

Off label applications of mimetic stent in distal iliac and common femoral flexion area

Uso *off label* de *stent* mimético en zona de flexión ilíaca distal y femoral común

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ABSTRACT

Peripheral vascular disease of the lower limbs is a serious problem regarding morbidity and mortality. Endovascular treatment has been gaining popularity placing and, currently, it is the number one therapeutic option in most cases. Despite of this, obstructions or occlusions affecting flexion zones are still challenging. Stents have been developed to specifically treat the femoropopliteal flexion zone. However, the transition between the distal external iliac artery and the common femoral artery (CFA) still raises questions. We present two cases in which the use of mimetic stents inside the CFA became a feasible alternative for the resolution of an underlying condition.

Keywords: peripheral vascular disease, flexion zone, mimetic stent.

RESUMEN

La enfermedad vascular periférica de miembros inferiores constituye una problemática de alto impacto en términos de morbimortalidad. El tratamiento endovascular ha cobrado un protagonismo que lo ubica como la primera opción terapéutica en la mayoría de los casos. Pese a ello, las obstrucciones y oclusiones que afectan zonas de flexión siguen representando un desafío. Han sido desarrollados *stents* para el tratamiento de la zona de flexión femoropoplíteica. Sin embargo, el tratamiento de la transición entre la arteria ilíaca externa distal y la arteria femoral común (IFC) plantea interrogantes. En esta oportunidad presentamos dos casos en los que el uso de *stents* miméticos en la IFC resultaron una alternativa viable para la resolución de la patología subyacente.

Palabras clave: enfermedad vascular periférica, zona de flexión, *stent* mimético.

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INTRODUCTION

Peripheral vascular disease of the lower limbs is a serious problem regarding morbidity and mortality. Its incidence rate goes up with age and affects 4% of the people over 40, and almost 20% of those over 65. Its prevalence among diabetics is around 27% and it is more common among males and African American individuals (1-2). In the United States, it affects over 1 million people to the point that it has come to reduce the patients' survival rate and increase disability and healthcare costs (3). The 1-year mortality rate is between 15% and 40% (exceeding 50% at 5 years) especially in critically ill patients (4).

Endovascular treatment is now very popular placing and has become the first therapeutic option in most cases. However, the obstructions and occlusions that affect flexion zones are still challenging. The use of drug-coated balloons is a feasible alternative. However, when angiographic findings or the technique used require stent implantation, we face another problem: how the material used behaves compared to external compression.

Several medical manufacturers have developed flexion-and-torsion resistant devices, especially for the management of the distal superficial femoral and popliteal arteries. (5).

However, the transition zone between the distal external iliac artery and the common femoral artery (CFA) still poses some questions.

As it passes through the femoral triangle and the common femoral artery adductor canal, it is exposed to external compression due to flexion (6-8). For this, also for the usual presence of coronary calcium, and for its association with the deep femoral artery, management—that should be surgical—should also be planned carefully.

In these cases, some authors recommend the use of atherectomy associated with a balloon and/or stent angioplasty (9). However, previous experiences suggest using external compression-resistant stents as a feasible therapeutic alternative (10).

We present two clinically and angiographically complex cases performed on the CFA zone.

The WIfI score (Wound, Ischemia, Foot infection) was used on both cases for the clinical and prognostic assessment of the diseased patients. With this score it is possible to assess the risk of amputation at the 1-year follow-up, as well as any possible benefits following revascularization in a patient with solved local and system infection. (11)

CASE #1

This is the case of a 76-year-old man. The patient is a former smoker and a diabetic. He presented with right lower limb critical ischemia. The patient also showed trophic lesions and ulcers with compromised subcutaneous cellular tissue, pain at rest, and an infection that required hospitalization and IV antibiotic therapy for its resolution (WIfI score = 232). The angiography performed revealed the presence of a serious restenosis of a self-expandable conventional stent implanted on the CFA zone. The angiographic image

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Figure 1. A: angiography from the left radial multipurpose catheter. Severe in-stent restenosis at CFA zone level. B: angioplasty with balloon via right popliteal access. C: SUPERA stent implantation via right popliteal access into the CFA zone. D: final outcome.

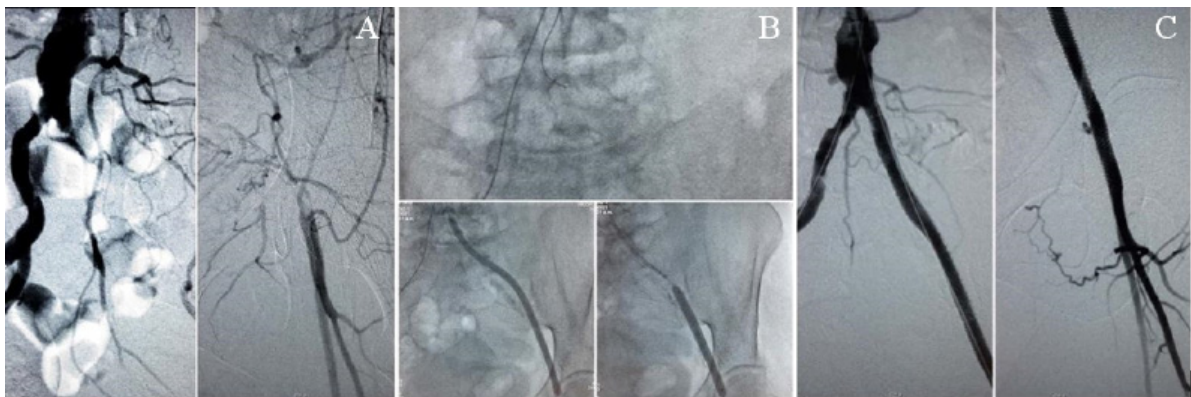


Figure 2. A: angiography performed via right femoral access showing the ostial occlusion of the iliac artery recanalizing into the middle portion of the common femoral artery. B: a carotid sheath at left iliac artery level with crossing of the occlusion is seen here. Balloon angioplasty. C: SUPERA stent implantation into the CFA zone, and EPIC stent implantation into the common iliac artery.

suggested the fracture of the stent. Multiple percutaneous transluminal angioplasties (PTAs) with stents had been performed that prevented vascular access: PTAs with self-expandable stents from the left common iliac artery towards the distal abdominal aorta running through the ostium of the right common iliac artery, PTA with stents in both external iliac and common femoral arteries.

It was decided to treat the in-stent restenosis and eventual fracture of the stent located at CFA and proximal superficial femoral artery level. The left radial access was used for angiographic control. Using one hydrophilic guidewire, a 5-Fr multipurpose catheter was advanced behind the stent crossing the ostium of the right iliac artery. Right popliteal retrograde access was used for treatment purposes. The popliteal artery was punctured using ultrasound guidance while the patient remained in the frog-legged position. Eventually, a 6-Fr radial introducer sheath was inserted. One Command 18 guidewire (Abboth, Abboth Park, Illinois, United States) with progressive arterial lumen gain. Successive dilatations were performed using the Sterling conventional balloon (Boston Scientifics, Massachusetts, United States) until reaching the appropriate luminal diameter for the uneventful implantation of a torsion-resis-

tant mimetic stent (Supera, Abboth, Abboth Park, Illinois, United States). Prolonged manual hemostasis of the popliteal puncture followed with compression bandage of the radial puncture.

CASE #2

This is the case of a 67-year-old woman, heavy smoker and with dyslipidemia. She had left lower limb critical ischemia. Also, she presented with trophic lesions, no ulcers or subcutaneous cellular tissue compromise, critical ischemia with claudication after walking < 50 meters with an ankle-brachial index of 0.3, and left hallux infection controlled with oral antibiotic therapy (WIFI score = 131). An angiography performed revealed the occlusion of the left iliac artery from its origin with compromise of the CFA zone. Right femoral access was used for angiographic control and left humeral access to administer treatment. A 6-Fr carotid artery introducer sheath was inserted via humeral access at aortic bifurcation level. The occlusion was crossed with a Command 18 guidewire using the endoluminal technique. Afterwards, an angioplasty was performed using a 6 mm x 150 mm balloon from the ostium towards the common femoral artery fo-

llowed by a 7 mm x 80 mm Sterling balloon. A 6.5 mm x 100 mm Supera stent was successfully implanted followed by a self-expandable conventional 8.0 mm x 80 mm stent (EPIC, Boston Scientific, Massachusetts, United States). Hemostasis was performed manually.

In both cases, clinical assessment occurred after 30 days, 6 months, and 1 year. Due to the absence of symptoms and the improvement of trophic lesions, new additional examinations were not required.

DISCUSSION

Both cases were technically challenging. In the first case, the therapeutic target was treating a conventional stent implanted in the common femoral artery that seemed fracture and with severe in-stent restenosis. Additionally, the presence of several devices prevented the use of conventional access. On the other hand, ultrasound-guided punctures, and popliteal access both have a learning curve.

In the second case, the lack of a proper ipsilateral femoral access, and of a proximal branch of the left common iliac artery that would allow treatment using the crossover technique, as well as the extensive occlusion reported were the least favorable aspects of this case.

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The endovascular treatment of the areas exposed to external compression requires a tremendous effort from us. This anatomical location often requires new procedures. The often increased load of calcium in such territory requires assessing the possibility of using atherectomy followed by an angioplasty with a conventional balloon or a drug-eluting stent. This strategy includes the benefit of not having to implant a stent (9). However, the possibility of suboptimal results or dissection with flow compromise can also lead to stent implantation.

The use of flexion-and-torsion resistant stents has been studied extensively in the femoropopliteal territory; however, this has not been the case with the CFA zone. In our own experience, the use of torsion-and-compression resistant mimetic stents should be considered a valid alternative in patients with a compromised transition zone between the distal external iliac artery and the common femoral artery, thus avoiding more aggressive therapeutic procedures.

The clinical characteristics of patients with peripheral vascular disease often leads to using minimally invasive strategies. This is not only a challenge *per se*, but also an opportunity. In the future, the long-term follow-up of patients treated in unusual territories, and the development of further studies on this topic will define the utility of these procedures in the overall population.