

CASE STUDY

ACUTE EMBOLISM OF THE SUPERIOR MESENTERIC ARTERY AND SIGNIFICANT STENOSIS OF THE CELIAC TRUNK SUCCESSFULLY TREATED WITH PERCUTANEOUS ANGIOPLASTY AND STENT IMPLANTATION

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ABSTRACT

Among patients presenting with acute abdominal symptoms, patients with acute mesenteric ischemia (AMI) constitute 0.09% - 0.2% of cases. Unfortunately, due to the short period between the first symptoms and irreversible ischemic changes in the intestine, the mortality rate in this group is high – up to 60% - 100%. We present a case of a 75-year-old female with severe comorbidities (ischemic heart disease, atrial fibrillation, poorly controlled arterial hypertension, and a history of colorectal carcinoma previously treated with radio- and chemotherapy). The patient was admitted due to severe abdominal pain. Computed tomography (CT) confirmed superior mesenteric artery (SMA) and celiac trunk embolism. Due to the relatively short time of symptoms onset as well as the soft abdomen, the patient was qualified for percutaneous treatment. Successful percutaneous transluminal angioplasty was performed with stent implantation to SMA and celiac trunk (Neptun C, Balton, Poland). As a result, the patency of both arteries was fully restored. The patient's condition improved within 24 hours, and she was discharged home.

KEY WORDS: SMA embolism, celiac trunk embolism, endovascular surgery, Neptun C stent

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INTRODUCTION

Among patients presenting with acute abdominal symptoms, patients with acute mesenteric ischemia (AMI) constitute 0.09-0.2% of cases [1]. Unfortunately, due to the short period between the first symptoms and irreversible ischemic changes in the intestine, the mortality rate in this group is high – up to 60-100% [2]. The short period between the symptoms' occurrence and intestine necrosis, as well as diagnostic difficulties delaying the final diagnosis and qualification into urgent surgery, are the causes of high mortality.

CASE REPORT

A 75-year-old woman was admitted to the Department of Vascular Surgery due to severe, recurrent abdominal pain accompanied by nausea and vomiting. She presented less severe, but similar symptoms for several months after meals. These symptoms were not associated with a significant weight loss. However, in the last three months, the symptom intensity increased and was accompanied by a moderate weight loss (5-6 kg). As a result, the patient was hospitalized twice in the Department of General Surgery and later in the Department of Internal Medicine.

In the emergency computed tomography (CT) scans, total occlusion of the superior mesenteric artery (SMA) was found together with significant stenosis of the celiac trunk (Fig. 1 and 2). Moreover, CT scans revealed embolic material in the lumen of both vessels.

After admission to the Department of Vascular Surgery, the abdomen was soft, slightly painful on deep palpation, with no pathological resistance, no peritoneal symptoms, and with preserved intestine function. In per rectum examination, no blood was found. The decision of the endovascular approach was based on the high risk of open repair surgery due to severe comorbidities.

An introducer sheath (90 cm/6F) was placed in the abdominal aorta from the brachial approach. After contrast injection, total occlusion of SMA and significant stenosis of the celiac trunk were observed (Fig. 3). The hydrophilic guidewires (Victory 0.18" 25 g) were advanced to the celiac trunk and SMA. The flow in SMA was restored. After predilation (PBA balloon 4x30 mm), balloon-expandable Neptun C stents (Balton, Poland) were implanted to celiac trunk and SMA. Both stents had 5 mm in diameter and 30 mm in length (Fig. 4).

After the procedure, abdominal pain was completely relieved and did not reoccur after a light meal. The Doppler examination performed the next day confirmed the full patency of SMA and celiac trunk (Fig. 5). The patient was discharged after 24 hours.

DISCUSSION

In recent years, we have observed that acute intestinal ischemia is mainly caused by the occlusion of SMA and/or the celiac trunk. The most common cause of occlusion (40-50%) is an embolic material originating from the left

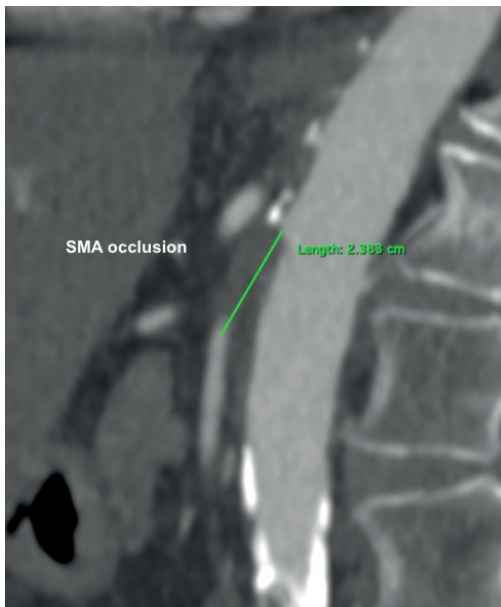


Fig. 1. CT scan showing SMA occlusion.

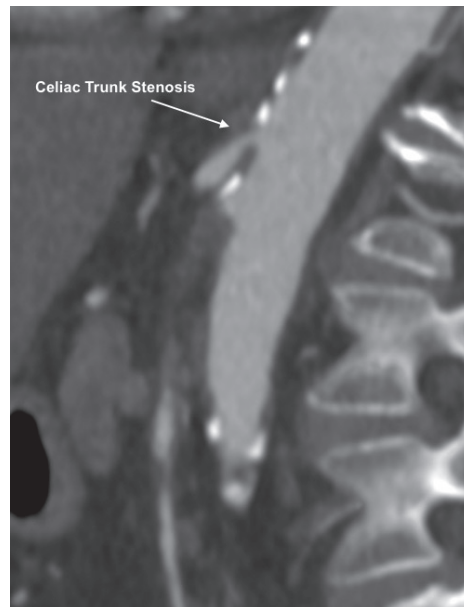


Fig. 2. CT scan showing the celiac trunk stenosis



Fig. 3. SMA occlusion revealed in the invasive angiography.

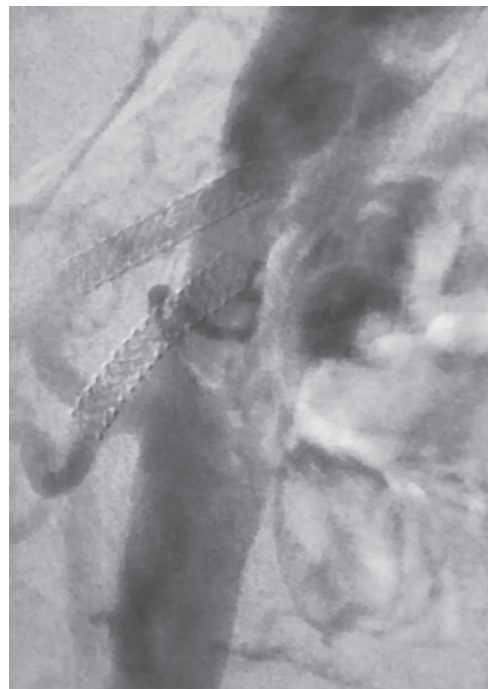


Fig. 4. Two stents (Neptun C, Balton, Poland) implanted in the celiac trunk as well as SMA

atrium/ventricle, mainly in the course of atrial fibrillation [3]. The second cause is thrombosis of atherosclerotic lesions in these vessels [4]. The less common reasons for AMI might be thrombosis due to severe dehydration, condition after radiotherapy of the epigastric area, or inflammatory bowel diseases. Also, since 2020, numerous reports have been published describing AMI as a complication in the course of SARS-CoV-2 infection [5].

Regardless of the cause, the symptoms of the disease are non-specific, and the clinical examination does not lead to the final diagnosis. Therefore, the definitive diagnosis is often challenging to establish. Nevertheless, the prompt diagnosis is

critical for successful treatment and, in many cases, a crucial element deciding on the patient's survival. According to the literature reports, the chances of survival are 50% in the case of diagnosis-to-treatment time within a 24-hour window. Beyond this period, the mortality rate increases to 70% [2].

Until recently, transcatheter mesenteric angiography was the gold standard in diagnosing mesenteric artery thrombosis; however, now experts state that CT angiography is the comparable and quickly available modality, allowing for accurate imaging of SMA and celiac trunk patency. This also allows for setting the final diagnosis within the above time frame [6-8].

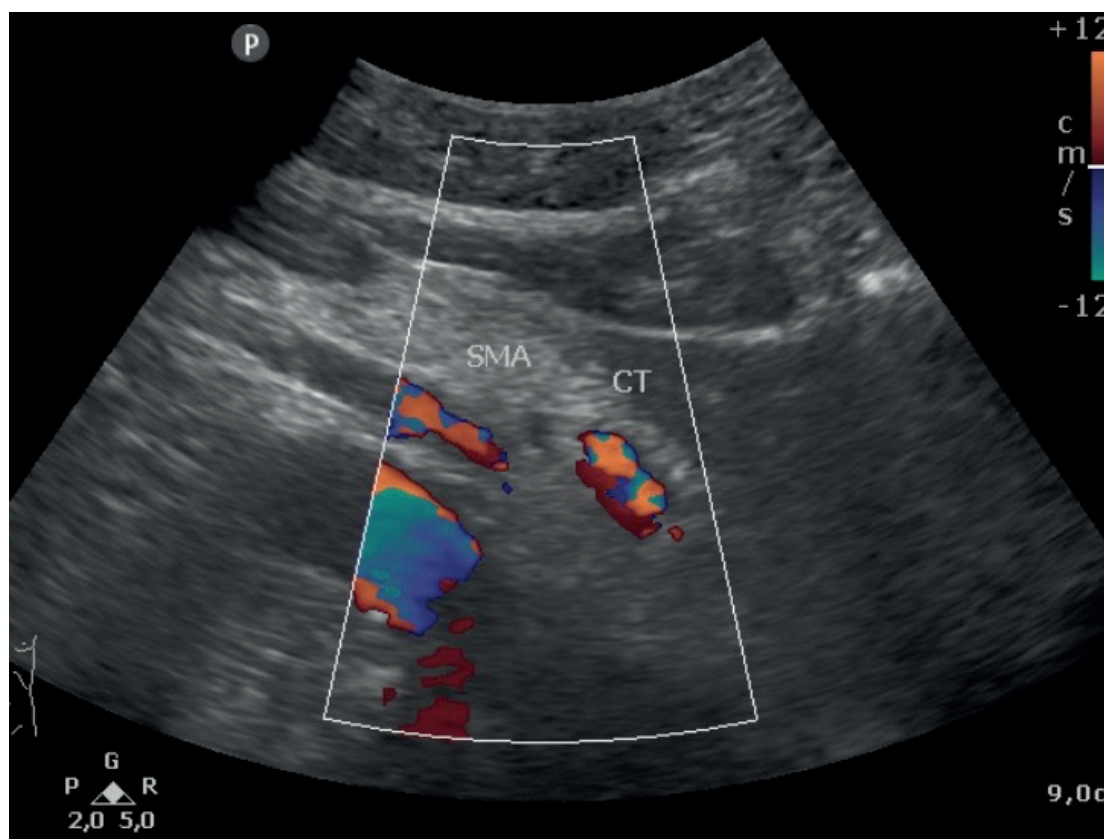


Fig. 5. Doppler examination showing the successful revascularization procedure with the restored flow in the celiac trunk and SMA.

If peritoneal symptoms are present, urgent laparotomy is the treatment of choice. In most cases, however, intestinal necrosis develops, requiring resection of the necrotic tissues. If the necrosis is not complete, a thrombectomy/embolectomy with a second-look option can be performed after 24 hours to reassess the intestine condition. Unfortunately, most often, the only possibility is an intestine resection procedure together with jejunostomy [9].

In cases when no peritoneal symptoms are present and the symptoms last shortly, percutaneous methods may be applied. Often, in this scenario, their efficacy is higher than open surgery. For example, targeted thrombolysis [7, 10-11], mechanical thrombectomy using small diameter devices [12], or, as reported in this paper, angioplasty with stent implantation may be used. The great advantage of the percutaneous method is the possibility of avoiding laparotomy, which significantly increases the chances of survival in patients with numerous comorbidities. In that group, the mortality rate after open surgery is very high and reaches up to 90% [13].

CONCLUSIONS

In the case of acute occlusion of SMA or celiac trunk, an endovascular approach is an efficient option compared to open repair, especially in patients with severe comorbidities. Furthermore, the short decision time is an important factor influencing the future outcome of the patient, especially in decreasing the risk of intestine necrosis.

REFERENCES

1. Bala M, Kashuk J, Moore EE, et al. Acute mesenteric ischemia: guidelines of the World Society of Emergency Surgery. *World J Emerg Surg* [Internet]. 2017 Dec 12(1). <http://wjeb.biomedcentral.com/articles/10.1186/s13017-017-0150-5> [Access: 2021 Oct 28];
2. Boley SJ, Feinstein FR, Sammartano R, Brandt LJ, Sprayregen S. New concepts in the management of emboli of the superior mesenteric artery. *Surg Gynecol Obstet*. 1981 Oct;153(4):561–9.
3. Acosta S. Epidemiology of mesenteric vascular disease: clinical implications. *Semin Vasc Surg*. 2010 Mar;23(1):4–8.
4. Acosta S, Ögren M, Sternby N-H, Bergqvist D, Björck M. Clinical Implications for the Management of Acute Thromboembolic Occlusion of the Superior Mesenteric Artery: Autopsy Findings in 213 Patients. *Ann Surg*. 2005 Mar;241(3):516–22.
5. Pirola L, Palermo A, Mulinacci G, Ratti L, Fichera M, Invernizzi P, et al. Acute mesenteric ischemia and small bowel imaging findings in COVID-19: A comprehensive review of the literature. *World J Gastrointest Surg*. 2021 Jul 27;13(7):702–16.
6. Acosta S. Mesenteric ischemia. *Curr Opin Crit Care*. 2015 Apr;21(2):171–8.
7. Franca E, Shaydakov ME, Kosove J. Mesenteric Artery Thrombosis. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 <http://www.ncbi.nlm.nih.gov/books/NBK539763/> [Access: 2021 Oct 28].
8. Xie J, Yan W, Liu J, Zhou Z, Zhao J, Chen B. [Multi-slice CT angiography in the diagnosis of lesions of mesenteric artery and mesenteric vein]. *Zhong Nan Da Xue Xue Bao Yi Xue Ban*. 2014 Jun;39(6):612–7.
9. Acosta S. Surgical management of peritonitis secondary to acute superior mesenteric artery occlusion. *World J Gastroenterol*. 2014;20(29):9936.
10. Kozłowski W, Uryniak A. Superior mesenteric artery embolism effectively treated with endovascular methods — case study. *Chir Pol*. 2012;14(1–2):118–25.

11. Björnsson S, Björck M, Block T, Resch T, Acosta S. Thrombolysis for acute occlusion of the superior mesenteric artery. *J Vasc Surg.* 2011 Dec;54(6):1734–42.
12. Kuhelj D, Kavcic P, Popovic P. Percutaneous mechanical thrombectomy of superior mesenteric artery embolism. *Radiol Oncol.* 2013;47(3):239–43.
13. Christensen MG, Lorentzen JE, Veith Schroeder T. Revascularisation of atherosclerotic mesenteric arteries: Experience in 90 consecutive patients. *Eur J Vasc Surg.* 1994 May;8(3):297–302.

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Conflict of interest

The Authors declare no conflict of interest.

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