CASE REPORT
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Massive intestinal mesenteric portal vein ischemia: Percutaneous endovascular thrombolysis as minimally invasive step-up approach

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ABSTRACT

Acute mesenteric ischemia represents a group of diseases, which lead to an abrupt interruption of blood flow to the small intestine resulting in intestinal necrosis. Its first symptoms are vague and in the majority of cases nonspecific, so the diagnostic suspicion is of the utmost importance to establish the correct diagnostic and prompt treatment. It is a complex and difficult event, that needs a multidisciplinary approach involving different specialties such as gastrointestinal and vascular surgeons, interventional radiologists, and expertise from the acute care unit team. The fundamental aspect is the precocity of diagnostic based on abdominal computed angio-tomography and the immediate re-establishment of blood supply to the affected areas. In this report, we introduce a case of a patient with mesenteric venous thrombosis, who has beenundergone a percutaneous endovascular treatment (portal-mesenteric mechanical thrombectomy, besides an intravenous thrombolytic infusion), due to poor clinical response after anticoagulation approach that needed mechanical ventilation.

Keywords: Intestinal ischemia, thrombolysis, endovascular thrombectomy, emergency surgery, management

INTRODUCTION

Acute mesenteric ischemia (AMI) is the abrupt interruption of the blood flow to the small intestine, leading to cellular injury, intestinal necrosis, and considerable lethality (1-6). It is classified as occlusive or non-occlusive: The first one has three main causes: arterial embolism (50%), arterial thrombosis (15-25%) and acute mesenteric venous thrombosis (AMVT) (5-15%). The initial complaints, in the majority of cases, are vague. The presence of colic, nausea, vomiting, anorexia, and even diarrhea, lower digestive bleeding represent the most common manifestations of the disease, which has a low incidence (0.09-0.2% of all acute admissions) (2,4,6). Moreover, the acute care surgeon must be aware of the clinical history, investigating risk factors that contribute to the Virchow's triad (2). The high clinical suspicion allied to angio-computed-abdominal tomography (ACAT) can establish the prompt diagnosis, which represents the most reliable indicator of the disease's management success (4,6,7).

AMVT treatment requires a multidisciplinary approach involving gastrointestinal and vascular surgeons, interventional radiologists, and an acute care team, due to its inherent pathophysiologic complexity. The treatment of choice is based on clinical setting, hemodynamic status, and the presence of peritonitis. The goal is to reestablish, as soon as possible, the blood flow to affected areas regardless of the etiology (4,6). In AMVT, the first-line treatment is non-operative, based on anticoagulation. The approach has good outcomes in the majority of cases (1,6). In cases where there is clinical deterioration and no response to previous measures, endovascular treatment has emerged as an interesting option. It includes mechanical thrombectomy

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and/or catheter-directed thrombolysis via transhepatic or transjugular portosystemic access (1-4).

The aim of the manuscript is to report a clinical case of AMI caused by mesenteric-portal axis thrombosis, which, after a dismal response to the pharmacologic approach, underwent percutaneous endovascular thrombectomy treatment.

For this case report, informed consent was obtained from the patient (or their legal guardian) for the publication of clinical details and any accompanying images. The patient was informed about the purpose of the report, and their anonymity was ensured by omitting any identifying information.

CASE REPORT

A 22-year-old female patient, who has a family history of thrombophilia and is using oral contraceptives, was examined in the emergency room. She complained of abdominal pain that had lasted for 10 days and was refractory to common analgesia. The physical exam showed contracture and abdominal tenderness, laboratory tests showed leukocytosis, and the urgent non-contrast computed tomography (CT) revealed free liquid inside the abdominal cavity. she underwent an exploratory laparotomy in an emergency situation. The intra-operative finding was diffuse cyanosis in the small intestine, without abnormality of peristalsis or necrosis. An ACAT was performed on post-operative day one, which showed extensive thrombosis of mesenteric-portal veins, associated with intestinal edema and ascites, without imaging signs of bowel necrosis (Figure 1). The patient was then subjected to full anticoagulation with continuous infusion of unfractionated heparin-bolus of 80 UI/kg followed by 18 UI/kg/hour. Unfortunately, she showed no clinical improvements after 24 hours following the onset of treatment. However, there was progressive pain, a decline in clinical and laboratorial parameters such as leukocytosis, anemia, tachycardia, vomiting, and abdominal distension; however, there were no signs of peritonitis. After multidisciplinary discussion, the decision was to perform an endovascular percutaneous approach. The planned procedure involved percutaneous access with the NPAS kit and insertion of catheters from the portal vein to the superior mesenteric vein, followed by pharmacologic thrombolysis of the portal-mesenteric axis with recombinant tissue plasminogen activator using a multiperforated catheter (Figure 2). The next step was a mechanical thrombectomy with the rotarex device and thrombus suctioning with a guide catheter 7F (Figure 2E). The transhepatic access was embolized with histoacryl and lipiodol glue (Figure 2F). The patient remained on full anticoagulation for 21 days. She demonstrated significant improvements in clinical and laboratory parameters, despite a self-limited episode of melena. She was discharged 10 days after the procedure with an oral anticoagulant.

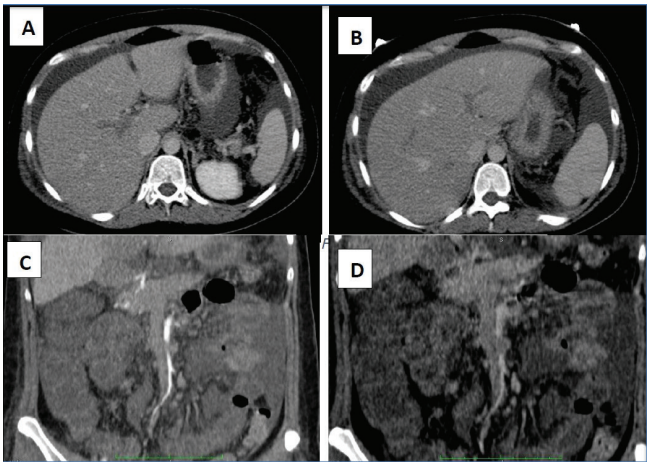

Figure 1. Extensive mesenteric-portal thrombosis.

A) and (B) - Axial CT angiography, portal phase with thrombosis of right and left port branches; portal phase CT angiography with thrombosis of the left port branch; (C) - Coronal angio-CT arterial phase with patent superior mesenteric artery; (D) - Coronal angio-CT venous phase with no superior mesenteric opacification compatible with extensive thrombosis associated with thickening of intestinal loops.

CT: Computed tomography

DISCUSSION

The AMVT corresponds to 6 to 9% of mesenteric ischemia and its mortality remains high (from 19 to 23%) (2,6), mostly due to delay in the diagnostic workup prompt treatment, which should be started in the emergency room. Another aspect that should not prevent the precocity of the diagnosis refers to delay in the ACAT requesting, due to an old paradigm: i.e., fear from the development of renal failure induced by iodine contrast in elderly patients. In this aspect, it is important to highlight that it is not an absolute truth so controversies on the subject remain (7).

The pivotal role of the contrast-enhanced CT with intravenous contrast administration is undeniable when rapid intervention is needed to improve outcomes in an emergency setting.

Moreover, a recent systematic review showed that the incidence of contrast-induced nephropathy after intravenous contrast administration is very low in the general population (8).

In the clinical history, it is relevant to search for risk factors that predispose the formation of clots, like a positive family history for thrombophilia and the use of oral contraceptives, as seen in this case (2). In stable patients without signs of peritonitis, a non-operative approach with anticoagulation is the first line of treatment, with up to three quarters of patients achieving partial resolution of the thrombus and a good clinical outcome (4). The management may be started with low molecular weight heparin (LMWH) and continued with oral administration of warfarin. If the initial symptoms are severe, suddenly worsens or ACAT shows intestinal edema and others sign of progressive venous splanchnic congestion, then, continuous infusion of unfractionated heparin should replace LMWH (1,6). Moreover,

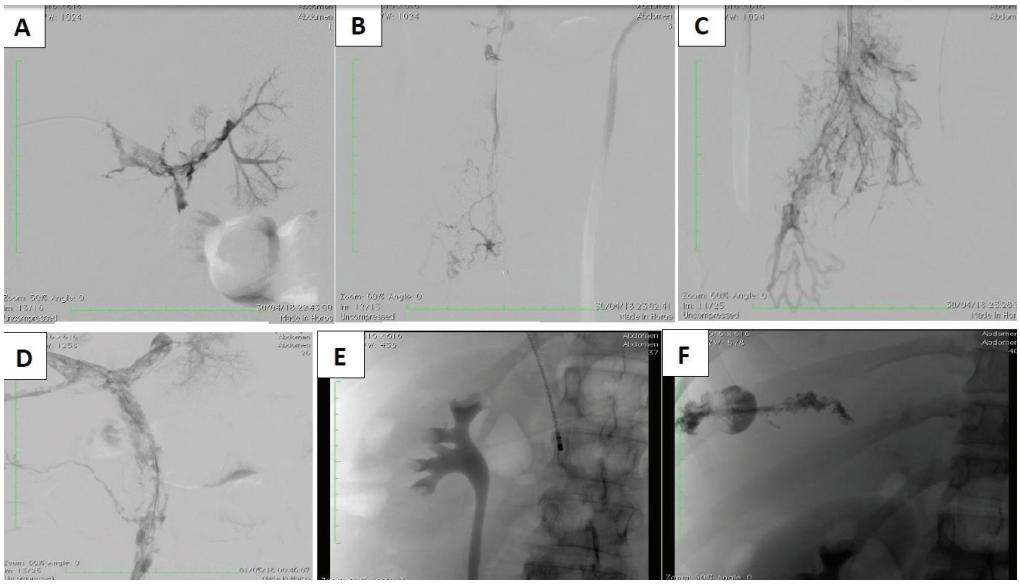

Figure 2. Extensive mesenteric-portal thrombosis.

A) - Direct portography after portal branch puncture guided by fluoroscopy; B) - Catheterization of the superior mesenteric vein and phlebography showing extension of thrombosis; (C) and (D) - Pharmacological thrombolysis with multiperforated catheter and rTPA; (E) - Rotarex device used for mechanical thrombectomy; (F) - Embolization of the puncture path with biological glue and lipiodol.

rTPA: Recombinant tissue plasminogen activator

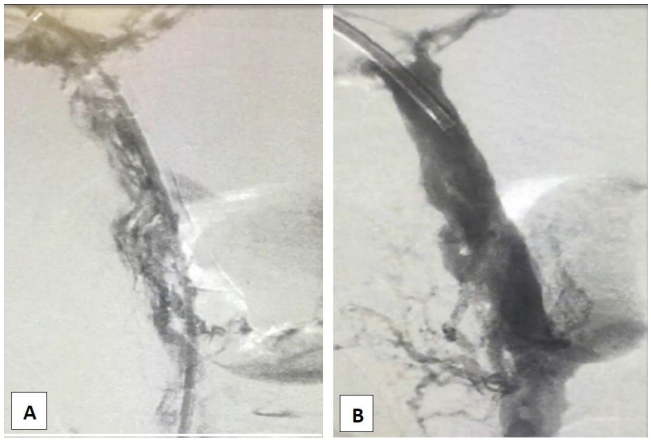

Figure 3. Extensive mesenteric-portal thrombosis. (A) Before and (B) after percutaneous mesenteric-portal vein thrombolisis.

if those severe clinical manifestation persists as observed in our patient, endovascular thrombolysis and mechanical thrombectomy has been increasingly employed (4).

The option was percutaneous trans-portal access, to reestablish immediate improvement in the venous flow and reduce the congestion in the splanchnic territory. Its use is based on minimal invasiveness and the reduction of risks of complications from the laparotomic approach and promising clinical results (2,9,10). It includes, percutaneous procedure, endovascular catheter-directed chemical thrombolysis associated with mechanical thrombectomy. In our patient, the approach was repeated twice and significant resolution of the thrombosis was immediately obtained. At the end of the procedure, the access was embolized with Histocryl glue and lipiodol to minimize bleeding (Figure 3) (4,5).

There is no specific definition yet regarding on which day of the anticoagulation treatment we should evaluate the treatment efficacy and how to evaluate it. The majority of recent series reported that anticoagulation failure was defined as no clinical improvements, and worsening of the patient's clinical features in subsequent clinical follow-up. In our case report, we have re-evaluated the anticoagulation treatment 24 hours after the first administration of heparin. On the contrary, clinical success was defined as symptom resolution as well as patency of at least 50% of the superior mesenteric vein at venography and resolution of jejunal thickening. The patients should be discharged on oral anticoagulation with an international normalised ratio 2.5-3.5. Follow-ups were performed using CT and color Doppler ultrasound (11).

In cases of AMVT, the anticoagulation should be continued for a minimum of six months after the initial treatment and, if thrombophilia was diagnosed, a life-long anticoagulation should be considered (4). However, surgery still represents the first choice approach when there is a suspicion of bowel necrosis, perforation, or abdominal compartment syndrome.

In these cases, open-abdomen damage control surgery can avoid extended intestinal resection complicated by ashort bowel syndrome (12). Nowadays, open venous thrombectomy should be expedited only rarely, except as rescue therapy in difficult cases (1-4).

CONCLUSION

The subacute presentation of pain and other symptoms observed in the report (10 days), may be due to a progressive but massive thrombosis in the mesenteric-portal territory, which delayed the clinical presentation and was also responsible for the poor response to pharmacological treatment. The option for a direct approach to the thrombus was a wise and effective choice. Thus, cases that do not obtain significant clinical improvement despite the use of heparin after 48-72 hours of close clinical monitoring may be candidates for a percutaneous endovascular approach.

Ethics

Informed Consent: For this case report, informed consent was obtained from the patient (or their legal guardian) for the publication of clinical details and any accompanying images. The patient was informed about the purpose of the report, and their anonymity was ensured by omitting any identifying information.

Footnotes

Author Contributions

Concept - C.A.G.; Design - C.A.G.; Supervision - F.C., M.S., C.A.G., B.D.S.; Data Collection or Processing - A.M.C., T.D.S.F.; Analysis or Interpretation - C.A.G., B.D.S., F.C., M.S.; Literature Search - A.M.C., T.D.S.F.; Critival Review - M.S., F.C., B.D.S.; Writing - T.D.S.F.

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REFERENCES

1. *Liu FY, Wang MQ, Fan QS, Duan F, Wang ZJ, Song P. Interventional treatment for symtomatic acute-subacute portal and superior mesenteric vein thrombosis. World J Gastroenterol. 2009;15:5028-5034.*
2. *Goldberg MF, Kim HS. Treatment of acute superior mesenteric vein thrombosis with percutaneous techniques. AJR Am J Roentgenol. 2003;181:1305-1307.*
3. *Kim HS, Patra A, Khan J, Arepally A, Streiff MB. Transhepatic catheter-directed thrombectomy and thrombolysis of acute superior mesenteric venous thrombosis. J Vasc Interv Radiol. 2005;16:1685-1691.*
4. *Kärkkäinen JM, Acosta S. Acute mesenteric ischemia (Part II) – Vascular and endovascular surgical approaches. Best Pract Res Clin Gastroenterol. 2017;31:27-38.*
5. *Hollingshead M, Burke CT, Mauro MA, Weeks SM, Dixon RG, Jaques PF. Transcatheter thrombolytic therapy for acute mesenteric and portal vein thrombosis. J Vasc Interv Radiol. 2005;16:651-661.*
6. *Bala M, Kashuk J, Moore EE, Kluger Y, Biffl W, Gomes CA, et al. Acute mesenteric ischemia: guidelines of the World Society of Emergency Surgery. World J Emerg Surg. 2017;12:38.*
7. *Ehrmann S, Quartin A, Hobbs BP, Robert-Edan V, Cely C, Bell C, et al. Contrast-associated acute kidney injury in the critically ill: systematic review and Bayesian meta-analysis. Intensive Care Med. 2017;43:785-794.*
8. *De Simone B, Ansaloni L, Sartelli M, Gaiani F, Leandro G, De' Angelis GL, et al. Is the risk of contrast-induced nephropathy a real contraindication to perform intravenous contrast enhanced computed tomography for non-traumatic acute abdomen in emergency surgery department?. Acta Biomed. 2018;89:158-172.*
9. *Ozkan U, Oğuzkurt L, Tercan F, Tokmak N. Percutaneous transhepatic thrombolysis in the treatment of acute portal venous thrombosis. Diagn Interv Radiol. 2006;12:105-107.*
10. *Cai G, Li C, Hua Z, Xu P, Jiao Z, Cao H, et al. AngioJet aspiration thrombectomy combined with transcatheter thrombolysis in treatment of acute portal venous systemic thrombosis. Ann Vasc Surg. 2020;66:362-369.*
11. *Rabuffi P, Vagnarelli S, Bruni A, Antonuccio G, Ambrogi C. Percutaneous pharmaco-mechanical thrombectomy of acute symptomatic superior mesenteric vein thrombosis. Cardiovasc Intervent Radiol. 2020;43:46-54.*
12. *Coccolini F, Roberts D, Ansaloni L, Ivatury R, Gamberini E, Kluger Y, et al. The open abdomen in trauma and non-trauma patients: WSES guidelines. World J Emerg Surg. 2018;13:7.*