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TECHNICAL NOTE

Use of VIABAHN Open Revascularisation TEChnique (VORTEC) for Iliofemoral Bypass

Fabrice Schneider [a,*], **Anaïs Peran Dubourg** [a], **Jean-Baptiste Ricco** [b]

[a] Department of Vascular Surgery, University Hospital of Poitiers, Poitiers, France
[b] Department of Vascular Surgery and Renal Transplantation, University Hospital of Strasbourg, Strasbourg, France

Introduction: The VIABAHN Open Revascularisation TEChnique (VORTEC) was initially described for visceral revascularisation and supra-aortic reconstruction for complex aortic hybrid surgery. Herein is reported the use of this innovative technique for revascularisation of the iliofemoral arteries.
Report: The use of the VORTEC to perform proximal anastomosis of a prosthetic iliofemoral bypass in two symptomatic patients with heavily calcified iliac artery lesions and redo surgery, respectively, is reported.
Discussion: In case of loco-regional hostile conditions, a sutureless telescoping iliac anastomosis should be considered as a valuable adjunct in iliofemoral revascularisation.

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INTRODUCTION

The VIABAHN Open Revascularisation TEChnique (VORTEC) was first described in 2008 for renal revascularisation of complex aortic reconstruction,[1,2] and for supra-aortic debranching during hybrid aortic arch surgery.[3] More recently, surgical teams have shown interest in this method in performing the distal anastomosis of femoropopliteal or aortoiliac bypasses.[4,5]

Herein, the application of VORTEC in performing proximal anastomosis localised to the external iliac artery in an iliofemoral bypass is described.

SURGICAL TECHNIQUE

Patient 1 was a 70 year old man (body mass index 32.7) who presented with severe bilateral intermittent claudication of the lower limbs. Computed tomography angiography (CTA) revealed TASC D iliac lesions with extensive calcified stenosis of the external iliac arteries and 90% stenosis of the left femoral bifurcation associated with occlusion of the superficial femoral artery (Fig. 1). Classic hybrid treatment by conventional endarterectomy of the common femoral artery extended to the profunda femoral artery associated with iliac angioplasty was not done because of tricky proximal clamping due to a heavily calcified artery and a high risk of post-operative patch infection secondary to the extensive femoral bifurcation approach and obesity. It was opted to perform an iliofemoral bypass with the VORTEC technique to limit femoral access and to avoid arterial clamping.

Patient 2 was a 68 year old man with rest pain in the left leg and a hostile left groin with two previous left iliofemoral bypasses. CTA showed a restenosis along the entire length of the iliofemoral bypass. In this case, endovascular treatment was not chosen owing to the length of the lesion, localisation to the mobile arterial segment, and potential stent fracture. It was opted to perform a redo iliofemoral bypass with VORTEC to limit exposure to the scar tissue.

The VORTEC technique was used to perform the proximal anastomosis, which was located on the external iliac artery, above the origin of the iliofemoral bypass (Fig. 2). The distal anastomosis was performed by hand on the profunda femoral artery after performing the VORTEC technique. This technique required a short elective groin incision to access the profunda femoral artery. No extensive dissection of the common femoral artery was required as a simple view of the anterior side is recommended to perform the puncture. After heparinisation (3,000 IU), a 7 mm polytetrafluoroethylene (PTFE) graft was punctured 6 cm from its extremity with the introduction of a 0.035 inch guidewire outside the patient. The same guidewire was introduced into the common femoral artery through a second puncture. An 8 F introducer sheath was introduced into the PTFE and into the common femoral artery.

The PTFE was anchored to the adventitia of the common femoral artery using two 5/0 Prolene stitches. A covered nitinol VIABAHN stent (8 mm × 50 mm; W.L. Gore, Flagstaff, AZ, USA) was used to match the diameter of the external

* Corresponding author. Department of Vascular Surgery, University Hospital of Poitiers, Poitiers 86021, France.
E-mail address: fabrice.schneider5@orange.fr (Fabrice Schneider).

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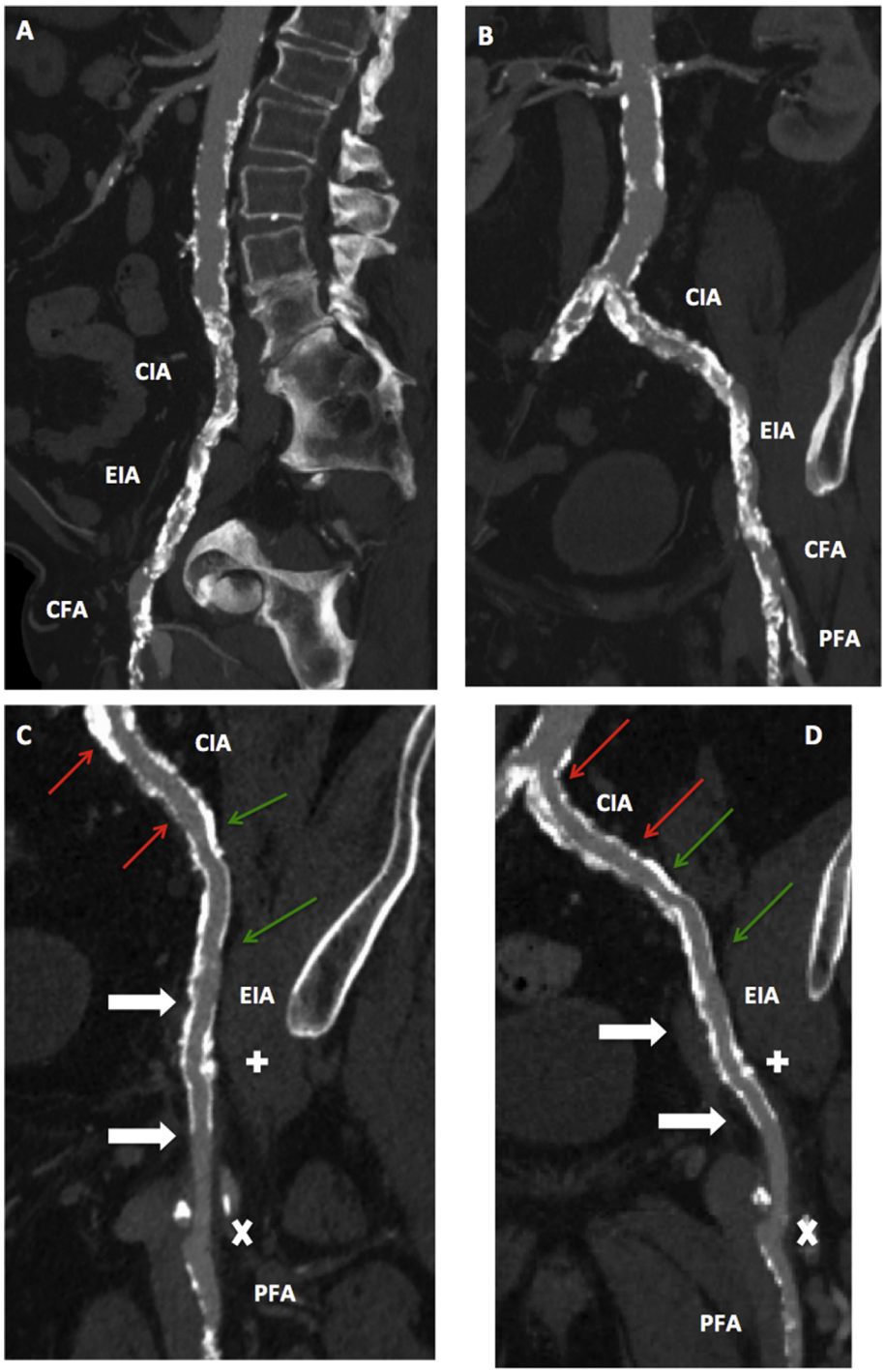

Figure 1. Computed tomography (CT) scans of patient 1. (A) Pre-operative CT scan with sagittal reconstruction of the left aorto-ilio-femoral arterial axis. (B) Pre-operative CT scan with reconstruction of the left aorto-ilio-femoral arterial axis. (C, D) Post-operative CT scan at 1 month in the same patient with reconstruction of the left aorto-ilio-femoral arterial axis. Arrows (→) indicate the position of the covered VIABAHN stent to perform the VIABAHN Open Revascularisation TEChnique (VORTEC). The iliofemoral bypass is represented between (+) and (×). (+) Localises the proximal anastomosis using VORTEC and (×) indicates the regular distal anastomosis on the profunda femoral artery. In this case, extensive stenting of the external iliac artery (EIA) with a nitinol covered stent (→) and stenting of the common iliac artery (CIA) with a bare metal stent (→) completed the iliofemoral bypass. *Note.* CFA = common femoral artery; PFA = profunda femoral artery.

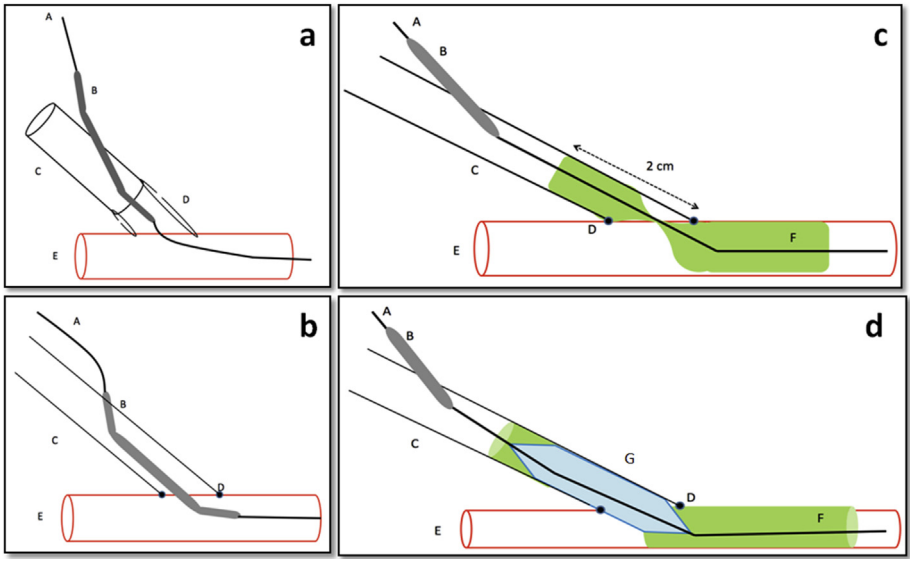

Figure 2. Description of critical steps in performing the VIABAHN Open Revascularisation TEChnique (VORTEC) applied to proximal anastomosis on external iliac artery during iliofemoral bypass. (a) Initial step. A standard 0.035 guidewire (A) is introduced through a 7 mm polytetrafluoroethylene (PTFE) graft (C) and in the native artery (E). An 8 F introducer sheath (B) is pushed down on the guidewire. Two stitches (D) are placed but not completed during this step (D). (b) Intermediate step. The introducer sheath (B) is in place. The stitches (D) are completed to secure the PTFE graft (C) on the native artery (E). (c) VIABAHN deployment step. The 8 mm VIABAHN (F) is moved down through the introducer sheath (B) and the sheath is removed partially (B). The VIABAHN (F) is deployed under flouroscopy to get a 20—30 mm overlap with the PTFE graft (C). (d) Final step. The VIABAHN catheter sheath is exchanged with a 7 mm balloon catheter (G). Balloon inflation allows full expansion into the iliac artery.

iliac artery. Sealing was achieved by ballooning the VIABAHN stent with a 7 mm Powerflex Balloon (Cordis, Fremont, CA, USA). The distal anastomosis was handsewn end to side between the PTFE graft and the profunda femoral artery.

No transfusion was needed in either case. In patient 1, an extensive external iliac artery angioplasty with a covered stent and stenting of the common iliac artery with a bare metal sent completed the iliofemoral bypass to improve inflow in the graft.

Both patients received a dual antiplatelet regimen combining clopidogrel and aspirin for at least 6 months. In the first case, a superficial infection of the groin incision required local drainage with delayed healing. In both cases, the patency of the bypass was confirmed by CTA at 30 days (Fig. 1) and at 6 months by Doppler ultrasound.

DISCUSSION

To the authors' knowledge, this is the first description of VORTEC applied to the proximal anastomosis of an iliofemoral bypass. The VORTEC technique was used to facilitate the making of a challenging proximal anastomosis due to severe calcification of the iliac artery that could be clamped or sewn owing to calcification. The same risk exists in obese patients with local fibrosis of the groin due to previous vascular approaches. In these cases, the VORTEC technique allows minimisation of dissection and lowers the risk of infection.

When using VORTEC for construction of an iliofemoral anastomosis, moderate oversizing and an overlap length of more than 20 mm should be employed with fixation of the graft to the arterial wall by two stitches to avoid disconnection between the covered stent and the graft. A valuable alternative could be to use the Gore hybrid graft. However, availability remains a major drawback and the "home made" technique could be useful in emergency situations. Using this technique to perform the proximal anastomosis on the common iliac artery could jeopardise the patency of the internal iliac artery and should be avoided. It is recognised that no conclusion, except on the feasibility of VORTEC, can be drawn from these two cases. The long-term results of this technique should be confirmed in a large series with long-term follow up.

CONCLUSION

The application of the VORTEC technique provides an additional option in difficult iliofemoral revascularisation, especially in the case of a heavily calcified external iliac artery. The telescopic sutureless technique reduces operative time and is easily reproducible.

CONFLICT OF INTEREST

None.

FUNDING

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