

## Urinary tract infection mimicking acute mesenteric ischaemia in an immunocompromised patient

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### Abstract

Bowel infarction due to acute mesenteric ischaemia (AMI) is an abdominal emergency with a high mortality rate. We report a case of exaggerated septic response to a urinary tract infection mimicking AMI in an immunosuppressed diabetic patient. A 56-year-old female was found collapsed at home with a 24 hour history of diarrhoea, a central abdominal pain and a complex past medical history. Examination showed her to be pyrexial, drowsy, profoundly dehydrated with evidence of cardiovascular collapse. She had a tender distended abdomen, raised inflammatory markers, raised lactate of 9.1 u/L and urinalysis was positive for leucocytes and nitrites. An abdominal computed tomography (CT) scan was reported to show small bowel ischaemia. She underwent a negative laparotomy and recovered following management in the intensive therapy unit. The negative laparotomy rate can be reduced by having abdominal CT performed and reported by an experienced radiologist or by the use of diagnostic laparoscopy.

### Introduction

The mortality rate for bowel infarction due to acute mesenteric ischaemia (AMI) is between 50-80% and is directly related to the duration from onset of symptoms to treatment.<sup>1</sup> When treated within 24 hours of onset of symptoms the mortality rate is 50%, increasing sharply after this time.<sup>2</sup> Despite the recent development of diagnostic and treatment modalities the prognosis of AMI has improved little in the past 50 years,<sup>3</sup> largely because the non-specific presentation continues to result in a delayed diagnosis. Consequently a principle of maintaining a high index of suspicion and instituting early aggressive treatment has been adopted by the surgical community. One of the drawbacks of this approach is a negative laparotomy rate of up to 25% with its associated morbidity.<sup>4</sup> We report an unusual case of a urinary tract infec-

tion in an immunosuppressed diabetic patient presenting with features compatible with the diagnosis of AMI. The continuing difficulties experienced by surgeons in making an accurate and prompt diagnosis of AMI, is also examined.

### Case Report

A 56-year-old female was admitted to hospital having been found collapsed at home with a 24 hour history of diarrhoea and central abdominal pain. The patient had a 30 year history of rheumatoid arthritis, steroid induced diabetes mellitus, bilateral knee replacements, previous deep vein thrombosis and pulmonary embolism. Her regular medications included Methotrexate, Gliclazide, Warfarin and Simvastatin. On examination she was drowsy and confused, profoundly dehydrated with evidence of cardiovascular collapse. She had a sinus tachycardia of 130/min, blood pressure of 70/40 mmHg and a pyrexia of 39°C. The lung fields were clear and cardiac auscultation revealed normal heart sounds. An erect chest x-ray was unremarkable. She had a distended abdomen with central tenderness.

Laboratory results revealed acute renal dysfunction with urea 12 mmol/L and Creatinine 156 umol/L; raised inflammatory markers, C-reactive protein 300 mg/dL, white cell count  $12.2 \times 10^9/L$  and a raised lactate 9.1 u/L. Blood glucose level was 22.0 mmol/L and international normalised ratio (INR) was 1.8. There was evidence of haemoconcentration with a haemoglobin of 19.7g/dL and an elevated haematocrit of 0.56. Liver function tests and amylase were within normal limits. Urinalysis was positive for leucocytes and nitrites but negative for ketones, blood and protein. An abdominal computed tomography (CT) scan revealed dilated, thick walled loops of proximal small bowel enhancing to a greater extent than the remaining small bowel suggestive of proximal small bowel ischaemia (Figure 1). The coeliac axis and superior mesenteric artery were patent, with no evidence of pneumatosis coli or gas in the portal vein.

A diagnosis of bowel infarction due to ischaemia was made and after full resuscitation a laparotomy was undertaken. This did not reveal any abnormality. She was transferred intubated and ventilated to the intensive care unit where she was given supportive treatment for three days before being transferred to the ward. She made a full recovery and was discharged 10 days after admission. Detailed review of the case with the medical team suggested that the patient had an exaggerated septic response to a urinary tract infection because of her immunosuppression with Methotrexate and diabetes mellitus.

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### Discussion

AMI is associated with a high mortality rate due to its non-specific features and complications. A high index of suspicion and early aggressive treatment are required to improve outcome for such patients. Many studies have examined the clinical presentation,<sup>3,5</sup> biochemical markers<sup>6</sup> and CT imaging<sup>7,8</sup> in an attempt to improve the accuracy of diagnosis and prognosis. Whilst some progress has been made, delayed diagnosis is still common<sup>9</sup> with both mortality and negative laparotomy rates remaining high.<sup>4</sup> The presentation of AMI depends to some extent on its underlying cause and duration.<sup>1</sup> At a late stage in the presentation excessive third space fluid losses



Figure 1. Abdominal computed tomography scan showing dilated loops of proximal small bowel, with thickened, enhancing walls reported as suggestive of ischaemic bowel.

result in mental confusion with features of circulatory collapse.<sup>1</sup> Our patient presented in a similar condition and was thought to have a classic picture, therefore the urgent laparotomy. The need for laparotomy was made more expedient by the CT findings.

A recent systematic review concluded that the diagnostic accuracy of serological markers in achieving early diagnosis in AMI was not particularly helpful.<sup>6</sup> In those undergoing laparotomy for suspected AMI, Woo *et al.*<sup>4</sup> did not find a statistically significant difference in the biochemical parameters between those that had a confirmation of AMI and those that had a negative laparotomy. The biochemistry profile of our patient matched almost exactly that expected in AMI with severe lactic acidosis, acute renal dysfunction, leucocytosis and haemoconcentration yet still had a negative laparotomy.<sup>1</sup>

With recent advances in technology abdominal CT is being increasingly relied upon to detect bowel ischaemia or infarction in patients presenting with an acute abdomen.<sup>8</sup> A recent meta-analysis reports the sensitivity and specificity of contrast enhanced multidetector CT in diagnosing AMI to be 93.3% and 95.9% respectively.<sup>7</sup> Bowel lumen dilation, bowel wall thickening, abnormal bowel wall enhancement have all been reported amongst others as signs of bowel ischaemia.<sup>8</sup> In contrast to these reports Woo *et al.*<sup>4</sup> reported CT findings being highly suggestive of AMI in three of their 25 patients who had a negative laparotomy. Indeed the CT scan of this patient confirmed the presence of all three signs described above without any intraoperative evidence of ischaemia. A retrospective review of the films by a specialist gastrointestinal radiologist suggested the CT findings described were misinterpreted and unlikely to represent AMI. The reported high specificity and sensitivity of CT in the diagnosis of AMI<sup>7</sup> clearly represents a function of both technology and available clinical expertise. Given the importance of instituting definitive treatment as early as possible in the clinical course, when a patient presents out of hours, as in this case, it may not be feasible to have the images reviewed by a specialist gastrointestinal (GI) radiologist before performing an emergency laparotomy. Consequently the reportedly high sensitivity and specificity of CT is unlikely to result in a significant reduction in negative laparotomy rate. It is important that the emergency general surgeons are aware of this pit-

fall as being falsely reassured by a high sensitivity may result in more negative laparotomies. Conversely, false reassurance from a high specificity could result in a patient with AMI having a laparotomy delayed with significantly increased morbidity and even the risk of mortality.

Given the increasing complexity of patients that present acutely, awareness of the effect that commonly prescribed immunosuppressants may have on the presentation of general surgical pathology is essential. Methotrexate, a disease modifying anti-rheumatic drug is considered a first line treatment for rheumatoid arthritis. There is a belief amongst rheumatologists that methotrexate not only increases the risk of infection but increases the severity and alters the presentation of the infection.<sup>10</sup> This phenomenon has been shown to be particularly prominent when combined with diabetes<sup>10</sup> as seen in the present case. Whether closer consideration of the patient's drug history and awareness of the side effects of commonly prescribed immunosuppressants might have prevented a negative laparotomy in this case is debatable. With the diagnosis of AMI remaining largely based on clinical grounds, new modalities of diagnosis and treatment need to be considered. Laparoscopy has been shown to be a safe alternative to laparotomy in some circumstances.<sup>11-13</sup> Studies in the trauma setting have shown that negative laparotomies result in significant morbidity, which can be prevented by laparoscopy.<sup>14,15</sup>

## Conclusions

This case demonstrates the importance of specialist input in the management of uncommon abdominal emergencies. The negative laparotomy rate can be reduced by either the development of a new laboratory test, CT performed and reported by an experienced radiologist or the use of diagnostic laparoscopy particularly in patients with a past history of atrial fibrillation, recent myocardial infarction or previous emboli.

## References

1. Oldenburg WA, Lau LL, Rodenberg TJ, et al. Acute mesenteric ischemia: a clinical

- review. *Arch Intern Med* 2004;164:1054-62.
2. Boley SJ, Feinstein FR, Sammartano R, et al. New concepts in the management of emboli of the superior mesenteric artery. *Surg Gynecol Obstet* 1981;153:561-9.
3. Berland T, Oldenburg WA. Acute mesenteric ischemia. *Curr Gastroenterol Rep* 2008;10:341-6.
4. Woo K, Major K, Kohanzadeh S, Allins AD. Laparotomy for visceral ischemia and gangrene. *Am Surg* 2007;73:1006-8.
5. Dang C, Wade J. Acute mesenteric ischemia. In: eMedicine [online]. Available from: [www.emedicine.com/med/topic2627.htm](http://www.emedicine.com/med/topic2627.htm). Accessed: August 18th, 2010.
6. Evennett NJ, Petrov MS, Mittal A, Windsor JA. Systematic review and pooled estimates for the diagnostic accuracy of serological markers for intestinal ischemia. *World J Surg* 2009;33:1374-83.
7. Menke J. Diagnostic accuracy of multidetector CT in acute mesenteric ischemia: systematic review and meta-analysis. *Radiology* 2010;256:93-101.
8. Lee R, Tung HK, Tung PH, et al. CT in acute mesenteric ischaemia. *Clin Radiol* 2003;58:279-87.
9. Heys SD, Brittenden J, Crofts TJ. Acute mesenteric ischaemia: the continuing difficulty in early diagnosis. *Postgrad Med J* 1993;69:48-51.
10. McLean-Tooke A, Aldridge C, Waugh S, et al. Methotrexate, rheumatoid arthritis and infection risk: what is the evidence? *Rheumatology (Oxford)* 2009;48:867-71.
11. Zamir G, Reissman P. Diagnostic laparoscopy in mesenteric ischemia. *Surg Endosc* 1998;12:390-3.
12. Yanar H, Taviloglu K, Ertekin C, et al. Planned second-look laparoscopy in the management of acute mesenteric ischemia. *World J Gastroenterol* 2007;13:3350-3.
13. Cho YP, Jung SM, Han MS, et al. Role of diagnostic laparoscopy in managing acute mesenteric venous thrombosis. *Surg Laparosc Endosc Percutan Tech* 2003;13:215-7.
14. Renz BM, Feliciano DV. Unnecessary laparotomies for trauma: a prospective study of morbidity. *J Trauma* 1995;38:350-6.
15. Simon RJ, Rabin J, Kuhls D. Impact of increased use of laparoscopy on negative laparotomy rates after penetrating trauma. *J Trauma* 2002;53:297-302.