Off-label use of the Gore Excluder iliac branch endoprosthesis in association with the Rotarex S catheter to achieve total endovascular recanalization of an occluded aortobifemoral bypass

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ABSTRACT

We describe a successful case of hybrid revascularization of a totally occluded aortobifemoral bypass with retrograde use of the Rotarex S catheter (BD) and complete relining with a Gore Excluder iliac branch endoprosthesis (W.L. Gore & Associates). The repair procedure was performed with femoral surgical access and percutaneous brachial access. Despite left renal artery endoclamping, after the final angiography, deployment of a covered stent in the left renal artery was needed because of residual thrombotic material at the vessel ostium. The procedure was completed with reconstruction using a common femoral artery Dacron graft and bilateral complete iliac surgical branch relining using self-expanding covered stents, with recovery of distal pulses. (J Vasc Surg Cases Innov Tech 2023;9:101234.)

Keywords: Aortic occlusion; Aortoiliac; Athero-thrombectomy; Endovascular thrombectomy; Rotarex

Bilateral limb occlusion after aortobifemoral (ABF) bypass occurs in 1% to 3% of patients.[1] Multiple strategies are known in the literature to manage a bilateral occluded ABF bypass, including redo ABF, axillobifemoral bypass, endovascular recanalization of the native aortoiliac system, and thrombectomy.[2] Technologic developments have recently provided devices allowing minimally invasive treatment for acute and chronic thrombosis, restoring the original graft patency, and avoiding open surgery. The Rotarex S (BD) percutaneous mechanical athero-thrombectomy system, although originally indicated for the treatment of acute, subacute, and chronic occlusions involving peripheral arteries, has recently been proposed for occluded ABF bypass.[3] We describe a successful case of hybrid total revascularization of a completely occluded ABF bypass using the Rotarex system, with relining with a Gore Excluder iliac branch endoprosthesis (IBE; W.L. Gore & Associates) used in an off-label fashion.

CASE REPORT

A 51-year-old male patient was admitted to the emergency room of our hospital because of bilateral chronic limb-threatening lower limb ischemia with a 4-day history of acutely worsening rest pain. He underwent computed tomography angiography, which revealed total thrombotic occlusion of the infrarenal native aorta starting just below the renal arteries and complete occlusion of a previous ABF bypass performed for Leriche syndrome a few years earlier, with bilateral blood flow reconstitution at the level of the common femoral arteries. At his admission, he reported bilateral rest pain and mild digital paresthesia; no other neurologic deficits were reported. The revascularization strategy was decided using a dedicated software program (Aquarius; TeraRecon). The planned procedure was based on the use of a rotational mechanical athero-thrombectomy device (10F Rotarex S catheter) to remove the thrombotic material from the native infrarenal aorta and bypass. This maneuver had to be followed by complete graft relining with a Gore Excluder IBE coupled with Viabahn covered stents (W.L. Gore & Associates). Several anatomic issues were considered during the procedural planning. The ABF bypass was performed using a 16-mm × 8-mm bifurcated graft. The distance from the most caudal renal artery (the left) to the flow divider of the surgical graft was ~63 mm. Thus, no options were available to perform relining with a standard bifurcated abdominal endograft owing to the too short infrarenal segment, which did not allow for expansion of the contralateral gate. Surgery was performed with the patient under general anesthesia and systemic heparinization in a hybrid operating room. Bilateral surgical common femoral artery exposure and right percutaneous brachial access were obtained. Digital subtraction angiography was performed from the upper access and confirmed paravisceral aorta and renal artery patency, with occlusion starting from the native infrarenal aorta just below the left renal

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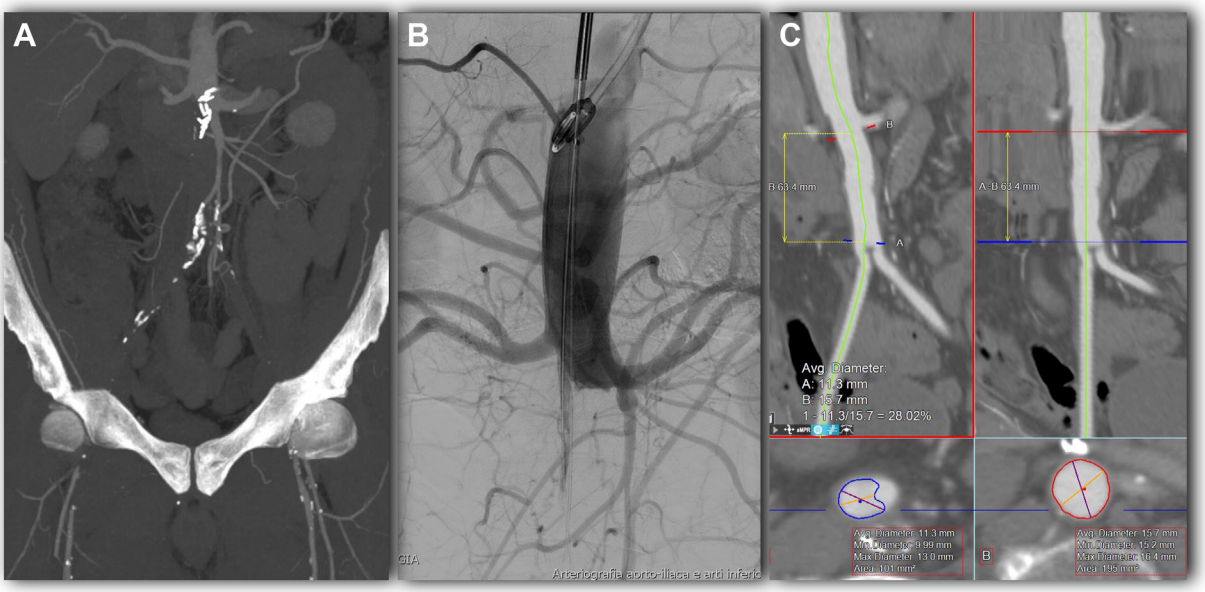

Fig 1. Preoperative computed tomography angiography **(A)** and intraoperative diagnostic angiography **(B)** showing patency of the paravisceral aorta and both renal arteries, with total occlusion starting from the native infrarenal aorta just below the left renal artery (LRA) and involving the entire previous aortobifemoral (ABF) bypass. Preoperative planning and centerline reconstruction were based on a previous computed tomography angiography scan demonstrating the length from the LRA to the flow divider **(C)**.

artery (LRA) and involving the entire previous ABF bypass (Fig 1). Next, two 11F introducer sheaths were positioned in retrograde fashion at the distal anastomotic groin sites. From the upper access, where a 90-cm-long Destination 6F introducer sheath (Terumo Interventional Systems) was placed, both renal vessels were cannulated. Next, a filter (Spider FX; Medtronic) was advanced and opened in the right renal artery (RRA), and a balloon catheter was placed into the LRA. A 10F Rotarex S catheter was advanced over the 0.018-in. dedicated guidewire to perform occluded graft revascularization. The LRA balloon was inflated, and several device passages were executed inside each occluded surgical branch and into the infrarenal aortic segment, removing most of the intraluminal material (Fig 2). Next, from the left femoral access, over a 0.035-in. super-stiff guidewire, a 23 mm × 10 mm × 100-mm Gore Excluder IBE was advanced and deployed with its proximal end point just below the LRA, covering the residual mural aortic thrombus. The balloon in the LRA was then deflated, and the contralateral gate was cannulated from the right femoral access. Right iliac branch relining was performed, deploying a 13-mm × 100-mm and, distally, a 13-mm × 50-mm Viabahn covered stent (W.L. Gore & Associates). On the left side, iliac relining was completed with an 11-mm × 50-mm Viabahn covered stent (Fig 3). Completion angiography demonstrated aortoiliac recanalization and the presence of residual thrombotic material in front of the LRA ostium. The RRA filter was then removed, the LRA 0.018-in. guidewire was exchanged for a 0.035-in. Rosen guidewire, and a 6-mm × 28-mm BeGraft covered stent graft (Bentley Innomed) was deployed into the LRA (Fig 4). The right femoral introducer sheath was then removed, and the arteriotomy was closed with interposition of an 8-mm Dacron patch. On the left side, the common femoral artery needed to be reconstructed using an 8-mm Dacron branch because of previous femoral anastomosis bleeding. The final angiography performed from the upper access showed RRA, LRA and stent graft patency, with satisfactory downstream flow (Fig 5). Finally, the right brachial percutaneous access was manually compressed after sheath removal. At the end of the procedure, the patient had palpable distal pulses and no evidence of neurologic deficits or compartmental syndrome. The amount of contrast medium used was 135 mL, and the fluoroscopy time was 69 minutes. The intraoperative blood loss was estimated at 500 mL, and no transfusions were required after surgery. The patient remained stable during surgery and subsequently. No major complications occurred during the postoperative course. The patient was discharged on postoperative day 6 with a prescription for double antiplatelet therapy for 6 months and instructions to continue with only aspirin afterward. The predischarge follow-up computed tomography angiography confirmed patency of both renal arteries and the entire bypass (Fig 5). The patient provided written informed consent for the anonymous report of his case details and imaging studies.

DISCUSSION

According to the instructions for use, the Rotarex S catheter has applications in the treatment of arterial occlusions of native vessels, stents, prosthetic bypass, and vascular access for dialysis. The endovascular atherothrombectomy approach provided by the Rotarex S catheter allows, once the target vessel has been

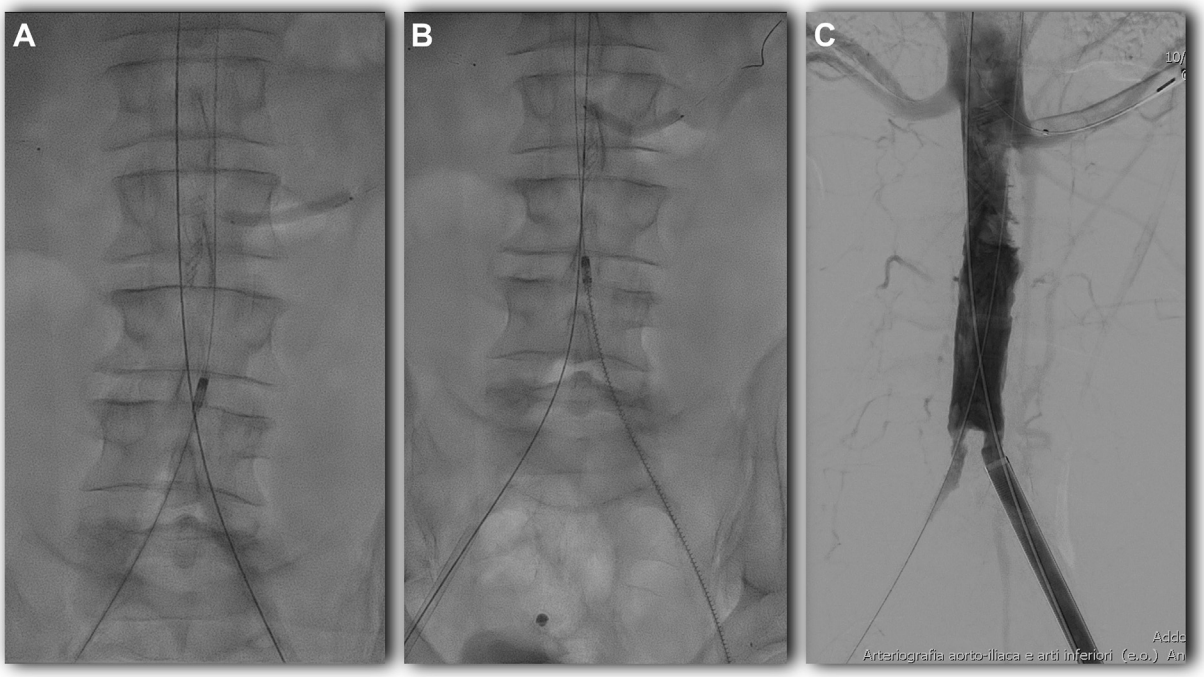

Fig 2. **A** and **B**, Images showing 10F Rotarex S catheter advancement from the femoral access, with left renal artery (LRA) endoclamping and a protective filter opened in the right renal artery (RRA). **C,** Bypass lumen reconstitution before relining.

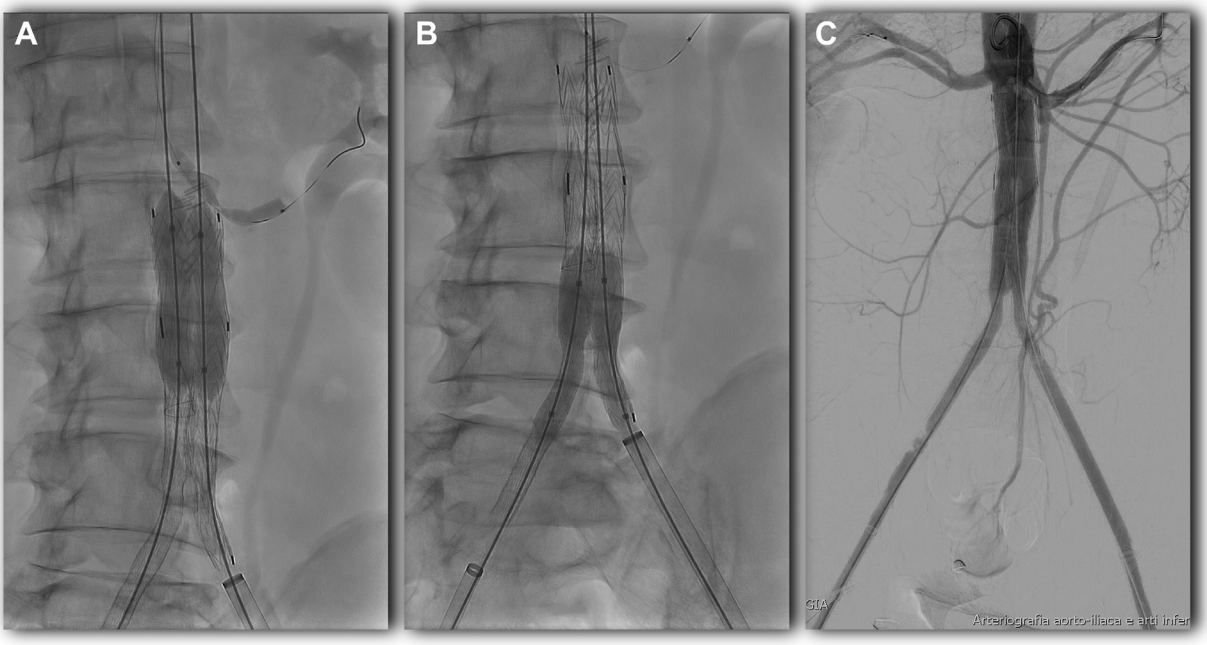

Fig 3. **A** and **B,** Total bypass relining with Gore Excluder iliac branch endoprosthesis (IBE) and Viabahn covered stents, with kissing balloons. **C,** Follow-up angiography demonstrating aortobifemoral (ABF) bypass recanalization.

recanalized, for the performance of adjunctive procedures, such as additional graft deployment to correct eventual intraluminal material persistence or the underlying pathology causing the thrombosis.[3] In the present case, we chose mechanical atherothrombectomy for bypass recanalization because of its

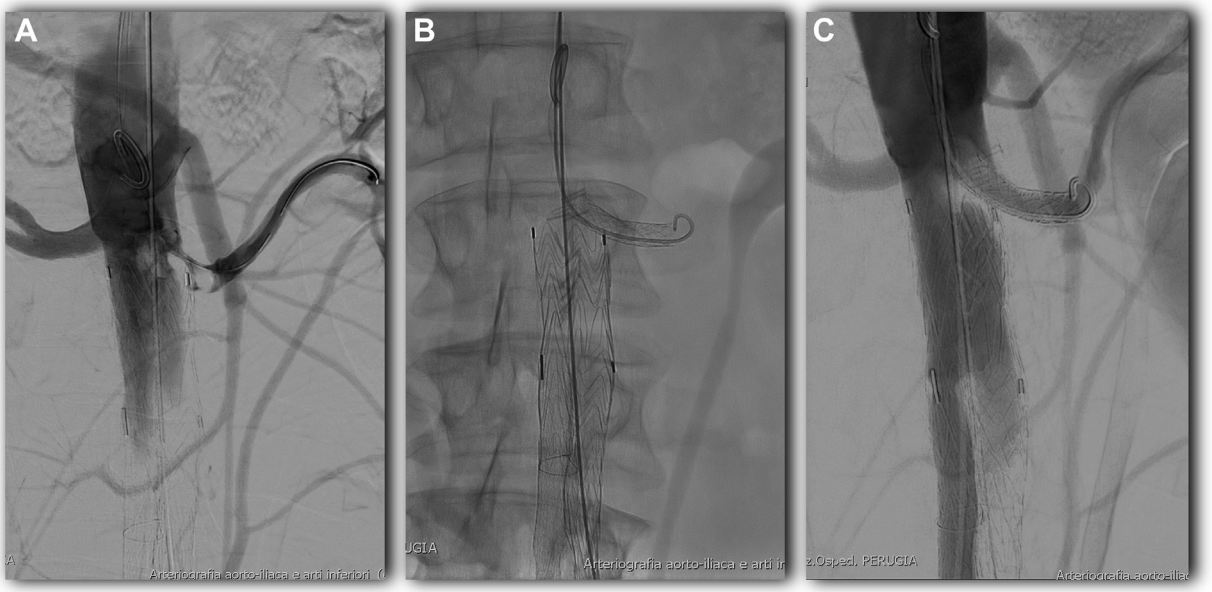

Fig 4. A, Follow-up angiography showing the presence of residual thrombotic material in front of the left renal artery (LRA) ostium. **B** and **C,** LRA stenting with a BeGraft covered stent deployed over a Rosen 0.035-in. guidewire.

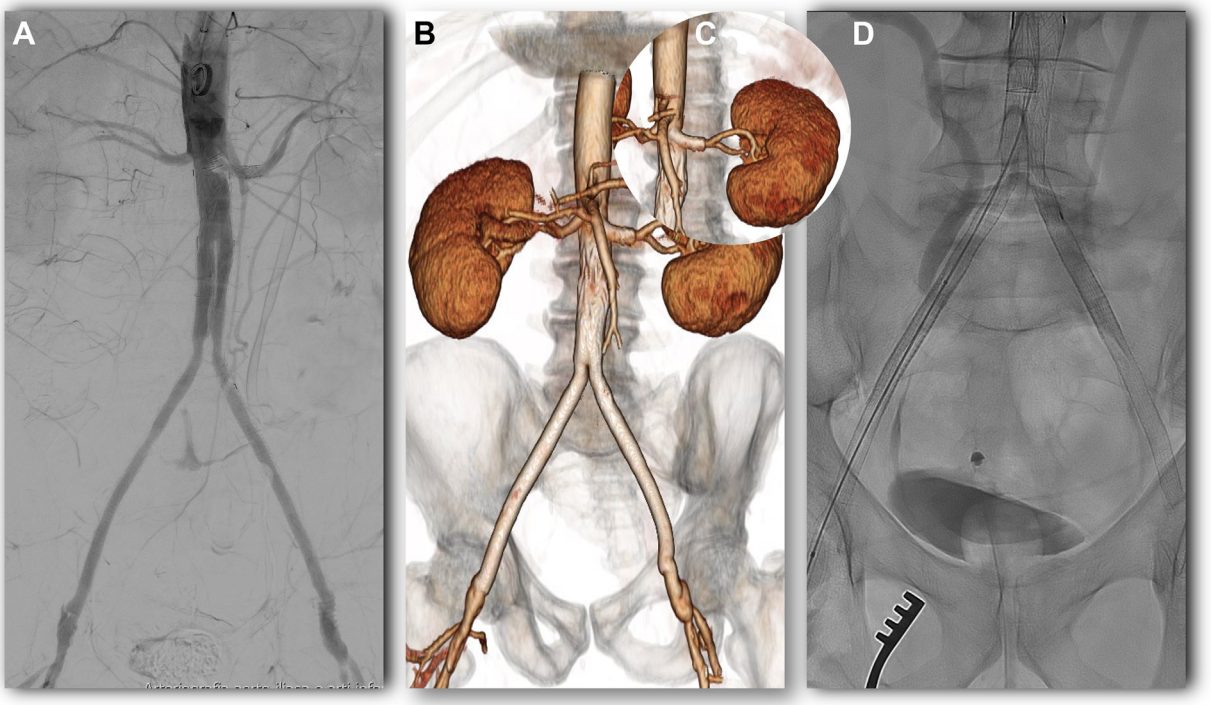

Fig 5. Total aortobifemoral (ABF) bypass recanalization images at final angiography **(A)** and postoperative computed tomography angiography **(B)**. **C,** Detail of LRA stenting and bilateral iliac relining. **D,** LRA stenting and bilateral iliac relining.

effectiveness and safety compared with Fogarty thrombectomy. Thrombolysis was excluded because it was not expected to be effective considering the amount of thrombotic material to be removed.

To completely exclude any residual intraluminal thrombus, a Gore Excluder IBE was selected. Because of the shortness of the surgical aortic segment above the flow divider and its diameter, the Gore IBE (55 mm

long from its proximal edge to the contralateral gate and 23 mm in proximal diameter) was the only off-the-shelf bifurcated endograft available for use in the urgent setting and outside the instructions for use to avoid contralateral gate opening into the ipsilateral surgical branch. In the treatment of common iliac artery and aortoiliac aneurysms, iliac branch devices have been used sporadically, with high technical success, excellent patency, and low reintervention rates.[4-8] Furthermore, with increasing confidence achieved over the years using such devices electively, some investigators have already described novel and off-the-label approaches.[9-11] Other endovascular alternatives would have been possible for our patient, including kissing covered stents or covered endovascular reconstruction of the aortic bifurcation technique.[12]

CONCLUSIONS

An endovascular approach using the Rotarex S catheter, combined with total endovascular relining, appears to be a safe and effective option for treating aortoiliac bypass graft occlusions. The off-the-label application of the Gore Excluder IBE might represent a versatile solution to achieve total endovascular relining in properly selected patients. Future cohort studies are advisable to assess whether this approach could offer durable results compared with traditional open surgical or endovascular therapies.

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