hospital and presented with signs and symptoms of peritonitis. Exploratory laparotomy was performed and revealed inflammatory mass with matted bowel loop and fluid collection at pancreatic head area and a sump drainage was provided without any additional procedure. Throughout the immediate 10 days postoperative period octreotide 100 μg was given subcutaneously every 8 hr. The patient responsed very well and was discharged on the 11th day. Third and seventh week later, he came back

** This case was previously presented and published in the Proceeding of 6th World Congress of Endoscopic Surgery, June 3-6, 1998. Further follow-up result is presented herein.*

with the same problem. CT showed pancreatic pseudocyst 4×6 cm in size at pancreatic head and ERP revealed complete disruption of MPD with communication to pseudocyst (Figure 2). Transpapillary drainage of pancreatic pseudocyst was successfully performed by placement of distal end of 5F catheter into cystic cavity and proximal catheter tip in duodenum (Figure 3). There was dramatic response of patient after stenting. The stent was left in place for 4 weeks. Very small residual cyst was detected on CT at one year post-injury at the time that this case was presented at the 6th World Congress of Endoscopic Surgery in June 1998 (Figure 4). During the subsequent follow-up, patient had no significant abdominal pain during the 4 years follow-up but his serum amylase remained elevate between 300-500 units. (normal < 200 units). It was until at the last follow-up in early September 2002 that his serum amylase became normal and CT scan showed no further change of the small residual pseudocyst. He remained well and free of pain or other symptoms.

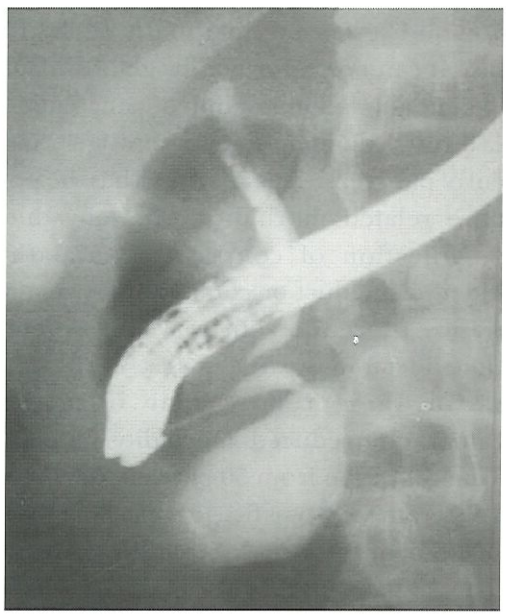


Fig. 2 Complete disruption of MPD with communication of proximal MPD to pancreatic pseudocyst and non-visualization of distal MPD.

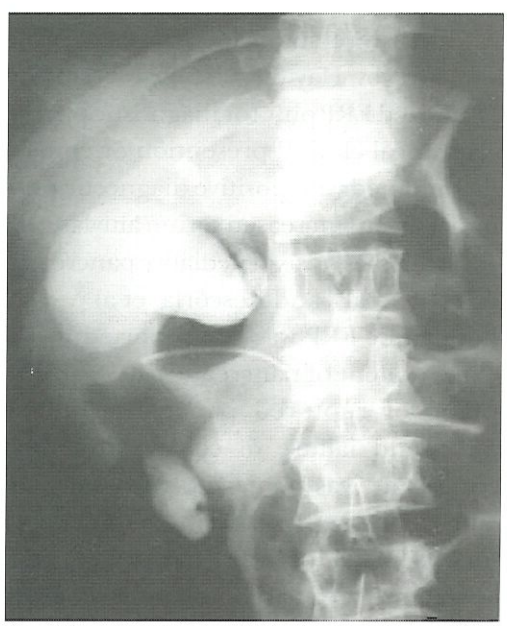


Fig. 3 Transpapillary drainage of pancreatic pseudocyst by placement of distal tip of stent into cystic cavity and proximal tip in duodenum.

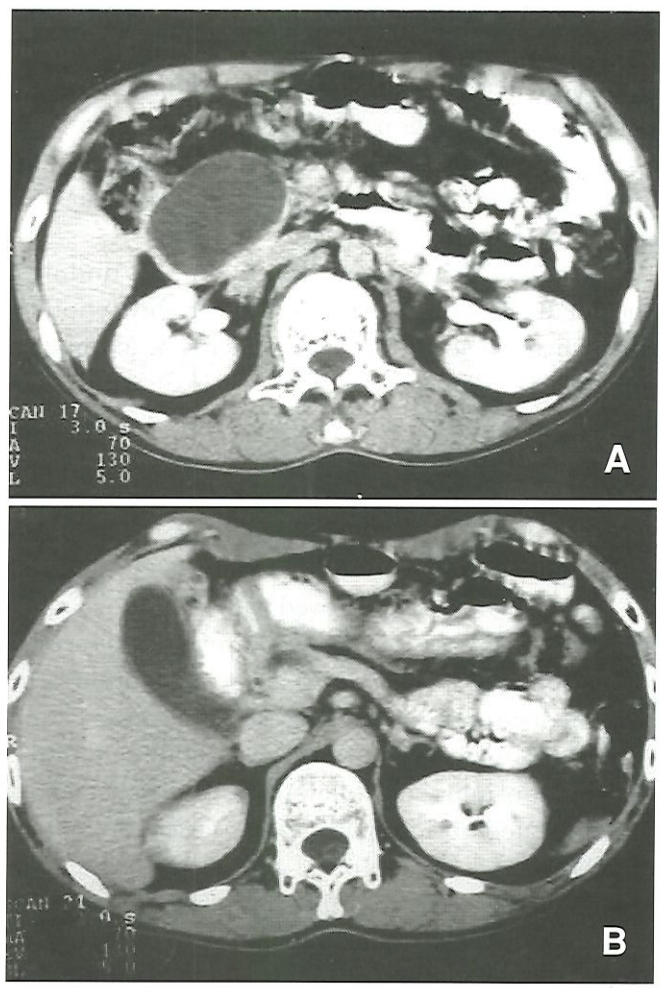


Fig. 4 A. Initial CT revealed a 4x6 cm of pseudocyst at pancreatic head area with thin wall of cyst was observed.
B. CT at one year postinjury revealed small residual pseudocyst with thick wall.

Discussion

Pancreatic injury is relatively uncommon, one surgeon many have little opportunity to gain extensive experience from one institution. Large series of more than one hundred cases might take decades for collection of data. Appropriate diagnosis and treatment are evaluated from cumulative experience of these literatures.[16-18] Therefore classification of injury is essential for comparing of clinical outcome from various centers. It also being used for management guideline and predictor of mortality and morbidity. Many classifications of pancreatic injury have been devised for description of anatomical consideration and severity of injury.[4,19,20] Pancreatic injury scale devised by organ injury scaling committee (OIS)[20] of the American Association for Surgery of Trauma (AAST) suggests the following classification: Grade (I) minor contusion or laceration without ductal injury, Grade (II) major contusion or laceration without ductal injury, Grade (III) distal transection or parenchymal injury with duct injury, Grade (IV) proximal transection or injury involving duct or ampulla, and Grade (V) massive disruption of pancreatic head.

Preoperative scale depends on CT findings. Specific CT findings are transection or disruption or parenchymal laceration. Non-specific findings are pancreatic edema or hematoma, peripancreatic fluid collection, retroperitoneal fluid, fluid in lesser sac, thickening of anterior renal fascia, fluid collection between pancreas and renal vein.[21-24] Kim et al[25] reported 11 cases of CT findings to which they can predict MPD injury in 6 cases. Jeffery et al[14] reviewed CT in 13 cases surgically proved pancreatic duct injury and found two cases of false negative and two cases of false positive. He concluded that CT done within 12 hr or immediate postinjury may have false negative. Patton et al[1] showed that CT findings gave subtle sign in the early phase of injury and follow-up CT at 48 hr postinjury demonstrated obvious pancreatic transection. Wong et al[21] reviewed 10 cases of CT findings of transection or deep laceration more than 50 per cent of parenchymal thickness had duct disruption in 9 cases. Sivit et al[24] studied 18 cases of blunt pancreatic trauma in children and found that CT diagnosed pancreatic injury were confirmed by surgery or autopsy in only 12 cases.

Pancreatic duct injury may be missed during exploration despite meticulous inspection especially in case of delayed operation due to inflammatory reaction from liberation of pancreatic enzymes. Intraoperative pancreatography was introduced since 1976[15] for defining pancreatic duct in patient suspected to have ductal injury which could not be directhy visualized such as parenchymal laceration greater than 50 per cent, central gland perforation, severe gland contusion and suspected duct injury at the head of pancreas. It can be performed by gently injection of contrast material via cannulation of pancreatic duct at ampulla through duodenotomy or through transection of the tail of pancreas. This approach has the potential procedure related morbidity especially duodenal fistula. Injection of contrast material through gallbladder, cystic duct or common bile duct are the less invasive procedure but may not demonstrate pancreatic ductal injury in all cases.[1,3-5] Berni, et al[26] showed in their report that intraoperative pancreatography reduced morbidity of pancreatic related complication from 50 per cent to 15 per cent.

Preoperative ERP was first performed by Gougeon, et al[15] in 1976 for diagnosis of complete disruption of MPD. Thereafter many reports of ERP were performed in pancreatic trauma. Taxier, et al[27] reported 6 cases of ERP in diagnosis of late pancreatic complication before surgical treatment. Laraja et al[28] performed 14 cases of preoperative ERP revealed that ERP had 100 per cent sensitivity and specificity of pancreatic duct rupture which were surgically proven. Subsequent reports of ERP by Hayward[30], Stone[31], Doctor[32] and Harrell[33] utilized ERP only for diagnostic procedure in case of equivocal clinical presention or equivocal CT findings combined with positive diagnostic peritoneal lavage or persistent increased serum amylase. ERP was also reported in diagnosis of pediatric pancreatic ductal injury by Hall, et al[34] and Rescorla, et al[35].

Therapeutic ERP was first reported by Faber, et al[36] in management of pancreatic fistula attributed to overlooking of ruptured pancreatic duct during exploration and failure of conservative treatment. Excellent result was achieved after placement of pancreatic stent, the fistula output stopped within a few hours. Huckeldt, et al[37] performed pancreatic stent for treatment of partial disruption of MPD with satisfactory result. Kim, et al[25] reported a large series of 14 cases of pancreatic duct injury out of 24 cases of ERP for pancreatic trauma. Three cases had branch

duct injury with leakage of contrast confined in pancreatic parenchymal and patients recovered by conservative treatment. Eleven patients had MPD injury in which 8 patients who had contrast leaked into peritoneal cavity were treated by surgery, another 3 patients who had leakage confined in pancreatic parenchymal underwent transpapillary stent insertion with clinical resolution within 3 months but 2 patients developed pseudocyst. Overall mortality of this series was 8.7 per cent and pancreatic related compli-cation was 56.5 per cent.

The first case of this report involved partial disruption of MPD with localized contract material leakage in parenchyma was managed by conservative treatment and octreotide administeration within 12 hr postinjury. Pancreatic endoprosthesis was not performed as reported by other authors.[25,37] Pancreatic exocrine suppression by octreotide might play important role in his recovery. Amirata, et al[38] reported non-pancreatic related complication in patients receiving prophylactic octreotide treatment group of pancreatic trauma. Buchler, et al[39] reported lower pancreatic complication in octreotide-treated group in elective pancreatic resection. In the second case, pseudocyst developed after unrecognized disruption of MPD. Most of pseudocyst resolved within 6 weeks and cyst smaller than 6 cm diameter can be observed for longer period without serious complication.[40] This patient presented with signs and symptoms of peritonitis from leakage of pseudocyst and ERP showed the communication of cyst to MPD. Endoscopic transpapillary drainage was successfully performed. It is most likety that Case 2 obtained good response from endoscopic transpapillary drainage because of its communicating nature of the post traumatic pancreatic pseudocyst. Non-communicationing pseudocyst from pancreatic trauma can be treated by placement of endoprosthesis through endoscopic cystogastrostomy or cystoenterostomy as reported in treatment of pseudocyst caused by alcoholic or idiopathic pancreatitis.[41,42]

Conclusion

Diagnosis of isolated pancreatic trauma is very difficult especially in blunt trauma because of it's anatomical location in the retroperitoneum and no single diagnostic modality is sensitive and specific for pancreatic injury. Combined physical examination, CT findings, serum amylase and diagnostic peritoneal lavage are essential for evaluation. Understanding of limitations and pitfalls of these diagnostic procedure are importance in the determination of optimal treatment or consideration for further diagnostic procedure or further assessment of pancreatic duct injury by ERP. Integrity of pancreatic duct is the most important factor to predict mortality and morbidity. ERP should be done in patient who had stable vital signs and no indication for emergency operation. It is the best procedure for preoperative delineation of pancreatic ductal system. Intact pancreatic duct contributes to the success of conservative treatment or less invasive surgical treatment. ERP also provides therapeutic intervention for pancreatic fistula, pancreatic pseudocyst and partial disruption of MPD with very low procedure related complication and mortality.[43,44] Major disadvantage of ERP is the technical expertise which is usually unavailable in emergency situation.

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