Fracture of the pancreas in two patients after a go-kart accident

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Background

After blunt abdominal trauma, an isolated injury to the pancreatic duct is uncommon. Physical signs and laboratory parameters are often inaccurate, and missing this diagnosis can cause serious clinical problems.

Case outlines

Two young women (aged 18 and 20 years) are reported who sustained isolated trauma to the pancreatic duct in go-kart accidents. Each patient sustained a fracture of the pancreas. This injury was diagnosed only after a period of clinical observation with repeated laboratory parameters, ultrasound and CT scan. Pancreatic tissue was conserved by performing a pancreaticojejunostomy.

Discussion

After any episode of blunt abdominal trauma, isolated injury to the pancreatic duct should be considered. Serum analysis, ultrasonography and CT scanning can be helpful in early diagnosis. Preservation of pancreatic tissue can be achieved with a good clinical outcome.

Keywords

pancreatic trauma, pancreaticojejunostomy

Introduction

The diagnosis and management of pancreatic injury after blunt abdominal trauma are notoriously difficult [1]. First, the injury is uncommon, occurring in 0.4 per 100 000 population [2] or 1 per 250 000 hospital admissions [3]. Secondly, a combined morbidity and mortality rate of 50% has been reported [4]. Thirdly, physical signs are often absent and laboratory parameters such as serum amylase are inaccurate for diagnosis [3,5,6]. There is a role for computed tomography (CT) in showing structural alterations to the gland and for endoscopic retrograde pancreatography in showing rupture of the main pancreatic duct (MPD) [7].

We report two almost identical patients who demonstrate these problems in the diagnosis and treatment of injuries sustained in the same manner (in go-kart accidents). Ultrasound scanning and CT with 3D reconstruction were helpful in the early diagnosis of severe pancreatic trauma, leading to successful operative treatment with preservation of pancreatic tissue.

Case reports

Case 1

A 20-year-old woman was admitted with pain in the upper abdomen after blunt abdominal trauma inflicted by the steering wheel of a go-kart. On admission, the patient was stable and showed no signs of peritonitis. The serum amylase level was 186 U/L (normal<161 U/L), and the white blood cell count (WBC) was 9.6×10^9/L. The initial ultrasound scan revealed no abnormalities. During observation in the surgical ward, the abdominal pain progressed and the serum amylase level had increased to 3290 U/L at 24 h with a WBC of 16.3×10^9/L. A second ultrasound scan now showed signs of a fracture of the pancreas, which was confirmed by CT scan and 3D reconstruction. At laparotomy 48 h after the injury, a fracture of the pancreas was seen at the level of the spine. The proximal part of the pancreas was closed with a running suture, and pancreaticojejunostomy was performed to the distal part of the pancreas using a Roux-en-Y jejunal loop.

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The patient developed postoperative fever, and CT scan showed a minor fluid collection, which was treated conservatively. Thereafter, she settled and left the hospital 23 days after admission.

Case 2

Two weeks after the first case, an 18-year-old woman was admitted with an almost identical history of blunt abdominal trauma after a go-kart accident. On admission, she had minimal abdominal pain; vital signs were stable and there were no signs of peritonitis. Serum amylase was 374 U/L and WBC 7.2×109/L. Ultrasound scan revealed no abnormalities. Again, because of progression of the abdominal pain in hospital and a rise in serum amylase (to 1194 U/L), a second ultrasound was performed after 17 h (Figure 1) and showed signs of a pancreatic fracture, which was then confirmed by CT scan and 3D reconstruction (Figures 2 and 3). At laparotomy, a complete fracture of the pancreas was seen at the level of the spine (Figure 4), and the same type of drainage procedure was performed. The patient recovered without any complications, and she was discharged 7 days after admission.

Discussion

These two case reports show that the diagnosis of a pancreatic fracture can be difficult at first. Trauma to the pancreas is not common, and isolated pancreatic trauma is even less common [4,8-10]. In 50-98% of pancreatic trauma cases, there are associated injuries to other organs [2,3,11], but neither of our patients had any associated injury. In each patient the symptoms were minor. The first patient was persuaded by friends to go to hospital, and the second patient attended because of minor abdominal pain. In both patients, the pattern was one of slight pain on admission becoming worse over the succeeding 24 h; neither showed clinical signs of peritonitis.

Figure 1. *Ultrasound scan (case 2) showing a fracture of the pancreas. The arrow indicates the splenic vein.*

Figure 2. *Contrast-enhanced spiral CT (case 2). The black arrow indicates the splenic vein and the white arrow indicates the disrupted pancreas.*

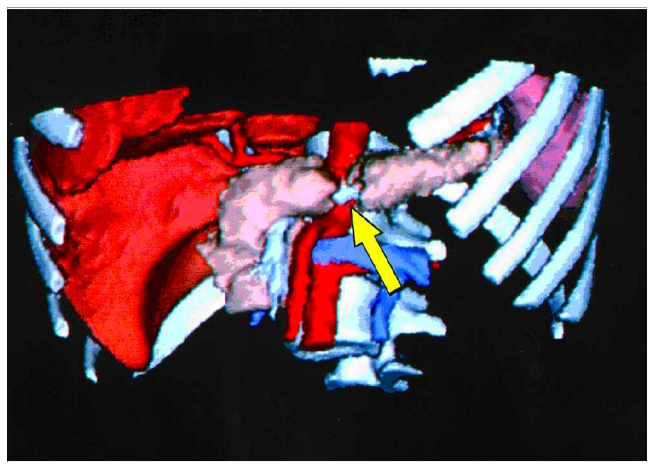

Figure 3. *Three-dimensional CT using a surface-rendering technique (case 2). The arrow indicates the splenic vein seen through the fracture.*

In patients with multiple organ involvement, prompt surgical intervention is usually undertaken, and an associated pancreas rupture is diagnosed during laparotomy (although even complete fracture of the pancreas can be missed). Especially in those with isolated pancreatic trauma, delay in diagnosis and exploration can occur because the patient is stable, and there seems to be no indication for urgent laparotomy [3]. It is the retroperitoneal location of the organ that makes the diagnosis of pancreatic injury so difficult and muffles the clinical features of peritonitis, causing a delay [11]. Even patients with complete ductal transection can reportedly be asymptomatic for months [12-14]. Serum amylase levels are neither specific nor

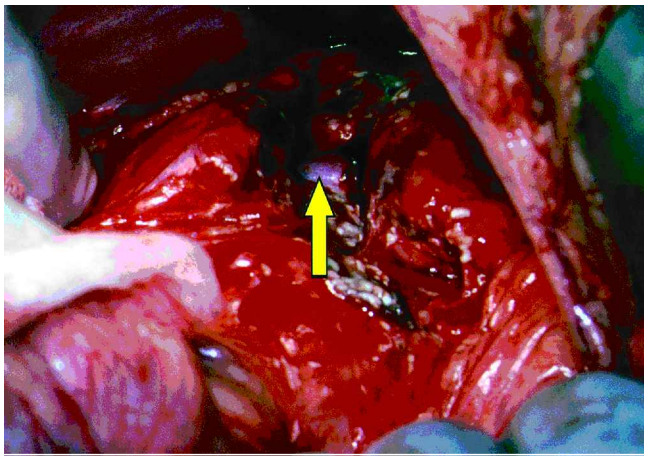

Figure 4. *Fracture of the pancreas shown at laparotomy (case 2). The arrow indicates the splenic vein seen through the fractured pancreas.*

sensitive [3,4,6,15,16], though in the present cases the rising values from initial normality were very helpful.

Ultrasound scan is routinely used at present in many accident and emergency departments and is useful for the detection of free intraperitoneal fluid or a large haematoma, but its ability to show a specific injury to the pancreatic duct is limited [5]. The accuracy of CT in diagnosing trauma to the pancreas is lower than for other injured abdominal viscera [17]. The sensitivity of CT for diagnosing all grades of pancreatic injury is acceptable (71.4%), but its accuracy in detecting major ductal injury is low [3,10]. Others state that CT and ERCP are both necessary tools in diagnosing the pancreatic fractures [7,18,19]. Magnetic resonance pancreatography is being used with increasing frequency as an alternative to ERCP [20]. In both our cases the initial ultrasound scans showed no evidence of pancreatic fracture, but repeat scans indicated the possible fractures, which were then confirmed by CT. ERCP was not performed because the complete transection was apparent with non-invasive imaging.

It is clear that an injury to the pancreatic ductal system is the main cause of morbidity in this type of injury [3,14,21,22]. The decision to undertake laparotomy can be difficult when isolated pancreatic injury is suspected, but evidence of complete transection makes it easy (as in our patients). The choice of operative procedure in each case was pancreaticojejunostomy with a Roux-en-Y reconstruction. This is a good option when there is concern about the function of the residual pancreatic tissue, especially if the resection would include more than 80% of the gland [4,23]. The alternative is distal pancreatectomy. When grade I or II pancreatic injury is found at laparotomy (i.e. the MPD is intact), drainage of the omental bursa should be sufficient. ERCP is proposed in patients in whom disruption of the MPD is suspected but not seen on CT or ultrasound scanning [3]. Endoscopic stenting of the disrupted MPD is described in some small series [24-26], but we do not have experience with (acute) endoscopic stenting of the disrupted MPD.

In conclusion, we stress the importance of suspecting a possible injury to the pancreatic duct after blunt abdominal trauma. In patients with multiple abdominal injuries, the possibility of pancreatic injury should not be overlooked, and the organ should be inspected at laparotomy. When laparotomy is not required immediately, one can observe the patient and repeat the estimation of serum amylase. The use of modern contrast-enhanced CT with or without 3D reconstruction can clinch the diagnosis, but if the diagnosis is still uncertain, emergency ERCP is advocated [3,7,18]. At laparotomy, therefore, one should not hesitate to visualise the pancreas, especially in the presence of injuries to other organs.

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