Reversed Gore Excluder conformable main body as a conduit between branched stent graft limb, common iliac artery, and renal artery

Pekka-Sakari Aho, MD,[a,b] Patrick Björkman, MD,[a,b] *and* Maarit Venermo, MD,[a,b] *Helsinki, Finland*

ABSTRACT

Renal artery access might not always be achieved due to anatomical reasons during the deployment of a branched stent graft in thoracoabdominal or juxtarenal abdominal aortic aneurysms. Renal perfusion is maintained through the aneurysm sac until the iliac limbs are deployed. To preserve renal perfusion, a branched iliac limb would be needed. Such limbs with a side branch, a narrow (12-14 mm) proximal end, and a wide (16-20 mm) distal end are not commercially available. Due to the nature of their deployment mechanism, Gore Excluder distal limbs (W.L. Gore & Associates) have been used outside the instructions for use in reversed position. A traditional Gore Excluder main body can be reversed; however, the smallest proximal diameter is 23 mm, which could be too large to be deployed in a typically 16- to 18-mm common iliac artery. However, the smallest Gore Excluder Conformable endoprosthesis (W.L. Gore & Associates, Inc) main body is 20 mm in diameter, and the distal limb is 14.5 mm. This allows for a perfect fit when deployed in reversed position between an 11-mm unibody limb (Cook Medical Inc) and the common iliac artery, resulting in access to the renal artery from the side branch. We used a Gore Excluder Conformable main body graft in two such cases successfully. In these two patients, the iliac limbs and renal artery have stayed patent during a follow-up of 24 and 3 months. A Gore Excluder Conformable graft can be deployed in reversed position, using it as a conduit between the branched stent graft limb, common iliac artery, and renal artery. (J Vasc Surg Cases Innov Tech 2024;10:101452.)

Keywords: Branched aortic stent-graft; Endovascular aneurysm repair; Renal artery access

The complexity of endovascular aneurysm repair has increased significantly, allowing use of the technique in patients with challenging anatomies. Sometimes, innovative solutions are required to seal the aneurysm outside the systemic circulation but maintain perfusion to the vital visceral branches. We had two patients in whom a bridging stent between the renal artery and branched stent graft could not be achieved during the primary procedure but was successful later. The solution was to use a reversed Gore Excluder Conformable endoprosthesis (C-Excluder; W.L. Gore & Associates, Inc) as a bridge in the iliac limb, allowing a side branch to the renal artery.

METHODS

A C-Excluder 20-mm main body (model no. CXT201412E) was reversed and used as an iliac limb in two patients. Both patients provided written informed consent for the report of their case details and imaging studies. In the first patient, during deployment of a T-branch stent graft (Cook Medical Inc), the right renal artery could not be accessed because the bridging stent was inadvertently deployed in an accessory, small renal artery, resulting in rupture of the accessory renal artery. Due to bleeding and instability of the patient, the accessory renal artery branch had to be occluded. The left iliac limb was not deployed to minimize the risk of spinal cord ischemia, allowing perfusion to the aneurysm sac and right renal artery; thus, the right renal artery stayed patent (Fig 1). In the second patient, the left renal artery could not be accessed due to anatomic reasons; the artery orifice was in the top of the aneurysm and located distal to a very narrow aneurysmal neck with an angulation compressing the branch and making access impossible (Fig 2). We wanted to preserve the renal arteries, but no branched commercial grafts are available that would fit in both the proximal graft and the distally located common iliac artery and yet provide a side branch that could be connected to the renal artery. For both patients, we decided to use a reversed C-Excluder graft and the iliac limb and renal artery were connected through the contralateral limb of the graft using Gore VBX covered stents and Gore iliac branch endoprosthesis internal component 16 × 10 × 70-mm graft (model no. HGB161007).

TECHNICAL ASPECTS

The technique to reverse a Gore Excluder iliac limb has been previously described.[1-3] Reversing a Gore Excluder

From the Abdominal Center, Helsinki University Hospital[a]; and the Division of Vascular Surgery, Meilahti Tower Hospital[b].

Correspondence: Pekka-Sakari Aho, MD, Abdominal Center, Helsinki University Hospital, Division of Vascular Surgery, Meilahti Tower Hospital, Haartmaninkatu 4, P.O. Box 340, FI-00029 HUS, Helsinki 00290, Finland (e-mail: pekka.aho@hus.fi).

The editors and reviewers of this article have no relevant financial relationships to disclose per the Journal policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2468-4287

https://doi.org/10.1016/j.jvscit.2024.101452

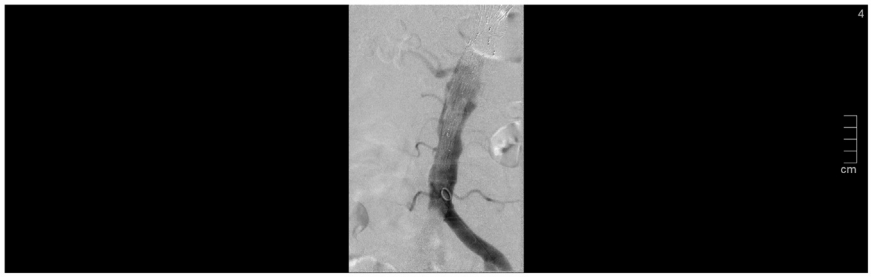

Fig 1. Angiogram of patient 1 without the left iliac limb showing the pigtail in the aneurysm sac and right renal perfusion from the aneurysm sac.

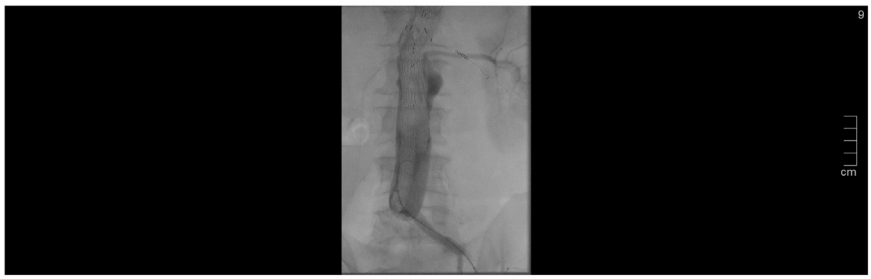

Fig 2. Angiogram of patient 2 without the left iliac limb showing the pigtail in the aneurysm sac and left renal perfusion from the aneurysm sac.

Conformable main body is somewhat more complicated. We rehearsed the deployment with a demonstration stent graft device (Supplementary Video 1). First, the top olive must be cut off (Fig 3). Under the hatch of the deployment handle, all three polytetrafluoroethylene deployment lines (nos. 1, 4, and 5) are cut (Fig 4). The lines are numbered and, importantly, all the lines are slightly different in color, one white, one gray, and one bluish. This is important, because in our experience the deployment must occur in the correct order (ie, 1, 4, 5) later. Next, the deployment knob is removed. The last two wires (no. 2 and 3; one is metal) are also removed by detaching the safety handle (Fig 5). The graft can now be removed from the catheter by sliding it off at the end of the catheter (Fig 6). The reversed graft is then inserted into a 16F Gore DrySeal Flex introducer sheath over a stiff wire and pushed in using the dilator of the introducer sheath with the tip cut off (Fig 7). The graft is deployed inside the introducer sheath using the three deployment lines in correct order (Fig 8). In our experience, an incorrect deployment sequence can complicate the deployment. Once the C-Excluder main body is deployed inside the DrySeal introducer, the graft is delivered in correct position using the pull-back method (ie, retracting the introducer sheath and holding the dilator in place; Supplementary Video 2). The rotation of the graft is also important because the (contralateral) short limb must be positioned such that enough space is available for the bridging stent grafts to open. We cannulated the renal artery first, and then deployed the first (most distal) bridging stent (6- or 8-mm Gore VBX graft), followed by an 8-mm Gore VBX graft. This is then connected to the main body of the reversed Gore Excluder Conformable contralateral limb with a Gore iliac branch endoprosthesis internal iliac component with 10-mm distal and 16-mm proximal diameters, complying to the attachment sizes. All attachments are ballooned using a compliant balloon. In both patients, the deployment was successful, and a perfusing flow was created to the renal artery and iliac artery (Supplementary Video 3).

In both patients, after a follow-up of 24 and 3 months, respectively, the iliac limbs and renal arteries were patent (Supplementary Video 4). A three-dimensional reconstruction of the graft in patient 2 is demonstrated in Fig 9.

DISCUSSION

Because there are no commercially available branched grafts with the correct proximal and distal diameters, a reversed Gore Excluder Conformable stent graft is a possible option. A double-barrel technique can also be considered, but we believe there is a risk of endoleaks and uncertainty of the long-term patency of such grafts. The patency of a reversed C-Excluder graft in this position also requires confirmation. However, in our two patients, the stents have remained patent even after 2

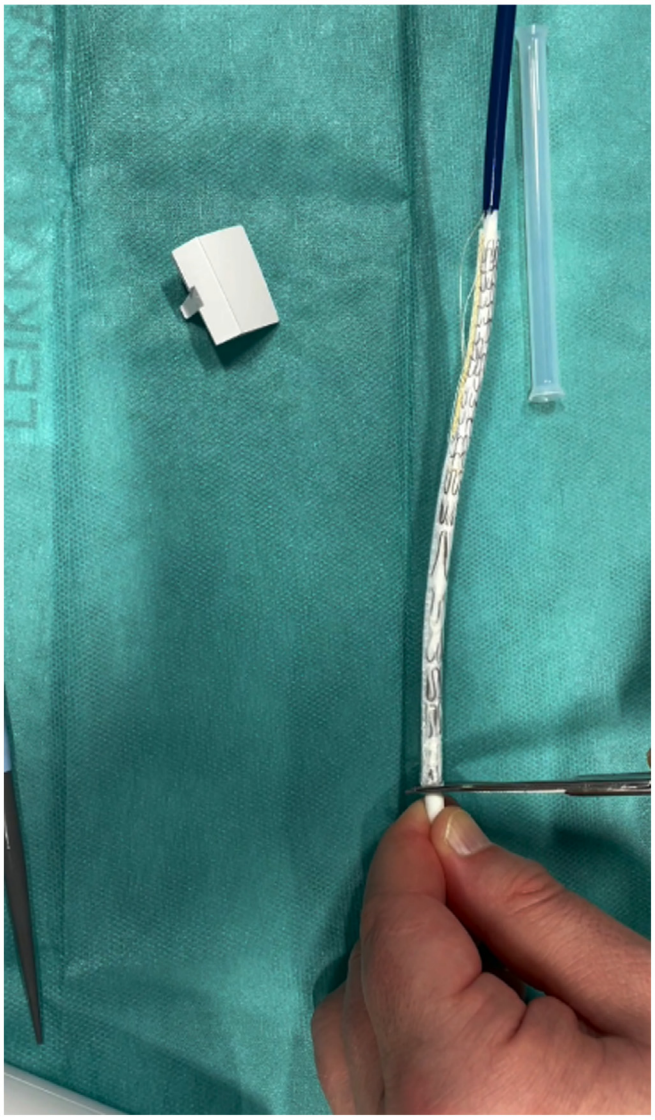

Fig 3. The top olive of the stent graft catheter is cut to allow detachment.

Fig 4. Numbered and colored deployment lines.

Fig 5. After the wires have been cut, the deployment system is removed.

Fig 6. The loose graft is slid off the catheter.

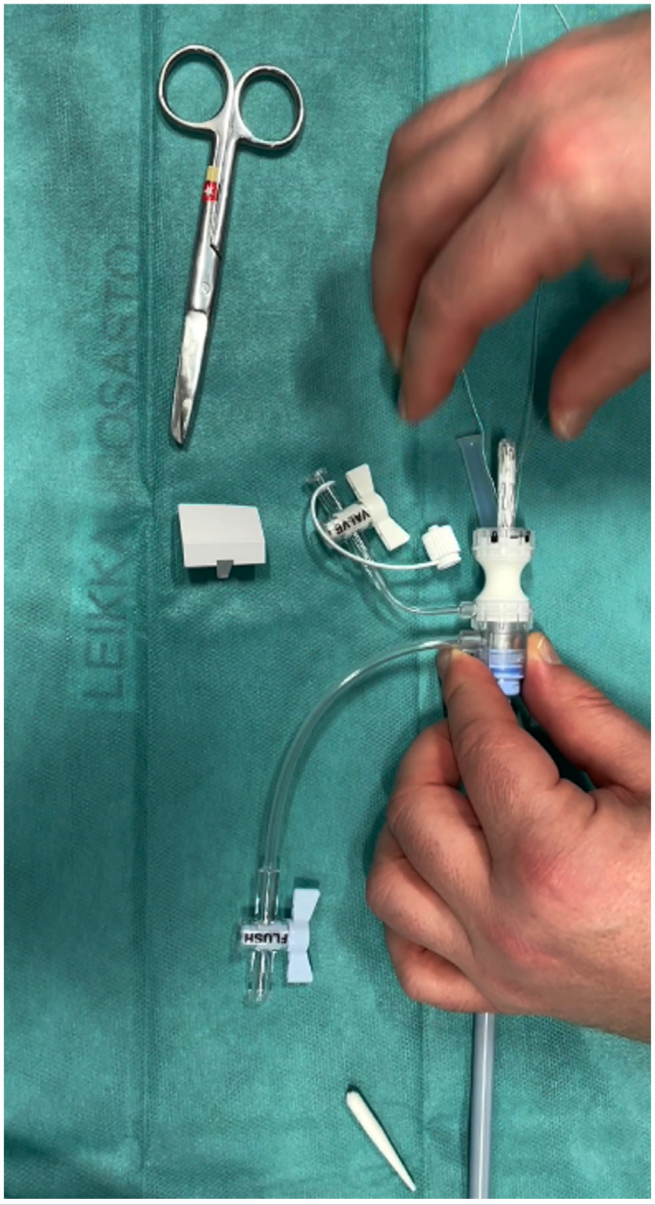

Fig 7. The reversed graft is inserted into a 16F introducer sheath.

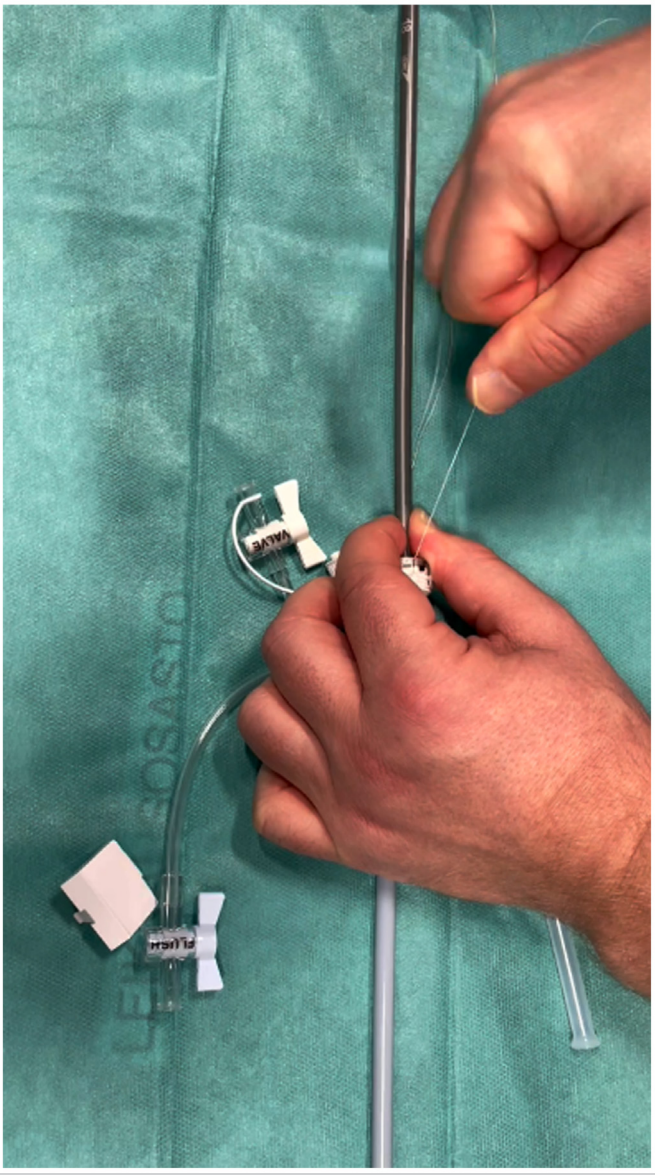

Fig 8. The graft is deployed inside the sheath by pulling the deployment lines.

years follow-up. The deployment must, however, be planned carefully, and there must be sufficient space in the distal aorta for the side branch to the renal artery.

CONCLUSIONS

A Gore Excluder Conformable endoprosthesis can be deployed in reversed position. It can be used as a conduit between a branched stent graft limb, common iliac artery, and renal artery.

DISCLOSURES

None.

We want to thank Rainer Mattsson for help and guidance in planning the procedure.

Fig 9. Three-dimensional reconstruction of graft configuration in patient 2. *L,* Left; *R,* right.

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Submitted Oct 23, 2023; accepted Jan 31, 2024.