

*Letter to
the Editor*

Non-Obstructive Mesenteric Ischemia after Cardiovascular Surgery: Not So Uncommon

[Letter regarding “Non-obstructive mesenteric ischemia: a potentially lethal complication after cardiovascular surgery: report of two cases.” (Ann Thorac Cardiovasc Surg 2012; 18: 56-60)]

Maria Antonietta Mazzei, MD,¹ Susanna Guerrini, MD,¹ Nevada Cioffi Squitieri, MD,¹ Giusi Imbriaco, MD,¹ Francesco Giuseppe Mazzei, MD,² and Luca Volterrani, MD¹

Keywords: multidetector computed tomography, non-obstructive mesenteric ischemia, ischemia-reperfusion

To the Editor:

We read with great interest the article by Dr. Kazui and colleagues in Vol. 18, No.1 (2012) of *Annals of Thoracic and Cardiovascular Surgery* on two successfully managed cases of non-obstructive mesenteric ischemia (NOMI) after cardiovascular surgery.¹⁾

They considered NOMI a rare complication after cardiovascular surgery (with a frequency between 0.1 and 0.87%) and, despite the usefulness of contrast-enhanced multi-detector computed tomography (MDCT) scan in the diagnosis of NOMI, they also reported that selective digital subtraction angiography (DSA) of the mesenteric arteries is still the gold standard for the diagnosis of this devastating condition, by demonstrating the mesenteric vasospasm.^{1,2)}

Some authors have already reported the usefulness of MDCT for the diagnosis of NOMI, as a valid diagnostic alternative to catheter angiography, by assessing the morphology and diameter of the superior mesenteric artery (SMA) on multi-planar reconstructed images.³⁻⁵⁾

¹Department of Human Pathology and Oncology, Section of Radiological Sciences, University of Siena, Siena, Italy

²Department of Diagnostic Imaging, Azienda Ospedaliera Universitaria Senese, Siena, Italy

Received: September 24, 2012; Accepted: October 29, 2012

Corresponding author: Maria Antonietta Mazzei, MD. Assistant Professor of Radiology, Department of Human Pathology and Oncology, section of Radiological Sciences, University of Siena, Viale Bracci 10, Siena 53100, Italy

Email: mariaantonietta.mazzei@unisi.it; mamazzei@gmail.com

©2013 The Editorial Committee of *Annals of Thoracic and Cardiovascular Surgery*. All rights reserved.

In our case history, composed of a group of 25 subjects (20 males, 5 females, mean age 72.28; range 49–88) with a confirmed diagnosis of NOMI who underwent MDCT between July 2003 and February 2012, this condition was also a complication after cardiovascular surgery in 6 patients (24%). This fact reflects the concept that cases of NOMI are increasingly common due to the ageing of society and to the increase in the number of cardiovascular interventions in elderly patients.

From a diagnostic point of view, also in our case history MDCT is proved to be an equivalent useful modality compared to angiography for the diagnosis of NOMI by interpreting the morphologic appearance and diameter of SMA. In particular, in the early phase of NOMI, CT appearances regarding the abnormal arterial findings are superimposable to angiography, revealing the narrowing of many branches of the SMA, spasm of the intestinal marginal artery, and poor contrast enhancement of veins in the muscular layer as a feature of vasospasm, associated with NOMI. In our patient population, the mean value of the SMA diameter was 4.6 +/- 1.4 mm (range 2.2–7.4 mm), whereas it was 3.4 +/- 1.1 mm, in the study of Woodhams R.^{3,6)} In both studies, a significant difference with controls was found and the average SMA diameter was consistent within the errors. In addition, in line with our experience too, the great advantage of MDCT, in comparison to angiography, is the possibility to also evaluate mesenteric, bowel and peritoneal findings and not only the appearance of the vessels.⁶⁻⁷⁾ In our case history, mesenteric, bowel and peritoneal CT features were observed in all CT examinations, ranging from 7.14% (free air in peritoneal cavity) to 82.14%

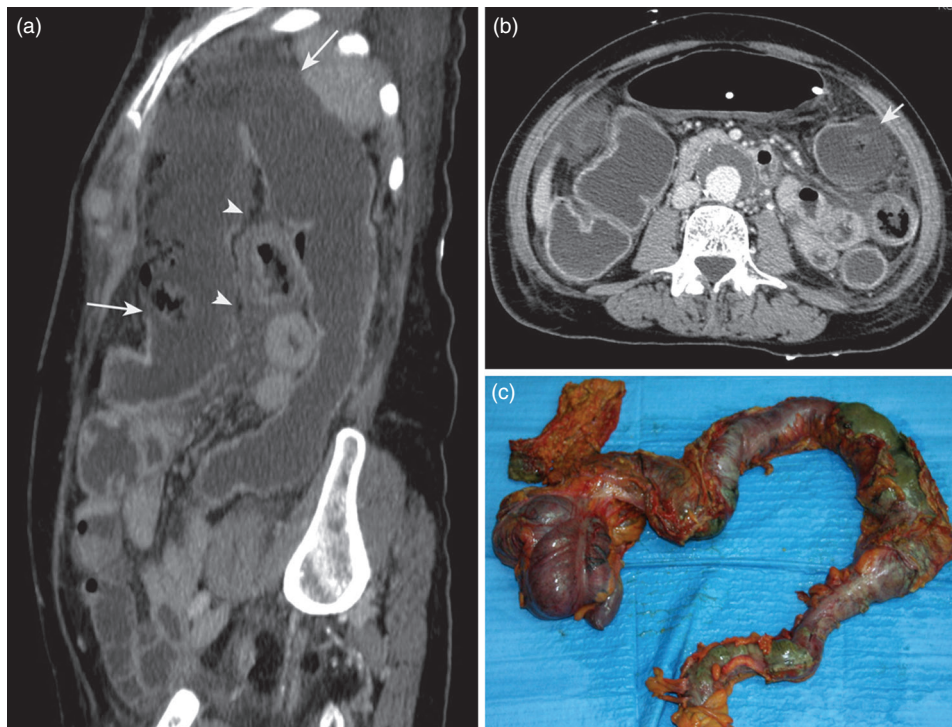


Fig. 1 Abdominal CT and surgical specimen of a clinical case of NOMI after major cardiovascular surgery. The extracted images of the CT examination, on sagittal-oblique reconstruction plane (a) and axial plane (b), clearly showing the portion of the colic wall affected by necrosis, proved thin and without contrast-enhancement, exactly matching the necrotic portion of the surgical specimen resected one hour after the CT examination (c).

(mesenteric fat stranding) and some of these demonstrated significant correlation to the reperfusion event (mesenteric fat stranding, $p = 0.026$, bowel wall thickening, $p = 3.2E-05$, and high attenuation of the bowel wall on unenhanced CT images, $p = 2.6E-04$), a condition that is more common in NOMI than in the intestinal ischemia from obstructive (arterial or venous) etiology, and that probably should also be explored with magnetic resonance imaging (MRI), avoiding multiple administration of contrast media when diagnostic follow-up of the evolution of this condition over time can be proposed as an alternative to surgery.⁸⁻¹⁰ MDCT is also the best imaging modality to demonstrate necrotic damage of the bowel wall, limiting surgery to the excision of the irreversibly necrotized intestine (**Fig. 1**).¹¹

Finally, we unequivocally agree with Dr. Kazui and colleagues about the role of angiography for treatment of this condition, with selective infusion of vasodilator drugs and, above all about the clinical lesson of their article, according to the fact that when a patient suffers from a vague abdominal symptoms early after a major cardiovascular operation, even if the blood markers, such as elevation of lactic acid, LDH, and/or CK are

absent, NOMI should be considered as one of the presumed causes.

Disclosure Statement

There are no disclosure statements about potential conflicts of interest.

References

- 1) Kazui T, Yamasaki M, Abe K, et al. Non-obstructive mesenteric ischemia: a potentially lethal complication after cardiovascular surgery: report of two cases. *Ann Thorac Cardiovasc Surg* 2012; **18**: 56-60.
- 2) Siegelman SS, Sprayregen S, Boley SJ. Angiographic diagnosis of mesenteric arterial vasoconstriction. *Radiology* 1974; **112**: 533-42.
- 3) Woodhams R, Nishimaki H, Fujii K, et al. Usefulness of multidetector-row CT (MDCT) for the diagnosis of non-occlusive mesenteric ischemia (NOMI): assessment of morphology and diameter of the superior mesenteric artery (SMA) on multi-planar reconstructed (MPR) images. *Eur J Radiol* 2010; **76**: 96-102.
- 4) Kamimura K, Oosaki A, Sugahara S, et al. Survival of three nonocclusive mesenteric ischemia patients

- following early diagnosis by multidetector row computed tomography and prostaglandin E1 treatment. *Intern Med* 2008; **47**: 2001-6.
- 5) Mitsuyoshi A, Obama K, Shinkura N, et al. Survival in nonocclusive mesenteric ischemia: early diagnosis by multidetector row computed tomography and early treatment with continuous intravenous high-dose prostaglandin E(1). *Ann Surg* 2007; **246**: 229-35.
 - 6) Mazzei MA, Mazzei FG, Imbriaco G, Guerrini S, Foderà E, Centra M, Marrelli D, Volterrani L. Non-occlusive mesenteric ischemia: CT features and their prognostic values. *ESGAR 2012, Edinburgh, Book of Abstracts: Insight into Imaging volume3/supplement2/SS-9.08/2012 DOI: 10.1007/s13244-012-0171-2*.
 - 7) Mazzei MA, Mazzei FG, Marrelli D, et al. Computed tomographic evaluation of mesentery: diagnostic value in acute mesenteric ischemia. *J Comput Assist Tomogr* 2012; **36**: 1-7.
 - 8) Mazzei MA, Guerrini S, Cioffi Squitieri N, et al. MRI: is there a role in clinical management for acute ischemic colitis? *World J Gastroenterol* 2013; In press.
 - 9) Berritto D, Somma F, Landi N, et al. Seven-Tesla micro-MRI in early detection of acute arterial ischaemia: evolution of findings in an in vivo rat model. *Radiol Med* 2011; **116**: 829-41.
 - 10) Iacobellis F, Berritto D, Somma F, et al. Magnetic resonance imaging: a new tool for diagnosis of acute ischemic colitis? *World J Gastroenterol* 2012; **18**: 1496-501.
 - 11) Mazzei MA, Guerrini S, Cioffi Squitieri N, et al. Diagnosis of acute mesenteric ischemia/infarction in the era of multislice CT. *Recenti Prog Med* 2012; **103**: 435-7.