

# Gastric arteriovenous malformation: treatment by embolization\*

*Malformação arteriovenosa gástrica: tratamento por embolização*

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**Abstract** Gastrointestinal bleeding is a common cause of admission to emergency services. Hemorrhages originated from arteriovenous malformations in the stomach have been rarely described in the literature. Embolization offers a good chance for the control of bleeding. We describe the case of a patient with recurrent hematemesis and melena whose angiography identified arteriovenous malformations in the greater curvature of the stomach. The bleeding was treated by arterial embolization.

**Keywords:** Arteriovenous malformation; Gastrointestinal hemorrhage; Embolization.

**Resumo** Sangramento digestivo é causa comum de internação nos serviços de emergência. Hemorragias originadas de malformações arteriovenosas no estômago foram raramente descritas na literatura. O tratamento por embolização oferece boa chance de controle do sangramento. Descrevemos caso de paciente com hematemese e melena recorrentes, cuja angiografia identificou malformação arteriovenosa na grande curvatura do estômago. Foi realizado tratamento da hemorragia por meio de embolização arterial.

**Unitermos:** Malformação arteriovenosa; Hemorragia digestiva; Embolização.

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## INTRODUCTION

Gastrointestinal bleeding is a common cause of admission to emergency services in hospitals<sup>(1)</sup>. Amongst the main etiologies, esophageal varices, gastric ulcers and gastrointestinal neoplasms are highlighted. Bleedings originated from arteriovenous malformations (AVM) in the stomach have been rarely described in the international literature<sup>(2,3)</sup>.

The authors describe the case of a patient admitted with recurrent hematemesis and melena, without elucidation of the diagnosis by upper digestive endoscopy (UDE), whose angiogram detected AVM in the greater curvature of the stomach. The

hemorrhage management was performed by means of arterial embolization.

## CASE REPORT

A male, black, 55-year-old patient was admitted to the emergency unit with hematemesis and melena for five hours. The patient reported previous personal history of arterial hypertension under drug therapy and three episodes of mild hematemesis over the last year which were controlled with clinical treatment. No other comorbidity was known.

After hemodynamic stabilization, the patient was submitted to UDE which revealed moderate erosive body-fundus gastritis. During the hospital stay, the patient presented new episodes of hematemesis (hemoglobin: 4.3 g/dl; hematocrit: 11.8%), evolving to hypovolemic shock. Repeated UDEs could not identify the origin of the digestive bleeding. Considering the persistence of the hemorrhagic condition (hemoglobin: 6.6 g/dl; hematocrit: 18.5%), the patient was submitted to abdominal CT angiography and celiac trunk angiography which demonstrated the presence of a AVM

with plexiform nidus, located on the wall of the greater curvature of the stomach, supplied principally by the short gastric arteries and also by the left gastric artery, with drainage into the splenic vein, where an aneurysm was further demonstrated in the collector vein (Figure 1).

After angiography, embolization of the supplying arteries was selected for treatment of the AVM. The procedure was performed by right transfemoral approach, utilizing the Seldinger technique. Initially, a 6F pressure transducer was placed followed by selective catheterization of the celiac trunk and splenic artery with a cross-over maneuver utilizing a 260 cm hydrophilic guidewire and a curved 6F Cobra 2 catheter. Subsequently, a superselective characterization of the arterial pedicles of the gastric AVM (short gastric arteries) was performed with a SL 1018 microcatheter aided by a transend 0.014 guidewire. Occlusion of those arterial branches was performed with six GDC microcoils and one Nester microcoil, followed by infusion of N-butyl cyanoacrylate (NBCA) with lipiodol (Figure 2). The day after the procedure, the patient presented a new episode of

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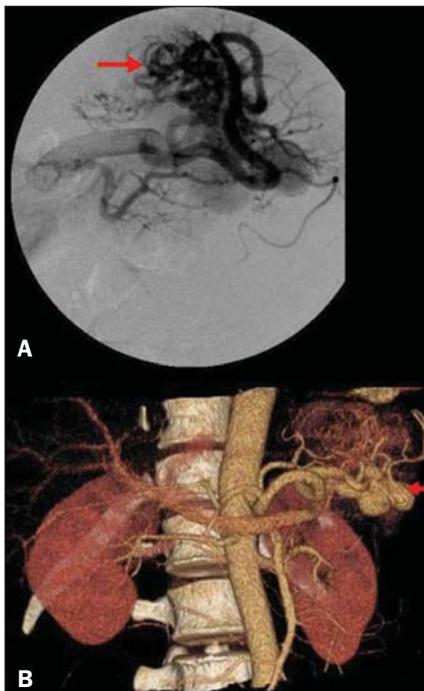
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**Figure 1.** Selective arteriography of splenic artery demonstrating arteriovenous malformation supplied by short gastric arteries (arrow). Early filling of the splenic vein is observed, with venous aneurysms (arrow). Reconstruction volume rendering CT angiography image.

hematemesis and was submitted to a new UDE which could not identify the origin of the bleeding. Complete embolization of the left gastric artery was chosen for treatment. The procedure was performed with the same previously described technique (Seldinger), utilizing microcoils and NBCA to occlude the arterial vessel (Figures 3 and 4). With no other episode of hematemesis, the patient was discharged. He is currently asymptomatic, presenting normal hematometric levels.

**DISCUSSION**

Arteriovenous malformation is a congenital lesion where persistent abnormal connection is observed between veins and arteries originating from an embryonic failure in the vascular development of the affected region<sup>(4)</sup>. The authors describe the case of a male, 55-year-old patient with bleeding in the digestive system treated with embolization. The literature reports equal distribution of such malformation between men and women, a mean age of 56 years at the diagnosis, with 75% of pa-



**Figure 2.** Post-short gastric arteries embolization angiographic follow-up. Angiographic exclusion of the shunt is observed (arrow).

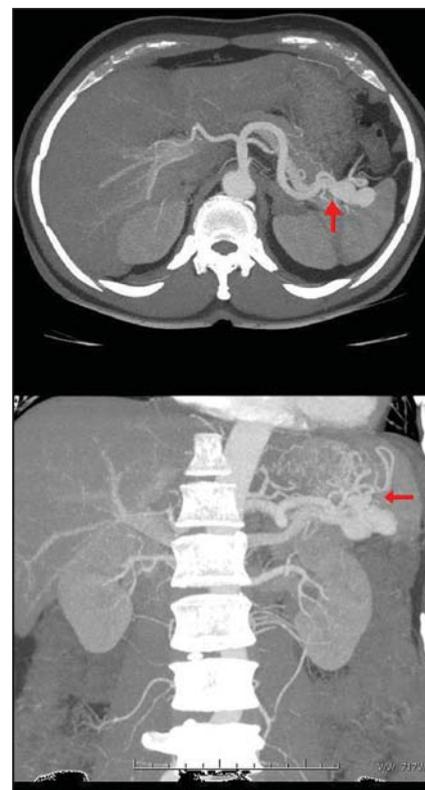


**Figure 3.** Post-left gastric arteries embolization angiographic follow-up, with angiographic exclusion of the shunt (arrows).

tients aged between 50 and 80 years – data compatible with the findings of the present case report<sup>(5)</sup>.

Clinically, AVM lesions in the gastrointestinal tract may be either asymptomatic or manifest with hematemesis, melena or iron deficiency anemia. The presence of AVM should be suspected in cases of difficulty in identifying the bleeding origin at UDE<sup>(1,6,7)</sup>. Endoscopy is the method most frequently utilized in the management of these patients, and CT angiography and angiography remaining reserved for cases of difficult diagnostic elucidation. Currently, with the wider availability of these techniques, the diagnosis and treatment of AVMs have become more effective<sup>(1)</sup>.

Arteriovenous malformation of the gastrointestinal tract has been determined as the most common cause of chronic and massive hemorrhage in cases where conventional diagnostic tools failed to reveal the cause of the bleeding<sup>(8)</sup>. In the present case, successive UDEs failed to detect the focus of bleeding, likewise in other cases reported in the literature<sup>(1,3,8)</sup>, proving the difficulty in the diagnosis of this condition by means of endoscopy. In the present case, computed tomography angiography and celiac trunk angiography could readily identify AVM in the patient. The differential diagnosis of the arteriographic findings should be made with diseases such as gastric cancer, hemangioma and leiomyosarcoma<sup>(5,9)</sup>.



**Figure 4.** CT angiography with multiplanar reconstruction – axial and coronal sections demonstrating post-treatment management of AVM with embolization (arrows).

According to Latar et al., the site of bleeding may be accurately determined by selective angiography with 50%-75% or up to 90% accuracy, provided the procedure is performed while the patient is actively bleeding<sup>(5)</sup>.

In the present case, the studies demonstrated that the arterial supply of the AVM was made by the short gastric arteries and by the left gastric artery, with venous drainage into the splenic vein. Previous history of less significant manifestations of hematemesis was reported, hence the inference of the congenital nature of the defect. In the last decades, the treatment by means of embolization has gained widespread acceptance, offering a good chance for controlling the bleeding<sup>(2,7,10)</sup>. An European study has observed that arterial embolization could control upper gastrointestinal bleeding in 88% of patients referred to a center of interventional radiology, and in 77% of such cases, the objective was achieved with a single procedure<sup>(10)</sup>. In the patients with lower gastrointestinal bleeding, the technique was successful in 78% of cases<sup>(10)</sup>. In the present case, the bleeding could not be completely controlled after the first procedure, probably because of the large size of the AVM, which presented more than one feeding source, making the treatment more difficult. With the decision of performing a second intervention with occlusion of the left gastric artery, absolute success was achieved in the hemorrhage management.

The technique utilized in the treatment was the same established for controlling digestive bleedings of other etiologies: superselective embolization with occlusion

of the arterial branch of the bleeding digestive tract segment with microcoils and NBCA, by means of selective catheterism of celiac trunk or mesenteric artery, depending on the site of the bleeding<sup>(11)</sup>. Intestinal ischemia is the most feared complication of embolization in the gastrointestinal tract. The literature reports rates of such a complication of 14% a 20%<sup>(10)</sup>. The rates of immediate and late postoperative bleeding range from 5% to 37%, hence the relevance of long-term follow-up of these patients. Such a complication may be secondary to incomplete initial resection or metachronous AVM, which have been reported in 11% of cases<sup>(8)</sup>. In the present case, the patient progressed favorably with no complication and total control of the bleeding. Even with the decision to embolize the whole left gastric artery, the stomach vascularization was not affected by the great number of arterial anastomoses in this organ which remained perfused in the postoperative period. Percutaneous embolization represents a less invasive treatment option in cases of gastrointestinal tract hemorrhage which may be utilized in those patients who had not the bleeding controlled by UDE<sup>(2,4,12)</sup>.

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