Embolization of Challenging Type II Endoleaks

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INTRODUCTION

Despite significant advances in the devices used in the endovascular repair of abdominal aortic aneurysms, the occurrence of clinically relevant type II endoleaks remains relatively common. Although there are a variety of ways to successfully treat type II endoleaks, one of the most frequently used techniques involves accessing the feeding vessels via an endovascular approach. As a result of the significant tortuosity, the navigation of catheters and wires to these aneurysms can be difficult, and it typically requires the clinician to use smaller, more precise microembolization devices (0.018-inch), which are often less occlusive than larger 0.035-inch embolization devices. Historically, this requirement has made it challenging to achieve the desired level of hemostasis because large aneurysmal volumes typically need a large quantity of highly thrombogenic devices to achieve stasis. As a result of these conflicting priorities, very few embolization platforms are available that satisfy the need for precise delivery and high thrombogenicity.

One of the most important advances in the field of embolization has been the development of long detachable coils that contain significant amounts of thrombogenic fibers. These devices allow delivery of large volumes of embolic materials quickly and accurately. As a result, many of the procedures that are traditionally very time consuming and challenging have become common practice for experienced interventionists.

The following cases demonstrate the utility of the Interlock™ Fibered IDC™ Occlusion System in patients with challenging type II endoleaks.

CASE 1

An 84-year-old man underwent endovascular aortic repair and was monitored for an enlarging aneurysm sac and a type II endoleak.

As a result of the location of the stent graft and the endoleak, an endovascular approach via the lumbar vessels was selected. Using a 5-F, 0.038-inch inner diameter selective diagnostic catheter, the origin of the feeding vessel was identified with a contrast injection. Because of the small diameter and the significant tortuosity of the lumbar vessel, the 5-F catheter was advanced only slightly beyond the origin of the vessel.

A 0.021-inch inner lumen diameter microcatheter (Renegade® STC Microcatheter) and a torquable 0.016-inch

Figure 1. The origin of the feeding vessel was identified with a contrast injection.

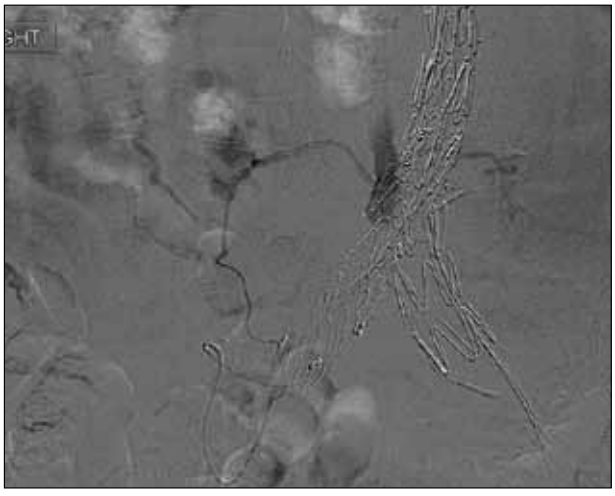

Figure 2. Selective contrast injection revealed a large aneurysm.

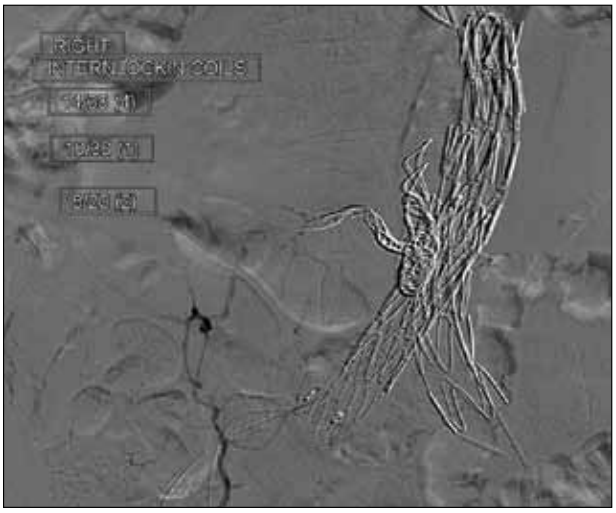

Figure 3. Coil embolization of the aneurysm sac.

microwire (Fathom® – 16 Steerable Guidewire) were passed through the diagnostic catheter into the distal vasculature. After significant catheter and wire manipulation, access to the sac was achieved, and a contrast injection revealed a large aneurysmal void that was causing the endoleak.

After positioning the microcatheter within the aneurysm and removing the guidewire, the process of embolizing both the sac and the feeding vasculature began. The embolization procedure was completed using a number of Interlock™ – 18 Fibered Platinum Coils, each with a wide diameter and a long length to ensure adequate wall apposition. Using a total of seven coils, 210 cm of coil was rapidly deployed, and hemostasis was achieved.

CASE 2

Approximately 6 months after endograft implantation, a CT scan revealed the continued expansion of a large aneurysm sac.

Using a radial access site, a 120-cm, 5-F hydrophilic catheter was used to select the left internal iliac artery. After cannulation of the internal iliac artery with the 5-F catheter, a lumbar vessel was selected using a 150-cm Renegade® STC Microcatheter and a Fathom® – 16 Guidewire. Selective angiography revealed that the large aneurysm sac was being fed by two lumbar vessels.

Figure 4. Selective angiography revealed that a large aneurysm sac was being fed by two lumbar vessels.

Figure 5. Twenty-two coils were used, and complete stasis was achieved.

Once positioned appropriately, the microcatheter was used to deliver embolic coils in an attempt to halt flow into the enlarging aneurysm sac. To begin the coil embolization, a number of 14-mm Interlock™–18 Fibered Platinum Coils were packed into the wide-diameter aneurysm sac. In an effort to fill the aneurysm with a dense network of coils, varying diameters were selected. After the embolization of the sac itself, the same microcatheter was used to deliver additional long coils into the feeding vessel. In total, 22 coils were used, and complete stasis was achieved.

CASE 3

A 76-year-old man with an enlarging aneurysm and type II endoleak was treated via the inferior mesenteric artery (IMA).

Interrogation of the superior mesenteric artery was done using a standard technique from the right femoral artery. Using the 5-F, 0.038-inch catheter, the superior mesenteric artery was imaged, and the middle colic artery was identified. The 5-F catheter was used to cannulate the origin of the middle colic artery, and a small-lumen microcatheter was then used to further access the distal vasculature.

Using a small-lumen 0.021-inch inner lumen microcatheter (Renegade® STC Microcatheter) and a torqueable microguidewire (Fathom® – 16 Steerable Guidewire), navigation through the mesenteric arch and into the ascending branch of the left colic artery was gradually achieved. Due to the tortuous path of the vasculature and the relative lack of proximal support, a guidewire with significant rail support was required to ensure adequate push through the vasculature.

After significant manipulation of the microcatheter and microwire, access to the ostium of the IMA was achieved.

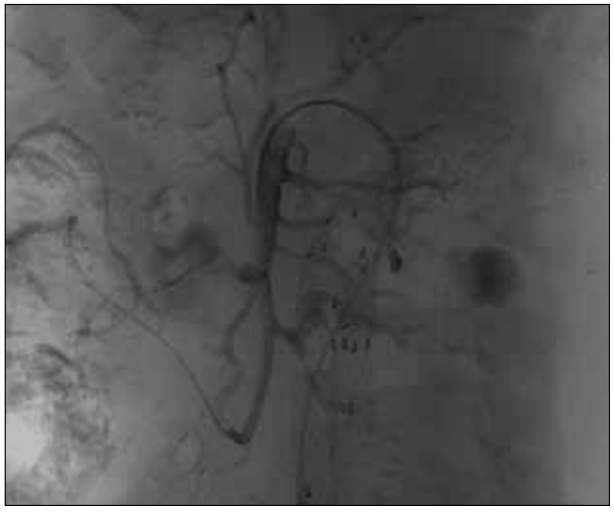

Figure 6. Interrogation of the superior mesenteric artery was done using a standard technique from the right femoral artery.

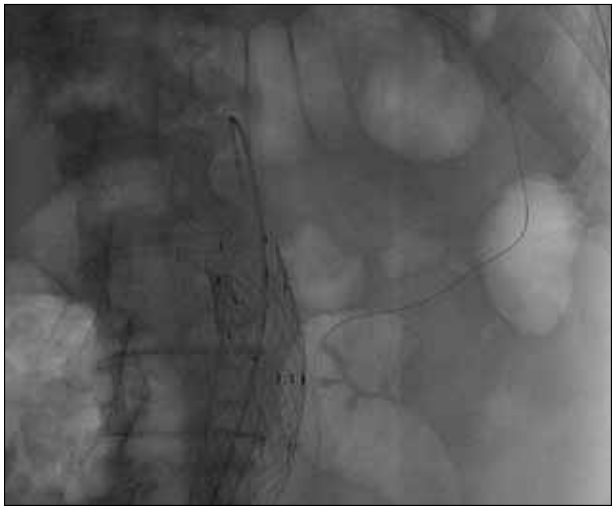

Figure 7. Navigation through the mesenteric arch was achieved with a microcatheter and microguidewire.

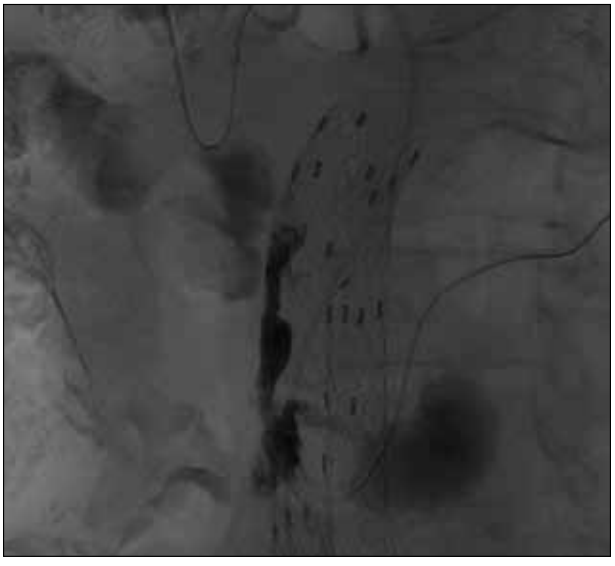

Figure 8. Contrast injection revealed a large, patent IMA feeding the aneurysm sac.

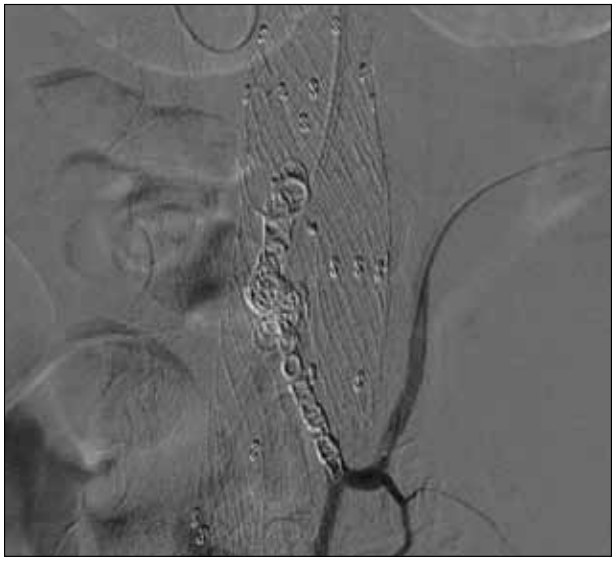

Figure 9. Nine long, fibered detachable coils were used, and complete stasis was achieved.

After removal of the microwire, a contrast injection revealed a large, patent IMA feeding the aneurysm sac.

After further advancement of the microcatheter, numerous detachable coils (Interlock™ – 18 Fibered IDC™ Occlusion System) were deployed in an attempt to fully embolize the vessels feeding the endoleak. In total, nine long, fibered detachable coils were used, and complete stasis was achieved.

DISCUSSION

Although improvements have been made to commercially available endovascular aortic repair devices over the past decade, the endovascular repair of type II endoleaks remains a relatively common procedure. As the cases presented illustrate, significant technical skills with small-lumen delivery systems and embolic platforms are often required due to the challenging nature of the vasculature that is involved. In addition, although the vasculature that must be traversed is often challenging due to the small diameter of the vessels and the tortuosity of the path, the area that must ultimately be embolized is often quite large and requires a significant amount of embolic material to achieve adequate stasis. Embolic systems that offer long coil lengths and a dense network of thrombogenic fibers can be valuable tools in these procedures. ■

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