

Case Series

Colonic complications in acute pancreatitis: management experience from a single institution

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ABSTRACT

Colonic complications secondary to acute pancreatitis (AP) are rare. Management of these pathologies is inconsistent and non-standardized because of their rarity. A retrospective review was performed for patients admitted to our health network with colonic complications secondary to AP from 1st January 2009 to 31st December 2023. 13 patients were admitted at Monash Health between January 2009 and December 2023 for a colonic complication secondary to AP. One had a bowel obstruction secondary to retroperitoneal compression, four had pancreatic-colonic fistulas, three had colonic infarction, two presented with colonic perforation while three presented with obstructive colonic strictures. The most common aetiology was gallstone pancreatitis (n=4). Initial management for colonic fistulas and strictures were commonly with a diverting loop ileostomy, while perforations/necrosis required emergent colectomies with or without diverting stomas. Colonic fistulas in AP can be managed safely with a diverting loop ileostomy to delay or avoid the need for a major resection during the acute phase. However, emergency colonic resection should be performed in the case of colonic perforation or necrosis and is associated with worse outcomes.

Keywords: Acute pancreatitis, Necrotising pancreatitis, Colonic complications, Colonic stricture, Colonic stenosis, Colonic perforation

INTRODUCTION

Acute pancreatitis (AP) is a common surgical pathology, accounting for over 200 000 hospitalisations in Australia every year.¹ Around 10% of AP will progress to necrotising pancreatitis (NP), which is associated with higher rates of mortality and morbidity, and is routinely diagnosed radiologically.^{2,3}

With the extent of locoregional inflammation and release of inflammatory mediators in severe AP, surrounding organs are commonly affected, including the colon. Around 10% of severe AP or NP will go on to develop colonic complications such as fistulas, strictures, ischaemia and perforation.⁴ The extension of

inflammation or necrosis into the transverse mesocolon and the retroperitoneal space can affect the blood supply to the large bowel, giving rise to ischaemia, strictures, or perforation. Direct extension into the large colon itself can result in a pancreatic-colonic fistula. Colonic complications increases the morbidity and mortality risks for patients who are already severely deconditioned from AP/NP.⁴

Reported mortality rates for severe acute pancreatitis can be as high as 30%. Patients who require surgical interventions have a 40% chance of mortality due to the additional stress.⁵ Currently, there are no clear guidelines for the management of colonic complications during an acute episode of AP. Recent studies have suggested that

surgical management is often required for colonic complications in AP.⁴ However, any major operation during the acute phase of pancreatitis poses additional morbidity and mortality.⁶ Hence, it is our view that certain colonic pathologies in acute pancreatitis can be managed conservatively, or with diversion as opposed to colonic resection.

Our institution provides tertiary level care within the largest health service in the state of Victoria, Australia. AP is a common pathology managed by both the departments of gastroenterology and hepatopancreatic and biliary surgery. The aim of our study was to examine our experience with colonic complications secondary to AP in our institution. We specifically focused on the management and outcomes of colonic complications in AP.

CASE SERIES

A retrospective review was performed of all patients who were admitted to Monash Health with AP from 1st January 2009 to 31st December 2023. All patients diagnosed with colonic complications secondary to AP were included in this study. This retrospective review was approved by the Monash health ethics committee (Reference no: RES22-0000-155Q-85010).

This article was previously presented at the HBP Surgery Week 2023 as a poster presentation, hosted by the Korean association of hepato-biliary-pancreatic surgery. During that time period, our institution managed around 10000 patients with AP. The median age of our cohort was 60 years old (IQR 43–69 years old). There was a total of 13 cases of colonic complication secondary to AP (Table 1). One presented for a bowel obstruction secondary to retroperitoneal compression, four had pancreatic-colonic fistulas, three had colonic infarction, two presented with colonic perforation while three presented with obstruction secondary to colonic strictures. Overall risk of a colonic complication secondary to AP was 0.11%.

Aetiology of acute pancreatitis

The most common aetiology of AP in our cohort with colonic complications is gallstone pancreatitis (n=4), followed by idiopathic causes (n=3), ERCP (n=2), alcohol induced (n=2) and hypertriglyceridemia (n=2). 9 patients were admitted to the intensive care unit during their admission for AP and colonic complications, with a median of 16 days (IQR 11 to 29 days) (Table 1).

Onset of colonic complications

Colonic perforations, infarction and large bowel obstructions (from extramural compressions) occurred within the first 2 weeks of diagnosis, with colonic infarctions occurring 14 to 25 days after the initial diagnosis of AP. Colonic perforations occur 14 days after initial diagnosis, and large bowel obstruction from

retroperitoneal compressions occur 7 days after diagnosis. Colonic strictures and fistulas commonly occurred as a delayed complication, normally beyond 4 weeks from diagnosis of AP. Colonic strictures were diagnosed between 41 to 578 days after the onset of AP, while colonic fistulas were diagnosed between 22 to 114 days after onset of AP.

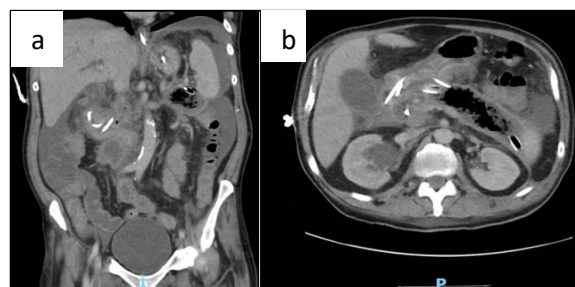


Figure 1 (a, b): Necrotizing pancreatitis on CT-coronal and axial views with drain tubes.



Figure 2: Faeculent discharge from necrosectomy drain tube site.



Figure 3: Gastrografin rectal enema demonstrating descending colonic stricture.

Management of colonic complications

The descending colon/splenic flexure was the most affected portion of bowel in colonic complications (n=6), followed by sigmoid colon (n=3), ascending colon/caecum (n=2), and transverse colon (n=2).

All patients with colonic complications were managed either endoscopically or surgically. Patients with colonic infarction or perforation were managed with immediate emergency surgical intervention. All three patients with a colonic infarction had an emergency colectomy with or without stoma formation. One patient who was initially managed with a right hemicolectomy was taken back to theatre 2 weeks after the initial surgery for a total colectomy.

One patient subsequently died from overwhelming sepsis after the operation. Of the two patients with a colonic perforation, one had a total colectomy whilst the other had the perforation oversewn with 3/0 PDS sutures (no further surgery required). The patient who underwent a total colectomy subsequently died from overwhelming sepsis leading to multi-organ failure.

Of the three patients with a colonic stricture, two were managed with an initial diverting loop ileostomy and a subsequent elective colectomy. One was managed with an endoscopic balloon dilatation but required subsequent emergency subtotal colectomy 2 months after the initial procedure.

4 patients were diagnosed with a pancreatic-colonic fistula. Fistulas tended to affect either the splenic flexure or descending colon (n=3). Three of these patients were managed with a diverting loop ileostomy while the other was managed endoscopically with the application of an Over-The-Scope clip. At time of writing, two patients have had a successful reversal of ileostomy after endoscopic evidence of fistula resolution.

One patient developed a large bowel obstruction secondary to a retroperitoneal compression from a walled-off collection. This was managed with a diverting loop ileostomy. The patient subsequently developed a pancreatic-colonic fistula which was radiologically diagnosed one year after surgery. The patient is currently awaiting a reversal of ileostomy.

Table 1: Case review of all incidences of colonic complications from 2009 to 2023.

Age (years)	Year of admission	Aetiology	Colonic complication	Diagnosis of AP to colonic complications, Days	Colonic site	Initial Management for colonic complication (CC)	Diagnosis of AP to initial management of CC, Days	Subsequent management	Diagnosis of AP to subsequent management of CC, Days
37	2009	ETOH	colonic infarction	15	ascending colon	right hemicolectomy	15	Emergency Total Colectomy	26
72	2010	Gallstone	colonic stricture	578	descending colon	balloon dilatation	578	Emergency subtotal colectomy	652
63	2011	Gallstone	colonic stricture	282	sigmoid colon	diverting loop ileostomy	289	Elective total colectomy	1025
68*	2012	Idiopathic	colonic infarction	24	descending colon	left hemicolectomy	24	-	-
51	2014	Gallstone	colonic stricture	41	descending colon	diverting loop ileostomy	47	Elective total colectomy	507
61	2016	Idiopathic	colonic perforation	14	caecum	laparotomy and oversown perforation	14	-	-
72*	2017	Gallstone	colonic perforation	13	caecum/sigmoid colon	total colectomy	13	-	-
57	2021	Idiopathic	colonic fistula	114	descending colon	diverting loop ileostomy	114	-	-

Continued.

Age (years)	Year of admission	Aetiology	Colonic complication	Diagnosis of AP to colonic complications, Days	Colonic site	Initial Management for colonic complication (CC)	Diagnosis of AP to initial management of CC, Days	Subsequent management	Diagnosis of AP to subsequent management of CC, Days
27	2021	Hypertriglyceridaemia	bowel obstruction	7	descending colon	diverting loop ileostomy	7	-	
72	2021	ERCP	colonic fistula	22	splenic flexure	diverting loop ileostomy	44	-	
44	2021	ERCP	colonic fistula	120	transverse colon	endoscopic ovesco clip.	120	-	
30	2022	Hypertriglyceridaemia	colonic infarction	4	transverse colon	emergency extended right hemicolectomy	5	-	
49	2023	ETOH	colonic fistula	28	splenic flexure	loop ileostomy	81	-	

Note: *-Mortality.

DISCUSSION

Colonic complications remain a rare complication of AP. The oedema and inflammation from severe pancreatitis can affect surrounding structures, while the retro- and intraperitoneal spread of pancreatic enzymes and necrosis can directly affect the large bowel itself, or the vascular supply to the colon.⁷ This correlates with histopathological results from our colonic resections, which revealed extensive segments of fat necrosis and saponification as well as extensive regions of muscularis inflammation but patchy areas of submucosal oedema in most specimens. Involvement of the mesenteric vessels including the colic arteries can lead to potential thrombosis and stenosis of these contributing vessels, leading to acute ischaemia of the colon.

Our case series demonstrates that the splenic flexure/descending colon is the most affected by acute pancreatitis. This is not unexpected, because the pancreatic tail is commonplace for the accumulation of pancreatic collections, whilst the splenic flexure is a known anatomical watershed area.⁸ Hence, this region is at increased risk of vascular compromise and colonic complications secondary to extensive inflammation and shock. Colonic complications place an additional burden on the morbidity and mortality of the patient. The largest retrospective study conducted to date by Maatman et al regarding the incidence and risk factors of colonic complications in AP showed a significantly increased risk of morbidity (96% vs 86%) and mortality (19% vs 8%) in patients with colonic complications compared to patients without colonic involvement.⁴ Despite the morbidity and mortality related to colonic complications in AP, management of such complications remains anecdotal and non-standardised. This is especially so in delayed colonic complications such as strictures and fistulas.

There remains a wide variety of interventional procedures for the management of the various colonic complications, with no formal consensus on best practice. Patients with severe AP or NP have a higher risk of multi-organ failure in the setting of systemic inflammatory response.⁹ Due to this, immediate surgical management of colonic complications should not be taken lightly, as peri-operative stress coupled with multi-organ failure results in a higher mortality rate compared to delayed surgery.¹⁰

Pancreatic-colonic fistulas

Pancreatic-colonic fistulas can present with per-rectal bleeding, constant diarrhoea, or persistent sepsis in the setting of AP.¹¹ These pathologies are commonly diagnosed either radiologically with a contrast scan or endoscopically.

Pancreatic-colonic fistulas are relatively common in colonic complications secondary to AP, with an incidence rate of 3-10%.^{12,13} While fistulas to the upper gastrointestinal tract can be managed conservatively, fistulas to the colon rarely heal spontaneously and are associated with high mortality rates.¹⁴ Although evidence remains lacking in the overall usage of endoscopic clips in such scenarios, there are reports of several institutions that have used these devices successfully.¹⁵⁻¹⁸ As reported earlier, one patient treated at our institution had a successful outcome after endoscopic over-the-scope clip of a transverse colon fistula, without the need for further surgical intervention.

Surgical intervention might be necessary in cases of pancreatic-colonic fistulas. However, as previously stated, any major surgical intervention in an acutely unwell patient with AP increases the peri-operative morbidity and mortality. What is clear is that early colonic diversion meant that a colonic resection was

avoided acutely and allowed for the possibility of a minimally invasive endoscopic approach instead.¹⁵ At our institution, we recommend patients with pancreatic-colonic fistulas be managed initially with a DLI for sepsis control through minimally invasive means. Prompt sepsis control would allow for early enteral feeds, protecting gut immunity and reducing risks of malnutrition.^{19,20} Subsequent endoscopic evaluation can determine the resolution or progression of the fistula and whether a colonic resection is necessary to allow for normalisation of nutritional markers. This should be appropriately timed for when the patient has recovered from the initial episode of AP. In certain cases, a colonic resection might not be necessary, and a reversal of ileostomy is all that is required. From a multi-disciplinary point of view, early enteral nutrition (EN) has been reported by Cui et al to be a curative conservative management approach for pancreatic-colonic fistulas.²¹ Although this is a single case study, we recommend early nutritional assessment and optimisation of nutritional requirements for patients with a pancreatic-colonic fistula as these patients are at risk of malabsorption secondary to electrolyte losses.²² Biochemical markers such as transferrin and albumin can be used to assess a patient's nutritional status.²³ Clinicians should consider normalisation of markers prior to definitive surgery, and delay if necessary.

Colonic strictures

As colonic strictures secondary to AP can have an insidious onset, patients might not present with the typical features of large bowel obstruction. These patients can present with non-specific symptoms of weight loss and loss of appetite.²⁴ As the stenosis progresses and worsens in severity, these patients will present with the typical obstructive features of nausea, vomiting, constipation, and abdominal distension.

As noted from our study, colonic strictures tend to present as a delayed complication of pancreatitis. Again, we recommend a DLI in the acutely unwell patient with AP as an initial surgical option. A definitive colectomy and reversal of stoma can be considered when the patient has clinically recovered from the episode of AP and is in a well-nourished state to minimise the peri-operative risks of major colonic resection.

Colonic perforation or infarction

Patients with colonic perforation or infarction tend to occur within the acute phase of AP, within the first 2 weeks of presentation. These patients are typically septic despite maximum conservative therapy and require further intervention for source control. These patients should proceed to urgent operative intervention with a colonic resection and damage control surgery for immediate sepsis control.⁴ We recommend a diverting loop ileostomy for these patients if an anastomosis is formed to reduce the risk of post-operative anastomotic leaks. A "re-look" surgery is also recommended when

bowel viability is in question. Unfortunately, as noted from our study, these cohort of patients have the highest risks of post-operative mortality secondary to the severity of the pancreatitis coupled with the physiological stressors from major surgery. Both mortalities from our case series originate from patients with either a colonic infarction or perforation.

Limitations

There are several limitations to this study. Firstly, it is evident that colonic complications from AP are very rare complications, with an incidence rate of around 0.1% of all presentations of AP. Even at a large institution servicing most of the state, cases are rare, leading to a small sample size. Furthermore, its retrospective nature can introduce selection bias, especially with the difficulty of accurately identifying colonic complications from those admitted under our institution with AP. This study was also limited to a single institution. Patients with AP could have been discharged home after their initial episode and subsequently presented to another institution with colonic complications secondary to AP. At times, it was also difficult to ascertain the initial episode of acute pancreatitis that might have precipitated the colonic complication given that some of these patients had multiple recurrent episodes prior to their colonic complications.

CONCLUSION

Although colonic involvement in AP is rare, the morbidity and mortality risks are high. This is likely augmented by the fact that there is no global standard for the management of such complications. In a clinically unwell patient, colonic involvement should be considered as a potential source of sepsis, and endoscopic or radiological diagnosis pursued. Although less invasive management in the forms of conservative "watch and wait approach" and endoscopic management have been described, these should only be considered in a select minority of patients. In most cases of colonic fistulas or strictures, we recommend that a DLI is formed during the acute phase of pancreatitis for source control or to relieve obstruction, prior to definitive resection at a later stage. Nevertheless, emergency colonic resections should always be performed in cases of perforation or necrosis. Future meta-analysis can help institutions delineate the best course of action for colonic complications in AP.

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