Clinical Evaluation and Diagnosis of Iliac Disease

Optimal use of today's imaging options combined with an elevated index of suspicion enables results in early detection and successful treatment.

BY MICHAEL R. JAFF, DO

Although the iliac artery is not the most common peripheral artery affected by atherosclerosis, it is the anatomical location most effectively treated using endovascular approaches. Because the interventional options are so effective, safe, durable, and associated with low complication rates, the opportunity to treat patients with iliac artery disease should never be overlooked.

PRESENTATION

As is the case with most peripheral arterial disease (PAD), iliac artery disease is commonly found in patients who either smoke, have diabetes, hypertension, and/or high cholesterol. Their symptoms are somewhat different from patients with infrainguinal PAD in that they commonly present with more proximal symptoms, which manifest as discomfort in the hip, thigh, or buttocks during ambulation that subsides when the patient stops the activity.

Underdiagnosis and Misdiagnosis

Most endovascular specialists have developed a keen index of suspicion and quickly and accurately detect iliac artery disease. Many primary care physicians, however, either overlook the presence or misdiagnose the symptoms as musculoskeletal in nature. Most primary care physicians are not currently equipped with the resources necessary to properly diagnose this disease; these physicians regularly see older, less-fit patients who complain of hip discomfort, which may appear on the surface to be arthritis. To compound matters, because claudication is an exercise-induced symptom, patients with symptomatic iliac artery disease often have a pulse in the groin while at rest, which may falsely indicate a nonvascular cause to the examiner.

FIRST-LINE EVALUATION: THE ANKLE-BRACHIAL INDEX

With most patients, I begin by obtaining their ankle-brachial index (ABI), a completely noninvasive method

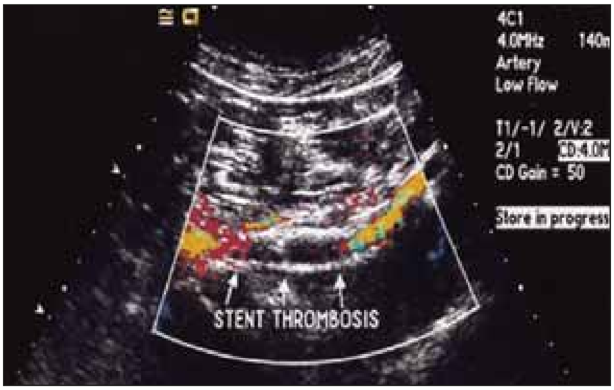

Figure 1. Color duplex ultrasonography demonstrating occlusion of an iliac artery stent. Note the presence of reconstitution of the external iliac arteries via collateral flow.

of determining the presence of any arterial disease between the brachial artery and the lower-extremity arteries at the level of the ankle. If the ABI indicates the presence of disease, segmental blood pressure cuffs, such as thigh and calf cuffs, can be helpful in determining its location. The ABI is not perfect, however; elderly patients, or patients with diabetes mellitus often have calcified arteries at the level of the ankle. This results in noncompressibility of the arteries, and therefore, a very high ankle systolic pressure. If the systolic pressure at the ankle exceeds 250 mm Hg, the presence of PAD is suspected. In addition, the ABI does not localize disease, it only indicates that there is arterial disease at some level from the arm to the ankle. Finally, especially in patients with iliac artery disease, a resting normal ABI does not exclude the diagnosis. These patients must also be tested after exercise.

PRIMARY IMAGING OPTIONS

Duplex Ultrasonography

Duplex ultrasonography (DUS) is an excellent noninvasive imaging option for patients who are not significantly overweight, however, the presence of bowel gas can prevent accurate DUS imaging. In appropriate patients, DUS can determine the location of the disease, whether it is stenotic or occluded, etc. If performed by a skilled technologist with good equipment, DUS is very accurate and highly reproducible. Despite its diagnostic imaging, primarily because of the large number of patients for whom the modality is not ideal. It is now more commonly used for surveillance and monitoring after stenting (Figure 1).

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Magnetic Resonance Imaging

The most commonly used imaging modality for diagnosing iliac artery disease is magnetic resonance angiography (MRA) (Figure 2). MRA is performed with combinations of time of flight imaging and contrast administration. The contrast (gadolinium) is administered via a peripheral intravenous catheter, usually in the forearm or a vein of the hand. MRA is very accurate in determining whether a patient's iliac arteries are affected by atherosclerosis. One of the limitations of MRA is that despite technological advances, it continues to overestimate stenoses as occlusions and moderate stenoses as severe. However, if you are interested in identifying the anatomic locations of atherosclerosis in the iliac arteries and whether a lesion might be amenable to intervention, MRA is an excellent test.

MRA is minimally invasive; although it does require an IV, it does not require iodinated contrast, so nephrotoxicity and allergy are very rare. Not every patient will tolerate MRA, however; 10% of patients cannot undergo MRA either because of an implantable pacemaker or defibrillator, claustrophobia, or because they are too overweight to fit into the magnet. MRA also requires a dedicated technician and physician to postprocess the images and evaluate both the source images and the reformatted 3-D images. This promotes more accurate anatomic diagnoses. MRA is an expensive test, thereby limiting repetitive use in patients.

In contrast to DUS, MRA is optimally used in the diagnosis of iliac disease, but is not practical for follow-up after endovascular intervention. This is primarily because most iliac revascularization includes stenting, and

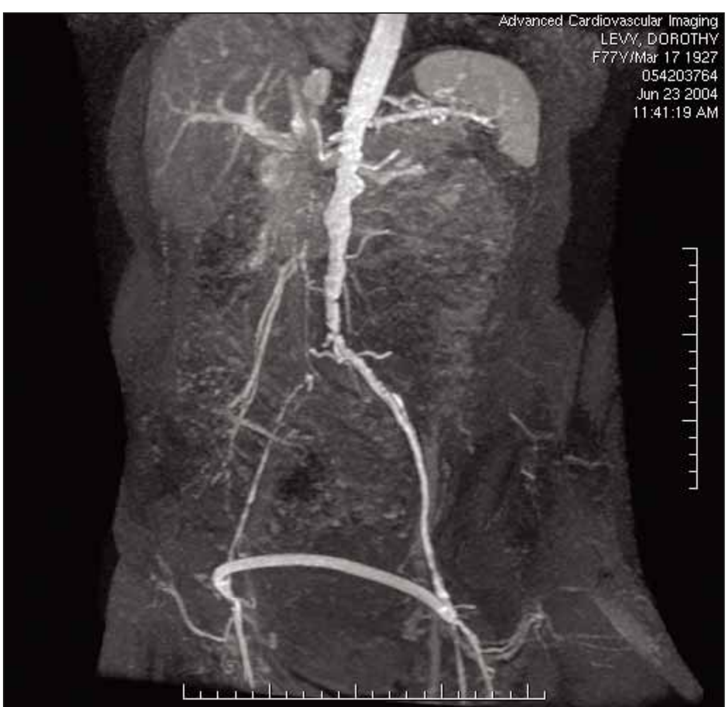

Figure 2. Gadolinium-enhanced magnetic resonance arteriogram demonstrating patency of a left-to-right femorofemoral bypass graft in a patient with severe disease of the native right iliac arteries.

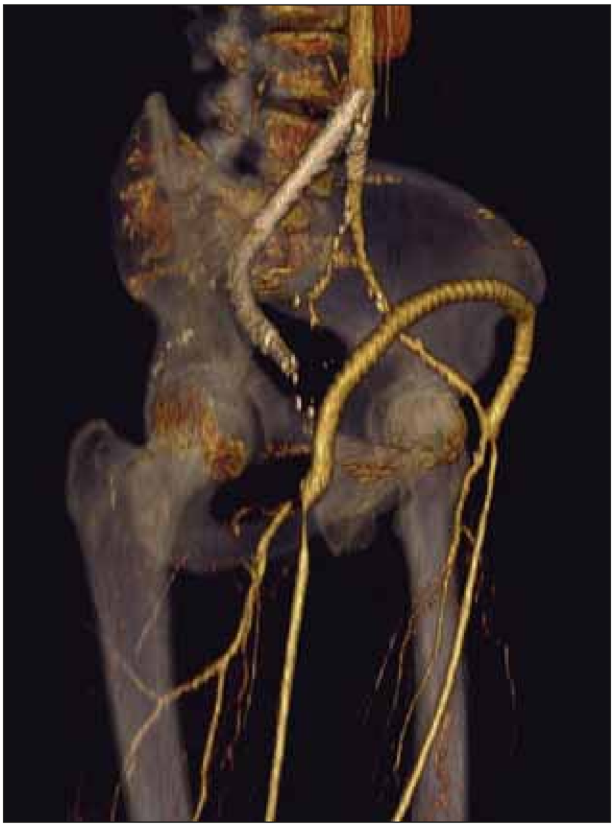

Figure 3. Contrast-enhanced multidetector computerized tomographic arteriogram of a patient with iliac and infrainguinal arterial disease and a patent femorofemoral bypass graft.

the metal of the stent causes a signal dropout in the image; the stented area appears as a black void, making it impossible to precisely determine the presence or nature of in-stent restenosis.

Computerized Tomographic Angiography

There is currently a great deal of excitement about the extraordinary images created using computerized tomographic angiography (CTA) (Figure 3). CTA is currently only being used in a small number (5% to 10%) of all cases, but this is primarily because the most advanced CTA machines are just starting to proliferate in hospitals and clinics around the country. Today's 64-slice multidetector systems provide outstanding accuracy in determining location, length, and severity of stenosis. At Massachusetts General Hospital, we have been fortunate to study the utility of a volume-rendered CTA machine, an experimental unit that holds great promise for the future. When combined with advanced techniques, today's CTA platforms can significantly reduce contrast administration.

CTA has several of the limitations seen with MRA; it too is costly and requires a dedicated technologist and physician to postprocess the images generated. It also requires a peripheral IV and the use of iodine-based contrast. Of course, the need for iodine-based contrast prevents using CTA on patients with pre-existing renal failure, allergies to contrast, advanced age, diabetes, dehydration, etc. CTA also exposes patients to a large amount of external beam radiation, so to use this modality routinely during follow-up is not practical. CTA has some trouble dealing with calcium, in that calcium tends to obscure the lumen of the vessel. Despite these limitations, CTA holds tremendous promise; although the earlier 4-, 8-, and 16-slice multidetector scanners are not accurate enough, the 64-channel scanners consistently generate accurate images, and the technology has the potential to improve significantly.

COMING SOON

Each of the aforementioned imaging modalities will likely evolve in the near future, maintaining the usefulness of each in diagnosing iliac artery disease. We will soon be using better multidetector scanners that perform faster, higher-resolution CTA, with lower contrast boluses and decreased radiation exposures. Our use of MRA will likely be improved with the development of stents composed of MR-compatible metal alloys. These alloys will enable us to image stents and observe their patency under MRA, which we currently cannot do. DUS will continue to become available in smaller, less-expensive systems that are more powerful. One future area of great interest is contrast administration with ultrasound, which will allow us to look at deeper vessels in larger patients. Using non–iodine-based ultrasound contrast agents with long half-lives, we will be able to image many vessels that are currently difficult to image, such as polar renal arteries, intracranial arteries at the level of the circle of Willis, and aortic endograft leaks.

Despite the improvement in imaging, we must continue to work at increasing the awareness and the index of suspicion of our referring primary care physicians regarding the prevalence of peripheral vascular disease. Perhaps more often than not, the presence of disease is either overlooked or wrongly diagnosed, which minimizes our ability to use these exciting technological developments to their full potential to promptly and accurately evaluate and treat these patients. ■

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