Case report

Acute mesenteric ischaemia secondary to portal, splenic and superior mesenteric vein thrombosis

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Accepted 26 August 2019

SUMMARY

Mesenteric ischaemia represents an uncommon complication of splanchnic vein thrombosis which requires a high level of suspicion to diagnose in a timely manner. This report discusses a case of portal, splenic and superior mesenteric vein thrombosis leading to mesenteric ischaemia and infarct in a 79-year-old man. The diagnosis of acute mesenteric ischaemia and splanchnic vein thrombosis remains difficult due to the non-specific symptoms of these conditions. As diagnosis does continue to improve, treatment of acute mesenteric ischaemia using medical management has become increasingly possible before ischaemia advances to the point at which surgical resection is required.

BACKGROUND

The portal, splenic and superior mesenteric veins (SMV) collectively form the splanchnic venous system; with the portal vein being formed by the confluence of the splenic and superior mesenteric veins. Although thrombosis of this system is uncommon, improved imaging has led to an increased incidence of this phenomenon.¹ A 20-year case-controlled study showed that fewer than half of cases of splanchnic vein thrombosis involved multiple vessels, with the most common location being isolated portal vein thrombosis followed by multivessel disease.² Splanchnic vein thrombosis is most commonly caused by underlying malignancy

or cirrhosis, whereas pancreatitis and postoperative complications account for a significant number of cases as well.^{2–4}

The most serious complication of mesenteric vein thrombosis is mesenteric ischaemia and infarct. Although this complication occurred in as many as 33% of cases of mesenteric vein thrombosis in a retrospective study,² venous thrombosis only accounts for 5%–16% of cases of acute mesenteric ischaemia.^{5–9} Chronic liver disease, mesenteric arterial occlusion and combined portal vein and SMV thrombosis lead to increased risk of transmural necrosis, with chronic liver disease representing the most common risk.⁷

CASE PRESENTATION

Our patient is a 79-year-old man with an extensive medical history including prostate cancer with prostatectomy 14 years prior, renal transitional cell carcinoma with nephroureterectomy and adrenalectomy 11 years prior, multiple primary bladder tumours resected 9 and 5 years prior, and basal cell carcinoma resected 2 years prior. He received chemotherapy with one course of mitomycin for a bladder tumour to which he responded poorly with a severe inflammatory reaction. He has had two episodes of deep vein thrombosis, the first one following surgery 6 years ago, and his second unprovoked 2 years ago. He was treated with a vitamin K antagonist which was subsequently discontinued following both of these incidences.

The patient presented to the hospital complaining of severe lower abdominal pain lasting <1 day and recent constipation. Initial labs demonstrated leukocytosis with a white blood cell count (WBC) of $12.5 \times 10^3/\mu\text{L}$ and elevated plasma lactate of 2.1 mmol/L although the patient was afebrile. CT abdomen and pelvis was obtained and revealed mesenteric oedema, abdominal and pelvic free fluid, and small bowel wall thickening consistent with enteritis. The differential diagnosis at this time included enteritis, ileus and partial small bowel obstruction. The patient was admitted to an observation unit and managed conservatively with intravenous fluids, bowel rest and observation. This strategy was employed for 3 days, whereas serial abdominal X-rays were used to monitor for progression/regression. During this period, the patient experienced new-onset tachycardia, tachypnea, worsening leukocytosis with WBC $24.9 \times 10^3/\mu\text{L}$, acute kidney injury and obstipation. Abdominal X-ray on the fourth day showed 'thumbprint sign' concerning for small bowel ischaemia. A repeat CT

Figure 1 Contrast-enhanced CT depicting portal vein and splenic vein thrombosis as well as free fluid in the abdomen.

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To cite: Burch J, Enofe I. *BMJ Case Rep* 2019;**12**:e230145. doi:10.1136/bcr-2019-230145

Figure 2 Contrast-enhanced CT depicting portal vein thrombosis with perihepatic and perisplenic fluid.

Figure 3 Contrast-enhanced CT depicting superior mesenteric vein thrombosis as well as perihepatic and perisplenic fluid.

of the abdomen with oral and intravenous contrast demonstrated extensive filling defects in the main, right and left portal veins extending into the mesenteric veins, thrombus in the splenic vein and thick-walled small bowel loops with a large amount of ascites (figures 1-3). A repeat plasma lactate was 1.7 mmol/L.

In light of the patient's clinical deterioration and new imaging results, the decision was made to pursue surgical therapy. An exploratory laparotomy was performed, and 75 cm of gangrenous jejunum was resected. The bowel was left in discontinuity and the abdomen was left open in anticipation of a follow-up procedure. Surgical pathology showed transmural ischaemic changes without mention of transmural necrosis. Following surgery, the patient was transferred to the intensive care unit (ICU) and kept sedated and ventilated. Total parenteral nutrition (TPN) was started the following day for nutritional support with concern for prolonged recovery time. A re-exploration of the abdomen took place 2 days following the exploratory laparotomy, and a small bowel anastomosis was performed. The patient was extubated the following day and was transferred out of the ICU the day following extubation.

The patient was switched from heparin to apixaban 10 mg two times per day 2 days postoperatively for long-term anticoagulation. The following day, apixaban was changed to warfarin, with bridging enoxaparin 1 mg/kg two times per day, according to the patient's wishes due to familiarity with this medication. The target international normalized ratio (INR) while on warfarin was 2.5.

One week following re-exploration, the patient developed haematochezia with two bloody bowel movements and bloody aspirate per nasogastric suction. A significant drop in

haemoglobin to 6.1 g/dL required 4 units of packed red blood cells to achieve and maintain haemoglobin >7.0 g/dL. Anticoagulation was held at this time for 3 days. It was thought that the bleeding was due to mucosal sloughing secondary to the ischaemia shown on a repeat CT. The patient responded well to conservative therapy with bowel rest and pain control. He demonstrated no further episodes of gastrointestinal bleeding.

Following the resolution of bleeding and improvement in abdominal pain, the patient's diet was slowly advanced to a normal diet 12 days postoperative. TPN was stopped at this time. The patient was discharged from the hospital to a subacute rehab facility 16 days after surgery.

DISCUSSION

Due to improvements in imaging, the diagnosis of both acute mesenteric ischaemia and splanchnic venous thrombosis has become more timely and accurate than in previous years.⁶⁻⁸ Currently, contrast-enhanced CT represents the gold standard for the diagnosis of mesenteric venous thrombosis due to its ability to depict bowel ischaemia and venous thrombosis.^{5 7 8 10 11} Despite these improvements in imaging, the non-specific symptoms associated with mesenteric ischaemia and splanchnic vein thrombosis continue to require a high degree of suspicion on the part of the practitioner in order to make a timely diagnosis.^{8 10}

As a result of improved early diagnosis, it is increasingly possible to treat mesenteric venous thrombosis conservatively with anticoagulation in an effort to avoid bowel resection and the complications thereof.^{6 7 10} LMWH bridged to vitamin K antagonists is the preferred method of anticoagulation at

this time.^{3 8 10} In our patient, initial CT was obtained without contrast for concern regarding the patient's increased risk of contrast nephropathy. This non-contrast CT indicated mesenteric oedema along with bowel wall thickening consistent with enteritis. Clinical deterioration prompted repeat CT using oral and IV contrast which demonstrated findings concerning for ischaemia. This led to aggressive therapy with laparotomy and resection of ischaemic bowel. The approach to surgical therapy used a planned second-look operation following a short period of open-abdominal management in the ICU. This surgical approach closely resembled that described by Occhionorelli *et al.*⁸ This second look afforded the opportunity to re-evaluate the margins of the previous bowel resection for any remaining signs of ischaemia before performing a reanastomosis.

Regarding patients with splanchnic venous thrombosis, there is some debate as to the appropriateness of testing for thrombophilia.^{9 12} In this case, the decision was made not to test for inherited thrombophilia for several reasons. Based on the guidelines described by Kearon *et al.*,¹³ this episode of venous thromboembolism would be categorised as an unprovoked deep vein thrombosis (DVT). Due to the patient having now had three episodes of venous thromboembolism, two of them unprovoked, he will require life-long therapy with anticoagulation regardless of the presence of inherited thrombophilia, or lack thereof. The presence of acute thrombosis can also lead to false results when testing for some of the underlying causes of thrombophilia.¹² Although the decision was made in this case not to test for underlying causes of thrombophilia in the acute setting, the argument could be made for testing for acquired causes of thrombophilia, in particular the JAK2 V617F mutation, which is commonly associated with myeloproliferative neoplasms.^{9 12}

This case represents a unique look at the intersection of several of the most important aspects of mesenteric ischaemia, including the high index of suspicion required to diagnose the patient before progression to transmural necrosis, improved early diagnosis with contrast-enhanced CT and both the surgical and medical treatment of this condition.

Learning points

- ▶ A high index of suspicion is required for the diagnosis of acute mesenteric ischaemia and splanchnic vein thrombosis due to the non-specific symptoms of these conditions.
- ▶ Due to improvements in imaging, the diagnosis of both acute mesenteric ischaemia and splanchnic venous thrombosis has become more timely and accurate.
- ▶ Medical management with anticoagulation is possible before ischaemia advances to the point at which surgical resection is required.

OUTCOME AND FOLLOW-UP

Since discharge, the patient has continued to follow-up with his general surgeon, as well as his primary care doctor. He has also undergone a CT urogram for continued surveillance for his history of renal cancer. This CT, performed after 6 weeks of anticoagulation, showed continued subacute to chronic occlusion of the right portal vein, superior mesenteric vein and splenic vein, as well as interval development of perigastric and mesenteric collateral vessels. Ten months following initial hospitalisation, the patient has not suffered any additional complications related to his splanchnic thrombosis, mesenteric ischaemia or subsequent anticoagulation.

Acknowledgements The authors would like to acknowledge Dr Rajit Pahwa for his leadership on this case, and assistance in the editorial process.

Contributors JB: primary author, planning and gathering of data surrounding case. IE: critical review and editing.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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