

The Shock Bowel – “Abdominal shock” presenting as bowel ischaemia

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ABSTRACT

This case illuminates a distinctive clinical challenge: a 67-year-old woman with disseminated ovarian cancer developed severe abdominal pain following gastrojejunal bypass, highlighting the complexity of diagnosing non-occlusive mesenteric ischaemia within the context of septic shock. Despite unremarkable clinical examination and normal biochemical parameters, imaging revealed extensive small bowel pneumatosis and signs of bowel ischaemia. An anastomotic leak from the gastrojejunal bypass was successfully repaired during exploratory laparotomy. However, indocyanine green imaging indicates pneumatosis without clear ischaemic evidence. The patient's recovery was uneventful. This case underscores the importance of specific imaging features that could help differentiate between surgical cases and those benefitting from conservative management only.

Key Words: Abdominal shock; intestinal ischemia; sepsis; NOMI

INTRODUCTION

Shock bowel was initially described as an appearance of the bowel on CT in the state of major blood loss and subsequently hypovolaemic shock following trauma [1]. Later, it became part of several abdominal CT findings, seen in patients following hypotension, hypovolaemia, or hypoperfusion in the context of trauma, as well as other non-trauma-related diseases [2]. The limited literature concerning this subject mainly focuses on describing this entity. We would like to highlight the possible use of these findings in the decision-making in surgery.

CASE REPORT

A 67-year-old woman previously admitted to our

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department, after receiving a laparoscopic gastrojejunal bypass due to disseminated ovarian cancer with gastric outlet symptoms presented with excruciating abdominal pain during rounds. Clinical examination was rather unremarkable and biochemical analysis was within range of a normal post-operative window. An abdominal X-ray showed extensive small bowel pneumatosis and multiple dilated bowel loops (Figure 1). Additional CT imaging showed signs compatible with bowel ischaemia: intramural gas within the small bowels, gas within the mesenteric veins, as well as in the portal veins, and signs of decreased arterial perfusion of the liver and kidneys (Figure 2). Urgent exploratory laparotomy was performed during which we encountered an anastomotic leak of the previously fashioned gastrojejunal bypass. A full inspection of the small bowel as well as the colon was performed with indocyanine green (ICG) and infrared, which showed extensive pneumatosis but no clear signs of mucosal nor transmural ischaemia (Figure 3). The anastomotic defect was sutured, and the patient was transferred to the intensive care department for postoperative haemodynamic monitoring and IV antibiotics. The postoperative course



FIGURE 1. Plain abdominal radiograph shows extensive intestinal pneumatosis within multiple dilated small bowel loops.

was uneventful, and the patient could be discharged 10 days after the procedure.

DISCUSSION

In our case, we describe a patient suffering from septic shock resulting in abdominal hypoperfusion and a clinical presentation/radiological suspicion of intestinal ischaemia.

Acute mesenteric ischaemia is most commonly caused either by an occlusive (embolism, thrombus) or a non-occlusive disease, also known as non-occlusive mesenteric ischaemia (NOMI). The differentiation between either is made using a CT scan due to high specificity and sensitivity using IV contrast agents [3]. The differential in NOMI is still challenging and specific CT signs could guide us in differentiating between actual ischaemia or systemic hypotension secondary to shock. The imaging features associated with the latter: flattening of the inferior vena cava with/without halo sign, dilated small bowels with thickened walls and hyperenhancement, decreased enhancement of liver/spleen, peripancreatic oedema, abnormal pancreatic enhancement, abnormal adrenal and

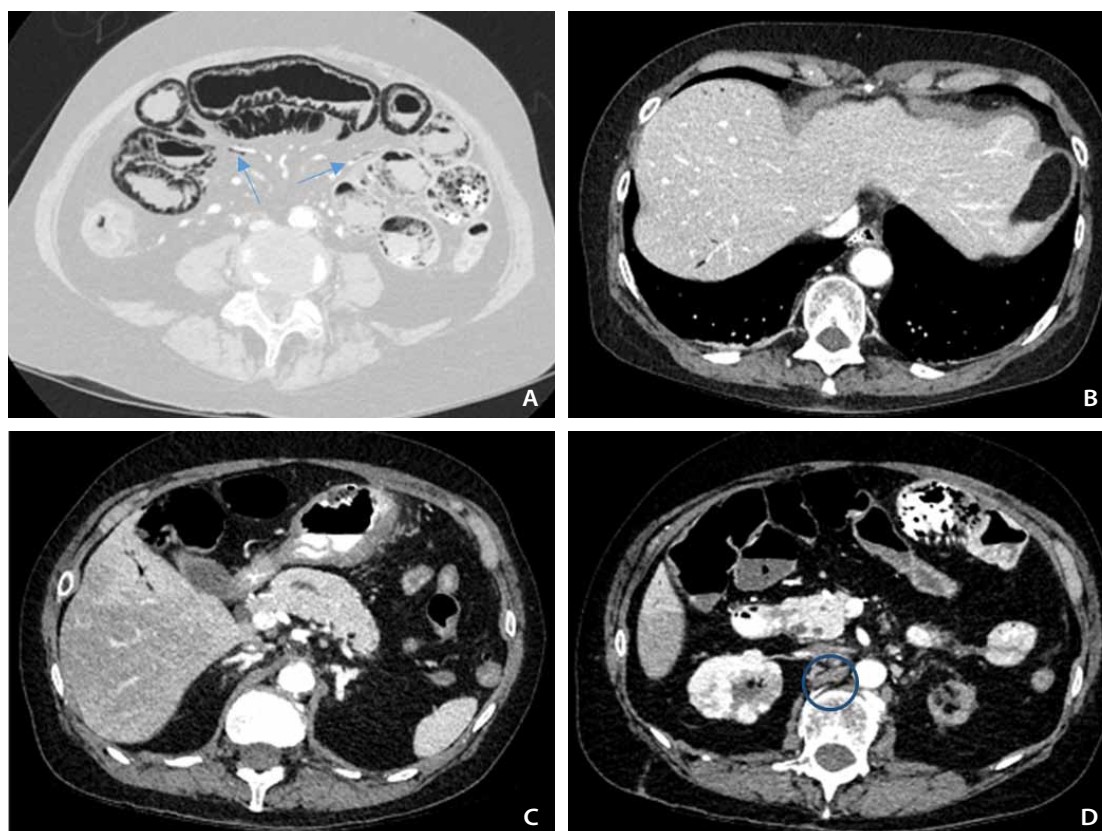


FIGURE 2. Contrast-enhanced CT abdomen shows (A) intramural gas in multiple slightly dilated small bowel loops, consistent with intestinal pneumatosis. Concomitant extensive gas in the mesenteric veins (arrows). (B) Gas in the portal veins peripherally in the liver. (C) Bilateral intense adrenal enhancement and decreased arterial perfusion in the liver. (D) Areas of decreased to absent arterial perfusion in the kidneys and liver. Also, note the small caliber of the inferior vena cava (circle).

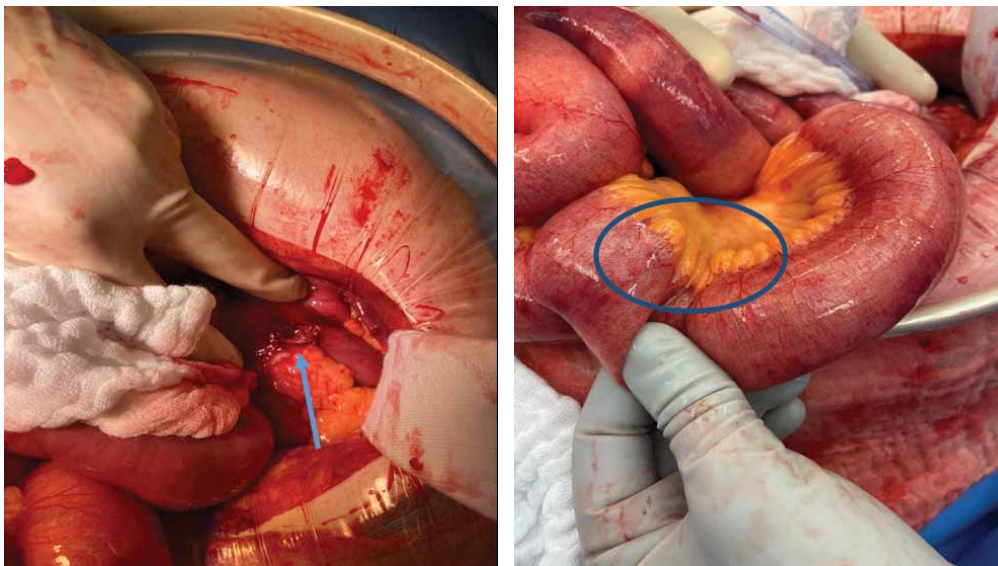


FIGURE 3. Perioperative findings show an anastomotic leakage of the previously constructed gastro-jejunostomy (arrow) as well as extensive pneumatosis within the small bowel (circle). The small bowel was oedematous and showed patchy discolouring, yet no segment was suspected of transmural or mucosal ischaemia. Peristalsis was present.

renal hyperenhancement. These are referred to as “the CT hypotension/hypoperfusion complex”. The term “shock bowel” generally nowadays only refers to the small bowel abnormalities [4].

Although first described in trauma patients, these findings and symptoms can be present in cases of prolonged and ongoing abdominal hypoperfusion and hypotension [2]. The pathophysiology behind this is assumed to be reduced cardiovascular output (which can be described as a hypovolaemic or distributive shock due to congenital heart disease, myocardial infarction, liver or renal failure, massive haemorrhage due to trauma, sepsis, ...) with increased sympathetic activity and thus splanchnic vasoconstriction resulting in decreased peripheral perfusion, insufficient oxygen delivery, and increased bowel permeability, as well as decreased fluid reabsorption and ileus. This in turn, can respectively lead to mucosal enhancement, wall thickening, and bowel distension as well as mesenteric ischaemia [1,2,5].

A search through the PubMed database with the term “shock bowel”, without limits set, identifies only 20 studies. This emphasises the lack of knowledge and recognition concerning this subject. A recent study by Elst. et al. recommends the use of signs of hypovolaemic shock complex as guidance in trauma setting for possible pending hypovolaemic shock [4].

In our case, however, we describe a patient suffering from septic shock resulting in hypoperfusion and a clinical presentation suspect of intestinal ischaemia. Even though the urgent laparotomy performed on our patient was justi-

fied due to an anastomotic leak, the abnormalities found on the abdominal X-ray and CT scan were mere indications of an ongoing septic process without intestinal ischaemia.

Patients presenting with an acute abdomen and clinical signs of septic shock should be assessed carefully as the differential diagnosis concerning the cause can be misleading. Careful clinical examination and thorough CT examination are indispensable to rule out surgical emergencies requiring immediate intervention compared to those benefiting from fluid resuscitation alone thus sparing these patients unnecessary surgery.

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REFERENCES

1. Taylor GA, Fallat ME, Eichelberger MR. Hypovolemic shock in children: abdominal CT manifestations. *Radiology*. 1987 Aug;164(2):479-81. DOI: 10.1148/radiology.164.2.3602389. PubMed PMID: 3602389.
2. Ames JT, Federle MP. CT hypotension complex (shock bowel) is not always due to traumatic hypovolemic shock. *AJR Am J Roentgenol*. 2009 May;192(5):W230-5. DOI: 10.2214/AJR.08.1474. PubMed PMID: 19380528.
3. Di Serafino M, Viscardi D, Iacobellis F, Giugliano L, Barbutto L, Oliva G, et al. Computed tomography imaging of septic shock. Beyond the cause: the “CT hypoperfu-

- sion complex". A pictorial essay. *Insights Imaging*. 2021 Jun;12(1):70. Epub 20210605. DOI: 10.1186/s13244-021-01006-5. PubMed PMID: 34089401; PubMed Central PMCID: PMC8178660.
4. Elst J, Ghijssels IE, Zuidema WP, Berger FH. Signs of post-traumatic hypovolemia on abdominal CT and their clinical importance: A systematic review. *Eur J Radiol*. 2020 Mar;124:108800. Epub 20191224. DOI: 10.1016/j.ejrad.2019.108800. PubMed PMID: 31935595.
 5. Versyck G, de Gheldere C, Vanclooster P. Non-occlusive mesenteric ischemia: two case reports and a short review of the literature. *Acta Chir Belg*. 2018 Dec;118(6):392-7. Epub 20171125. DOI: 10.1080/00015458.2017.1408280. PubMed PMID: 29173076.