The management of multi-site, bleeding, visceral artery pseudoaneurysms, secondary to necrotising pancreatitis

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ABSTRACT

We present the case of a 45-year-old man, who presented to his local casualty department with severe epigastric pain following an alcohol binge, and was subsequently diagnosed with acute pancreatitis. Pancreatic necrosis with multiple collections ensued, necessitating transfer to an intensive care unit (ITU) in a tertiary hepatopancreaticobiliary centre. Initially, the patient appeared to slowly improve and was discharged to the ward, albeit following a prolonged ITU admission. However, during his subsequent recovery, he suffered multiple episodes of haematemesis and melaena associated with haemodynamic instability and requiring repeat admission to the ITU. Computerised tomographic angiography, followed by visceral angiography, was used to confirm the diagnosis of multisite visceral artery pseudoaneurysms, secondary to severe, necrotising pancreatitis. Pseudoaneurysms of the splenic, left colic and gastroduodenal arteries were sequentially, and successfully, radiologically embolised over a period of 9 days. Subsequent sequelae of radiological embolisation included a clinically insignificant splenic infarct, and a left colonic infarction associated with subsequent enterocutaneous fistula formation. The patient made a prolonged, but successful, recovery and was discharged from hospital after 260 days as an in-patient. This case illustrates the rare complication of three separate pseudoaneurysms, secondary to acute pancreatitis, successfully managed radiologically in the same patient. This case also highlights the necessity for multidisciplinary involvement in the management of pseudoaneurysms, an approach that is often most successfully achieved in a tertiary setting.

KEYWORDS

Pseudoaneurysm – Acute pancreatitis – Radiology

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Pancreatitis is a common condition with an increasing incidence, but a mortality rate that has not significantly decreased since the 1970s.¹ Bleeding from visceral artery pseudoaneurysms is a rare, but potentially lethal, complication, occurring in less than 2% of cases of chronic pancreatitis,² and even less frequently following acute pancreatitis and pancreatic surgery.³ It can lead to massive haemorrhage into the gastrointestinal tract or peritoneal cavity, and results in death in 20–40% of cases.^{3–5}

Case report

Local management

BM, a 45-year-old man, presented to his local casualty department with severe epigastric pain following signifi-

cant alcohol consumption. Epigastric tenderness was elicited on abdominal examination and blood results revealed significantly raised serum amylase, white cell count (WCC) and C-reactive protein (CRP) levels, associated with haemoconcentration (raised mean corpuscular volume and haemoglobin [Hb] levels) and decreased serum calcium. He was subsequently diagnosed with acute pancreatitis, and the diagnosis confirmed on computed tomography (CT).

During the following 24 h, BM's respiratory function deteriorated and arterial blood gas analysis revealed a severe acidosis. He was transferred to a high dependency unit and continuous positive airways pressure, broad-spectrum antibiotics and total parenteral nutrition (TPN) commenced. His hypoxia continued to worsen however and he was endotracheally intubated and admitted to the intensive

Figure 1. Plain angiographic images showing embolisation of the left colic artery.

Figure 2. Plain angiographic images showing embolisation of the gastroduodenal artery, with preservation of the marginal artery.

care unit (ITU) on the second day post-admission. By the end of the first week, CT images had progressed to reveal bilateral pleural effusions and necrosis of the pancreatic head and body.

On the 25th day post-presentation, clinical deterioration was associated with elevations in WCC and CRP levels, together with increased inotrope and ventilatory requirements. A CT scan revealed a large peripancreatic collection, into which a radiologically-guided drain was placed. Over the following days, BM gradually improved and he was discharged to the ward on the 37th day post-presentation.

A CT scan 1 week following ward discharge revealed a further abdominal collection in the anterior pararenal space, into which a further radiologically-guided drain was placed. CT images now revealed that pancreatic necrosis (approximately 20%) had led to complete separation of the proximal and distal pancreas. BM was referred to, and accepted by, the regional pancreatic unit.

Tertiary management

Upon arrival at the tertiary unit (48 days' post-presentation), CT scanning revealed that the intraperitoneal collections had extended to envelop the descending colon. A further radiologically-guided drain was, therefore, inserted and a regimen of regular drain aspiration commenced. TPN and antimicrobial therapy were continued and on the 75th day post-presentation, enteral nutrition was introduced.

However, during the evening of the 96th day post-presentation, BM developed sudden abdominal pain and distension, associated with haematemesis and the passage of fresh blood per rectum. Frank blood was also noted in the abdominal drains. Clinical review revealed tachycardia and

tachypnoea, and blood results showed haemoglobin levels of 6.9 g/dl. BM appeared to settle spontaneously following urgent blood transfusion, with no further haematemesis or melaena throughout that night. However, BM remained tachycardic, with a tender, distended abdomen and blood results the next morning revealed haemoglobin of 8.0 g/dl despite significant transfusion. Subsequent CT scanning demonstrated a significantly increased amount of free fluid in the pelvis and abdomen, and a small focus of high attenuation, representing a potential bleeding focus, in the territory of the superior mesenteric artery. A mesenteric angiogram was arranged to investigate these findings further, but was unavailable until the next day.

By the time of ward review on the following day (third day after bleeding onset), further melaena had led to clinical deterioration, decreased haemoglobin (5.2 g/dl), dysfibrinogenaemia and consumptive thrombocytopenia. Fresh frozen plasma, platelets and packed cells were all transfused, but significant tachycardia and acidosis remained. BM's Glasgow Coma Score soon deteriorated to 11/15 (E4/V2/M5) and he was endotracheally-intubated. Mesenteric angiogram, now on an emergency basis, revealed two previously unsuspected and interconnecting splenic artery pseudoaneurysms. The vascular abnormalities were successfully coiled to exclusion and BM was transferred directly to ITU.

The next morning (fourth day after initial bleed), further per rectal bleeding was noted. Repeat mesenteric angiogram allowed successful deployment of two coils into a bleeding left colic artery pseudoaneurysm (Fig. 1). Despite this, however, BM continued to pass rectal blood throughout the day. An additional urgent angiogram was

arranged but revealed no abnormality. Further blood replacement products were administered and, over the next 24 h, BM's per rectal haemorrhage slowed and eventually settled.

Four days later (9 days post initial haemorrhage), a further rectal haemorrhage, associated with haemodynamic instability, occurred. A mesenteric angiogram revealed a haemorrhagic focus in the gastroduodenal artery, which was successfully embolised (Fig. 2).

Following the third embolisation, all haemorrhagic episodes gradually ceased, haemoglobin levels stabilised and respiratory and cardiovascular supports were slowly weaned.

On the 106th day, cellulitis was noted to be spreading from a focus around the left-sided drain. A routine CT scan revealed a large subcutaneous abscess extending from beneath the left-sided drain to connect with the perirenal space. The abscess was debrided and washed out at the bedside on the ITU. Over the next few days, faeculent material began to drain from the wound, gradually increasing to > 2 l/day. A diagnosis of left colonic enterocutaneous fistula was reached, daily wound lavage commenced and TPN re-initiated. Methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococci* (VRE) were subsequently cultured from the wound effluent and treated as per microbiology advice.

BM was discharged to the pancreatic ward on the 153rd day post-presentation. A routine CT scan later that week revealed large anterior and right-sided collections requiring further drain insertion, a splenic infarction secondary to embolisation, and a small abscess cavity in what remained of the pancreatic tail.

BM's general condition was much improved by the 235th day; however, he still required intravenous/intramuscular analgesia for chronic abdominal pain. A referral to the pain team was arranged and subsequent blockage of both the ilio-inguinal nerve and left lateral cutaneous nerve of the thigh, had good effect.

BM was discharged on the 260th day post-presentation, with generalised weakness and poor mobility, secondary to his prolonged ITU stay and nutritional depletion. CT scanning prior to discharge revealed minor enhancement of the pancreatic head and a small amount of pancreatic tail (containing stones), but complete loss of the remaining pancreatic parenchyma.

Discussion

This patient demonstrates the rare complication of multiple, bleeding, visceral artery pseudoaneurysms, secondary to acute pancreatitis, as well as other sequelae of pancreatic inflammation, including intra-abdominal sepsis and multi-organ failure. The potential ischaemic complications

of radiological embolisation are also clearly illustrated in the form of splenic infarction and enterocutaneous fistula.

Our centre has developed specific protocols for the management of acute pancreatitis, including the utilisation of CT scanning within the first 48 h of admission, via a specific radiological protocol; and a universal, non-operative approach to the management of pancreatic necrosis, even in the presence of super-infection. Patients with pancreatic necrosis are, therefore, managed expectantly; peripancreatic collections are percutaneously drained under radiological guidance and then regularly aspirated on the ward, and antibiotics are utilised only when infection has been confirmed microbiologically via blood or drain-fluid cultures. In extremely unwell patients, selected percutaneous necrosectomy is considered.

Our approach to antibiotic utilisation was instigated as a response to a failure of studies thus far to demonstrate definitively a beneficial outcome following the use of prophylactic antibiotics in pancreatic necrosis.⁶ However, although patient outcome is worse when sterile pancreatic necrosis is operated upon,⁷ many centres would advocate debridement for confirmed, infected, pancreatic necrosis,⁸ and thus deviate from our largely, non-operative approach. In this instance, however, positive microbial cultures were not grown from blood or drain effluent until after the onset of enterocutaneous fistula (114th day post-presentation) – although a possible reason for this is the commencement of antibiotic therapy at a very early stage (second day following presentation).

Enteral nutrition is associated with superior cost-effectiveness and reductions in infectious morbidity and length of stay in acute pancreatitis.^{7,9} Nasojejunal nutrition is, therefore, utilised as the route of choice in our centre, in order to avoid delays in gastric emptying that can occur when nasogastric feeding is employed. TPN is only utilised where it has not been possible to establish a route of enteral nutrition, or if other, standard indications for parenteral nutrition exist, such as enterocutaneous fistula (as here), paralytic ileus or duodenal outlet obstruction.

There are few large series describing the management of pseudoaneurysms secondary to pancreatic inflammation. Some studies have shown that percutaneous angiographic embolisation techniques carry a similar mortality rate to operative strategies, thus reflecting the multisystem involvement of pancreatic disease.^{2,3,5} However, other authors have shown that radiological embolisation strategies are associated with a decreased incidence of blood transfusion and length of hospital stay,² as well as lower re-bleed and mortality rates.¹¹ Radiographic embolisation, therefore, remains the mainstay of treatment in our centre. Following failed embolisation, urgent haemostatic surgical intervention is necessary, for ligation/repair of bleeding vessels in proximity to the head of the pancreas, and distal

pancreatic resection in patients with splenic artery (or its branches) bleeding.²

Mesenteric angiography successfully localises bleeding foci in > 80% of cases of visceral artery pseudoaneurysm,^{2,10,11} and is associated with a low complication rate.¹⁰ Radiological embolisation achieves definitive haemostasis in 80–95% of cases,^{2,3,5,10} and is associated with an improved outcome when early recognition and prompt exclusion takes place.⁴ However, re-bleeding from known pseudoaneurysms and development of further vascular abnormalities can occur, as in this case, mandating careful clinical follow-up and repeat angiography as necessary.⁵ Splenic artery occlusion can lead to postembolisation syndrome and infarction in up to 30%.¹² However, significant complications of embolisation, such as enterocutaneous fistula seen here, are rare.

Conclusions

This case illustrates that the management of severe, acute pancreatitis often requires a multidisciplinary approach and for this reason is often most successfully managed in a tertiary setting. No definitive guidelines exist for the precise indications and timing of tertiary transfer, but all patients requiring intervention or those with potentially life-threatening complications, should be at least discussed with the regional pancreatic centre and also transferred if stable.

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