

CASE REPORT

Non-operative management of a grade IV pancreatic injury

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Accepted 3 April 2014

SUMMARY

Isolated pancreatic transection with ductal disruption in blunt abdominal trauma is extremely rare. We report the case of a 14-year-old boy who suffered pancreatic transection at the junction of body and head of the pancreas; yet remarkably recovered after initial conservative management. He was periodically examined clinically and underwent regular abdominal ultrasonography. Nearly 6 months later, endoscopic retrograde cholangiopancreatography with pancreatic duct stenting, pancreatic sphincterotomy and cystogastrostomy for the pseudocyst diagnosed during the follow-up period was performed. Acute surgical management of pancreatic transection is fraught with high mortality and morbidity. Through this effort, we highlight the successful role of non-operative management of a haemodynamically stable patient with grade IV pancreatic injury, thereby avoiding radical surgery in the acute stage and preserving exocrine and endocrine function.

BACKGROUND

Pancreatic injury is a rare but severe complication occurring in 2–5% of blunt abdominal trauma.¹ It is more common following penetrating injury to the abdomen such as gunshot wounds and stab injuries. An isolated pancreatic injury is even rarer, occurring in only 5% of major blunt trauma.² Major vascular injury occurs in up to 35% of all pancreatic injuries.³ Associated vascular injuries are the most common cause of mortality in pancreaticoduodenal injuries. Pancreatic ductal injuries in general are seen in up to 15% of pancreatic injuries.⁴ In majority of cases, pancreatic transection is associated with the injury of other abdominal organs. The two most frequently affected organs are the liver (36%) and the spleen (33.3%).⁵ Hollow organ injuries occur in over 10% of such cases.⁶

Clinical symptoms are often initially subtle, leading to delay in diagnosis, increase in morbidity and mortality of up to 60%.⁷ We describe a 14-year-old boy who sustained a grade IV pancreatic injury according to the Organ Injury Scaling (OIS) Committee by the American Association for the Surgery of Trauma (AAST).⁸

Diagnosis was reached 36 h after traumatic insult. Despite having a near transection of the body of the pancreas, he was treated non-operatively without any major complications. Challenges in diagnosis, mechanism of injury and controversies in management and complications are discussed.

CASE PRESENTATION

A 14-year-old boy was brought to the casualty, 2 days after having sustained a blunt abdominal injury while playing at school. He was initially investigated and managed at a local hospital where the ultrasonography (USG) of the abdomen on the day of injury did not reveal any solid organ injury or any free fluid. Over 36 h after his injury, a contrast-enhanced CT (CECT) of the abdomen revealed a proximal pancreatic transection and the patient was referred to our centre for probable surgery.

On examination, vitals were within normal limits. Icterus was present. Per abdominally, there was mild epigastric tenderness; the rest of the findings were normal. He was admitted to the paediatric intensive care unit for observation. Since he was diagnosed with transection at the proximal body of the pancreas by imaging modalities, measures were undertaken for a possible emergency surgery.

However, he remained stable haemodynamically for 48 h and the CECT of the abdomen showed only a minimal peripancreatic collection with no associated vascular injury or injury to other viscera. An MR cholangiopancreatography (MRCP) carried out on the third day following injury confirmed the abdominal CECT findings, with no further increase in peripancreatic collection. Hence the patient was managed conservatively. He was discharged after a week of careful monitoring of clinical and investigative parameters as mentioned below.

The patient was followed up clinically, biochemically and by serial abdominal USG for a year (fortnightly for the first 2 months, followed by monthly scans for the next 12 months), which revealed the development of a pseudocyst of the pancreas in the second month postinjury which stabilised in size by the fourth month of follow-up.

The patient underwent a repeat MRCP in the fifth month, which showed the pseudocyst communicating with the pancreatic duct. An endoscopic retrograde cholangiopancreatography (ERCP) with pancreatic sphincterotomy, pancreatic duct stenting, endoscopic cystogastrostomy and transgastric stenting of the pseudocyst was performed.

Six weeks after the ERCP procedure, the cystogastrostomy stent was removed while the pancreatic duct stent was removed 12 weeks following it. The patient was followed up as above for a period of 1 year post the initial injury and remained asymptomatic throughout.

INVESTIGATIONS

A panel of blood investigations required for the operation theatre was sent which was within



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To cite: Hiremath B, Hegde N. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-203805

normal limits. However, his initial blood investigations revealed a raised serum amylase of 1279 U/L and serum lipase of 8920 U/L at admission.

The CECT of the abdomen and pelvis (figure 1) carried out 36 h following injury, showed transection at the proximal body of pancreas. Rest of the pancreas appeared bulky with a minimal peripancreatic collection. However, the pancreatic duct could not be identified. No other organ injuries or vascular injuries were seen.

An MRCP (figure 2) was carried out on the third day which confirmed the pancreatic transection at the body–neck junction with an intrapancreatic collection at the site of the transection measuring 25×16 mm with fluid seen extending to the suprapancreatic region with a volume of 12 cc. The pancreatic duct could not be identified.

Serial USG of the abdomen on follow-up showed a gradually increasing pseudocyst form over the next few months, eventually reaching a size of 9.6×7.0×7.4 cm (volume 260 cc) at 4 months postinjury. Most of the pancreas was of normal echotexture except for a bulky head and proximal body of pancreas. However this too appeared to be resolving on later scans following the cystogastrostomy and pancreatic duct stenting.

Five months after the injury, a repeat MRCP (figure 3) confirmed the remnant thin-walled large pseudocyst, 9.6×7.6×7.5 cm in size, displacing the stomach anteriorly to the left. Pancreatic duct in the distal body and tail of the pancreas was mildly dilated with an abrupt cut-off of the duct in the proximal body at the inferior margin of the cyst. It also showed the communication between the pancreatic duct and the pseudocyst.

Serial serum amylase and lipase which were at first grossly elevated (1279 and 8920 U/L, respectively) showed a steady fall in levels remaining only mildly elevated above the normal at the end of the 1-year follow-up period.

At no point during the course of treatment and follow-up did the patient have any derangement of glucose metabolism or exocrine insufficiency.

TREATMENT

A conservative wait and watch approach was adopted initially with serial clinical examinations and monitoring of serum amylase and lipase levels as well as abdominal USG during the follow-up period. In the second month postinjury, he developed a pseudocyst, which increased in size gradually and stabilised after 4 months, showing no signs of spontaneous regression.

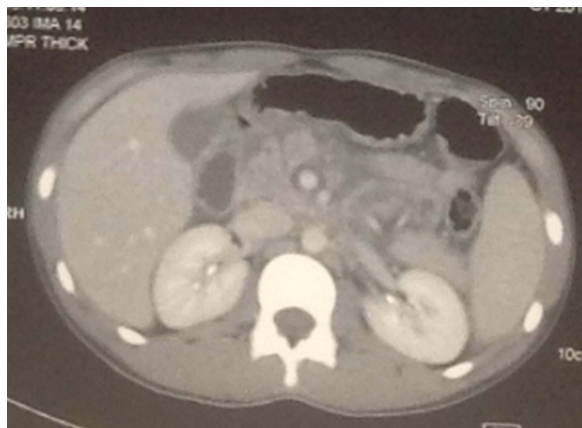


Figure 1 Contrast-enhanced CT of the abdomen with intravenous contrast showing the proximally transected pancreas.

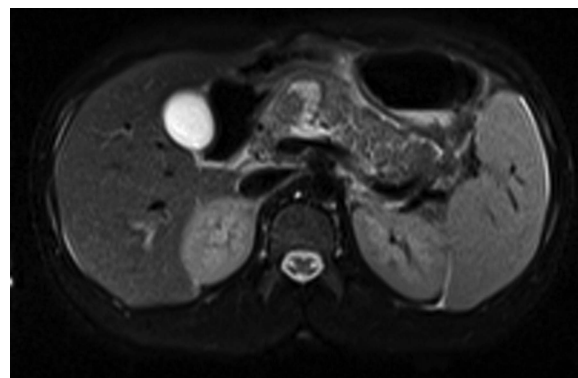


Figure 2 MRI of the abdomen (prior to MR cholangiopancreatography reconstruction) showing the proximally transected pancreas (grade IV pancreatic injury).

Biochemical parameters such as serum amylase and lipase were elevated but gradually resolving.

Ultimately, 5 months after the injury, the patient again underwent an MRCP, which showed a communication between the pancreatic duct and the pseudocyst. Hence an ERCP with pancreatic sphincterotomy, pancreatic duct stenting, endoscopic cystogastrostomy and transgastric stenting of the pseudocyst was performed.

OUTCOME AND FOLLOW-UP

The patient was followed up clinically, biochemically and sonologically for a year (USG of the abdomen fortnightly in the first 2 months followed by monthly scans for the next 12 months).

Post-stenting, he had mild fever for 2 days and was treated with antibiotics. A repeat USG of the abdomen a month after the pancreatic duct stenting and endoscopic cystogastrostomy showed only a bulky head and proximal body of the pancreas with no signs of the pseudocyst. The final USG of the abdomen at 1-year postinjury showed the pancreas with normal echotexture and no evidence of pancreatitis, peripancreatic collection or recurrence of pseudocyst.

A year after his injury, the patient is symptomless with no complications.

DISCUSSION

Isolated traumatic pancreatic injury is rare, occurring in only 5% of major blunt abdominal trauma.² Pancreatic transection in isolation is more commonly seen in the paediatric age group. Injury to the pancreas is most often caused by compression of

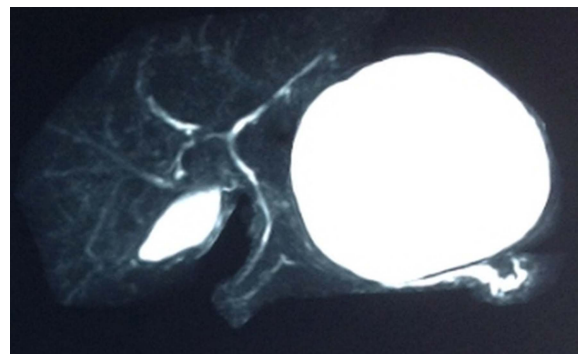


Figure 3 Repeat MR cholangiopancreatography, 5 months after the injury suggestive of pancreatic pseudocyst communicating with the main pancreatic duct. The abrupt cut-off of the duct in the proximal body of the pancreas are also seen.

the gland against the lumbar vertebrae. Bicycle handlebars or a misplaced seat belt placed across the abdomen are typical causes of this type of injury. In our patient it occurred secondary to receiving a kick to the abdomen. In the paediatric literature, the incidence of pancreatic injury from children sustaining blunt abdominal trauma is 2–9% and pancreatic transection is reported to be less than 0.5%.⁹ Ductal injuries in children are seen in 0.12–0.3% of all paediatric trauma.¹⁰

Isolated pancreatic injury though uncommon is fraught with high levels of morbidity or mortality especially if the injuries are grade III and higher. The clinical diagnosis may be delayed or missed because the initial signs and symptoms of pancreatic injury such as moderate epigastric or back pain and mild tenderness in the epigastrium on examination are subtle and non-specific. In the majority of cases, no or very minor symptoms appear following isolated injury. Even these are noticed usually after a 24 h complete pain-free period. It is important not to be misled by the mechanism of the injury, however minor it may seem. Even low-energy trauma is capable of causing serious internal injury, including pancreatic rupture. A high index of suspicion along with accurate imaging modalities such as CECT of the abdomen and MRCP in a haemodynamically stable patient helps in diagnosis and deciding management.

The role of serum markers such as amylase and lipase in the evaluation and management of pancreatic injury is indeed controversial. Elevated serum amylase and lipase are common with pancreatic injuries but not pathognomonic, nor is the degree of elevation of these enzymes necessarily indicative of the extent of injury.⁹ Elevated amylase values are in fact present in a third of all blunt abdominal trauma cases without pancreatic injury.² Serial monitoring of enzyme values proves more effective. If constant elevation or continuous high values are present pancreatic injury is probable.¹ In our patient, the high initial serum amylase and lipase values gradually decreased over the length of the follow-up period indicating resolution of the earlier injury-induced pancreatitis.

Following blunt abdominal trauma, haemodynamically stable patients with CT of the abdomen showing no evidence of pancreatic parenchymal fracture, parenchymal haematoma, parenchymal oedema, fluid in the lesser sac or retroperitoneal haematoma may be treated conservatively but must be observed for at least 72 h before they can be cleared of pancreatic injury. Any such patient who continues to have abdominal pain or develops symptoms suggestive of pancreatic injury should be reassessed for pancreatic injury and possible operative management.

While USG of the abdomen and focused assessment with sonography in trauma may be used especially in haemodynamically unstable patients, CECT of the abdomen is an extremely safe and more accurate imaging modality for pancreatic parenchymal injuries. Its sensitivity in detecting pancreatic injury is around 80%. Initial CT of the abdomen can miss up to a third of pancreatic injuries, especially ductal injuries, which may be seen on follow-up imaging after 12–24 h.¹¹ By that time, soft tissue changes appear, oedema and fluid development leads to sufficient tissue disruption and separation of transected edges.⁹

In our patient, while CECT of the abdomen visualised the injured pancreas, with no evidence of associated vascular and other visceral injuries, the ductal status could only be made out at the time of repeat MRCP. USG of the abdomen was used for monitoring purpose especially to look for regression or progression of the pseudocyst that formed.

The status of the pancreatic duct is best known through MRCP and ERCP.¹² While MRCP provides a non-invasive, highly accurate account of ductal involvement, ERCP can also

be used as a therapeutic means as in our case for pancreatic ductal stenting and endoscopic cystogastrostomy. At the initial admission in our patient, ERCP to know the status of the duct was contemplated but deferred because of the possibility of introducing ascending infection.

In grade IV injuries, while multiple procedures, such as closed suction drainage and distal resection, may be performed, ideal surgical treatment is to preserve the viable pancreatic tissue. This is accomplished by closing off the proximal ductal stump with sutures or a stapler and preserving the distal part by anastomosing it to the stomach or jejunum thereby preserving the endocrine function. The spleen is not necessarily removed, especially in children. The integrity of the pancreatic duct has been suggested to be an important factor for determining the method of treatment and prognostication.¹³ In the absence of ductal disruption and depending on the clinical condition, a non-operative conservative course of management can be pursued in pancreatic trauma with proper monitoring of parameters.

Conservative management includes rehydration, correction of electrolyte imbalances, proper nutrition, nasogastric tube drainage in cases of vomiting and analgesia. Preventive antibiotic therapy and octreotide are advocated.¹⁴ The latter enhances healing and also promotes early drain removal in surgically managed cases and is also used in case of complications such as high output pancreatic fistulas.

Even with pancreatic ductal injuries, endoscopic pancreatic sphincterotomy, stenting and drainage yield favourable results. Normal diet can be resumed as soon as symptomatic recovery occurs, also minimising the hospital stay.

Major complications include pseudocysts (9%), fistulas (4%), intra-abdominal abscesses (6%) and post-traumatic pancreatitis (15%).¹⁵ Among cases such as ours, treated by non-surgical measures, a pseudocyst is one of the commonest sequelae. If the pancreatic duct is not injured, most pseudocysts resolve spontaneously. In our case since the duct was disrupted and indeed communicating with the pseudocyst, a cystogastrostomy and pancreatic duct stenting was required. The other long-term complication was that of injury-induced chronic pancreatitis indicated by the bulky head and proximal body of pancreas visualised on the initial follow-up USG of the abdomen. This showed gradual resolution radiologically and biochemically over the course of the follow-up period. The patient was asymptomatic throughout follow-up.

A trial of non-operative treatment may be considered even in more severe injuries such as isolated grade IV injuries as long as the patient is haemodynamically stable, imaging modalities show no vascular injury and there are facilities for accurate monitoring and for emergency exploration if required. This prevents the unnecessary surgical intervention and its associated morbidity and mortality in the acute stage.

Learning points

- ▶ In any case of blunt trauma to the abdomen, pain in the epigastrium, radiating to the back, a high index of suspicion should be exercised to rule out possible pancreatic injury.
- ▶ Non-operative management is possible even in selected patients with grade IV pancreatic injury who are haemodynamically stable and have no associated injuries.
- ▶ Stringent follow-up of these patients is necessary for at least 6 months postinjury to detect early and late sequelae.

Contributors BH worked up and treated the patient. NH collected and analysed the case data and compiled the case report along with BH.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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