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Case Report
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Superior Mesenteric Artery Dissected Aneurysm: Case Report with Anatomical Considerations

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ABSTRACT

Introduction: an aneurysm is defined as a weakening of the wall of a blood vessel, characterized by an abnormal dilation that, under greater pressure, can evolve into a rupture, causing emergency hemorrhages. They are classified as fusiform when both endothelial walls appear dilated or saccular, when the bulge appears on only one side of the vessel. Superior mesenteric artery aneurysm is rare and represents less than 0.5% of cases of intra-abdominal aneurysms. Among its many causes, are two main ones: atherosclerosis and infection.

Case Report: this paper reports the case of a 54-year-old symptomatic woman with a finding of superior mesenteric artery aneurysm with associated dissection. The patient complained of nausea and presented at the physical examination with a rigid and painful abdomen. A computed tomography detected a fusiform aneurysmal dilatation of the proximal segment of the SMA, measuring 1.2 x 1.0 cm in maximum caliber and 2 cm in length, with a line of on-site dissection.

Conclusions: such a finding is extremely rare, accounting for less than 0.5% of all intra-abdominal aneurysms recorded worldwide. A minimally invasive approach has been suggested and successfully performed. Although rare, superior mesenteric artery aneurysms are a serious condition, taking into account their likely consequences if they are not identified, and properly treated. Therefore, early diagnosis is essential for skillful treatment and better patient outcomes. Treatment includes an endovascular approach, surgeries, and periodic follow-up.

Keywords: Anatomy; Superior mesenteric artery; Aneurysm; Areatment.

Introduction

Visceral arterial aneurysms are rare findings and affect 0.1 to 2% of the total population[1], affecting men and women in similar proportions. They present a high rate of complications as rupture in 30% to 40% of patients, with mortality rates of 25% to 70%[1]. A superior mesenteric artery (SMA) aneurysm is a rare but potentialy fatal condition. It repreents about 5% of all visceral vascular aneurysms[2] and is the third most common site of visceral aneurysms from all causes[2].

The superior mesenteric artery (SMA) is the artery of the midsection of the digestive tract (midgut, from the embryology). It originates from the aorta on the level of the lower border of the first lumbar vertebra, between the celiac artery (about 1cm below this trunk) and renal arteries. The SMA travels behind the pancreas, running alongside the superior mesenteric vein. This artery gives off branches to irrigate various parts of the gastrointestinal (GI) tract. The branches include the a) Inferior pancreaticoduodenal artery, to the head of the pancreas (the organ's widest section), and the duodenum; b) Middle colic artery, to the transverse colon, the longest part of the large intestine; c) Right colic artery, to the ascending colon; d) Jejunal and ileal arteries, that supply the jejunum (the midsection of the small intestine) and part of the ileum (last part of the small intestine); e) Ileocolic artery, to the appendix, part of the ileum (last part of the small intestine) and cecum (first part of the large intestine)[3].

The treatment of an SMA aneurysm must suit the patient clinical conditions. The ideal approach to management in the asymptomatic patient remains elusive[4]. There are, for example, unfavorable anatomical conditions that make the minimally invasive endovascular treatment unfeasible, and open surgery is necessary for arterial reconstruction, containment of the aneurysm, and, in some cases, the insertion of devices. Some anatomic variations that surgeons must have in mind are the presence of a celiac-mesenteric trunk[5] or branches that normally arise from the celiac trunk, arising from the SMA[6], which certainly increases the surgical risks.

In 70% of the cases, there is no blood supply to the stomach or the liver, coming from the SMA[5].

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Nevertheless, in 2% of cases, the celiac trunk and the SMA have a common origin (gastrohepatosplenomesenteric trunk)[5], and the entire liver, stomach, and spleen get their blood supply from this trunk, plus all territory of the SMA itself. In 10% of cases, the right hepatic artery arises from the SMA which, in this case, will supply the right lobe of the liver[5].

When considering the SMA aneurysm treatment, the patient's age, personal history, aneurysm size, location, and risk of rupture must also be taken into account for risk analysis in choosing the appropriate therapy[4].

The technologies available today, such as computed tomographic angiography, help in the early and precise diagnosis, as well as in the identification of possible complications that can be associated with the AMS aneurysm. This case report presents a patient with an AMS aneurysm with associated dissection, in which the minimally invasive approach was chosen for treatment, due to the good clinical condition of the patient and favorable vascular anatomy for such an intervention.

Case Report

Female patient, 54 years old, military police, white, smoker since age 17, with a smoking history of 1-2 packs per day for 17 years, with a previous history of erosive duodenitis under treatment, was admitted to the endovascular surgery service due to the incidental finding of an SMA aneurysm with associated dissection during abdominal image exams requested after an episode of severe, non-localized abdominal pain.

The patient complained of nausea and presented at the physical examination with a rigid and painful abdomen. An electrocardiogram and an abdominal image examination were requested, ruling out cardiological involvement and appendicitis, respectively. The patient reported recurrent episodes of non-localized abdominal pain, although they were not as intense as in this specific episode. The previous suspicion was gastroesophageal reflux disease, for which numerous endoscopies were performed for investigation and were unsuccessful in terms of determining a diagnosis.

In addition, a computed tomography (Figures 1 and 2) was requested, which detected a fusiform aneurysmal dilatation of the proximal segment of the SMA, measuring 1.2 x 1.0 cm in maximum caliber and 2 cm in length, with a line of on-site dissection. There was also diffuse parietal thickening of the walls of the remaining SMA segments, with no apparent significant stenosis. Furthermore, a diverticulum was detected in the third portion of the duodenum, measuring 4.7 x 3.0 cm.

The analysis of the initial imaging tests showed an anatomical particularity in the patient that could favor the appearance of the aneurysm in intra-abdominal

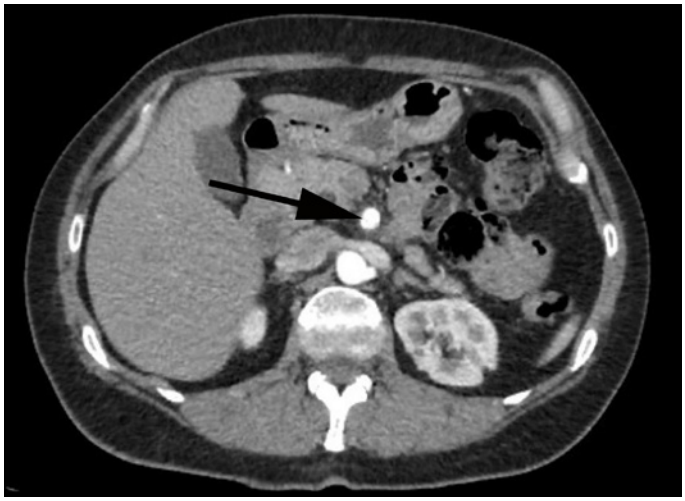

Figure 1. Computed tomography image of a transverse section of the upper abdomen, showing a fusiform aneurysmal dilatation of the proximal segment of the superior mesenteric artery (SMA), with a line of on-site dissection (arrow).

Figure 2. Computed tomography image of a longitudinal section of the abdomen, showing a fusiform aneurysmal dilatation of the proximal segment of the superior mesenteric artery (SMA), with a line of on-site dissection (arrow).

arteries. It was concluded that a decrease in the arteries caliber, associated with risk factors such as the patient's heavy smoking history, allowed the diffuse weakening of the abdominal endothelial walls, favoring the emergence of aneurysms.

Subsequently, arteriography of the abdominal aorta and visceral vessels was requested to better evaluate the case and choose the appropriate treatment, taking into account the clinical presentation of the vessels, the patient's overall clinical conditions, and the characteristics of the aneurysm itself, in addition to the underlying vascular situation. The study was

performed through the 6F hemostatic valve, inserted percutaneously into the right common femoral artery, with subsequent passage of a polyethylene catheter, positioned in the descending aorta, injections of non-ionic contrast, and acquisition of images.

Among the findings, the patency of the abdominal aorta, celiac trunk, and the SMA itself were all preserved. Also, no gross dissection line was observed in this exam. Endovascular treatment options include stent graft placement or stenting with coil embolization. In this case, the stent graft was chosen. It is an invasive procedure that aims to reestablish blood flow, in addition to providing endothelium support, preventing possible complications such as aneurysm rupture. The patient was anesthetized during the procedure, which consisted of introducing a balloon catheter through the right femoral artery, which was guided to the SMA at the site of the aneurysm, where the balloon was inflated. At that moment, the stent, which is a small tube-shaped prosthesis, was positioned inside the artery to support the vessel and avoid possible obstructions. Subsequently, after verifying the normalization of blood flow, the catheter was removed and the patient was observed for 24 hours in the hospital.

The patient was discharged from the hospital in good clinical condition with guidance on smoking cessation, lifestyle changes, and changes in eating habits and oriented to a medical appointment in six months for further examinations and control of the diagnosed vascular lesion.

Discussion

We described a case of SMA aneurysm, treated successfully by an endovascular procedure. The SMA aneurysm, although very rare, is the third most common among visceral aneurysms and, in the absolute majority of cases, it is found in the proximal 5 cm of the superior mesenteric artery without involving the middle colic artery[2].

There are possible etiologies to this rare disease that may cause unfavorable repercussions and outcomes. In young adult patients, the most common etiology is that an infection can trigger an aneurysm formation, and they are usually associated with *Streptococcus ssp.* and *Staphylococcus ssp.* bacteremia or endocarditis[2,7]. In individuals over 50 years of age, the aneurysm is mostly due to atherosclerosis, with interruption of normal blood flow. Some other diseases such as acute pancreatitis, rheumatoid arthritis, syphilis or even trauma have also been described in the literature as possible SMA aneurysms etiologies, although they contribute to a small percentage of cases[2,7].

The location of the AMS aneurysm certainly makes early diagnosis difficult and, therefore, its incidence is almost always underestimated among the analyzes of the cases described. In addition, the clinical manifestations are almost always nonspecific and not well localized, as in the case described above, which also makes the correct diagnosis difficult and delayed, and can be easily confused with other more common hypotheses such as gastritis, diverticulitis, gall bladder inflammation or stones, and even some cardiac event. This can increase medical costs due to the need for extra tests and even trigger the worsening of the patient's clinical condition. Moreover, there is a greater chance of complications due to the increased time to wait for results of colonoscopies and endoscopies, frequently requested in such situations[2,7].

Clinical manifestations are almost always present and usually involve severe and progressive abdominal pain, in addition to nausea, vomiting, fever, jaundice, and gastrointestinal bleeding that may occasionally occur. The worst case is a rupture of this aneurysm leading to internal bleeding, hypovolemic shock, and intestinal ischemia. In this case, the rate of patients who progress to death ranges from 30% to 90%[2].

The diagnostic imaging method has been extremely important and definitive to define treatments for patients affected by visceral arterial aneurysms. Abdominal ultrasound, for example, is an affordable and widely used method to identify aneurysms. Subsequently, a contrast-enhanced tomography or even an angiotomography can be performed aiming at better visualization, diagnosis, and treatment of patients at this stage. However, CT angiography is considered the gold standard for the diagnosis of AMS aneurysms[8].

Many factors prevent a single protocol from being applied in the treatment of these aneurysms. Firstly, they are very rare, which has not yet made it possible to provide effective guarantees of a single treatment that encompasses all the complications that can occur in a case like this. The patient's clinical situation must also be taken into account; in addition, the vascular anatomy must be favorable so that the treatment can follow an open surgical course or an endovascular course. This was the determining reason why the treatment of choice for the patient, in this case, was endovascular rather than the open surgery option, as it avoided unnecessary interventions. Thus, in this case, it was decided not to expose the patient to the risk of other complications and possible infections resulting from open surgery.

Open surgery is an option for patients with low surgical risk and for those hemodynamically unstable individuals who need urgent intervention; however, it has a significant mortality risk that reaches up to 15%[2]. The procedure consists of proximal and distal ligation of the aneurysm, followed by aortomesenteric reconstruction using a prosthesis when there is no associated infection. In the presence of an infection, the so-called mycotic aneurysms must be treated by resection.

Minimally invasive endovascular treatment is effective, has lower mortality and morbidity rates,

and shorten hospital stay. However, the patient's anatomy must be thoroughly understood, evaluating the collateral circulation around the aneurysm, the stent insertion zones, and the caliber of blood vessels. Still, this method has some disadvantages, such as dissection and iatrogenic rupture of the vessels and the need to repeat annual or biannual imaging exams[2,7].

Finally, but no less important for this discussion, the importance of changing patients' lifestyles of those who already had or who have this disease is highlighted. Satisfactory results are achieved in the face of early diagnosis, adequate treatment for the patient promptly, and a change in diet to a low-fat diet, in addition to the practice of frequent physical activities.

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