CASE REPORT

Pancreaticoaerospheric fistula following severe acute necrotising pancreatitis

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SUMMARY

Severe acute necrotising pancreatitis is associated with numerous local and systemic complications. Abdominal compartment syndrome requiring urgent decompressive laparotomy is a potential complication of this disease process and is associated with increased morbidity and mortality. We describe the case of a pancreaticoaerospheric fistula following decompressive laparotomy in a patient with severe acute necrotising pancreatitis. While this fistula was managed successfully using the current standard of care for pancreatic fistulas, the wound care for in this patient with drainage of the fistula through an open abdomen, is a significant challenge.

BACKGROUND

Severe acute necrotising pancreatitis (SANP) is associated with numerous complications including local (infected necrosis, haemorrhagic transformation, fistula formation) and systemic (inflammatory response syndrome, acute respiratory distress syndrome, metabolic disturbances and acute renal failure).¹ In this context, pancreatic fistulas which result from a disrupted pancreatic duct, may occur after a surgical intervention such as necrosectomy and can be categorised as internal or external (exteriorising to the skin). This complication in itself is known to have significant associated morbidity and mortality, which parallels the mortality of SANP alone.²⁻³ In the context of aggressive fluid resuscitation and concomitant intra-abdominal process, surgical decompressive laparotomy with temporary abdominal closure for abdominal compartment syndrome may further compromise patient outcomes by increasing infectious complications and metabolic derangements.⁴ We discuss here the development and subsequent management of a pancreaticoaerospheric fistula (pancreatic fistula exteriorising to an open abdomen), a clinical entity not previously described, which may occur after severe acute necrotising pancreatitis managed with an open abdomen for compartment syndrome.

CASE PRESENTATION

A 67-year-old man, known for obesity, was admitted to the intensive care unit with severe acute necrotising gallstone pancreatitis. Following aggressive resuscitation, he rapidly developed an abdominal compartment syndrome requiring an urgent decompressive laparotomy with a temporary abdominal closure. The patient stayed in the intensive care unit and underwent serial abdominal washouts and dressing changes for his open abdomen. One week after admission, he underwent

a cholecystectomy and the abdominal wound was covered with a vicryl mesh and a vacuum-assisted closure, as primary closure was impossible. Three weeks postoperatively, the mesh had dissolved and significant drainage of fluid was noted from the open abdomen.

INVESTIGATIONS

At this time, the patient did not exhibit any signs of sepsis and had a normal serum amylase (28 U/L) and no evidence of leucocytosis (white cell count $6.00 \times 10^9/L$). After analysis of the fluid, it was found to be of pancreatic origin, with amylase and lipase levels of 28 703 and 16 625 U/L, respectively; this confirmed the presence of a pancreatic disruption communicating to the open abdomen. A MR pancreatography subsequently reported extensive pancreatic necrosis, without visualisation of the pancreatic duct. The fistula tract was identified, originating in a 4.8 cm collection located at the level of the body of the pancreas, and extending to the open abdomen (figure 1).

The patient underwent endoscopic retrograde cholangiopancreatography (ERCP) and a pancreatic duct stent was inserted through the ampulla into the pancreatic necrosis.

TREATMENT

This 'pancreatic-atmospheric fistula' was managed using the current standard of care for pancreatic fistulas, as well as pancreatic duct stenting and octreotide. Given the drainage of pancreatic fluid through the open abdomen, the local wound care was an added challenge as the pancreatic fluid was initially difficult to control and therefore prolonged the formation of granulation tissue. The stent and octreotide likely decreased fluid output through the open

Figure 1 MR pancreatography demonstrating fistula tract (arrow) from pancreatic collection to the open abdomen.

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abdomen and eventually, the drainage decreased significantly, allowing for the open abdomen to granulate completely (figure 2). The wound was then skin grafted. The remaining fistula drainage was contained using closed suction drainage into the fistula tract to protect the fresh graft. The graft had approximately 50–75% take, as it was likely contaminated by pancreatic fluid. Subsequent grafting was successful to the edge of the fistula once improved local fistula control was attained. Once the graft healed around the fistula site, a stoma appliance was used to protect the surrounding skin. The fistula output subsequently decreased to minimal drainage.

OUTCOME AND FOLLOW-UP

The patient remained ventilator-dependant in the intensive care unit for a period of 7 months, which included multiples episodes of pneumonia sepsis. He gradually improved until he was weaned off the ventilator, at which point he was transferred to the ward. Ten months after his initial admission, he was discharged to a rehabilitation centre with the pancreaticoatmospheric fistula completely healed.

DISCUSSION

This case describes an unusual complication that occurred after a relatively common acute surgical disease. In fact, pancreatic fistulas complicate necrotising pancreatitis in 15–23% of cases.⁵ While external pancreaticocutaneous fistulas have been described, to our knowledge, this is the first description of a pancreatic-atmospheric fistula, defined thereof as a pancreatic fistula exteriorising to an open abdomen. This distinction is important: while there is no

Figure 2 Exposure of the pancreaticoatmospheric fistula to the granulating open abdomen, in a patient who underwent decompressive laparotomy for abdominal compartment syndrome secondary to severe acute necrotising pancreatitis.

report regarding pancreaticoatmospheric fistula mortality rates, it is known that enteroatmospheric fistulas have a significantly higher mortality than their counterpart, enterocutaneous fistulas.^{6–8} A similar pattern may apply to pancreaticoatmospheric fistulas which likely have a higher mortality than the already high rate of 28.6% for pancreaticocutaneous fistulas.³ Moreover, while the overriding principles of their management is similar, the wound management of an atmospheric fistula is much more complicated than a fistula that would exteriorise to the skin of an intact abdominal wall.

The management of open abdomen, either in the acute care surgery setting or post-traumatic, can be quite challenging. The known treatment strategies are mostly derived from retrospective analyses and include control of underlying septic insults, control of the drainage to allow the surrounding tissue to granulate, skin grafting, fluid and electrolyte resuscitation, and nutritional support.⁹ While these measures are also essential for the management of pancreaticoatmospheric fistulas, the evaluation of the biliary tree, the consideration of pancreatic duct stenting and effective drainage using ERCP are also instrumental in the management of pancreaticoatmospheric fistulas. These measures serve to divert the fistula drainage away from the open abdomen to the duodenum, allowing for optimal conditions for the open abdomen to granulate and for improved take of the eventual skin graft. The importance of such diversion cannot be underscored as the impaired wound healing in the presence of pancreatic fluid can result in significant fluid and electrolyte imbalances, nutritional deficiencies and infectious morbidity. Moreover, in order to further reduce fistula output, octreotide was used with the understanding that as in other pancreatic fistulas, it is unlikely to affect fistula closure rates, but may help to decrease drainage quantity, essential for local wound control.

In the setting of enteroatmospheric fistulas, control of fistula effluent ensuring a clean granulation bed is essential for early placement of a split thickness skin graft on the granulating tissue.¹⁰ This allows for an earlier reversal of the catabolic state and expedites patient recovery. This approach, defined as the ‘planned ventral hernia’,¹⁰ demonstrated benefit of early skin grafting as part of a staged management of open abdomen. With coverage of the wound by a skin graft, the so-called effect of ‘catabolic drain’, as well as fluid and protein losses are reduced. Following these principles, we covered the granulating abdominal wound with sequential split-thickness skin grafts to the fistula edges as drainage was better controlled. The described treatment modalities resulted in the successful management of this pancreaticoatmospheric fistula.

In an era where more abdomens remain open in different clinical settings, including damage control laparotomy, second-look laparotomy, severe intra-abdominal sepsis or abdominal compartment syndrome, new morbidities including enteroatmospheric fistulas have been described. We describe the development and management of a pancreaticoatmospheric fistula, a complex clinical entity that may occur in the context of severe acute necrotising pancreatitis. Although the outcomes of this clinical entity are as of yet unknown, the metabolic derangements and infectious complications that compound the already high mortality from SANP warrant multidisciplinary approaches, including resuscitative and supportive measures as well as meticulous attention and prompt management of fistula drainage for optimal wound management with eventual wound coverage and fistula closure as described above.

Learning points

- ▶ We report a rare complication of a commonly encountered acute surgical entity.
- ▶ A pancreaticoatmospheric fistula, or pancreatic fistula exteriorising to an open abdomen, can occur following acute necrotising pancreatitis requiring decompressive laparotomy.
- ▶ This fistula was managed successfully using the current standard of care for pancreatic fistulas as well as pancreatic duct stenting and octreotide. The wound care in such cases is especially challenging given the drainage of pancreatic fluid through the open abdomen. Control of output, maintaining a clean granulation bed and timely skin grafting are key principles for the management of such fistulas.

Contributors ES drafted the manuscript, provided the figures and contributed to the revised manuscript. TC performed the procedure and revised the draft. TR critically revised the manuscript and approved the final version of the manuscript. DLD drafted and approved the final version of the manuscript and contributed to the revisions. TC and DLD both contributed to the management of the patient including surgical procedures.

Competing interests None.

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REFERENCES

- 1 Baron TH, Morgan DE. Acute necrotizing pancreatitis. *N Eng J Med* 1999;340:1412–17.
- 2 Ridgeway MG, Stabile BE. Surgical management and treatment of pancreatic fistulas. *Surg Clin North Am* 1996;76:1159–73.
- 3 Tsiotos GG, Smith CD, Sarr MG. Incidence and management of pancreatic and enteric fistulas after surgical management of severe necrotizing pancreatitis. *Arch Surg* 1995;130:48–52.
- 4 Nicholas JM, Rix EP, Easley KA, *et al*. Changing patterns in the management of penetrating abdominal trauma: the more things change, the more they stay the same. *J Trauma* 2003;55:1095–108.
- 5 Ho HS, Frey CF. Gastrointestinal and pancreatic complications associated with severe pancreatitis. *Arch Surg* 1995;130:817–23.
- 6 Adkins AL, Robbins J, Villalba M, *et al*. Open abdomen management of intra-abdominal sepsis. *Am Surg* 2004;70:137–40.
- 7 Schein M, Decker GA. Gastrointestinal fistulas associated with large abdominal wall defects: experience with 43 patients. *Br J Surg* 1990;77:97–100.
- 8 Teixeira PG, Inaba K, Dubose J, *et al*. Enterocutaneous fistula complicating trauma laparotomy: a major resource burden. *Am Surg* 2009;75:30–2.
- 9 Di Saverio S, Villani S, Biscardi A, *et al*. Open abdomen with concomitant enteroatmospheric fistula: validation, refinements, and adjuncts to a novel approach. *J Trauma* 2011;71:760–2.
- 10 Fabian TC, Croce MA, Pritchard FE, *et al*. Staged management for acute abdominal wall defects. *Ann Surg* 1994;219:643–50.

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