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Case Report

Late Non-Anastomotic Rupture of a Bifurcated Dacron Aortic Graft Treated Using a Gore Excluder Limb Endoprosthesis

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Dacron vascular prostheses have been widely used in vascular surgery since the mid-1970s. They have been proven to be the most durable and reliable conduits for arterial replacement in aortic and peripheral surgeries for decades. However, an extremely rare complication, namely late non-anastomotic graft rupture, due to intrinsic structural prosthetic disruption can occur, resulting in acute hemorrhage or false aneurysm formation. We report a case of this rare complication due to non-anastomotic rupture of a bifurcated knitted Dacron aortic vascular graft in a patient who had undergone an aorto-bi-iliac bypass 6 years ago. The patient was successfully treated in an emergency setting with endovascular therapy using an iliac limb of an abdominal aortic endoprosthesis.

Key Words: Non-anastomotic rupture, Dacron graft, Endoprosthesis, Gore excluder

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INTRODUCTION

Dacron grafts have been extensively used in cardiovascular surgery for more than half a century with proven reliability and excellent reputation for long-term endurance. Nevertheless, intrinsic structural graft failure resulting in late non-anastomotic and non-infective rupture of the Dacron prostheses has been reported exceptionally. Breaches, tears, or holes in the Dacron textile structure might occur usually with a delay of years after implantation. This complication is unpredictable and the incidence has been estimated to be 0.5% to 3% in some clinical series. Management of this rare disorder, as described in few case reports, comprises of both open and endovascular treatments. We report a case of massive abdominal hemorrhage caused by the sudden rupture of an iliac branch of a previous aorto-bi-iliac Dacron bypass that was successfully repaired by deployment of an emergency Gore Excluder limb endoprosthesis.

CASE

An 80-year-old man who underwent an aorto-bi-iliac Dacron bypass for an infrarenal abdominal aortic aneurysm of 7 cm diameter 6 years ago was admitted to our emergency room due to sudden back pain, hypotension, and severe anemia. Incidentally, the surgical procedure was performed previously in our division. It was ascertained from the medical records that a 16 mm×8 mm Dacron knitted gelatin sealed bifurcated vascular graft (Gelsoft™; Vascutek Ltd., Inchinnan, Scotland, UK) was implanted. The patient had a history of active smoking, hypertension, mild end-stage renal disease, and a left carotid endarterectomy performed 8 years ago for symptomatic stenosis of the internal carotid artery.

On physical examination, a lower abdominal pulsatile mass was found. Computed tomography (CT) angiography revealed a massive left retroperitoneal hematoma around the Dacron prosthesis with an active focal bleeding from

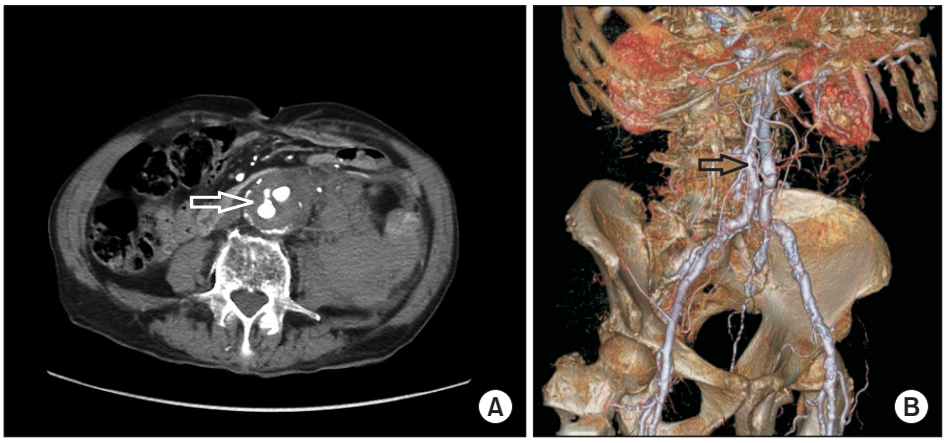

Fig. 1. Computed tomography scan (A) and volume rendering image (B) demonstrated focal bleeding (arrow) from the right iliac branch of the aorto-bi-iliac bypass.

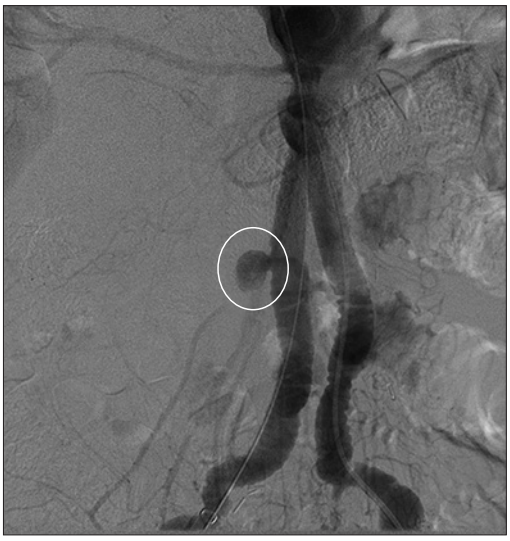

Fig. 2. Intraoperative digital subtraction arteriography showed the mid-graft source of bleeding (circle).

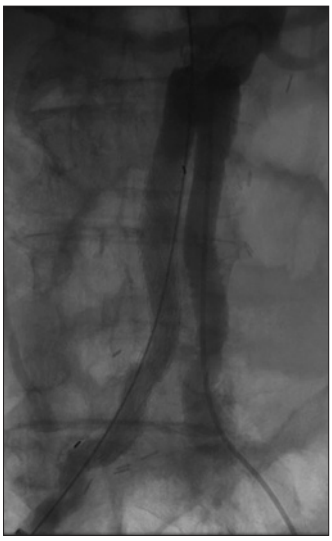

Fig. 3. Angiography after the excluder limb deployment demonstrated adequate relining of the defective prosthetic branch with no detectable bleeding.

the middle section of the right iliac branch of the bifurcated graft, having the appearance of a small breach in the mid-graft region away from the anastomosis. The rest of the prosthesis was normal (Fig. 1). There were no laboratory and radiological signs of graft infection.

Open surgery was excluded, as it was considered to be associated with high operative risk. Moreover, it was time-consuming due to the presence of abdominal adhesions. Hence, we decided to proceed with an emergency endovascular repair. The inner diameter of the defective iliac prosthetic branch was 11.5 mm. It was evaluated preoperatively for size planning using a radiological workstation (GE Healthcare, Chicago, IL, USA). Following intravenous heparin sodium injection (50 units/kg), an angiogram was obtained using a 5 Fr pig tail catheter (Cordis, Santa Clara, CA, USA) under local anesthesia with bilateral transfemoral artery access by placing two 6 Fr introducer sheaths. The angiogram showed localization of the active bleeding in the mid-graft region of the right iliac branch (Fig. 2). Due to the lack of a suitably large stent-graft in our stockroom and due to the urgency of the case, we decided to use an iliac limb of an abdominal aortic endoprothesis to seal the breach. A 12 Fr Gore DrySeal introducer sheath (W. L. Gore & Associates Inc., Flagstaff, AZ, USA) was placed through the right femoral access to accommodate a 14.5 mm×10 cm limb endoprosthesis (Gore Excluder® PXC141000; W. L. Gore & Associates Inc.). It was advanced over an Amplatz Super Stiff 0.035-inch guide wire (Boston Scientific, Marlborough, MA, USA) in the defective prosthetic branch and then deployed. Final angiogram confirmed the complete exclusion of the bleeding stump with patency of the prosthetic limb (Fig. 3). Subsequently, an 8 Fr Angio-Seal device (Terumo Medical Corporation, Somerset, NJ, USA) was used to seal

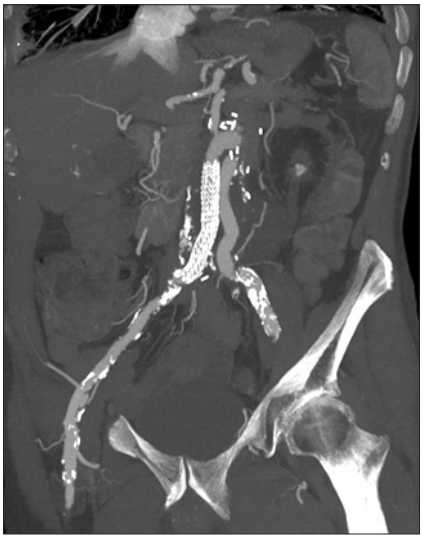

Fig. 4. Coronal computed tomography scan obtained 12 months after procedure showed patency of the endograft.

the puncture site of the femoral access to obtain hemostasis after removing the DrySeal sheath from the right groin. Pressure dressing was applied to the groin and removed after 24 hours.

The recovery was uneventful and the patient was discharged 6 days later in a good clinical condition. A CT scan obtained 12 months after the procedure demonstrated patency of the iliac endoprosthesis as well as absence of bleeding (Fig. 4).

DISCUSSION

Bleeding or pseudoaneurysm formation at the site of the anastomosis is a well-known complication of a Dacron prosthetic vascular graft. However, non-anastomotic bleeding due to rupture of the textile structure of the graft is extremely rare. A uniform and moderate dilatation of a pressurized Dacron graft is a well-documented phenomenon and is considered a normal feature right after implantation with almost no clinical relevance [1]. Knitted Dacron grafts are easier to handle, softer, and more pliable than the woven ones. However, they have a tendency to dilate more due to their high porosity. The woven grafts are stronger and less prone to structural prosthetic defects. Van Damme et al. [2] reported that intrinsic structural graft failure occurs after a time interval of 12 months to 19 years, with an estimated incidence of 0.5% to 3% in the earliest series. Possible causes of the loss of integrity of the prosthetic wall are fabrication flaws, mechanical fatigue by repeated bending, biodegradation due to a foreign body giant cell reaction, and inappropriate handling of the graft including application of unpadded clamps or graft overstretching by the surgeon. Generally, weakness zones of the Dacron grafts, where most of the textile fiber breakage occurs, are located at the remeshing line and on the black guideline. Early detection of Dacron rupture is not possible because unfortunately, the time from radiological evidence by duplex ultrasound or CT scan of the graft dysfunction to sudden clinical manifestation is unknown and unpredictable. Therapeutic modalities include both surgical and endovascular treatments. Nevertheless, open repair with total prosthetic replacement or partial graft substitution is usually challenging and is associated with high perioperative morbidity and mortality. Endovascular treatment is certainly a less invasive and a straightforward option, even in complex cases. The use of an aortic endograft in non-anastomotic aortic Dacron graft failure including rupture or localized graft aneurysm formation has been reported by several authors. Yamaguchi et al. [3] reported the use of a Gore TAG endograft to treat a non-anastomotic thoracic prosthetic pseudoaneurysm in a patient who underwent aortic arch replacement with a knitted Dacron graft for a type A dissection many years ago. Similarly, Lee et al. [4] documented a case of successful use of a thoracic endoprosthesis to fix a Dacron graft rupture in the descending aorta. The prosthetic rupture occurred 20 years after the initial operation and the authors deployed two stent grafts to cover the entire length of the defective graft. Furthermore, in a case of complete Dacron graft aneurysm degeneration detected in an aorto-bifemoral bypass, Ugurlucan et al. [5] described successful use of the Endurant aorto-iliac endoprosthesis (Medtronic, Santa Roja, CA, USA) to treat this rare disorder. Particularly, use of the Gore Excluder contralateral limb endoprosthesis has been reported to treat isolated aneurysms of the common iliac artery or saccular abdominal aortic aneurysms, although in an upside down configuration [6,7]. In the present case, to minimize the risk of incomplete sealing, we decided to use an off-label solution using a Gore Excluder limb with proximal and distal diameters of 16 mm and 14.5 mm, respectively, and a length of 10 cm to perform complete relining of the defective prosthetic branch with a maximum oversizing of about 30%. Moreover, the whole procedure was performed in an emergency setting under local anesthesia and with the total percutaneous approach. The large bore arteriotomy of the 12 Fr DrySeal sheath was sealed using an 8 Fr Angio-Seal VIP closure device, according to the "post-close technique" described by Chaudhuri [8]. We believe that this approach, although non-conventional, was readily available for an emergency situation, was easy to perform, and showed excellent sealing and fixation of the device inside the Dacron graft.

In conclusion, non-anastomotic Dacron prosthetic rup-

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ture may occur years after the initial graft placement. This uncommon complication can be successfully managed with a prompt diagnosis and early endovascular rescue using endografts.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

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AUTHOR CONTRIBUTIONS

Concept and design: AA. Data collection: SD, EP. Writing article: AA. Final approval of the article and overall responsibility: AA.

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