

# Superior mesenteric artery thrombosis managed percutaneously by timely combining aspiration thrombectomy with angioplasty and stents

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## Case presentation

A 65 years old woman with hypertension, diabetes mellitus and history of coronary artery bypass grafting presented with abdominal pain, nausea, vomiting since two days and one day history of maroon colored bowel movements. Her blood pressure was 190/100 and her abdomen was diffusely tender. Urgent CT scan with intravenous contrast detected thrombosis of the Superior Mesenteric Artery (SMA) but no bowel wall edema or pneumatosis intestinalis (air within bowel wall). The patient, therefore, underwent emergent, percutaneous intervention consisting of a challenging aspiration thrombectomy followed successfully by angioplasty and bare metal stent placement. The patient tolerated the procedure well and was discharged from the hospital. She did not need any small or large intestinal resection which is usually expected even after a successful percutaneous intervention [1] re-iterating the importance of timely

successful intervention in this patient population to prevent major morbidity and mortality.

## Discussion

Acute thrombo-embolic occlusion of the SMA leads to intestinal infarction and is associated with a mortality rate of around 65% [2]. The key to salvage ischemic bowel and prevent patient death is rapid revascularization as well as early diagnosis before bowel ischemia progresses to irreversible bowel necrosis. Therefore, early clinical and radiological diagnosis and appropriate treatment is required for a good prognosis. The primary goal of therapy is rapid and complete restoration of SMA flow and hopefully preserve entire bowel viability. Surgery such as SMA embolectomy, revascularization, SMA bypass, and resection of necrotic bowel, have been attempted, but the peri-operative mortality still remains more than 50% [3]. Failed thrombolysis has been a well-known phenomenon in acute phases and is directly connected with bowel necrosis followed by urgent laparotomy and/or patient death. Adjunctive balloon angioplasty with failed thrombolysis has been reported [4] but use has not popularized due to the fear of distal embolization. On the other hand, a well timed combined use of aspiration thrombectomy with angioplasty and stent could prove safe, effective and relatively longer term solution considering risk factor control remains optimum.

Regarding our patient; with more than a day of symptom history, we thought it was too late for effective thrombolysis. And although the proximal site of the SMA and major branches was found to be occluded in our patient, signs of bowel necrosis on abdominal CT or X-Ray (for e.g. bowel wall edema or pneumatosis intestinalis) had not yet developed. This led the team decision towards relatively

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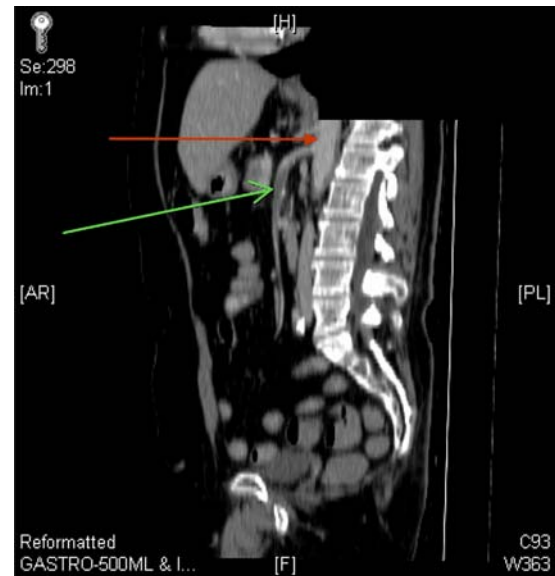
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safer but more challenging percutaneous intervention. To relieve life-threatening mesenteric ischemia, distal-to-proximal aspiration was attempted by the newer and flexible Pronto™ aspiration catheter (Vascular Solutions, Minneapolis, Minnesota, USA) with the help of 6 Fr Judkins Right 4 (JR-4) Launcher guide catheter (Medtronic). It was followed by transluminal angioplasty with a 3 × 30 mm balloon catheter and two multi-link Rx Zeta coronary artery stent system (Guidant Corporation) of sizes 3 × 38 mm and 4.5 × 18 mm respectively. These were pulse dilated and revealed excellent angiographic results. Eptifibatide was continued for 18 h after the procedure. Patient was discharged on plavix for a month and has now followed up for more than a year without any complications or requirement of repeat procedure.

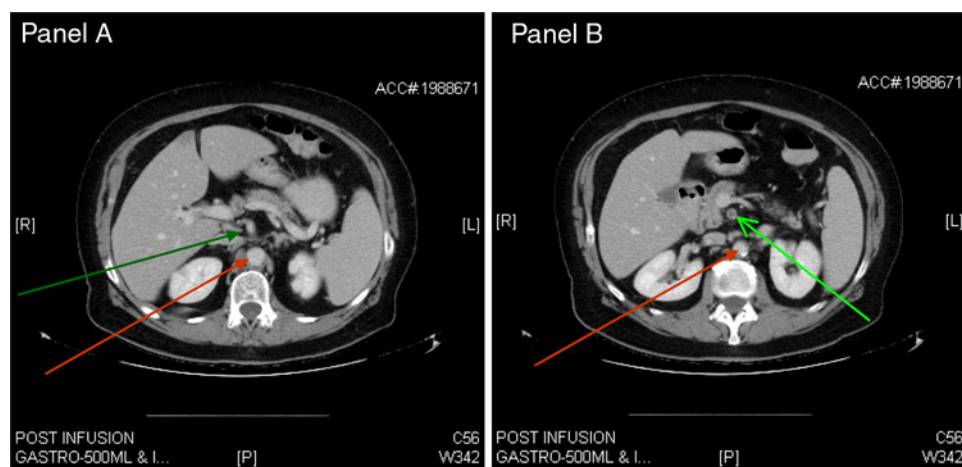
The Pronto device is a dual-lumen rapid-exchange aspiration thrombectomy catheter with an atraumatic distal tip and sloped extraction lumen designed to protect the vessel wall. It has been well utilized for coronary in-stent thrombosis as well as thrombosis of saphenous vein grafts to the coronaries [5]. The efficacy of this type of rapid-exchange, low-suction aspiration device in mesenteric thrombosis has been shown [6]. But the lack of active defragmentation of thrombus before removal, available in X-sizer catheter (eV3, Plymouth, MN, USA), and Angiojet thrombectomy catheter (Possis Medical, Minneapolis, MN, USA), makes other devices less effective in case of massive thrombus [7]. Concurrently though, these require a larger caliber guidewire and are similar to other available aspiration thrombectomy catheters in having a disadvantage of vessel wall damage, less flexibility and hence approachability, resulting in an incomplete aspiration of embolus/thrombus burden especially from distal segment

of SMA or branches. These scenarios of difficult calibration of distal branches and incomplete thrombus aspiration of peripheral vessels are more frequent in small lumen peripheral interventions. The Pronto device becomes extremely useful in above and also provides relatively easier maneuverability (Figs. 1, 2, 3, 4, 5, and 6).

To our knowledge, this is the first report of its kind in successfully utilizing the Pronto aspiration thrombectomy catheter for the management of relatively acute, pathologically fresh thrombosis of the SMA. Further large



**Fig. 2** Reformatted sagittal CT image through the aorta (*red arrow*) where contrast can be seen in the aorta but could not traverse past the proximal segment of the superior mesenteric artery (SMA) (*green arrow*). (Color figure online)

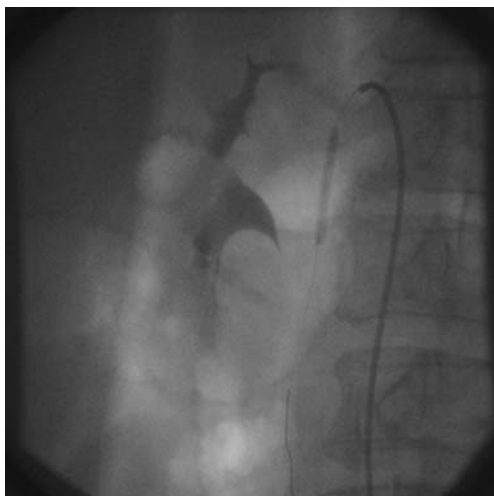


**Fig. 1** CT scan of the abdomen. Panel **a** showing adequate contrast at the most proximal portion of the SMA (*green arrow*) branching out of the aorta (*red arrow*). Panel **b** showing the lack of contrast in the

SMA in the next CT section (*green arrow*) while contrast is visible in the aorta (*red arrow*). This is suggestive of proximal SMA occlusion. (Color figure online)



**Fig. 3** Angiogram showing the failure of contrast flow through the thrombus in the proximal SMA (*circle*)



**Fig. 4** Angiogram image showing aspiration thrombectomy via the Pronto thrombectomy extraction catheter with help of JR4 guiding catheter



**Fig. 5** After aspiration thrombectomy, balloon angioplasty and stent placement depicting excellent filling of the SMA



**Fig. 6** The Pronto catheter (Vascular Solution, Minneapolis, USA) is a rapid-exchange, 6F compatible, thrombus-aspirating catheter. It has a soft, flexible non-traumatic tip, and a sloped extraction lumen opening to protect arterial wall during extraction. A 30 ml luer-lock syringe is connected to the proximal hub of the central lumen for thrombus aspiration

conclusive studies are warranted as the above described use of rapid-exchange, low-profile catheter for aspiration thrombectomy, either in combination with angioplasty and stent or alone, could provide a possible low mortality treatment option for the management of SMA thromboembolism.

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