

Complication after percutaneous treatment of inter-atrial communication: Amplatzer® device migration to the aortic bifurcation – a case report

Complicação após tratamento percutâneo de comunicação interatrial: migração de dispositivo Amplatzer® para bifurcação aórtica – relato de caso

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Abstract

Complications arising from use of the Amplatzer® device to correct endovascular conditions such as atrial septal defect have been described with increasingly frequency. We report on a case in which this device was used to correct an atrial septal defect, but 6 months later migrated to the abdominal aorta bifurcation. Removal of the foreign body was accomplished by conventional surgery after an endovascular attempt had failed.

Keywords: endovascular procedures; abdominal aorta; embolism.

Resumo

Com o uso crescente do dispositivo Amplatzer® para diversos procedimentos endovasculares, dentre os quais a comunicação interatrial, complicações decorrentes de seu uso vêm sendo descritas. Relatamos um caso em que o dispositivo foi empregado para correção de comunicação interatrial e, seis meses depois, migrou para a bifurcação da aorta abdominal. A retirada do corpo estranho foi realizada por cirurgia convencional, após insucesso de tentativa por via endovascular.

Palavras-chave: procedimentos endovasculares; aorta abdominal; embolia.

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■ INTRODUCTION

The original clinical indications for the Amplatzer® device were limited, but today it is widely used for a range of percutaneous procedures and as its use has increased, a growing number of complications relating to the device have been observed.¹ These include patency of the embolized vessel, late reperfusion of the vessel and migration of the device itself.²

We describe the case of a patient with interatrial communication who had undergone successful placement of an Amplatzer® device, which later migrated to the aortic bifurcation. After that, he needed surgical treatment to resolve the resulting situation after an unsuccessful attempt to extract the device percutaneously.

■ DESCRIPTION OF THE CASE

The patient, R.L.B., a 37-year-old male who had an ischemic cerebrovascular accident on August 8, 2012, with full clinical recovery in a few days. This diagnosis was confirmed with standard magnetic resonance imaging and magnetic resonance angiography of the brain. During etiologic work-up, a patent foramen ovale was detected and a possible paradoxical embolism secondary to deep venous thrombosis, after trauma to the lower limbs, although this was not confirmed by vascular ultrasound.

In view of the patent foramen ovale diagnosis, the decision was taken to occlude it, in September of 2012, using a 17 mm Amplatzer® vascular device, with access via the right femoral artery. Months after the procedure the patient underwent a control echocardiogram, but the Amplatzer® plug was not detected. An angiotomography of the thorax and abdomen was therefore conducted on April 8, 2013, and it was found that the device was lodged in the aortic bifurcation (Figure 1). From a peripheral vascular perspective, the patient was asymptomatic, with all pulses present.

It was decided to try to remove the intravascular foreign body and an attempt at extraction was made using a large-caliber sheath (26 Fr) via the right femoral artery. The introducer was advanced to the aortic bifurcation and a lasso was used to try to pull the foreign body into the introducer, but the attempt was unsuccessful because the device would not undergo deformation and so endovascular removal was not possible. During the same operation, the team proceeded with a transperitoneal median laparotomy until the retroperitoneal region was reached, taking care to displace the fibers of the autonomic plexus without sectioning them. Next the aorta and common iliac arteries were dissected and clamped, followed by

longitudinal arteriotomy and removal of the foreign body (Figures 2 and 3). Primary arteriorrhaphy was conducted and the cavity closed in layers. The patient recovered well with no intercurrent conditions during the postoperative period.

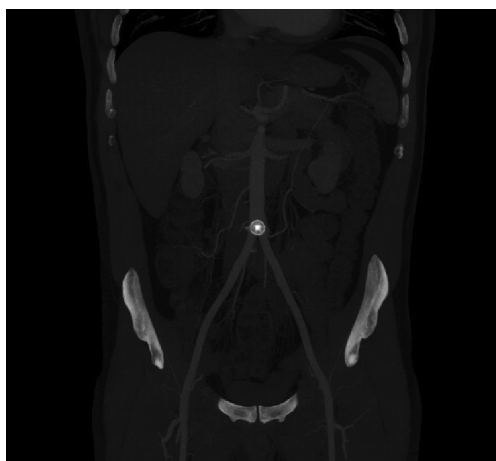


Figure 1. Angiotomography showing the Amplatzer® device at the aortic bifurcation.

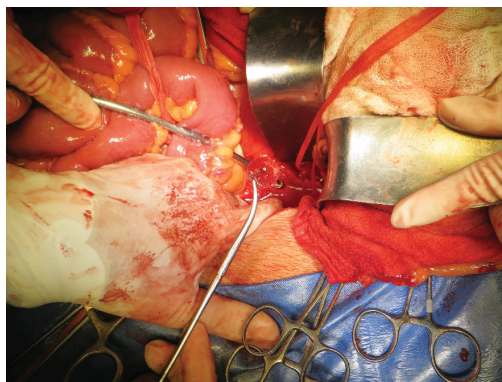


Figure 2. Intraoperative image: Amplatzer® device being removed from the aortic bifurcation.



Figure 3. Amplatzer® device after surgical removal from the aortic bifurcation.

■ DISCUSSION

The Amplatzer® vascular device was approved by the United States' Food and Drug Administration on March 3, 2004.³ After its initial introduction to medical practice, the Amplatzer® evolved from a single device, the AVP, to a four-model range of devices: AVP, AVP II, AVP III and AVP 4.^{1,3,4} The specific characteristics of each model have led to a great increase in the indications for Amplatzer® devices, while there have not yet been any reports of absolute contraindications to their use.³ Today the Amplatzer® is already considered a good alternative to coils or detachable balloons for embolization of medium and large caliber arterial vessels with high blood flow.^{3,5}

As mentioned earlier, complications related to use of the Amplatzer® include migration of the device, late recanalization and persistent patency of the vessel the device was intended to occlude. Migration may be early or late and is a rare complication in both cases,² with an approximate total incidence of 0.4 to 1.1% when the device is employed to occlude a patent foramen ovale.⁶ These rates are the result of the fact that the device is self-expanding and so exerts a radial force against the wall of the vessel, which is sufficient to minimize movement.³ Zorger et al.⁷ have reported that when the Amplatzer® device is used to occlude interatrial communication, the majority of cases of embolization involve the pulmonary arteries, probably as a result of using devices with smaller dimensions than the lesion, together with the pressure gradient between the left atrium and right atrium.

Displacement of the device from the lesion can occur if there is a discrepancy between the size of the atrial defect to be treated and the size of the device employed to treat it. There are several reasons why such a discrepancy can occur: the foramen ovale rarely has a completely circular shape, making it difficult to measure the largest diameter, and the lesion may increase in size during the procedure because of the flexibility and redundancy of the tissue into which the device is inserted.^{6,8,9}

Faella et al.¹⁰ reported 15 complications in 316 procedures using Amplatzer® devices (approximately 4.75%), including hemolysis, stenosis of the left pulmonary artery and protrusion of the device into the aorta, causing coarction of the vessel and embolization of the device. There was one death as a result of this last complication.¹¹

Migration of devices placed in the heart is usually diagnosed as a result of clinical suspicion combined with an echocardiogram that shows that the Amplatzer®

device is no longer present. The device is located systemically using angiotomography.

In cases in which embolization of the device occurs, conduct depends on the following variables: location, time, clinical manifestation and type of device used. Ferrero et al.⁶ published a study that reviewed cases of embolization of Amplatzer® devices in the aorta and its branches, identifying a small number of reported cases and a varied range of treatments. Two cases were treated with surgery, one was managed percutaneously and another had to be resolved surgically with median laparotomy after a percutaneous attempt had failed.

Maleux et al.¹² described a case managed conservatively in an asymptomatic female patient after an Amplatzer® vascular plug had migrated to the abdominal aorta at the origin of the superior mesenteric artery. This decision was taken after an unsuccessful attempt at percutaneous removal of the foreign body, when it was found that the material had undergone endothelization. When migration of the device occurs soon after placement, percutaneous recovery is a well-established technique.^{8,12} In cases of later migration of the device, in which it may have undergone endothelization and there is therefore a risk of injuring the vessel wall during the percutaneous procedure, open surgery is an attractive option.¹³ In the case described by Maleux et al.¹², the fact that the device was a first-generation AVP contributed to the decision to adopt a watchful waiting policy, since these devices have a more open weave with fewer layers than the newer models, and the absence of pressure gradients, confirmed on imaging exams, was also taken into account.

Zorger et al.⁷ described a case in which an Amplatzer® device had been attached to the interatrial septum to treat an ostium secundum and, 6 months later, the device could not be found at the placement site during a control echocardiography. Computed tomography then showed the device in the abdominal aorta, close to the ostium of the superior mesenteric artery. After the device had been identified, a 20 Fr sheath was introduced via the right femoral artery. This access was then used to advance a lasso catheter and draw out the device, removing it via the sheath.⁷ However, this technique can only be used when the device has small dimensions, compatible with sheaths.

Although we already knew that the Amplatzer® device that had migrated had a 17 mm diameter, we nevertheless attempted endovascular removal via a 26 Fr sheath in the hope that we could deform it and bring it into the sheath, which, unfortunately, we were unable to accomplish.

■ CONCLUSIONS

With development of new models, Amplatzer® devices are being used in a wide range of situations and, as a result, although rare, their complications have become evident. Embolization of these devices can be managed with conservative, percutaneous or surgical treatment and each case should be analyzed on an individual basis, since certain variables will determine which approach should be chosen.

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Critical revision of the article: JMSS, WES, DMF, EDR, GTFS
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