Treatment Strategies for Complex Iliac Artery Disease

Tips for treating this challenging presentation with endovascular techniques.

BY JEAN BISMUTH, MD, AND ALAN B. LUMSDEN, MD

In recent years, the number of aortobifemoral procedures for occlusive disease performed by vascular surgery trainees has, surprisingly, not declined[1] despite a significant increase in total procedures performed for aortoiliac disease, the majority of which are endovascular cases. This is, of course, to a great extent driven by improved device performance and likely a greater number of vascular surgeons who are well-trained interventionists.

BACKGROUND

Aortobifemoral bypass remains an efficacious and durable operation and is the procedure against which all other iliac procedures are benchmarked. It has been shown that primary patency rates are better for bypass at 1, 3, and 5 years when compared to iliac stenting.[2] This trend may be more pronounced as interventionists push the envelope further and not only treat iliac lesions of TransAtlantic Inter-Society Consensus (TASC) B and C, but also D.[3] However, if one thinks of an open procedure like an endovascular procedure, consisting of both a delivery system and a therapeutic component, the delivery system for aortobifemoral bypass remains unappealing. Consequently, endovascular management of aortoiliac disease has moved to the front line of the treatment algorithm. Although the durability of the therapeutic component may be more compromised, the appeal of the delivery system more than compensates. A catheter-based approach is recommended as first-line therapy for TASC A and B lesions and is likely the preferred option for initial revascularization of C lesions. Whether a patient undergoes an endovascular procedure or an operation for a TASC D lesion depends in great part on the treating clinician's experience, expertise, and comfort in either open procedures or advanced endovascular techniques. One question that remains unclear is whether one can maintain a standpoint that all lesions should be treated based on plain old balloon angioplasty (POBA) first with iliac stenting only being used as a rescue procedure or whether primary stenting is indicated.

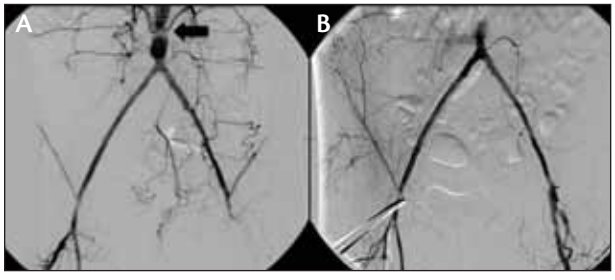

Figure 1. Patient with inadequately treated aortic disease.

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One of the main reasons for the confusion is that earlier studies did not define stenoses by accepted classifications such as TASC. Indeed, a recent article showed that, as one might expect, there is no difference in long-term patency between TASC A and B lesions treated with POBA or stenting. This is not the case for TASC C and D lesions, for which primary stenting seems to fare significantly better than POBA.[4]

There are multiple potential predictors of failure for endovascular procedures involving the aortoiliac segment, which can include a stenotic ipsilateral superficial femoral artery, ulcer/gangrene, smoking history, and chronic renal failure with hemodialysis. There is some indication that patients with these risk factors who do undergo endovascular procedures in the aortoiliac segment should be considered for primary stenting.[5,6]

We believe that there are also a variety of technical elements of aortoiliac stenting that can improve outcomes and success rates, particularly in the more complex lesions. One of the tools we use is intravascular ultrasound (IVUS). IVUS allows for accurate measurement/sizing, identification of lesion length, and also evaluation of plaque characteristics, particularly with respect to calcification and dissections. It also provides a better idea of the appropriateness of the therapy delivered and allows for accurate evaluation of lesions posttreatment. In a recent study evaluating stent deployment by IVUS, it was found that 40% of patients had underdeployed stents, although they appeared adequately expanded by arteri-

ography. In the group of patients who were evaluated by IVUS in addition to arteriography, no stenoses or occlusions were noted at follow-up, whereas in the group evaluated by arteriography alone, 25% had stenoses or occlusions at follow-up.

Of course, there are a number of stents on the market that have substantially varying results depending on the clinical scenario in which they are used. One can essentially separate stents initially into two groups, self-expanding and balloon expandable, and can be further subdivided into covered and uncovered stents. There is some suggestion that covered stents may, at least in the short-term, provide better patency rates,[7] but whether this holds true long-term remains unclear. More recently, the MELODIE study showed 2-year patency rates of almost 88% for the uncovered Express® LD balloon-expandable stent.[8] There are many variables that may impact stent efficacy, which include but are not limited to: (1) stent construction (laser-cut or etched, woven, knitted, coiled, or welded); (2) flexibility, radial strength, hoop strength, radiopacity, and foreshortening; (3) resistance to kinking; (4) metal thickness; (5) trackability or pushability of the device; and (6) in case of balloon-expandable stents, does the device stay on the balloon, or is it at significant risk of dislodging during delivery? All of these factors, as well as the source of the metal, corrosion resistance, and the amount of open area-to-metal surface ratio, may all affect the biocompatibility of the stent, and ultimately, long-term patency rates.

Figure 2. Patient with iliac disease and failed recanalization of left iliac (solid arrow identifying a high-grade iliac lesion).

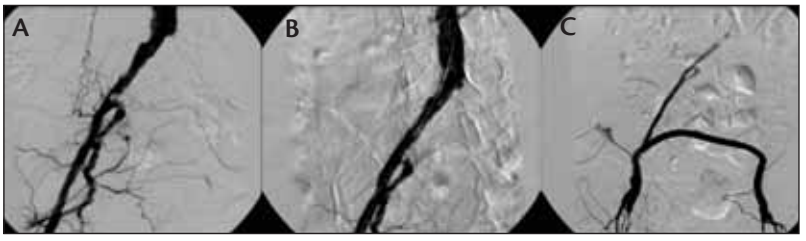

Figure 3. Right iliac stent with femoral-femoral bypass.

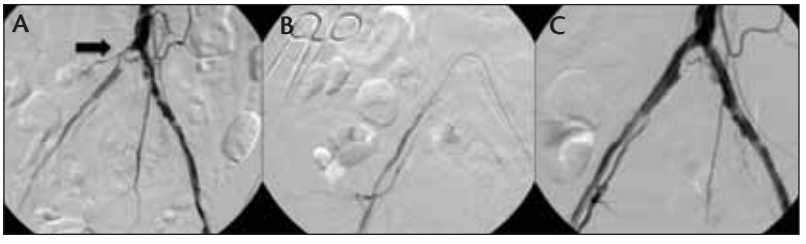

Figure 4. Kissing stenting of aortic bifurcation.

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Generally, our preference has been to use uncovered balloon-expandable stents in aortoiliac interventions due to their precise placement, ease of delivery, good radial force in calcified lesions, adequate flexibility, and "what you see is what you get" qualities that include minimal foreshortening and superior positioning when extending stents into the aorta using the kissing stent technique. We generally reserve covered stents for complications or what we consider high-risk lesions (embolization, exophytic calcification) and, consequently, only rarely use them as our primary device.

FAILED AORTOILIAC STENTING

Before embarking on endovascular interventions in the aortoiliac segments, it is imperative that the operator understands the pathophysiology and the severity of inflow and/or outflow compromise. If there is inadequate flow in the infrainguinal segment, then early failure may occur. Similarly, if all proximal disease is left untreated, then the stent is more likely to be compromised. It has been shown in a 10-year follow-up that if one fails to extend treatment into the aorta for lesions that are at the aortic bifurcation, outcomes are generally inferior.[9] In the case presented (Figure 1), a patient had been seen and treated initially with balloon angioplasty, followed up by covered stents placed in both common iliac arteries (CIA) extending into the external iliac arteries. The patient was referred to our hospital with early stent occlusion and failed previous endovascular treatments, which was found to be due to an aortic stenosis (Figure 1, solid black arrow) and poor outflow. The patient underwent an aortobifemoral bypass and a simultaneous femoral-popliteal bypass. As the patient was a young working woman, who very much needed to remain active and maintain her quality of life (with a background of already failed multiple endovascular

interventions), it was felt that a bypass would give her the best long-term result.

TREATMENT OF ILIAC LESIONS TO SUPPORT A BYPASS

Another example is of an 83-year-old woman who presented with severe rest pain having had two prior femoral-femoral crossover bypasses performed by separate surgeons over an 8-month period, which both failed. Basic principles dictate that inflow should always be corrected before performing a downstream bypass. Figure 2 shows a flush occlusion at the left CIA. Previous surgeons failed to identify a high-grade stenosis in the distal CIA, as well as diffuse severe disease extending up into the distal aorta based on IVUS. The approach for this patient, who actually had adequate outflow, was to attempt recanalization of the left side and then treat the right side with a balloon-expandable stent primarily. Despite a reentry device recanalization of the left side that was not fruitful, adequate treatment of the common iliacs (Figure 3) on the right side with a new femoral-femoral bypass was sufficient to provide the patient with adequate lower extremity reperfusion.

TREATMENT OF SEVERELY CALCIFIED LESIONS

We find that patients with severely calcified lesions of the CIA that extend up to the aortic bifurcation are best managed by kissing stents. Generally, these lesions do not respond well to balloon angioplasty because they are extremely resistant to dilation, and the hoop strength of balloon-expandable stents is a great advantage. Additionally, as previously discussed, it is important to have a stent that will deploy precisely and be able to travel through the tight lesion, which in this case did not respond very well to predilation. In Figure 4, the solid arrow identifies a large calcium shelf, which after deployment of kissing stents, is effectively displaced to improve flow distally. The near occlusion could not be traversed from the ipsilateral side, and a snare was used to snag a wire introduced from the contralateral side. For the stents to be deployed simultaneously into the aorta, access through the lesions needs to be obtained bilaterally in the femoral arteries.

CONCLUSION

In this short review of endovascular interventions for aortoiliac occlusive disease, we have discussed some of the available evidence supporting management of this arterial segment. Additionally, we have shared several cases identifying some fundamental aspects of this management. The data support the use of stents primarily, particularly in this era of aggressive endovascular management of both TASC C and D lesions. Of note, it is important that patients who are treated are followed closely by physical examination and noninvasive testing, as this will help in the treatment of failing stents. ■

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