CASE REPORT

Intestinal adaptation in fluid restricted cardiac failure following extensive bowel resection

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SUMMARY

Acute mesenteric ischemia (AMI) is an emergency associated with a high mortality rate. A high index of clinical suspicion, prompt diagnosis and treatment is necessary to improve the patient outcome. The principle of damage control surgery should be adopted in the management of critically ill surgical patients with AMI. Strategic planning by resecting the ischemic bowel, physiological restoration and planned reassessment of remnant bowel with a definitive procedure is recommended. The resection of a long segment ischemic bowel may result in morbidity such as that of short bowel syndrome.

We report here a case of decompensated cardiac failure in a 56-year-old lady, presented with one-day history of severe acute epigastric pain and abdominal distension. She presented with extensive bowel ischemia involving most of the superior mesenteric artery distribution. Damage control surgery followed by entero-colic anastomosis was performed 48 hours later. The patient recovered with remarkable intestinal adaptation without exhibiting short bowel syndrome symptoms despite the postulated theory of altered intestinal permeability in decompensated cardiac failure.

INTRODUCTION

Acute mesenteric ischemia (AMI) is commonly due to mesenteric artery embolism, thrombosis and venous thrombosis. A high index of clinical suspicion, prompt investigation and treatment is necessary to diagnose this condition. Mortality rate range from 54.1% to 77.4% is associated with the condition.[1,2] The resection of a long segment ischemic bowel may result in short bowel syndrome. Management of short bowel syndrome is challenging, and an estimated 13.3% of patients would require long-term parenteral nutrition.[3] Intestinal adaptation of the remnant small bowel and colon may take a significant duration before weaning off parenteral nutrition.

CASE REPORT

A 56-year-old lady, presented at the Sarawak General Hospital, Malaysia with one-day history of severe acute epigastric pain and abdominal distension. She had atrial fibrillation with congestive heart failure. She was on fluid restriction of 500ml per day. She appeared toxic, dehydrated and abdominal examination revealed generalised peritonitis. Laboratory results showed that total white blood count 13.8 X 10^9/L (normal range 4 - 11 X 10^9/L), serum creatinine 153µmol/L (normal range 45 - 90µmol/L), serum lactate 3.8mmol/L (normal range 0.5 – 1 mmol/L) and compensated metabolic acidosis. Chest and abdominal X-ray revealed no free air or bowel dilatation. Transthoracic echocardiography showed left ventricular ejection fraction of 40% and absence of thrombus or vegetation. Computed tomography angiography of the abdomen was performed, which revealed non-opacification of superior mesenteric artery and vein suggestive of embolus with extensive bowel ischemia (Figure 1). High-risk surgery consent was taken given the underlying co-morbidities and nature of the disease.

Urgent laparotomy was performed after fluid resuscitation and broad-spectrum antimicrobial coverage. Intraoperative findings revealed extensive small bowel and ascending colon infarct sparing the duodenum and 40cm of the proximal jejunum (Figure 2). Damage control surgery strategy applied by resecting the ischemic segment and left in discontinuity with temporary abdominal closure. The patient was resuscitated at the intensive care unit and physiological derangements were restored. Intravenous heparin infusion was initiated with judicious fluid resuscitation. Reassessment of the remnant bowel was performed 48 hours later prior to the anastomosis and abdominal closure. Entero-colic side to side anastomosis was performed using linear cutter stapler and enterotomy closure using polyglactin suture 3/0.

Post-operatively, she was managed by a multidisciplinary team and recovered steadily. Parenteral nutrition was initiated with staged weaning after initiation of elemental enteral feeding. Individualised dietary treatment was offered, and she had remarkable intestinal adaptation without exhibiting symptoms of short bowel syndrome. She was discharged home two weeks later with Apixaban 5mg twice per day and advised to increase fluid intake to one litre from the pre-admission intake of 500ml.

She was readmitted three weeks later for acute pulmonary oedema secondary to fluid overload. Her fluid intake was restricted back to 500ml. She was on monthly follow-up, followed by three monthly surgical outpatient clinic visits with no short bowel syndrome complication. She had no weight loss, tolerated regular diet, and the Bristol stool chart

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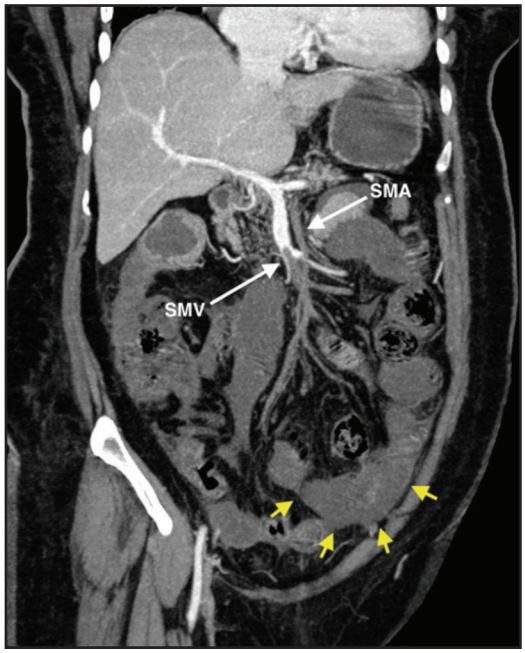

Fig. 1: Porto-venous phase computed tomographic angiography (Angio-CT) of abdomen and pelvis. Labelled image with long arrows shows filling defect within the SMA and SMV suggestive of emboli with non-enhancing bowel loop (short arrow).

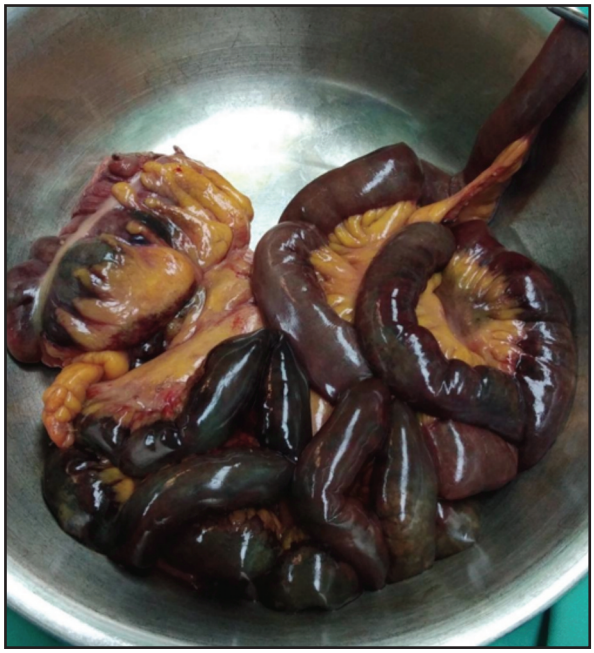

Fig. 2: Intraoperative finding of the extensive small bowel and ascending colon infarct.

was consistently Type 4 and 5. Her electrolytes were within the normal range. She, however, passed away one-year post-surgery due to cardiac-related complication.

DISCUSSION

AMI is an emergency that requires a high index of clinical suspicion. A mortality rate up to 54.1% to 77.4% was associated with acute mesenteric ischemia.[1,2] AMI can be further divided into occlusive and non-occlusive causes. Occlusive causes are mesenteric vein thrombosis, mesenteric artery embolism and thrombosis.[2,3] Urgent diagnostic investigation with Computed Tomography Angiography and therapeutic intervention should be performed.[2,3]

Early diagnosis and prompt intervention are necessary to improve outcome and survival.[3] Damage control surgery principle should be adopted in the management of critically ill patients with AMI.[2] Strategic planning by resecting the ischemic bowel, physiological optimization and planned reassessment of remnant bowel followed by the definitive procedure is ideal for managing this clinical entity.

Short bowel syndrome (SBS) in adulthood is common; it results from mesenteric ischemia, inflammatory bowel disease and malignancies. It is also associated with electrolytes imbalance, macro and micronutrient deficiency. Management of SBS is challenging and often dependent on parenteral nutrition. Affected patients tend to have a poor quality of life, and are burdened by socioeconomic and psychological impact.

Cardiac failure leads to multi-organ impairment, including the gastrointestinal tract. Gastrointestinal changes associated with cardiac failure is as a result of splanchnic hypoperfusion. Following which mucosal ischemia, bacterial translocation and alteration in intestinal barrier occur.[4] There was a component of both splanchnic hypoperfusion and venous congestion in our case of short bowel secondary to the superior mesenteric artery and vein emboli with underlying cardiac failure.

Fluid restriction is necessary for decompensated cardiac failure patients to achieve fluid homeostasis as a measure to avoid acute pulmonary oedema. Chronic cardiac failure patients tend to developed gastrointestinal changes. Enteral intake in short bowel should be tailored to gastrointestinal absorption of individual patient. In our patient, we anticipated a challenge to cope with increased intestinal permeability and the risk of malabsorption. Although the remaining small bowel length was 50 cm, the colonic adaptation should not be underestimated for the absorption of water, electrolytes and short-chain fatty acid.

Nutrient and non-nutrient factors are involved in complex intestinal adaptation following extensive bowel resection. There are promising studies with glutamine supplements, low dose short term growth hormone and glucagon-like peptide-2 to improve intestinal adaptation.[5] Fluid management needs to be balanced with consideration of total fluid intake and patient absorption capability. Once intestinal adaptation goals are achieved, the fluid restriction should be revised to pre-existing short bowel condition to avoid the risk of acute pulmonary oedema.

P-POSSUM scale in the context of AMI is a reliable tool for surgical risk assessment.[3] However, intraoperative evaluation and decision for withdrawal of treatment in diffused bowel

necrosis should be made a case to case basis. As our case highlights, urgent diagnosis, damage control surgery and post-operative multidisciplinary approach can improve patient outcome.

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