Cardiovasc Intervent Radiol
DOI 10.1007/s00270-010-9971-2

CASE REPORT

Stent-Assisted Coil Embolization of a Mycotic Renal Artery Aneurysm by Use of a Self-Expanding Neurointerventional Stent

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Received: 21 June 2010 / Accepted: 9 August 2010

Abstract Mycotic aneurysms are uncommon, especially those located in visceral arteries. We present a case of a patient with two visceral mycotic aneurysms due to bacterial endocarditis, one located in right upper pole renal artery and the second in the splenic artery. Both aneurysms were treated as endovascular embolization using microcoils. In the aneurysm located at the renal artery, the technique of stent-assisted coils embolization was preferred to avoid coils migration due to its wide neck. The stent used was the Solitaire AB, which was designed for the treatment of intracranial aneurysms and was used recently in acute stroke as a mechanical thrombectomy device. Complete embolization of the aneurysm was achieved, preserving all the arterial branches without nephrogram defects in the final angiogram.

Keywords Mycotic aneurism · Stent-assisted coil embolization · Endovascular treatment · Self-expanding intracranial stent

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Introduction

Infected or mycotic aneurysms (MAs) are uncommon. The prevalence of infected aortic aneurysms is 0.7–1% of all surgically treated aortic aneurysms. Not only is the aorta, but also peripheral arteries, cerebral, and visceral arteries, involved in the descending order of frequency. Delayed treatment often leads to fulminant sepsis, spontaneous arterial rupture, and death [1]. Therapeutic options include open surgery, endovascular stent placement, endovascular embolization, medical therapy, or a combination of these [1].

The purpose of this article is to report our result in endovascular treatment of a mycotic renal artery aneurysm with a self-expanding, intracranial stent-assisted coiling technique, and percutaneous embolization of a second mycotic aneurysm located in splenic artery.

Case Report

A 54-year-old woman, current smoker, with past history of ischemic stroke and temporal hemianopia sequel, was initially admitted to another hospital with respiratory tract infection. Treatment with levofloxacin was indicated. Clinical course

Published online: 02 September 2010

did not improve and transesophageal echocardiogram (ETE) was performed, mainly due to suspicion of bacterial endocarditis (BE). ETE confirmed the diagnosis. Blood cultures were negative, probably due to the previous antibiotic regimen. The patient underwent 4 weeks of antibiotics treatment with ceftriaxone and gentamicin. Finally, she underwent mitral and aortic valve replacement, and patent foramen ovale closure at the same procedure. Before surgery, the patient had abdominal pain. Multidetector computed tomography (MCT) angiography images revealed a right upper pole renal artery aneurysm of 20 × 16 × 17-mm in diameter. One month after surgery, a second MCT angiography showed an increase of 3 mm in diameter of the renal aneurysm. It also showed a second aneurysm located at the distal splenic artery with splenic segmental infarction. Magnetic resonance imaging ruled out the presence of cerebral aneurysm. Based on the history, the multiple locations, and MCT images, a diagnosis of mycotic aneurysm was made. Because the renal aneurysm had enlarged, endovascular treatment was indicated to reduce the risk of rupture.

Endovascular Technique

Under local anesthesia, a 6-F sheath was placed into the right femoral artery and after abdominal aortic angiography, a Cobra® guide catheter was advanced to the right renal artery. Selective renal angiography confirmed an aneurysm located in right upper pole renal artery (Fig. 1A, B). A 0.014″ guidewire was advanced and a 2.7-Fr over-the-wire microcatheter (Progreat®, Terumo Medica Corporation, Tokyo, Japan) was positioned distal to the MAs sac (Fig. 2A, B). A self-expanding stent designed for intracranial aneurysm assisted coil embolization of 4 × 15-mm (Stent Solitaire AB, ev3, Inc., Irvine, CA) was deployed (Fig. 2C) as a scaffold to prevents coils herniation into the parent vessel. This is a self-expanding stent designed for bridging the neck of aneurysms and can be fully retrieved. Its delivery and deployment can be made by a single operator, and due to its self-expanding Nitinol design, it easily adapts to the tortuous path of vessels. Another advantage is its positioning accuracy when open but

Fig. 1 **A** Selective contrast injection showing an aneurysm located at a right upper pole renal artery. **B** There is contrast medium retention inside the aneurysm

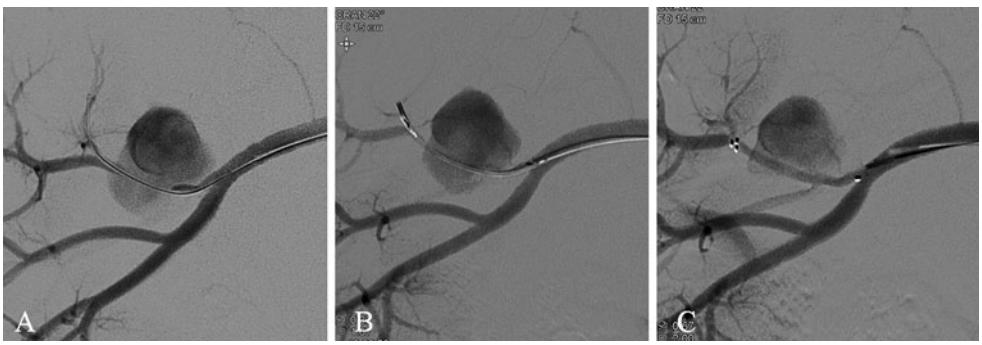

Fig. 2 Series of fluoroscopic images obtained from invasive angiography, showing 0.014″ guidewire tip distal to aneurysm neck (**A**); **B** Microcatheter Progreat and Stent Solitaire AB before deployment; **C** complete neck covering after deployment of the Solitaire AB

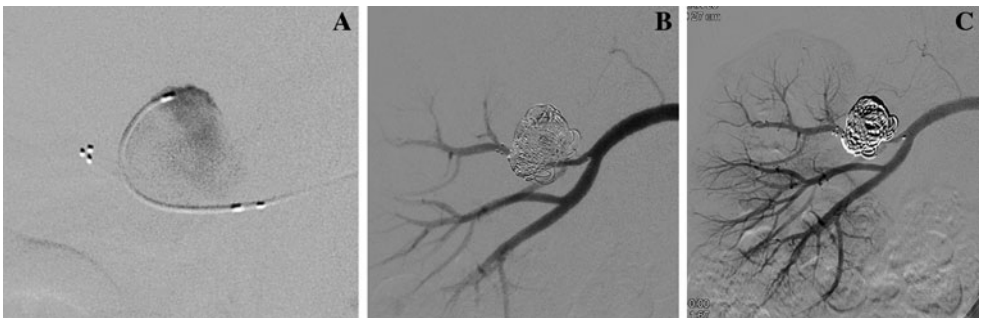

Fig. 3 **A** Microcatheter Prowler located inside the aneurysm through the stent cells. **B–C** Final angiogram showing complete occlusion of the aneurysm. The image also shows the right upper pole renal artery widely patent and no defects in the right Kidney pole perfusion

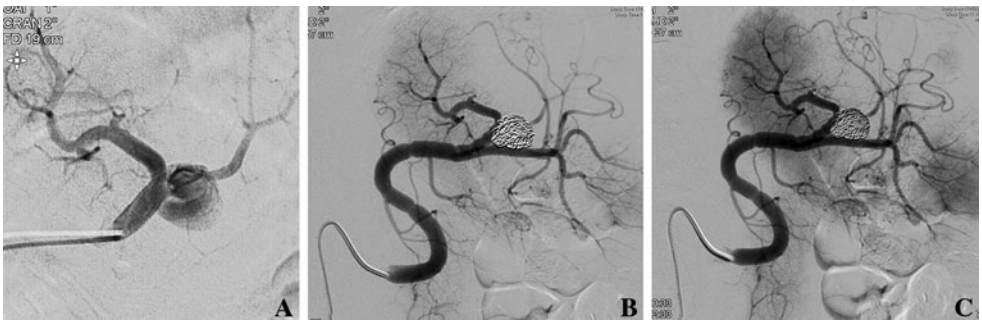

Fig. 4 **A** Selective contrast injection showing an aneurysm of the splenic artery. **B–C** Final result after coil embolization. The image also shows perfusion defects, probably related with previous embolic lesions

not detached, because it can be safely pulled to the desired position without risk of migration of the stent. It can be delivered through a standard 0.021″ or 0.027″ microcatheter on a 0.016″ pushwire like a coil. A 1.9-Fr microcatheter (Prowler®, Cordis, Miami Lakes, FL) was then positioned inside the aneurysm through the stent cells (Fig. 3A) and nine detachable coils (GDC 3D, Boston Scientific Corporation, Fremont, CA, EEUU) were delivered. The final angiogram showed complete occlusion of the aneurysm, without defects in the nephrogram (Fig. 3B, C).

Afterward, a 1.9-Fr Prowler® microcatheter was advanced into the splenic artery through the Cobra® guide catheter (Fig. 4A) to obtain angiographic images. The microcatheter was positioned inside the MAs sac. Finally, four GDC 3D coils were delivered to achieve total occlusion of the sac (Fig. 4B, C) without complications. A stent-assisted coil embolization was not necessary in this case, principally due to the narrower neck, in contrast to renal artery aneurysm.

Discussion

Mycotic aneurysms develop as a consequence of vessel wall necrosis after a showering of bacterial emboli into the circulation, usually due to BE [2]. Incidence is uncertain but can affect 1–10% of patients with BE [2]. The aorta, peripheral, cerebral, and visceral arteries are involved in descending order of frequency. Synchronous or metachronous infected aneurysms occur in 20–36% of cases [1].

In general, infected aneurysms have a fatal natural history, due to hemorrhage and fulminant sepsis. Infected renal artery aneurysms also may cause hypertension or hematuria, requiring nephrectomy in most cases [3, 4]. Therapeutic options of mycotic aneurysm should be individualized according to the characteristics of the aneurysm, such as location, morphology, or rupture. These therapeutic options include open surgery, endovascular stent placement, endovascular embolization, medical therapy, or a combination of these. Endovascular treatment of aneurysms/pseudoaneurysms in this type is described in the literature regardless of the affected territory [5–8]. Because we cannot predict, much less control, coils stabilization in wide-necked aneurysm, stent-assisted coil embolization technique was chosen to treat the right upper pole renal artery aneurysm. On the other hand, the wall of an infected aneurysm consists of compressed perivascular tissue, hematoma, and fibroinflammatory tissue, still very fragile, with high risk of rupture [9]. That was the main reason for choosing Stent Solitaire AB, because its open slit, closed cell design gives the stent a low radial force. It is a self-expanding nitinol stent and is recoverable once fully displayed, allowing for multiple retrieval for adjustment and superior placement and fits perfectly vascular anatomy. It can be delivered through a standard microcatheter just like

a coil. This stent was originally designed for cerebral aneurysm indications. Due to the stent features, it also has been used for acute stroke treatment as a "thrombectomy device" [10–12]. The stent easily adapts to the tortuous path of vessels. In fact, we can see in Fig. 2C no modification in vessel diameter after stent deployment.

Although stent-assisted coil embolization has been previously described in renal artery aneurysms [13], we did not find any reference in mycotics aneurysms. To our knowledge, this is the first reported case of stent Solitaire AB-assisted coil embolization of a mycotic visceral aneurysm.

Conflict of interest The authors declare that they have no conflict of interest.

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