

How Are Stent Grafts Used In Your Dialysis Access Practice?



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The role of bare-metal stents (BMS) is limited to flow-limiting dissections, major vascular ruptures, and vascular recoil when treating occlusions that are mostly central. I am somewhat limited by funding within a single-payer system that restricts reimbursement without proper evidence. Even with these indications, we are now using stent grafts for vascular ruptures. For ruptures, I prefer stent grafts because the rupture is definitively covered, and recent evidence suggests improved patency compared to BMS historically. My indications are limited based on no published conclusive results indicating an advantage of BMS for suboptimal angioplasty or elastic recoil. I believe that BMS convert a focal stenosis to a stent-length stenosis, related to intimal hyperplasia. To worsen the situation, there is no proven treatment for in-stent stenosis. Finally, BMS are prone to fracture, and as seen in the superficial femoral artery, points of fracture exhibit accelerated intimal hyperplasia and luminal loss.

We are somewhat restricted with our stent graft use in our practice within Canada. As there is limited evidence for the benefit of stent grafts in dialysis accesses, many hospitals refuse to pay for them. Given that, my practice is located at a university-based tertiary referral center. We end up being problem solvers for complex cases, which necessitates the stocking of many specialty devices.

I mainly restrict the use of stent grafts to vascular ruptures and unsalvageable autogenous fistulas. For vascular ruptures, I have used them for graft and vein ruptures that cannot be controlled with conserva-

tive measures such as prolonged balloon inflation and external compression. Also, before insertion, I do consider the quality and age of the vascular access and how the device may potentially restrict future accesses. In very rare cases, surgical intervention may be preferable.

I consider unsalvageable fistulas to be ones that are angioplasty failures and failures of declotting procedures. For angioplasty failures, I am very conservative and consider multiple repeat angioplasties over a short period of time (> 3 within a 6-month period) to be an indication to try a stent graft. For declotting of fistulas, there is occasionally wall-adherent clot and/or venous aneurysms that cannot be cleared that interfere with flow. When it appears to me that sufficient flow has not been reestablished, I will use stent grafts and cover areas of retained flow-limiting thrombus and/or exclude venous aneurysms. Lastly, I have also used stent grafts to exclude areas of acute pending rupture (aneurysms and pseudoaneurysms) after consultation with my access surgery colleagues.

I have the Gore Viabahn and Bard Fluency devices available. I only use self-expanding devices, and when crossing joint spaces or having to cover long distances, I prefer the Viabahn device for its flexibility and longer available lengths. At this time, I am not primarily stent grafting venous anastomotic stenosis in patients with dialysis grafts, as the Bard Flair stent graft until very recently was not commercially available in Canada.



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First, a word about BMS. We reserve them for the treatment of central veins, when post-PTA recoil or

early restenosis lead to recurrent symptoms. Otherwise, there are few indications in our dialysis access program for bare stents because they are very prone to in-stent stenosis.

Stent grafts have a definite role in both AV grafts and AV fistulas. We know from the Flair data that a stent graft can achieve better patency than optimal angioplasty at the venous anastomosis when used in conjunction with PTA. Furthermore, we've looked at a series of more than 100 patients treated for PTA-induced rupture or PTA failure (unsuccessful PTA, early recurrent of stenosis) and found that patency of circuit was very good after placing a stent graft. This has also been described by others, with both the Viabahn and Fluency stent grafts.

While we don't hesitate to salvage a poor PTA result in AVFs with stent grafts, we remain cautious when considering stent graft use as primary treatment. We attempt to achieve a good technical result with PTA alone. We are also cautious when using stent grafts for AV access pseudoaneurysms, although for focal, tense, cannulation site pseudoaneurysms, we will attempt to salvage the access with a stent graft after surgical consultation.

Finally, we routinely use stent grafts to treat bare-metal in-stent restenosis, particularly in the central veins. Unfortunately, we really don't have access to large-diameter stent grafts in many cases.



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We use stent grafts in dialysis accesses in three situations. The first is vein rupture during angioplasty. We use stent grafts to treat angioplasty-induced venous rupture when conservative therapy with prolonged low-pressure balloon tamponade is unsuccessful. Although bare stents may be effective, we always place stent grafts, which have better short-term results and superior patency rates.

We also use stent grafts for aneurysms of native fistulas and grafts that require treatment when they exhibit signs

of impending rupture (rapid increase in size, spontaneous bleeding and poor healing of puncture sites with or without superficial infection), when there is severe thinning with questionable viability of the overlying skin or when the size of the aneurysm limits the availability of cannulation sites. Although surgical revision is the mainstay of treatment for access aneurysms, in cases where surgery is complicated or may necessitate the insertion of a temporary central vein catheter, endovascular stent graft placement is our preferred approach. Endovascular aneurysm exclusion with a stent graft requires a sufficient landing zone (seal zone) at both ends of the aneurysm. The advantage of this approach is that the outflow stenosis, which is usually present and is a causative factor in these aneurysms, can be detected and treated during the same procedure. The disadvantage of aneurysm exclusion with stent grafts is the protracted period of time necessary for the aneurysm sac to reabsorb, making this segment of the access unavailable for cannulation, so that sometimes additional surgical evacuation is necessary.

Lastly, our main indication for stent grafts is in clinically symptomatic patients with poor results after balloon angioplasty or rapid recurrence within 3 months. We use stent grafts exclusively, as the results for bare stents are significantly inferior in the venous component of the arteriovenous access.

Patients who present with an occlusion that is very difficult to recanalize will be treated by stent graft placement, as will those with significant elastic recoil. When there is complete central vein occlusion that can be recanalized without difficulty, we insert a stent graft only when the immediate result of balloon angioplasty is poor. When the result with balloon angioplasty is acceptable, patients are rescheduled for angiography after 1 month, and if there is rapid recurrence of the stenosis, a stent graft is inserted.

There are caveats for stenting. It is not yet the optimal treatment for all situations. The use of stents may limit the availability of venous capital. We are therefore suggesting that stent grafts should be used only when definitely necessary, but if a stent is necessary, then only stent grafts should be used.



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I currently practice interventional medicine in a free-standing, outpatient access center. Stent grafts have all

but completely eliminated the need for surgical backup and have had a significant positive impact by allowing for more complex outpatient interventions. ePTFE-covered stent grafts represent a major leap forward in technology and are the latest weapon in the interventional arsenal to combat dysfunctional hemodialysis accesses.

Stent grafts have been used to exclude aneurysms, perform urgent repair of a bleeding access until surgical revision can be performed, and to treat rupture of a vessel after angioplasty. Most notably, ePTFE-covered stents mitigate tissue ingrowth through bare stent struts and result in improved primary patency rates. Data from my office demonstrate cephalic arch patency at 1 year improves from 15% with BMS to 60% with Viabahn covered stents. Similar findings have been noted when treating central venous stenosis. Overall, although the new technology is expensive, the benefit to the practice, patients, and system as a whole is very favorable.



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In the setting of hemodialysis vascular access, stent use in general has been driven by a combination of Kidney Disease Outcomes Quality Initiative specialty guidelines as well as a general frustration with the lack of durability of angioplasty results.

During the past few years, the use of BMS in our practice has diminished in favor of stent grafts. Robust tissue ingrowth as part of the reparative and remodeling process associated with vessel rupture makes the stent graft an attractive alternative to BMS. Many practitioners, the author included, believe that stent grafts have the advantage of reducing ingrowth of neointimal tissue through the stent interstices. Indirect evidence of this is found in the predominance of persistent relative to in-stent stenoses in stent grafts. When the rupture is of the degree that conservative measures are insufficient to stop the expansion or if flow has been disrupted, I preferentially deploy a stent graft to control the extravasation and restore antegrade flow.

Another instance in which stent grafts may pose a theoretical advantage over BMS is in the cephalic arch where the natural torquing of the vein and the predilection for hypertrophic valves makes the stiffer skeleton a seductive alternative. Our experience with

angioplasty in this anatomical site has been largely disappointing because of the frequency of recurrence, although the deployment of stents is fraught with the same problem albeit to a lesser degree. Clearly, large randomized studies are needed to clarify any real advantage of one stent design over another. Until that is available, intuitive logic may reign supreme over the absence of data, and the use of stent grafts in this scenario may become increasingly common. Additionally, the vastly improved price differential between the two platforms has already encouraged this transition. Flow re-equilibration procedures that reduce the inflow of these fistulas have shown promise in attenuating the frequency of recurrence. Finally, surgical rerouting of outflow to the basilic-axillary system should also be considered.

In the absence of any other significant pathology that precludes optimal functioning of a prosthetic graft, vein graft anastomosis stenosis that is recurrent and has patency that cannot be maintained without inordinate repeated intervention is an ideal indication for a stent graft. However, in the graft that has multiple pathologies, especially large pseudoaneurysms that limit available cannulation sites, focus should be on planning for the next access. Stenting the vein graft anastomosis in this instance addresses but one of the many dysfunctions of the circuit and may potentially limit future access sites, including secondary fistulas.

In a few isolated instances where surgical support and/or the patient's adherence to medical advice is poor, a prosthetic graft with large pseudoaneurysms that limit cannulation sites may be salvaged by deployment of a stent graft. This serves to decompress the pseudoaneurysm and allow for continued use of the graft. Reported cases of stent fracture and protrusion of the tines through the skin have been shown with repeated cannulation of the stent graft and the practitioner, and the patient should both be aware of this possibility.

In summary, I tend to use stent grafts for flow-limiting unstable venous extravasations and for cephalic arch stenoses that are frequently recurrent despite optimal angioplasty. I eagerly await large randomized controlled studies to illuminate these practice patterns that are derived mostly from personal experience. ■

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