

Acute Bowel Ischemia due to Contemporaneous Superior Mesenteric Artery and Vein Obstruction: MDCT Findings Before and After Intravenous Thrombolysis

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Abstract

Acute bowel ischemia is a life-threatening disease, mostly due to superior mesenteric artery or vein occlusion. It is quite rare, but it should be suspected in elderly patients with cardiovascular diseases presenting with acute abdominal pain. We discuss the case of a patient with contemporaneous arterial and venous mesenteric obstruction, which was diagnosed by means of multidetector computed tomography (MDCT). We describe the MDCT findings in our patient before and after intravenous thrombolytic therapy.

Keywords

Acute bowel ischemia; superior mesenteric artery; superior mesenteric vein; multidetector computed tomography

Abbreviations

MDCT: Multidetector Computed Tomography; SMA: Superior Mesenteric Artery; SMV: Superior Mesenteric Vein; CT: Computed Tomography

Introduction

Acute bowel ischemia can have various presentations and causes, but the most common reason for impaired blood supply to the intestines is thrombosis of the mesenteric vessels. Approximately 50% of acute mesenteric ischemia is due to SMA occlusion, and 5-15% to SMV occlusion [1, 2]. These pathologic features are well depicted by MDCT, with appropriate arterial and portal venous phases of enhancement after intravenous administration of iodinated contrast medium [3-6].

To the best of our knowledge, there is only one other report on MDCT imaging of simultaneous acute arterial and venous mesenteric obstruction, in a oncologic patient that underwent a successful SMA embolectomy and jejunum resection [7]. The peculiarity of our case is that we imaged a patient with simultaneous SMA and SMV occlusion before and after intravenous thrombolytic therapy.

Case Report

A 74-year-old male accessed the Emergency Department of our hospital for acute cardiac failure with severe hypertension and atrial fibrillation. He had a previous history of dilated cardiomyopathy,

diabetes mellitus and mild chronic renal insufficiency. At admission, his blood pressure was 240/130 mmHg. The patient was immediately treated for the hypertension, and blood pressure slowly normalized. In the following hours, he started to complain for a moderate diffuse abdominal pain. For this reason, the patient underwent plain X-ray of the abdomen (not shown), that was unspecific, and to abdominal ultrasound (not shown), that was inconclusive due to intestinal gas interposition. After patient's consent, MDCT with unenhanced, arterial and portal venous phases was then performed. The patient received 110 of iomeprol 350 mg I/ml (Iomeron®, Bracco imaging Italia S.R.L., Milan, Italy) administered intravenously in an antecubital vein, at a flow rate of 3.5 ml/sec followed by 40 ml of normal saline at the same flow rate, using a dual-head power injector (Stellant®, Medrad, INC, Warrendale, PA, USA). MDCT was performed on a 16-slice system (Mx 16-slice, Philips Healthcare, Best, The Netherlands) with the bolus tracking technique, and the parameters were: 120 kVp, 210-230 mAs, 0.6-sec rotation, pitch 0.8631, FOV 380 mm, matrix 512, slice thickness 2 mm, increment 1 mm.

The arterial phase of MDCT showed complete occlusion of the SMA 3.5 cm after its origin, extended cranio-caudally for 3 cm (Fig. 1A). In the nonenhanced phase, this portion of the SMA lumen was slightly hyperdense (Fig. 1B). The portal venous phase demonstrated subtotal obstruction of the SMV as well, extended caudo-cranially for 4 cm and nearly reaching the mesenteric-portal confluence (Fig. 1C). Other imaging findings consistent with acute bowel ischemia were mesenteric stranding, ascites, multiple diffuse air-fluid levels especially in the small intestine, impaired bowel wall enhancement (Fig. 1D).

The patient was considered inoperable for the severity and extension of the vascular obstruction, and also for the numerous comorbidities; endovascular therapy was excluded, too. Moreover, the patient asked to avoid invasive procedures. He was transferred to the Intensive Care Unit and, after careful explanation of the procedure risks and having obtained written informed consent, intravenous thrombolysis with alteplasi was attempted (Actilyse®, Boehringer Ingelheim GmbH, Ingelheim, Germany). Before the procedure the patient had mild diffuse abdominal pain with no guarding and the blood gas analysis did not show acidosis or impaired blood oxygenation; blood pressure was 150/80 mmHg. Eight hours after the procedure conclusion, he started to become hypotensive and developed respiratory distress, oliguria and finally acidosis.

MDCT was repeated 24 hours after thrombolysis, with the same technique and parameters of the first exam. The quality of the second CT was poor if compared to the first, due to the precarious clinical conditions of the patient. It showed partial and modest (estimated < 25%) SMA recanalization in the periphery of the vessel (Fig. 2A). On the venous side, a portion of the thrombus in the SMV reached the mesenteric-portal confluence (Fig. 2B). The other imaging findings described in the first CT (mesenteric stranding, ascites, multiple diffuse air-fluid levels, impaired bowel wall enhancement) were more evident in the second examination (Fig. 2C). Following the second CT, the patient underwent laparoscopy to confirm bowel ischemia (that was visually extended to the whole enteric tract), and deceased 12 hours later.

Discussion

Acute bowel ischemia is quite rare, however its incidence is increasing with the aging of the population, in fact it is estimated that approximately 1% of patients presenting with acute abdomen have it [6]. It is a life-threatening disease that can result from several conditions, the commonest being arterial

occlusion (60-70% of cases) and venous occlusion (5-10%); the most frequently affected vessels are, respectively, SMA and SMV [1, 2, 8]. The introduction of the MDCT technique, with appropriate arterial and portal venous phases of enhancement after intravenous administration of iodinated contrast medium [3-6], together with 2D and 3D images reconstruction, yielded the result of very high sensitivity, specificity and diagnostic accuracy in evaluating the causes of acute bowel ischemia, including the vascular ones [4, 9].

SMA or SMV obstruction have been described extensively in the literature, however there are few reports regarding the concurrence of mesenteric artery and vein thrombosis, and only in oncologic patients [7, 10]. In particular, the use of MDCT for diagnosis of contemporaneous SMA and SMV obstruction was described recently by Olgun et al [7]. In their patient, the procedure of SMA embolectomy and jejunum resection was successful, with a reported completely negative CT in the sixth postoperative day. In our non-oncologic patient, SMA thrombosis could be easily explained because of cardiac failure and, even more importantly, atrial fibrillation, which is one of the main causes of embolism. Prothrombotic states, local vessels injury and stasis are the most common causes of SMV obstruction, and in our patient probably venous hypercoagulopathy and stasis due to heart failure could be considered [7, 8, 11]. Moreover, we could not exclude with certainty that SMV occlusion was due to an unknown, undetected malignancy. SMA occlusion was considered acute because, together with the sudden onset of abdominal pain, vessel hyperdensity was noted in the nonenhanced phase of MDCT.

MDCT well depicted both the vascular thrombosis and the signs of ischemia of the other involved abdominal structures (impaired bowel wall enhancement, multiple diffuse air-fluid levels, mesenteric stranding, ascites), and the 2D multiplanar reconstructions were fundamental in this diagnosis. The follow-up examination was helpful in determining that endovenous thrombolysis was only partially effective on the SMA occlusion, and that the SMV thrombosis was not affected by the treatment, on the contrary the thrombus progressed. We decided to try a conservative approach, even if this could have yielded an unsatisfactory result (as actually happened), because of the precarious clinical condition of the patient, and in full agreement with him, who specifically asked to avoid invasive procedures.

Conclusion

Contemporaneous mesenteric and artery vein obstruction causing acute bowel ischemia is an extremely rare condition, which can be diagnosed with MDCT if proper arterial and venous phases after contrast are acquired, and multiplanar reconstructions are performed.

Figures

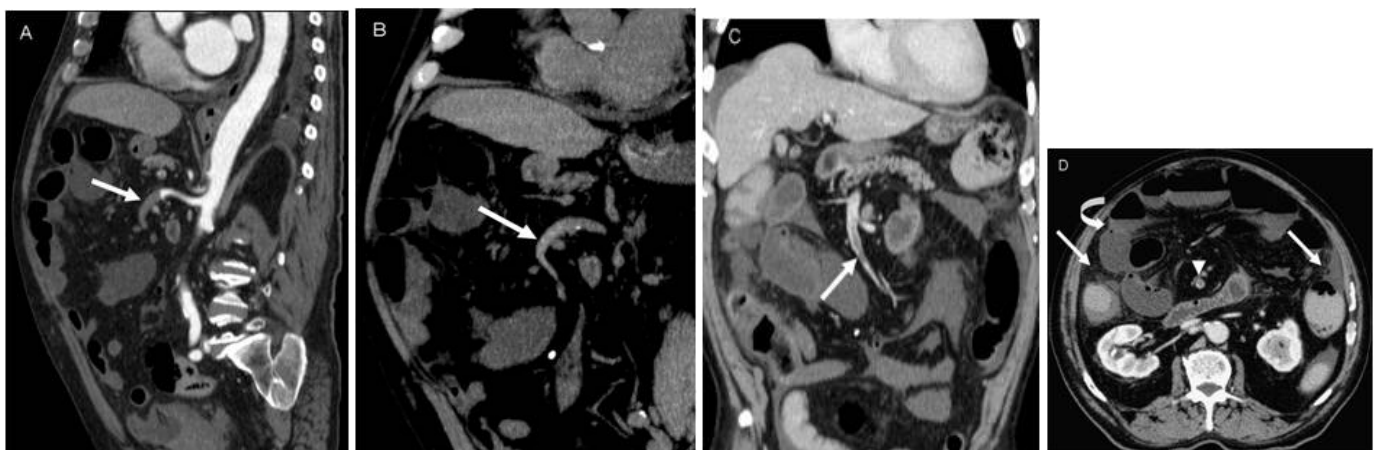


Figure 1: 74-year-old male with acute bowel ischemia; first MDCT. **A)** Parasagittal 2D reconstruction of the arterial phase after intravenous iodinated contrast showing complete occlusion of the superior mesenteric artery 3.5 cm after its origin from the aorta, extending for 3 cm cranio-caudally (see arrow). **B)** Parasagittal 2D reconstruction of the nonenhanced phase showing the slight hyperdensity of the thrombus in the superior mesenteric artery (see arrow). **C)** Paracoronal 2D reconstruction of the portal venous phase showing subtotal occlusion of the superior mesenteric vein; the thrombus, extended caudo-cranially for 4 cm and nearly reaching the mesenteric-portal confluence, spared the periphery of the vessel (see arrow). See also mesenteric stranding and ascites all over the peritoneal cavity. **D)** Axial slice of the portal venous phase showing mesenteric stranding and ascites (see arrows), multiple diffuse air-fluid levels of the small intestine and impaired bowel wall enhancement (see curved arrow), superior mesenteric vein obstruction (see arrowhead).

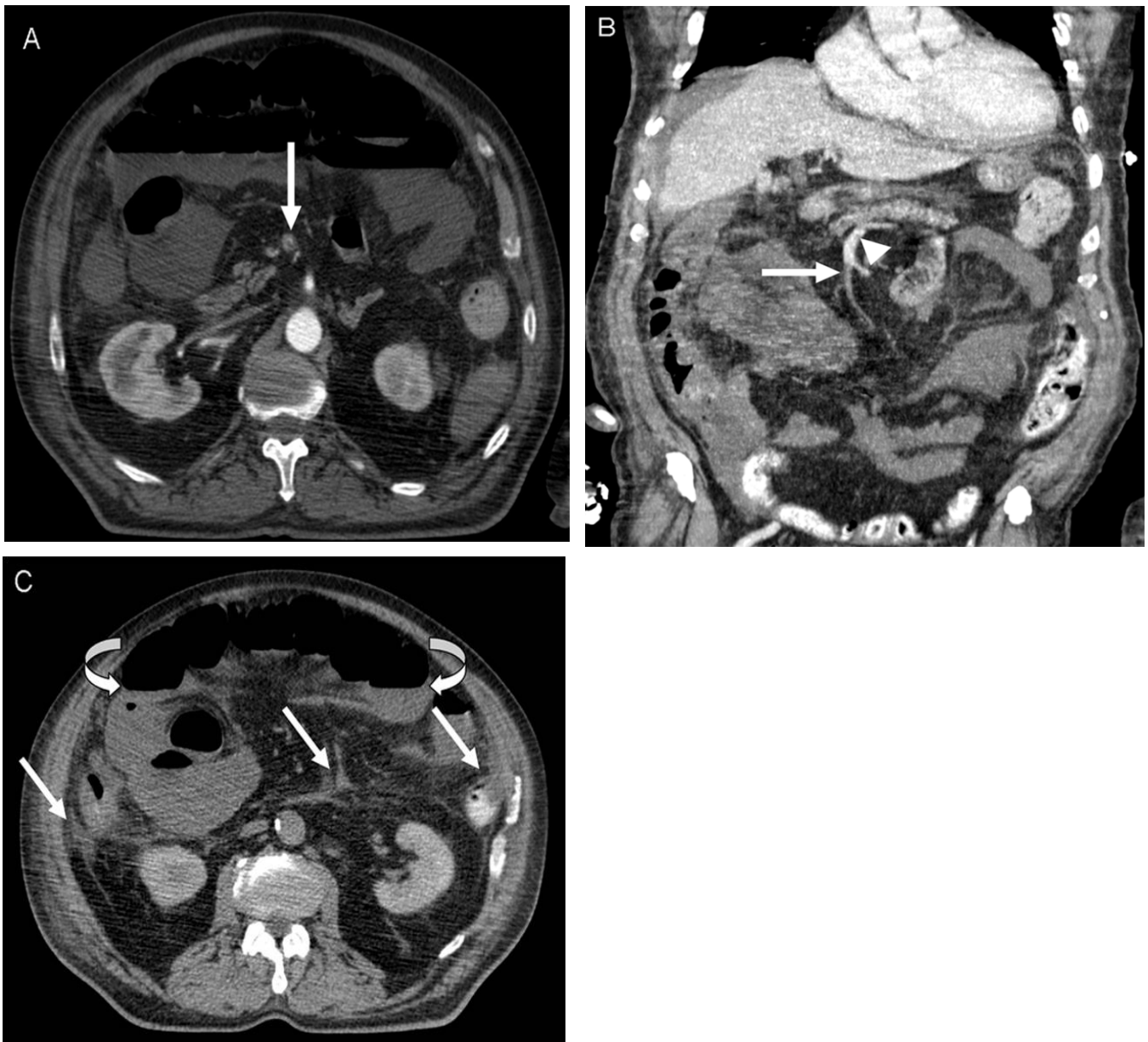


Figure 2: 74-year-old male with acute bowel ischemia; second MDCT, after intravenous thrombolysis. **A)** Axial slice in the arterial phase after intravenous iodinated contrast showing modest superior mesenteric artery recanalization in the periphery of the vessel (see arrow). **B)** Paracoronal 2D reconstruction of the portal venous phase showing that the subtotal occlusion of the superior mesenteric vein did not improve after therapy (see arrow), but a portion of the thrombus reached the mesenteric-portal confluence (see arrowhead). Mesenteric stranding and ascites all over the peritoneal cavity were more evident than in Fig. 1C. **C)** Axial slice in the nonenhanced phase showing mesenteric stranding and ascites (more evident than in Fig. 1D) (see arrows) and small bowel air-fluid levels (see curved arrows). Please note that the kidneys retained some of the contrast medium administered the day before.

References

1. Rha SE, Ha HK, Lee S, Kim J, Kim J, Kim JH, et al. CT and MR imaging findings of bowel ischemia from various primary causes. *Radiographics* 2000;20:29-42.
2. Stoker J, van Randen A, Lameris W, Boermeester MA. Imaging patients with acute abdominal pain. *Radiology* 2009;253(1):31-46. doi: 10.1148/radiol.2531090302.
3. Schieda N, Fasih N, Shabana W. Triphasic CT in the diagnosis of acute mesenteric ischaemia. *Eur Radiol* 2013;23(7):1891-1900. doi: 10.1007/s00330-013-2797-y.
4. Menke J. Diagnostic accuracy of multidetector CT in acute mesenteric ischemia. *Radiology* 2010;256(1):93-101. doi: 10.1148/radiol.10091938.
5. Moschetta M, Telegrafo M, Rella L, Stabile Ianora AA, Angelelli G. Multi-detector CT features of acute intestinal ischemia and their prognostic correlations. *World J Radiol.* 2014;6(5):130-8. doi: 10.4329/wjr.v6.i5.130.
6. Horton KM, Fishman EK. Multi-detector row CT of mesenteric ischemia: can it be done? *Radiographics* 2001;21:1463-1473.
7. Olgun DC, Bakan S, Samanci C, Tutar O, Demiryas S, Korkmazer B, et al. Simultaneous thrombosis of superior mesenteric artery and superior mesenteric vein following chemotherapy: MDCT findings. *Jpn J Radiol.* 2014;32:113-6. doi: 10.1007/s11604-013-0273-x.
8. Herbert GS, Steele SR. Acute and chronic mesenteric ischemia. *Surg Clin North Am.* 2007;87(5):1115-1134.
9. Weisner W, Hauser A, Steinbrich W. Accuracy of multidetector row computed tomography for the diagnosis of acute bowel ischemia in a non-selected study population. *Eur Radiol.* 2004;14:2347-2356.
10. Arima H, Inoue D, Tabata S, Matsushita A, Imai Y, Ishikawa T, et al. Simultaneous thrombosis of the mesenteric artery and vein as a novel clinical manifestation of intravascular large B-cell lymphoma. *Acta Haematol.* 2014;132:108-111. doi: 10.1159/000356682.
11. Singal AK, Kamath PS, Tefferi A. Mesenteric venous thrombosis. *Mayo Clin Proc.* 2013;88(3):285-294. doi: 10.1016/j.mayocp.2013.01.012.

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