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Infusion of Recombinant Human Tissue Plasminogen Activator Through the Superior Mesenteric Artery in the Treatment of Acute Mesenteric Venous Thrombosis

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Acute mesenteric venous thrombosis is an uncommon condition that is usually treated with systemic anticoagulation. Catheter-directed thrombolysis through the superior mesenteric artery may be a viable adjunct to treat this morbid condition. In the present article, we have described a case of superior mesenteric venous thrombosis treated with catheter-directed infusion of tissue plasminogen activator through the superior mesenteric artery.

Acute intestinal ischemia is a serious clinical condition associated with high mortality rates. Superior mesenteric vein thrombosis (SMVT) is an uncommon cause of acute intestinal ischemia, being responsible for 5-15% of the total number of cases.[1,2] The diagnosis of this illness is challenging because the initial clinical presentation is nonspecific: anorexia; nausea; vomiting; diffuse, nonspecific, and progressively escalating abdominal pain; reduced or absent bowel noises; abdominal distension; and absence of peritoneal irritation are some signs and symptoms detected in the beginning of the clinical picture. When diagnosis is confirmed by contrast-enhanced abdominal computed tomography (CT), the patient is treated with systemic anticoagulation. In the case of clinical and/or imaging signs of intestinal necrosis, prompt surgical treatment is mandatory. Some selected cases can be treated by fibrinolysis through the superior mesenteric artery (SMA), jugular vein, or transhepatic portal vein. We reported one case of successfully treated SMVT involving indirect infusion of recombinant human tissue plasminogen activator (rTPA) by SMA catheterization.

CASE REPORT

A 60-year-old male patient presenting with a 2-day history of diffuse and progressively escalating abdominal pain associated to anorexia and nausea was admitted to the hospital. Physical examination revealed dehydration, fever, tachycardia, and diffuse abdominal tenderness and guarding, without signs of peritoneal irritation. His medical history was notable for no previous abdominal operations and for a lower extremity deep venous thrombosis 15 years before treated by systemic anticoagulation. Laboratory abnormalities included absence of leukocytosis, metabolic acidosis, and no thrombophilia was identified. A CT angiogram with venous phase revealed occlusive thrombus in the superior mesenteric vein (SMV) and some of its tributaries, large SMV caliber, circumferential parietal thickening of the intestinal strips suggestive of congestion, and main trunk of the portal vein patent and with normal caliber (Fig. 1A, B).

Anticoagulation therapy with systemic heparinization with 80 IU/kg bolus followed by continuous infusion of 16 UI/kg/hr was initialized. Despite this therapy, the patient had increased abdominal distension and pain,

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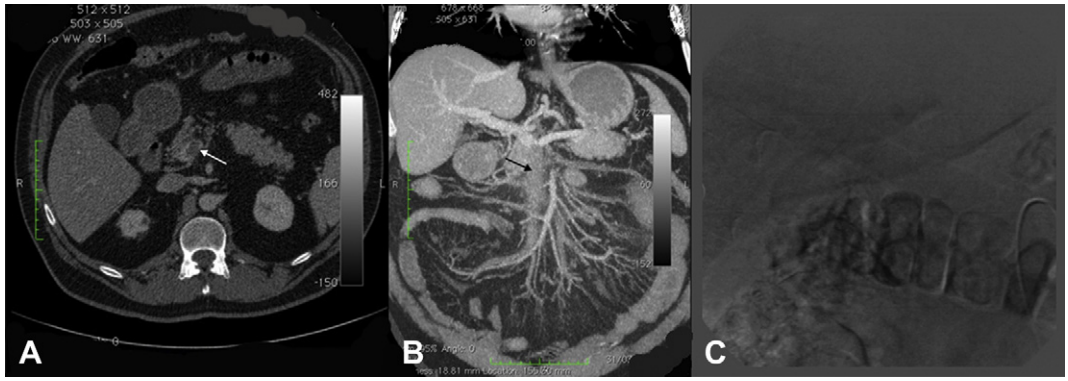

Fig. 1. Images of the initial studies carried out before the treatment. (**A**) Computed tomography (CT) scan in the axial plane showing the presence of a thrombus in the proximal segment of the portal vein (*white arrow*). (**B**) CT scan with reformatting in the coronal plane and using the maximum intensity projection (MIP) function, which shows the presence of a thrombus inside the superior mesenteric vein (SMV, *black arrow*) and its branches, as well as excess fluid in these vessels, circumferential parietal thickening of the enteric strips, and increased mesenteric fat, suggestive of congestion. (**C**) Digital subtraction angiography showing the catheter position in the proximal segment of the superior mesenteric artery. During venous return (indirect portography), there was no opacification of the SMV, its tributaries, and the portal vein.

although he remained stable and without peritoneal irritation. Angiographic study was requested.

Technique

A puncture of the right common femoral artery according to the Seldinger technique and implantation of the 4-F sheath was performed. Selective catheterization of the SMA with 4-F Cobra catheter was done, and an angiogram with indirect portography revealed a lack of opacity of the SMV and the portal vein (Fig. 1C), but an indirect splenoportography showed permeable splenic and portal veins. In view of the reported findings, fibrinolysis through the SMA was started with an injection of a bolus of 10 mg of rTPA followed by continuous infusion of 6.6 mg/hr, and the patient was sent to the intensive care unit for hemodynamic and bleeding control (fibrinogen levels and full blood count test every 4 hours). An SMA arteriography was performed 6 hours later and showed slight opacification of the portal vein and the tertiary venous arcades of the ileal–jejunal branches without opacification of the SMV. Another injection of a bolus of 10 mg of rTPA was performed, which was followed by continuous infusion of 3.3 mg/hr for 12 hours at the intensive care unit. After 18 hours of fibrinolysis treatment, an angiogram with indirect portography revealed opacification of the SMV, the portal vein, and tertiary and secondary jejunal–ileal venous arcades (Fig. 2C). Systemic anticoagulation was maintained during the fibrinolytic therapy.

Because of the improvement in clinical and imaging signs, interruption of the fibrinolytic treatment was decided, although with maintenance of full anticoagulation therapy. Twenty-four hours after the end of fibrinolysis, the patient was hemodynamically stable, asymptomatic, and had no abdominal pains. CT scan control showed reduction in the SMV caliber; decreased thickness of the intestinal walls. However, the SMV thrombus persisted, although smaller (Fig. 2A, B). The patient received oral diet on the second postoperative day after fibrinolytic treatment and was discharged on the fourth postoperative day. After 12 months of follow-up, the patient persists asymptomatic.

DISCUSSION

Thrombosis of the SMV as a cause of acute intestinal ischemia is a rare and serious clinical condition, with mortality rates that vary between 20% and 50%.[3,4] The diagnosis is difficult and in most cases occurs by exclusion because the abdominal symptoms are nonspecific and a high index of suspicion is required. It usually occurs by imaging tests, especially abdominal CT scan (sensitivity = 100%[1]). The initial treatment recommended for all patients suffering from this condition is systemic heparinization, which reportedly prevents new clots from forming and halts the progression of the existing clots, but systemic anticoagulation cannot always control the progression of mesenteric thrombosis, as well as the symptoms. If there is worsening of the initial presentation, even during systemic anticoagulation, the clinical condition of those patients may gradually become critical, causing their deaths. In those cases, some other treatment modality, such as the infusion of fibrinolytic agents or surgery, should be associated. However, in case of signs of

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