Treating Iliac Aneurysms

Two devices are currently being evaluated for treating patients with iliac aneurysmal disease.

BY ZVONIMIR KRAJCER, MD

Isolated iliac arterial aneurysms are infrequent, accounting for less than 1% of peripheral arterial aneurysms.[1] The most common cause is atherosclerosis, but they are also associated with conditions such as pregnancy, infection, postoperative injury, dissection, trauma, Marfan syndrome, and other collagen vascular diseases. Men are affected more commonly than women.[2] The frequency of iliac aneurysms increases with age. The location of iliac artery aneurysms in the pelvis makes them difficult to detect by physical examination. The increasing use of abdominal imaging studies over the last decade has resulted in more frequent detection of small and asymptomatic iliac aneurysms. Iliac aneurysms are more frequently found in the common iliac (70% to 90%), followed by the internal iliac artery (10% to 30%), and rarely in the external iliac. Up to 50% are bilateral.[1,2]

The vast majority of patients with iliac aneurysms are asymptomatic, but some may present with symptoms due to local compression of adjacent pelvic structures, thrombosis, embolism, or rupture.[1-4] These symptoms are usually related to gastrointestinal, genitourinary, neurologic, or venous obstruction or compression. Because of their low incidence, the natural history of these aneurysms is not well defined. Overall, the prognosis of patients with untreated iliac artery aneurysms is poor. A ruptured iliac aneurysm is associated with increased rates of morbidity and mortality. Brin et al reported a rupture rate of 67%, with a mortality of 90% in untreated patients.[3] Other investigators have reported rupture rates between 10% to 70% after 5 years of follow-up, and mortality rates of 25% to 57%.[4,5]

Arterial injuries resulting from penetrating trauma or interventional vascular procedures also occur infrequently. These may be in the form of arteriovenous fistulas, acute pseudoaneurysms, perforations, or ruptures.

SURGICAL TREATMENT OF ILIAC ANEURYSMS

The current treatment recommendation is elective surgical repair for iliac aneurysms measuring >3 cm in diam-

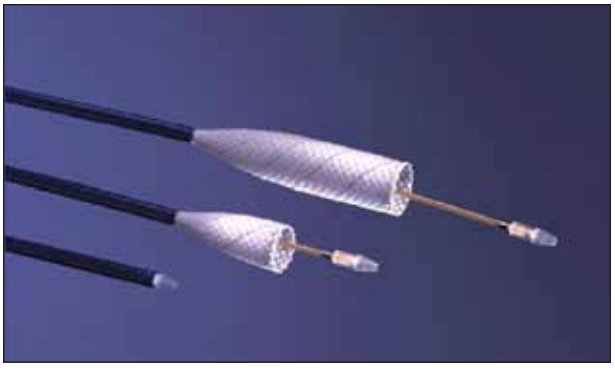

Figure 1. The Wallgraft Endoprosthesis (Boston Scientific Corporation, Natick, MA) is a polyester-covered Wallstent mounted on the Unistep Plus delivery system (Boston Scientific Corporation).

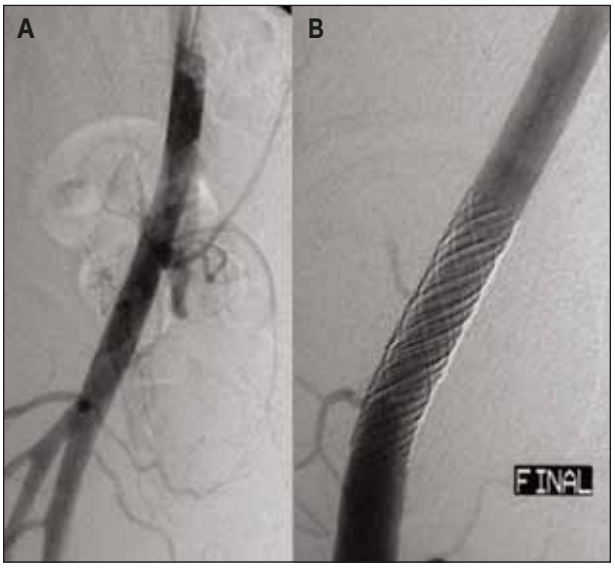

Figure 2. A right iliac artery perforation before (A) and after (B) repair with a 7-mm X 50-mm Wallgraft.

eter.[1-3] The surgical procedures that were reported included interpositional grafts, thromboendarterectomy, ligation with bypass, endoaneurysmorrhaphy, aneurymectomy, resection, and distal revascularization. The standard treatment for traumatic lesions requires isolation of the involved vessels and reconstruction of the traumatized artery.[5]

The mortality of elective surgical repair of iliac artery aneurysms is between 7% and 11%.[1-6] The operative mortality in emergent operations, however, has been reported to be between 33% and 50%.[3,5,6] In addition to the mortality associated with elective repair, significant operative morbidity has been observed in up to 30% of patients. These include lower-extremity ischemia, bleeding, infection, urethral injury, and renal failure. Other late complications such as amputation, graft infection, sepsis, and rarely, death, are often associated with continuation of events that occurred within the early postoperative period. In addition, despite surgical aneurysm repair, a small percentage of patients progress to having new, anastomotic, or recurrent aneurysms that require additional surgical repair.[4,5] The incidence of iliac anastomotic pseudoaneurysms at 3 years of follow-up has been reported to be 1.2%,[6,7] requiring further surgical repair and the accompanying additional risk of complications and mortality.

ENDOLUMINAL TREATMENT OF ILIAC ANEURYSMS

A nonsurgical treatment of isolated iliac artery aneurysms and traumatic iliac disruptions provides an alternative before surgery is considered. Endoluminal treatment of these aneurysms offers the potential to avoid many of the complications associated with open repair and general anesthesia. It is a less-invasive procedure that results in less blood loss, shorter recovery time, and shorter hospital stay.[8-12]

Since Parodi's initial description of endoluminal repair of abdominal aortic aneurysms, a variety of devices have been studied for the treatment of aneurysmal peripheral vascular disease.[13] Previous endovascular techniques such as coil embolization, uncovered balloon-expandable or self-expandable stents, and customized Dacron (INVISTA, Wichita, KS) or expanded polytetrafluoroethylene (PTFE)-covered stents have had limited success.[2,3] These procedures either had poor exclusion rates or were too cumbersome and time consuming to be incorporated

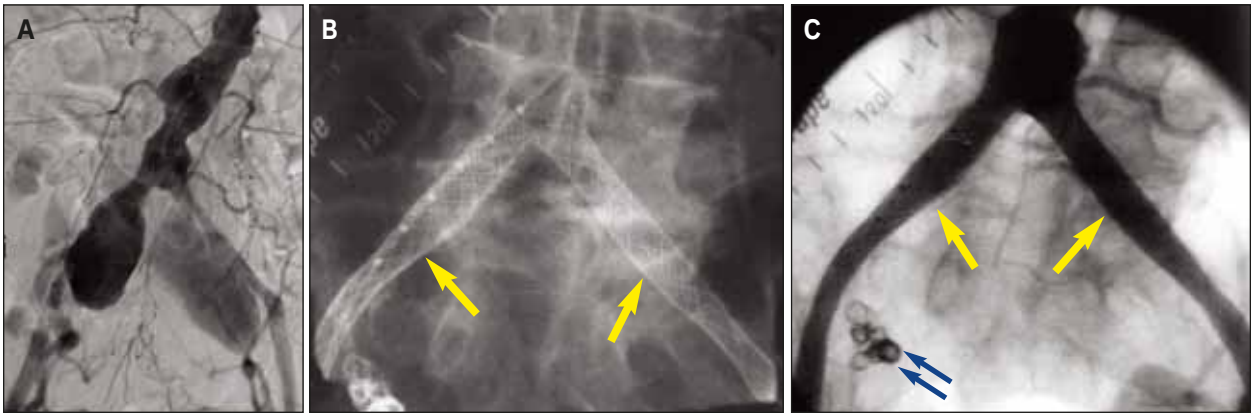

Figure 3. An abdominal angiogram shows bilateral iliac artery aneurysms (arrows) (A). A fluoroscopic image of a bilateral common iliac artery Wallgraft Endoprosthesis (arrows) (B). Abdominal aortogram reveals successful exclusion of bilateral common iliac artery aneurysms with Wallgraft Endoprosthesis (single arrows) and coil embolization of a right internal iliac artery (double arrows) (C).

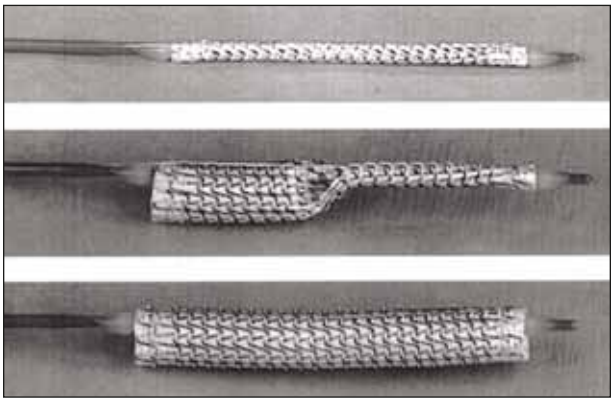

Figure 4. The Viabahn stent graft system is a self-expanding stent graft consisting of an external nitinol stent with an ePTFE lining on the luminal surface.

into standard practice.[8-12] With the availability in clinical trials of the newer, self-expanding, premounted stent grafts, the procedure became more successful and less time consuming. The only devices being studied in the US for endoluminal exclusion of arterial occlusive and aneurysmal disease at the time of this report are the Wallgraft Endoprosthesis[14,15] and the Hemobahn/Viabahn (W.L. Gore and Associates, Flagstaff, AZ). Although these devices are currently available in the US for hepatobiliary use, they are considered experimental for vascular use. Both devices have shown encouraging preliminary results in the European and US literature.[14-17]

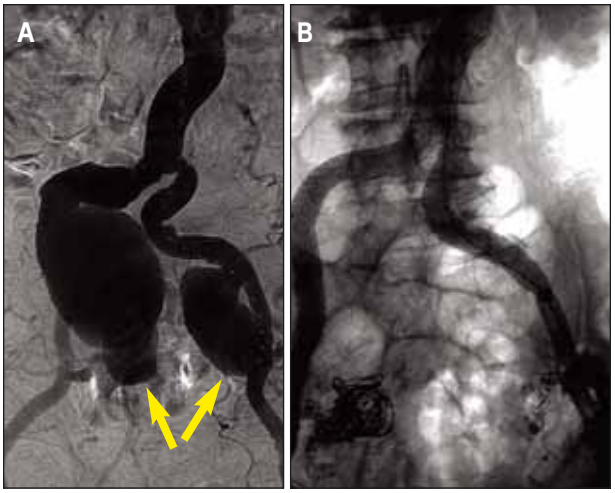

Figure 5. An abdominal aortogram revealing large, bilateral internal iliac and right common iliac artery aneurysms (arrows) (A). An abdominal aortogram in the same patient as shown in Figure 5A, revealing successful endoluminal repair of bilateral internal iliac artery aneurysms (B). This patient underwent coil embolization of his right and left internal iliac arteries and insertion of a bifurcated aorto-bi-iliac Excluder (W.L. Gore & Associates) stent graft.

The Wallgraft Endoprosthesis

The Wallgraft Endoprosthesis is composed of a braided polyester graft, which is bonded to the outside of a commercially available Wallstent with a thin layer of a Corethane (Boston Scientific Corporation). Radiopaque tracer wires are braided with the stent wires to distinguish the Wallgraft Endoprosthesis from a Wallstent Endoprosthesis under fluoroscopy. This design configuration is flexible and self-expanding. The Wallgraft Endoprosthesis is available in diameters of 6 mm to 14 mm and lengths of 20, 30, 50, and 70 mm. The premounted Wallgraft Endoprosthesis is available on a Unistep Plus delivery system (Figure 1). The delivery system is equal to or less than 11-F in diameter, has a 90-cm working length, and has a central lumen that can accommodate a .035-inch guidewire. The deployment is achieved by withdrawing the protective sheath. The self-expandable endoprosthesis is then expanded further by inflating the appropriately sized angioplasty balloon.

Recently, there have been multiple small reports of endovascular treatment of these aneurysms with placement of various types of stent grafts.[8-16] We have previously reported that treatment of isolated iliac artery aneurysms and traumatic disruptions with the Wallgraft Endoprosthesis is safe and effective (Figure 2A,B). This

Figure 6. The Excluder endograft is a self-expanding, modular component system consisting of expanded polytetrafluoroethylene (PTFE) on the luminal surface and a nitinol-supporting frame on the outer surface.

Figure 7. A contrast CT image of a patient who previously underwent endoluminal repair of his right common iliac artery aneurysm revealing patent stent graft (yellow arrow) without endoleak (red arrow).

procedure provides a less-invasive treatment option for patients with peripheral vascular aneurysms who are often at high risk for open surgical repair. The early results show high primary and secondary patency rates. The absence of distal extremity embolism and amputation is very encouraging. The 1-year primary and secondary patency rate for femoral aneurysms was 100%, and for popliteal aneurysms, it was 69% and 92%, respectively.[15] Similar results have been observed when treating iliac artery aneurysms with a 1-year exclusion rate of 93.8%. If the aneurysm in the iliac artery involves the internal iliac artery, coil embolization of the internal iliac is required prior to placing the stent graft to ensure complete exclusion of the aneurysm (Figure 3A-C).

The Viabahn Endoprosthesis

The Viabahn Endoprosthesis is a flexible, self-expanding stent graft consisting of an external nitinol stent with an ePTFE lining on the luminal surface. The Viabahn Endoprosthesis is compressed and attached to a dual-lumen, polyethylene delivery catheter available in lengths of 75 cm and 110 cm (Figure 4). The device is available in diameters of 5 mm and 13 mm, and lengths of 25, 50, 100, and 150 mm. The delivery system is ≤ 10 F in diameter, and it requires a .025-inch or .035-inch guidewire. The deployment consists of untwisting and slowly pulling the deployment knob. After deployment, the device must be smoothed against the arterial lumen wall by inflating an appropriately sized angioplasty balloon within it.

This device has also been successfully used to treat diffuse aortoiliac and femoropopliteal occlusive disease. Several reports have also shown successful nonsurgical treatment of vascular access complications.[16,17]

SUMMARY

Both devices are currently undergoing FDA evaluation and consideration for approval for vascular use and treatment of arterial occlusive and aneurysmal disease. Once these devices are available for vascular use, they will invariably be of great benefit to patients who suffer from iliac aneurysmal disease and traumatic disruptions.

Frequently, iliac aneurysms may involve the origin of the aortic bifurcation and the internal iliac arteries (Figure 5A). Coil embolization of the internal iliac arteries is performed, and a bifurcated stent graft is required to exclude the aneurysm (Figure 5B). The Gore Excluder is an approved bifurcated modular system that is deployed just below the renal arteries and can then be extended past the internal iliac arteries to cover the entire length of the aneurysmal segment (Figures 6 and 7). ■

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