

# World Journal of *Cardiology*

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## Endovascular treatment of paravisceral mycotic aneurysm: Chimney endovascular sealing the end of de road

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### Abstract

Open surgery is the elective treatment for mycotic aneurysms of the aorta. This surgery consists of resection of the aneurysm, debridement and revascularization with an *in situ* or extra-anatomic bypass. Even when surgery has been successful, the morbidity is raised and the endovascular treatment has become an alternative for specific patients. When mycotic aneurysms involved the visceral arteries, more complex techniques are necessary such as fenestrated endovascular aortic repair or chimney endovascular aortic repair and the most frequent complications of this are endoleaks and occlusion the visceral arteries. We present a case of a patient with a paravisceral abdominal mycotic aneurysms that was result with 2 chimney technique (in the right renal and superior mesenteric arteries) and a single Nellix EVAS (Endologix, Irvine, Calif) of 12 cm long without evidence of endoleaks in the follow-up.

**Key words:** Mycotic aneurysms; Edovascular repair; Aorta; Endoleaks; Para visceral aneurysms

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**Core tip:** The interesting of the case that we present is the resolution of the mycotic aneurysms throw a new techniques calls chimney endovascular sealing (Ch-EVAS). This case it would be the first case treated with Ch-EVAS that has been reported since in the

bibliographical review that we made we do not find cases of paravisceral abdominal mycotic aneurysms treated with this technology.

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Rabellino M, Moltini PN, Di Caro VG, Chas JG, Marenchino R, Garcia-Monaco RD. Endovascular treatment of paravisceral mycotic aneurysm: Chimney endovascular sealing the end of de road. *World J Cardiol* 2017; 9(7): 629-633 Available from: URL: <http://www.wjgnet.com/1949-8462/full/v9/i7/629.htm> DOI: <http://dx.doi.org/10.4330/wjc.v9.i7.629>

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## INTRODUCTION

Open surgery is the elective treatment for mycotic aneurysms of the aorta. This surgery consists of resection of the aneurysm, debridement and revascularization with an *in situ* or extra-anatomic bypass<sup>[1]</sup>. Even when surgery has been successful, the morbi-mortality is raised and the endovascular treatment has become an alternative for specific patients<sup>[2]</sup>.

The main problem of this kind of pseudoaneurysms is the location. When the mycotic aneurysm is in the descending aorta or infrarenal aorta without compromising the supra-aortic trunks or the visceral arteries, endovascular treatment is possible with a successful outcome<sup>[2]</sup>. Nevertheless, it has not been well described in the literature this type of procedure for paravisceral abdominal aortic aneurysm.

When mycotic aneurysms involved the visceral arteries, more complex techniques are necessary such as Fenestrated endovascular aortic repair (f-EVAR) or chimney endovascular aortic repair (Ch-EVAR) and the most frequent complications of this are endoleaks and occlusion the visceral arteries<sup>[3,4]</sup>.

We present a case of a patient with a paravisceral abdominal mycotic aneurysms with absolute contraindication for open surgery with two unsuccessful endovascular treatments, that was result with chimney technique and Nellix (Endologix, Irvine, Calif) chimney endovascular sealing (Ch-EVAS).

## CASE REPORT

A 72-year-old woman was admitted in the emergency department presented with acute abdominal pain. She had a medical history of former smoker, multiple coronary by-pass with dehiscence of the chest wound, pulmonary embolism treated with anticoagulants and respiratory failure (SpO<sub>2</sub> 82%).

To the physical examination, the patient was presenting an acute abdominal pain with rigidity, guarding and peritoneal irritation so an AngioCT scan was performed and showed gastrointestinal perforation and a 4.9 cm paravisceral abdominal aneurysms with intraluminal thrombus (Figure 1A). Small bowel resection and jejunostomy was done.

Anatomopathology showed miliary tuberculosis with intestinal involvement and peritoneal implants.

With this result and the presence of the aortic aneurysms we made the diagnosis of tuberculous mycotic aneurysm with compromise of the four visceral branches. Although, the endovascular treatment was decided because of the clinical situation of the patient, the endovascular options have not been simple because of the location of the aneurysms. The options were a f-EVAR, which was impossible for the time confection or a Ch-EVAR with the risk of endoleaks in the pseudoaneurysms that needs 4 chimney.

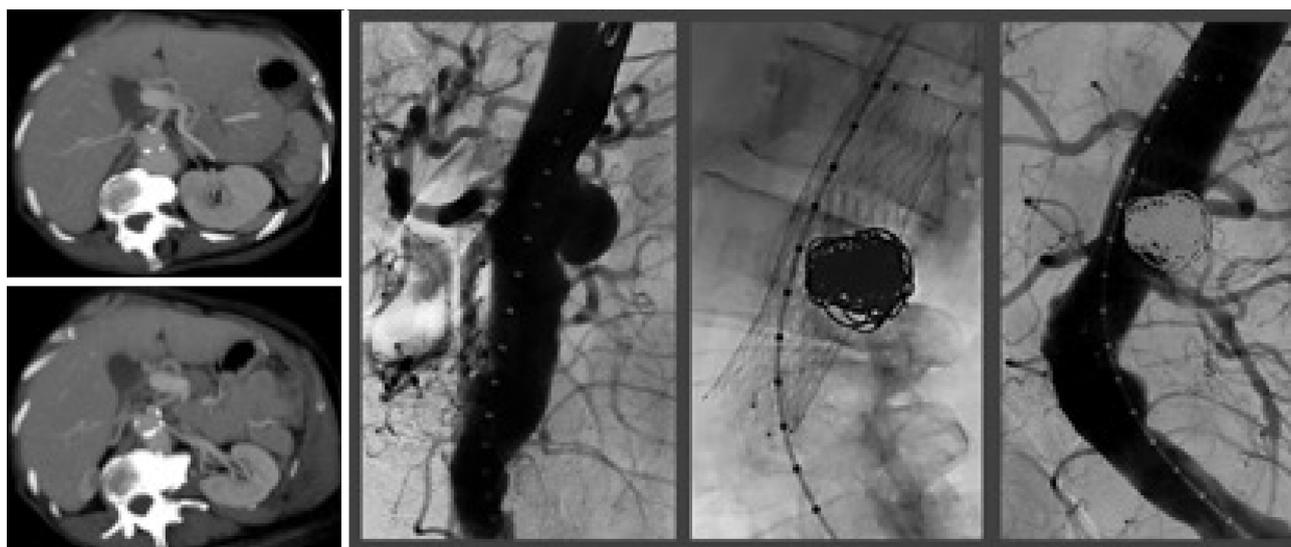
Another therapeutic option was Ch-EVAS which was not available in our country. Base on the foregoing, and knowing that it was not a definitive treatment, the decision was to perform stent assisted coil embolization technique of the aneurysms.

In the procedure, for a femoral access a Sinus XL stent (OptiMed, Ettlingen, Germany) was placed in the aortic visceral topography and across it embolization of the pseudoaneurysm with coils was performed with a successful initial first result (Figure 1B and D) and without complications. The patient was discharged 48 h later with parenteral nutrition, aspirin 100 mg/d and antibiotics therapy for tuberculosis.

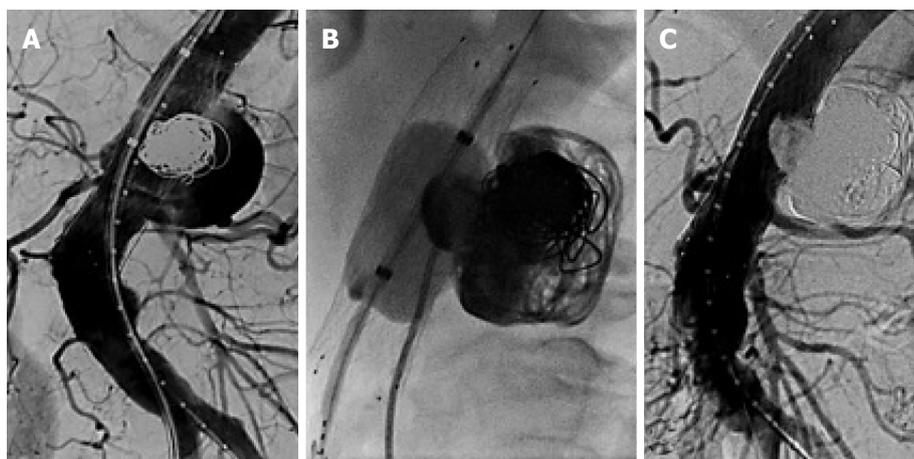
Four month later, an AngioCT scan revealed that the mycotic aneurysm had grown and a for a percutaneous femoral access a balloon-assisted coils and n-butyl 2-cyanoacrylate embolization was performed with good angiographic outcomes (Figure 2). The patient was still undergoing treatment for her infection disease and was discharged 24 h later without complications. Bowel transit and abdominal wall reconstruction was made a month later. Two month after surgery, the patient was admitted with low back pain and the CT angiogram showed an endoleak with aneurysm sac enlargement and extravasation of the embolic agents used previously that indicated rupture, so an endovascular treatment with Ch-EVAS was decided, because it was already available in our country.

Under general anesthesia a percutaneous femoral access was done for the introduction of a single Nellix EVAS of 12 cm long (the aortic diameter was normal and it was not necessary to spread up to the iliac arteries) and a open left subclavian access to place the chimneys for the right renal and superior mesenteric arteries. Both chimneys were performed with a Viabahn covered stent (Gore and Associates, Flagstaff, AZ) of 7 mm × 100 mm for the right renal artery and 8 mm × 100 mm for the superior mesenteric artery. Inside the chimneys a nitinol self-expanding stent was placed to give them a greater radial force strength and to avoid the chimney collapse by the polymer (Figure 3).

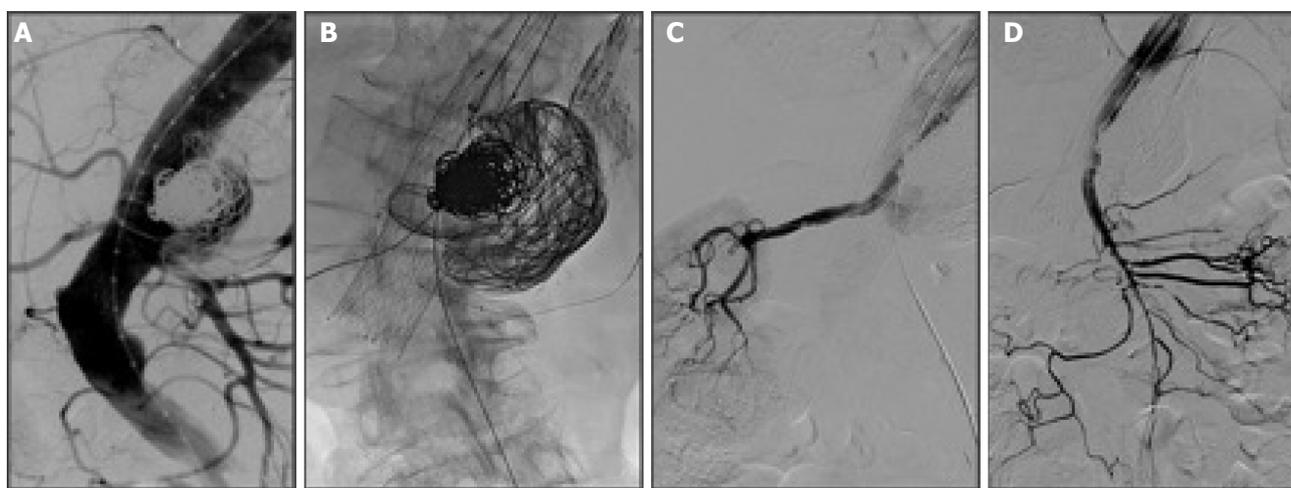
The left renal artery was catheterized but it was not possible to advance a catheter across the strut of the Sinus stent, so an angioplasty with a 6-mm low-profile coronary balloon was performed. Despite these, it was not possible to introduce a 4 Fr diagnostic catheter



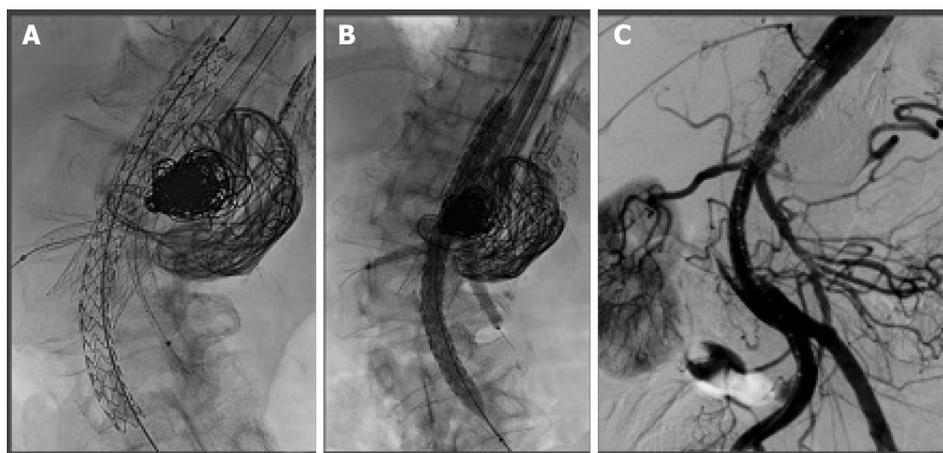
**Figure 1** AngioCT scan and digital subtraction angiography. Mycotic aneurysm and the relation with the visceral branches, stent assisted coil embolization of aneurysms with a Sinus XL stent and complete embolization of the mycotic aneurysms without evidence of flow inside the sac.



**Figure 2** Digital subtraction angiography (A-C). Flow in the mycotic aneurysms an increased de diameter of the sac. Coils and n-butyl 2-cyanoacrylate embolization performed with the balloon-assisted technique and final angiographic control shows absence of flow in the interior of the aneurysms.



**Figure 3** Digital subtraction angiography. Rechanneling of the pseudoaneurysms. Renals and superior mesenteric arteries catheterization (the left renal artery with a coronary balloon angioplasty) and the presence of n-butyl 2-cyanoacrylate out of the pseudoaneurysms. Chimney in the right renal artery and superior mesenteric artery.



**Figure 4** Single Nellix endovascular sealing and the chimneys (A-C). Fluoroscopy of the balloons inflated during the filling of the bag of the Nellix EVAS with the polymer. Permeability of the endograft, both chimneys and the celiac trunk without evidence of endoleaks.

so it was decided to abandon the left renal artery. It was decided not to be catheterized the celtrunk for the idea that it would be compensated for the superior mesenteric artery, as it happened.

The final angiographic control showed the exclusion of the mycotic aneurysms with permeability of the right renal artery and superior mesenteric artery which supply the celiac trunk and its branches (Figure 4). After the procedure, the patient was discharged 5 d later without complications, normal renal function, clopidogrel 75 mg, aspirin 100 mg a day and antibiotic therapy. AngioCT scan follow-up at 3 mo, showed absence of endoleaks and permeability of the right renal artery, superior mesenteric artery and the celiac trunk.

## DISCUSSION

Open surgery is the elective treatment for mycotic aneurysms of the aorta, however in patient with absolute contraindication for surgery, the endovascular treatment become an important alternative for this patients that have been well described in the multicentric European study which concluded that endovascular treatment it is a feasible and lasting option in most patients<sup>[2]</sup>. Nevertheless, in this study of all treated aneurysms only in the 7% of them it was used f-EVAR techniques, not having specific comments about the follow-up in these patients. Another endovascular option for the treatment of paravisceral abdominal mycotic aneurysms is the Ch-EVAR. However, the rate of endoleaks with this technique in a review by Patel *et al*<sup>[4]</sup> was estimated at 5% to 37.5%.

In a recent review by Li *et al*<sup>[5]</sup> the rate of endoleaks type IA was 11.8% with a permeability of the branches of 96.6% at 6 mo. Because of these, in our case we this alternative was scorned in view of the high percentage of endoleaks (4 or 3 chimneys were necessary) and the consequent risk of rupture. In this location, the f-EVAR is a good choice to treat this

aneurysm. The only problem is the time of confection that limits the use in pseudoaneurysms that need an early resolution. In the last 2 years, it has been reported some cases of paravisceral aneurysms treated with Ch-EVAS technique that show promising result<sup>[6-8]</sup>. Torella *et al*<sup>[7]</sup> presented 2 cases of juxtarenal aortic aneurysms treated with Ch-EVAS with 2 chimneys in each case and without evidence of endoleaks type IA. Youssef *et al*<sup>[6]</sup> published recently a series of 7 patients treated with Ch-EVAS with four chimneys for patient in which they reported no early endoleaks with a permeability of 96% of the branches to 6 mo of follow-up.

The Ch-EVAS turns out to be an interesting concept since the polymer realizes a copy of the aortic anatomy occupying the space of the gutters that they originate with the conventional Ch-EVAR technique reducing the risk of endoleaks. The case that we presented it would be the first case treated with Ch-EVAS that has been reported since in the bibliographical review that we made we do not find cases of paravisceral abdominal mycotic aneurysms treated with this technology. While so far, the reports on Ch-EVAS are only clinical case reports, they represent encouraging results as a future alternative of first choice for the treatment of paravisceral aortic aneurysms.

## COMMENTS

### Case characteristics

A 72-year-old woman with a medical history of military tuberculosis with abdominal involvement that was treated in two opportunities for a mycotic aortic aneurysm with compromise of the four visceral branches with endovascular technique was admitted at the emergency department with low back pain two months after the second treatment.

### Imaging diagnosis

Computed tomography angiogram showed an endoleak with mycotic aneurysm enlargement.

### Treatment

Endovascular treatment performed with Chimney endovascular aneurysm

sealing (Ch-EVAS) with good result with exclusion and absent of endoleaks in the final angiography control. In the follow up the patient continuous asymptomatic with no evidence of endoleaks or another complication.

### Experiences and lessons

A mycotic aneurysm of the aorta with involvement of the visceral arteries is a dreadful condition and repair it can be quite challenging. The endovascular treatment has become an important alternative. The Ch-EVAS turns out to be an interesting concept because it solves the endoleaks problems with the conventional chimney endovascular aneurysm repair. In the authors' bibliographical review, the authors did not find cases of paravisceral abdominal mycotic aneurysms treated with this technology.

### Peer-review

This is an interesting case report about the endovascular treatment of paravisceral mycotic aneurysm.

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