

COMPLEX AORTOILIAC, PELVIC AND VISCERAL REVASCULARIZATION

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Abstract

Aortoiliac occlusive disease (AIOD) remains an area of debate concerning open and endovascular treatment options. A case of a 63-year old female is reported, with previous known vascular intermittent claudication, that presented in the emergency room with acute ischemia of the right lower limb with 24-hours of evolution. The computer tomographic angiography unveiled occlusion of the superior mesenteric artery, occlusion of left common iliac artery (CIA), subocclusive stenosis of right CIA, occlusion of distal runoffs vessels in the right lower limb and diffuse aorto-iliac disease. The first approach was to place the patient under catheter directed thrombolysis (48h) which led to right pedal pulse recovery but the occlusion of left CIA remained. The patient was then electively submitted to Covered Endovascular Repair of Aortic Bifurcation (CERAB) with chimney to inferior mesenteric artery and with an additional bailout left iliac sandwich due to dissection. Distal pulses are still present after 18 months of follow-up. Endovascular techniques provide a low morbimortality option with similar symptomatic improvement, challenging open surgery as the standard of care even in complex AIOD.

INTRODUCTION

Complex aortoiliac occlusive disease (AIOD) was, according to the Inter-Society Consensus for the Management of Peripheral Arterial Disease (TASC II - 2007), best managed by an open surgical approach.¹ However, endovascular surgery has emerged as a minimally invasive alternative, challenging or even replacing open surgery as the standard of care.^{2,3} The authors report a case of extensive AIOD, presenting as acute limb ischemia treated initially with catheter directed thrombolysis, followed by a complex covered endovascular reconstruction of the aortic bifurcation with a chimney to the inferior mesenteric artery (IMA) and a left iliac sandwich (ChCERAB).

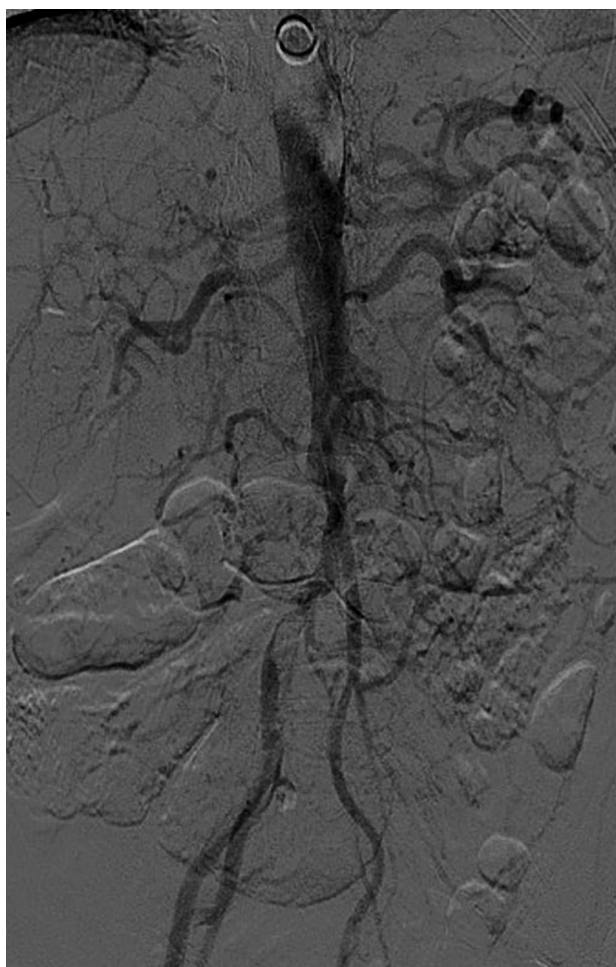
CASE REPORT

A 63-years-old female patient was admitted to the emergency department with right foot pain and cyanosis with 24-hours of duration. The patient had history of peripheral arterial disease with intermittent claudication and was an active smoker. Additional comorbidities included chronic obstructive pulmonary disease, obstructive sleep apnea syndrome, hypertension and dyslipidaemia. At clinical examination no femoral, popliteal or distal palpable

pulses were detectable bilaterally. Additionally, there was no motor deficit or sensory loss. Duplex ultrasound examination detected atherosclerotic femoro-popliteal disease and popliteal monophasic flow sign while distal flow signs were inaudible. The diagnosis of acute limb ischemia grade I was established. Due to the apparent complex peripheral disease pattern, a computed tomography angiography (CTA) was performed, unveiling occlusion of the superior mesenteric artery, occlusion of the left common iliac artery (CIA), subocclusive stenosis of the right CIA, occlusion of the distal runoff vessels in the right lower limb and diffuse aortoiliac disease.

Catheter-directed thrombolysis in the infra-renal aorta was initiated through percutaneous left brachial access. It lasted for 48-hours with right pedal pulse recovery while the left CIA occlusion remained (Figure 1). Due to the limited respiratory function of the patient, an endovascular approach was planned to resolve the issue of the left CIA occlusion as well as to treat the remaining obstructive right-side disease and exclude the remaining thrombus avoiding further distal embolization.

Under general anaesthesia, bilateral retrograde 8Fr femoral accesses and a left brachial artery 7Fr access were obtained. Subtraction angiography through the brachial access was performed and followed by selective catheterization of the IMA. Via femoral access, CIA lesions were

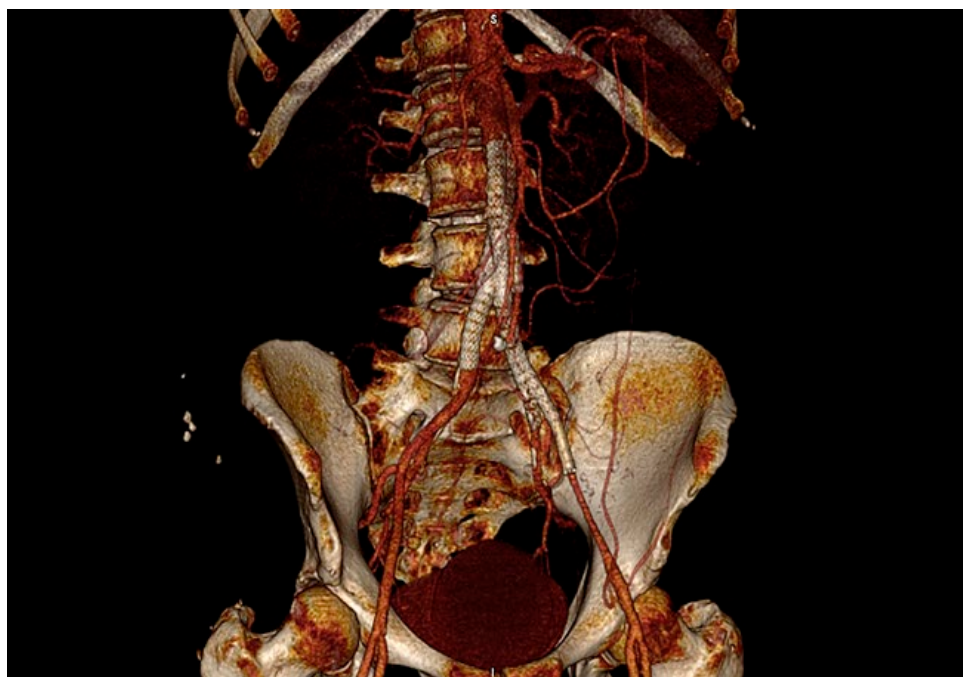
**Figure 1**

– Pre-operative angiography (post-catheter direct thrombolysis)..

crossed and a covered balloon expandable kissing stent (CBES) (Gore® Viabahn® VBX, 9x79 mm) was deployed at infra-renal aorta while actively ballooning the IMA. Both iliac pathways were stented followed by stenting of the IMA, all with CBES. Angiography confirmed patency of the stented segments however unveiled a left CIA non-occlusive thrombus and associated distal dissection. Catheterization of the left internal iliac artery was achieved via brachial access followed by an iliac sandwich-technique with two 6x39 mm CBES. Lastly, a subtraction image remained in the left external iliac artery which led to distal extension with a 6x60 mm self-expanding stent (S.M.A.R.T.® Flex Cordis) which provided a final subtraction angiogram with a good result (patency of all 8 stents and no luminal subtraction images). Distal pulses were palpable bilaterally at the end of the procedure. Postoperative complications included a brachial access site hematoma, a hospital acquired pneumonia and an inaugural diabetes. The patient was discharged home at the 32nd postoperative day. After 18 months of follow-up, distal pulses remain palpable and CTA confirmed stents patency (Figure 2).

DISCUSSION

Open surgery, namely aortobifemoral bypass (ABF), represents in many centres the gold standard for complex AIOD. It represents a durable treatment modality with high long-term patency rates although still associated with significant perioperative morbi-mortality.⁴ Given this, endovascular techniques have been evolving and technical success has improved over the past years which made it as an adequate alternative to ABF even in complex (TASC

**Figure 2**

Post-operative computed tomography angiography 3D reconstruction.

II D) AIOD.⁵ Many comparative studies between open and endovascular approach in AIOD have been published concerning this debate. In a cohort of patients presenting with TASC II D AIOD, endovascular surgery presented a more cost-effective therapy, without differences in postsurgical quality of life and been, at least clinically, equivalent.⁶ In another cohort, with the same pattern of AOID, endovascular therapy presented high initial technical success with fewer in-hospital complications but also slightly higher re-intervention rates due to lower primary patency.³ A systematic review and meta-analysis from 2013 that included 5358 patients (3733 and 1625 submitted to open bypass and endovascular treatments, respectively) corroborated the majority of previous finds, as open surgery demonstrated higher primary and secondary patency rates, however it was associated with longer length of hospital stay and higher complications and mortality rates at 30 days.⁷

A common argument in favour of endovascular therapy in complex aortoiliac disease was that a previous endovascular procedure would not affect negatively a future open approach. However, recently DeCarlo *et al.* retrospectively analysed 256 patients who underwent primary ABF, of which $\approx$ 25% had prior endovascular intervention, which revealed to be a predictor of major complications (odds ratio [OR], 2.2; 95% confidence interval [CI]: 1.2-4.1; $P=0.01$).⁸ Although there is limited knowledge relative to the pathophysiology behind this finding, this fact needs further enlightenment and further studies are warranted.

In line with the recent literature, supported mainly by the first multicentric trial to investigate the patency of CBES and bare metal stents (BMSs) in the treatment of aortoiliac disease (COBEST)⁹, in which CBES showed a patency advantage both in the short (1y) and long term (3y), the authors opted in this case for the covered endovascular repair of aortic bifurcation (CERAB).¹⁰ It was necessary to perform a chimney to the IMA to maintain its patency due to the CTA confirmed occlusion of SMA. The literature concerning IMA stenting is scarce, with small case series. A series of four cases reported 100% primary patency of IMA stenting in patients with chronic mesenteric ischemia.¹¹

Although results are promising with endovascular techniques, even in complex AIOD as shown in this case, there is still a paucity of randomized control trials in this setting.

CONCLUSION

An endovascular approach in complex aortoiliac disease, besides providing at least similar clinical results to a surgical approach, provides less procedure-related morbidity as demonstrated in this case report. With the advent and continuous improvement of endovascular techniques, the endovascular approach might become the state

of art in aortoiliac disease independently of the complexity. Randomized clinical trials are necessary to further address this question.

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