

Endovascular management of arterioenteric fistula: a case report

Manejo endovascular de fístula arterio-entérica, reporte de caso

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Abstract

Arterioenteric fistulas (AEFs) are a rare disease. They are a communication between a major artery and digestive tract. We present a patient who, after suffering a gunshot wound to the abdomen, underwent an exploratory laparotomy with damage control surgery, who later presented with hematemesis and melena. Studies were performed where an aneurysm of the right renal artery and gastrointestinal bleeding due to primary arterioenteric fistula were evidenced, which is successfully treated by angioembolization. Endovascular therapy for the treatment of AEF is a useful resource in patients with the previous abdominal surgeries that could make their management more difficult.

Keywords: Endovascular. Fistula. Arterioenteric. Management.

Resumen

Las fístulas arterio-entéricas son un padecimiento infrecuente. Son una comunicación entre una arteria mayor y el tracto digestivo. Paciente masculino quien sufre una herida por arma de fuego en abdomen se le realiza una laparotomía exploradora con cirugía de control de daños, quien posteriormente presenta cuadro de hematemesis y melena. Se realizan estudios donde se evidencia un aneurisma de la arteria renal derecha y sangrado de tubo digestivo por fístula arterioentérica primaria, la cual se trata por medio de angioembolización de manera exitosa. La terapia endovascular para el tratamiento de fístula arterio-enterica es un recurso útil en pacientes con cirugías abdominales previas que pudieran hacer más difícil el manejo.

Palabras clave: Endovascular. Fístula. Arterio-enterica. Manejo.

Introduction

Arterioenteric fistulas (AEFs) are a rare condition. They are defined as the communication between a major artery and a loop of the digestive tract, the most frequent communication site being at the level

of the duodenum^{1,2}. They are classified into two types according to their etiology: primary and secondary. The primary fistulas are caused by aneurysms, trauma, radiation therapy, atherosclerotic disease, and inflammatory bowel disease, while the secondary fistulas are usually caused by previous

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aortic surgery with the use of synthetic prosthetic material³.

In this clinical case, we present a male patient who, after suffering a gunshot wound to the abdomen, underwent an exploratory laparotomy with damage control surgery. After discharge, he presented a picture of hematemesis and melena. Imaging and endoscopy studies were performed showing a pseudoaneurysm of the right renal artery and gastrointestinal bleeding due to the primary AEF, which is successfully treated by angioembolization.

Clinical case

A 27-year-old male was referred to our emergency department after suffering a gunshot wound to the epigastrium, a downward and right pathway was observed with an exit orifice in the right paravertebral lumbar region at the L3 level. Hemodynamically stable, tachycardic patient with pain on abdominal palpation and paralysis of both lower extremities was evaluated.

He went to the operating room where an exploratory laparotomy was performed, in which it was evidenced that the projectile lacerated the free edge of liver segment IV b, perforated the fundus of the gallbladder; the anterior face of the second portion of the duodenum was found to be blunt with a 0.5 mm defect, as well as complete perforation of the hepatic flexure of the colon; the route went to the pararenal fascia, where no injury was found in the right renal parenchyma or its vascular structures, ending the journey in the lumbar spine.

Given these findings, a right hemicolectomy was performed with terminal ileostomy, cholecystectomy with intraoperative cholangiography, in which the integrity of the biliary tree without leaks or lesions in the distal common bile duct was observed; the edges of the thermal lesion in the duodenum were debrided, a two-plane defect was repaired, and a closed drain was placed in the surgical bed.

During his post-operative period, the patient had a good clinical evolution; however, on post-operative day 5, bile fluid leakage was observed through the drain, a volume of 100 cc in 24 h, suspecting dehiscence of the duodenal repair, he went to the operating room for abdominal examination.

In this second intervention, 200 cc of bile fluid were found when entering the cavity, it was dissected to expose the duodenum in its entirety, observing the complete repair without evidence of leakage at the site or in any other duodenal portion. It was decided to proceed to endoscopic retrograde

cholangiopancreatography to reassess the integrity of the bile duct. When performing the cholangiography, leakage of contrast material was observed at the level of the distal common bile duct at the level of the insertion at the level of the ampulla. It was decided to perform a sphincterotomy and biliary stent placement as treatment. The patient had an adequate clinical evolution, for which he was discharged.

Fourteen days after his medical discharge, the patient came after referring three episodes of hematemesis and melena through the ileostomy, he was found hemodynamically stable, with initial hemoglobin of 9 g/dL; a contrasted computed tomography (CT) was performed, where the presence of a saccular pseudoaneurysm in the right renal artery was observed in the arterial phase, which is in the proximity of the duodenum, in contact with the biliary diversion probe. Contact with the second portion of the duodenum shows an image suggestive of an AEF which conditioned the patient's hematemesis episodes (Fig. 1).

With these findings, it was decided to carry out the management of the AEF by endovascular media, obtaining an access through the right common femoral artery, selective catheterization of the right renal artery was performed for angiography, observing pseudoaneurysm in its proximal third; it was catheterized at the neck of the pseudoaneurysm; and embolization was performed with a Terumo® controlled release 6 mm × 10 mm coil. Subsequently, a control angiography was performed at 3 min at the level of the right renal artery, where adequate occlusion of the pseudoaneurysm was evidenced (Fig. 2).

The patient is monitored clinically, without presenting a new episode of hematemesis, with a hemoglobin of 11.5 g/dL after transfusing 2 blood packets. Due to the good clinical resolution, the patient is discharged, and his follow-up is continued in the outpatient clinic, where 3 weeks after this last hospitalization, the patient remained asymptomatic, so he was discharged from the clinic.

Discussion

Aneurysmal lesions are abnormal dilations of the lumen of the vessels secondary to disease or damage to the vessel wall^{4,5}. These lesions are classified into two types according to the composition of their wall: true aneurysms and pseudoaneurysms. True aneurysms are dilations of the arterial lumen with preservation of the three layers of the vessel (intima, media, and adventitia)⁶. However, pseudoaneurysms occur

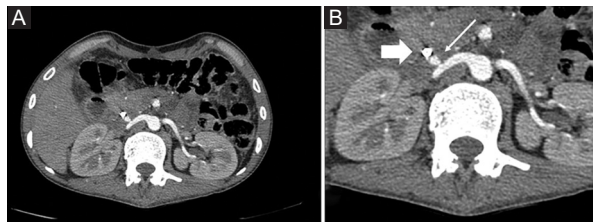


Figure 1. Contrast abdominal CT scan in arterial phase. **A:** The right renal artery with saccular aneurysm, which is in contact with the biliary diversion tube. **B:** Zoom in on the area, thin arrow: pseudoaneurysm of the renal artery. Thick arrow: biliary diversion probe.

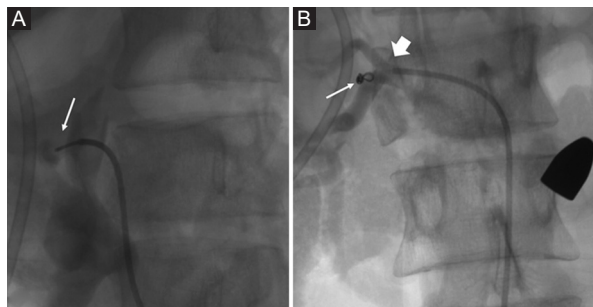


Figure 2. **A:** Arteriography with selective catheterization of the pseudoaneurysm of the right renal artery. Arrow: Pseudoaneurysm of the renal artery. **B:** Arteriography after coil placement in pseudoaneurysm, showing adequate occlusion of the vascular lesion. The image shows a firearm projectile at the left paravertebral level. Thin arrow: coil in topography of the pseudoaneurysm in the proper position. Thick arrow: right renal artery.

as a result of injury to one or more layers of the arterial wall. Compression of the periarterial tissue slows bleeding and forms a hematoma around the arteriotomy. Next, a fibrous reaction occurs that encapsulates the hemorrhage, forming a structure that resembles an aneurysmal sac. There is a theory that when this pseudoaneurysm bleeds, a hematoma is formed that is accompanied by a fibrous reaction, which if it persists is capable of eroding the intestinal wall, which until that moment served as containment, forming a fistulous path from the pseudoaneurysm toward the intestinal lumen⁷.

AEFs are a rare condition and are classified into the primary and secondary according to their etiology^{1,4,7}. The primary fistulas are caused by aneurysms, trauma, radiotherapy, and atherosclerotic disease, their incidence ranges between 0.04% and 0.07% at the time of performing an autopsy. The secondary fistulas are usually caused by previous aortic surgery with the placement of synthetic prosthetic grafts, with a postoperative incidence ranging from 0.5% to 2.3%⁸.

The common symptoms of AEFs are hematemesis, melena, and abdominal pain. Bleeding is initially scanty

and often intermittent ("sentinel hemorrhage") but eventually leads to severe bleeding and hypovolemic shock⁵. Some patients before bleeding experience fever, fatigue, malaise, or weight loss, which often go unnoticed. The natural history of arterioenteric fistulas is the progression of hemorrhage and/or sepsis, it can even lead to death in cases with massive hemorrhages, unless a rapid, correct, and exact diagnosis associated with an adequate surgical treatment avoids the fatal outcome⁹. In the case of our patient, he was admitted to the emergency department after referring generalized weakness, hematemesis, and melena through the ileostomy; on admission, he was hemodynamically stable, so an approach for upper gastrointestinal bleeding was initiated and studies of image.

CT with intravenous contrast is considered the test of choice in hemodynamically stable patients, with a sensitivity of 50-94% and specificity of 85-100% for the diagnosis of arterioenteric fistulas¹⁰⁻¹². Renal artery aneurysms are rare, and most of them are asymptomatic when detected by imaging. The CT scan of our patient was able to identify a saccular aneurysmal dilation of the right renal artery with a neck of 3 mm and a dome of 4 × 6 mm, which was found adjacent to the bile duct diversion and the second portion of the duodenum, for what existed the possibility of the existence of a fistulous path.

Endoscopy plays an important role in determining the main causes of gastrointestinal bleeding to rule out, such as esophageal variceal bleeding, peptic ulcers, among others. In some patients, it is not possible to identify the exact site of bleeding; however, in many cases, a clot associated with the site of the injury or even the presence of the fistula can be demonstrated with the presence of prosthetic material in cases, where it has already been placed a graft⁹. In our case, during the endoscopy for the approach to upper gastrointestinal bleeding, the presence of prosthetic material in contact with the duodenal lumen or any active bleeding site was not evidenced.

AEFs can have a fatal course if left untreated. Open surgery where enteric fistula repair is performed as well as artery repair by means of an *in situ* prosthetic graft or extra-anatomical reconstruction is widely accepted as the management today. However, despite successful surgery, there are mortality rates that have been reported from 21 to 90%, as well as a high rate of morbidity associated with these procedures. Due to this, the use of endovascular therapy has been presented as a promising technique for its management

both definitively and in its use as bridging therapy, creating better conditions for later definitive surgery¹³⁻¹⁵. In the case presented, due to the previous interventions and the general conditions of the patient, it was decided to perform an angiography in renal arteries with selective catheterization of the right renal artery as therapeutic management; the contrast was introduced observing a pseudoaneurysm in the proximal third of the artery. A first attempt at coil embolization was made, observing the coil inside the pseudoaneurysm; however, on immediate angiographic control, migration of the coil was identified toward the lower third of the kidney. A second attempt was made with placement of coils in the pseudoaneurysm, with a post-embolization control angiography observing the coil within the pseudoaneurysm and without contrast passage within the pseudoaneurysm.

Caution must be exercised when making the initial evaluation of the patient, in whom gastrointestinal bleeding is suspected due to an arterioenteric fistula, due to the bleeding so important that it can be triggered from one moment to the next, with a fatal outcome. Therefore, a patient with evidence of AEF with data of hemodynamic instability, in cases where the necessary equipment is not available to perform endovascular therapy quickly, an emergency exploratory laparotomy is indicated for vascular control and vascular repair as enteric in a definitive way.

Conclusion

The purpose of this case report is to present an infrequent pathology that must be taken into account to rule out in patients who present with gastrointestinal bleeding. It is very important to quickly diagnose and intervene in these patients due to their high mortality rate. Endovascular management as a therapeutic alternative to open surgery in the initial approach of these patients has demonstrated its short-term efficacy, from stabilizing the patient to definitive therapy, as in this patient.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

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