CASE REPORT

Non-surgical management of superior mesenteric artery thrombosis using spinal cord stimulation

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lauratod@doctors.org.uk**SUMMARY**

We report the use of a spinal cord stimulator (SCS) for non-surgical management of superior mesenteric artery thrombosis. A 59-year-old woman with polycythaemia rubra vera presented with extensive superior mesenteric artery thrombosis not amenable to surgical or endovascular revascularisation. A SCS was implanted for analgesia thereby allowing enteral feeding to be tolerated during the acute period. Four months later the patient developed a focal ischaemic jejunal stricture and underwent resection of a short segment of small bowel with primary anastomosis that healed without complication. Spinal cord stimulation can facilitate non-surgical management of mesenteric ischaemia.

BACKGROUND

Superior mesenteric artery thrombosis is a condition associated with significant mortality. Conventional treatment entails surgical or endovascular revascularisation alongside resection of non-viable bowel in the event of infarction. We present a case of complete superior mesenteric artery (SMA) thrombosis that had fallen out with the timeframe for thrombolysis and was not amenable to surgical revascularisation due to distal vessel involvement.

CASE PRESENTATION

A 59-year-old woman non-smoker with no medical history presented with acute, severe epigastric pain. Abdominal examination revealed mild epigastric tenderness without peritonism. This was preceded by a 3-month history of progressive postprandial pain and 12 kg weight loss. Eight weeks previously she underwent oesophagogastrroduodenoscopy which diagnosed *Helicobacter pylori* positive gastritis and she was treated with omeprazole, clarithromycin and metronidazole.

INVESTIGATIONS

Blood tests demonstrated haemoglobin of 211 g/L with haematocrit of 0.637; subsequent assays diagnosed Janus kinase 2 mutation positive polycythaemia rubra vera. Contrast-enhanced CT revealed complete thrombosis of the superior mesenteric artery from its origin to the termination of the ileocolic artery (figure 1). Coeliac and inferior mesenteric arteries were patent and there was no evidence of bowel ischaemia.

TREATMENT

Bypass surgery and thrombectomy were unfeasible due to extensive thrombus involving the distal

vasculature and the 3-month history excluded thrombolysis. The absence of clinical or radiological evidence of bowel infarction meant bowel resection could be deferred and conservative management with anticoagulation, venesection and hydroxycarbamide was initiated. After review by the hospital in-patient acute pain team a pharmacological analgesic regimen was initiated which included escalating doses of oral opiates and pregabalin. When this failed to control her symptoms, coeliac plexus block was considered initially. However, a spinal cord stimulator (SCS) was favoured as it potentially offered a longer-term solution. A SCS (Medtronic, Minneapolis USA) with tetra-polar stimulating system was implanted within the epidural space. The tip of the electrode was positioned at the eighth thoracic vertebral as this elicited paraesthesia at the required level when trialled in theatre.

OUTCOME AND FOLLOW-UP

Initial conservative management prior to SCS implantation brought about an improvement in symptoms with only mild postprandial pain persisting. Two weeks later she developed *Clostridium difficile* toxin positive diarrhoea, which significantly exacerbated her abdominal discomfort and postprandial pain. Serial abdominal examination and further CT imaging excluded bowel infarction. Her abdominal pain continued to worsen and pain management was problematic despite escalating pharmacological analgesics. Total parenteral nutrition was initiated since enteral feeding was not tolerated.

Following SCS implantation, complete analgesia was achieved thereby allowing reinstatement of enteral feeding which was progressively increased to stimulate the bowel and encourage its collateral circulation.

The SCS was removed 8 weeks later after successful re-establishment of a full oral diet. Two months later the patient represented with a small bowel obstruction. A CT revealed a short distal jejunum stricture and noted well developed collateral circulation (figure 2) with an increase in the diameter of the inferior mesenteric artery compared with CT imaging 4 months previously. The patient underwent laparotomy where neovascularisation was observed forming a rich collateral supply from the omental vessels. The short strictured segment was resected with primary anastomosis. This healed without complication. Twelve months later, the patient has regained weight and enjoys a normal diet.

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Figures 1 (A–C) Axial CT scans at differing levels showing complete thrombosis of superior mesenteric artery (arrowed).

DISCUSSION

This report represents the first documented case of a patient with complete SMA thrombosis secondary to polycythaemia rubra vera to be conservatively managed with SCS. In the presented case, conventional methods of revascularisation were not possible due to the extent and duration of the thrombus. The patient presented with symptoms of acute mesenteric ischaemia subsequent to a 3-month history of postprandial upper abdominal pain. Her abdominal pains were exacerbated by *C difficile* toxin positive diarrhoea, occurring 8 weeks after *H pylori* eradication therapy, presumably due to increased metabolic demands placed on inadequately perfused bowel. Small bowel resection was considered but avoided as it would have been extensive and inevitably resulted in short bowel syndrome.

SCS provided analgesia and supported tolerance to enteral feeding, thereby promoting bowel function and encouraging

collateral circulation development. An ischaemic stricture developed 4 months later which necessitated only a local resection. Small bowel perfusion was sufficient to support primary anastomosis as collateral circulation was well developed.

The mechanism of action of SCS is believed to be multifactorial, involving suppression of dorsal horn activity and restoration of γ -amino butyric acid concentrations in the dorsal horn.¹ In the context of ischaemia it is postulated to improve tissue perfusion via sympathetic nervous system inhibition and vasodilation, and has been studied for use in peripheral arterial disease. Rickman *et al*² found that 67% of patients with non-reconstructable arterial-occlusive disease avoided amputation when treated with SCS. Similarly Jivegard *et al*³ demonstrated SCS to produce a significant improvement in rest pain in 91% and improved ulcer healing in 58% of patients with lower limb necrosis. Though not previously described for mesenteric ischaemia in the acute phase, SCS has been described in one report to provide complete analgesia for chronic inferior mesenteric ischaemia for an 11-month observation period.⁴ A series of 35 heterogeneous patients undergoing SCS for chronic abdominal visceral pain found that 86% described more than 50% reduction in pain within a median of 9 days. Four patients suffered lead migration or infection, though in the majority there was sustained benefit after a year.⁵

In conclusion, this case demonstrates SCS as a therapeutic option in the non-surgical management of extensive SMA thrombosis in the absence of bowel infarction. The analgesic efficacy of spinal cord stimulation in the presented case allowed enteral nutrition and provided circumstances amenable for collateral vessel formation as would be expected through exercise in peripheral vascular disease. Though the effect on distal perfusion in this setting is unproven, it facilitates symptom control to allow enteral feeding and time for collateral vessel development.

Figure 2 Reconstructed CT scan of the aorta and mesenteric vessels demonstrating absence of superior mesenteric artery with collateralisation.

Learning points

- ▶ Spinal cord stimulation facilitates non-surgical management of complete superior mesenteric artery thrombosis.
- ▶ Spinal cord stimulation produces a good analgesic effect in patients with mesenteric artery thrombosis in the absence of bowel infarction thereby enabling restoration of enteral feeding.
- ▶ Spinal cord stimulation may encourage collateral circulation through a vasodilatory effect in cases of mesenteric artery thrombosis.

Contributors LT reviewed the patient's case notes and was involved in writing the case report. JG, IL and MB were all involved in clinical management of the patient and all contributed to the writing of the case report.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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