Caval Occlusion: The Last Frontier?

A discussion on pathophysiology, patient workup, gaps in data and disease-specific tools, and postprocedural follow-up and management.

With Kush R. Desai, MD, FSIR

What is the disease burden associated with caval occlusions?

Venous obstruction of the inferior vena cava (IVC) can be significantly debilitating and certainly to a greater extent than for patients with iliofemoral obstructive disease. Both lower extremities are affected (usually one limb more than the other), which leads to greater levels of disability, and there can also be problems with cardiopulmonary return, which can lead to exercise intolerance, shortness of breath, and orthostatic hypotension.

Like all venous disease, caval occlusions can affect a very wide cross-section of the population, from teenagers with congenital disease up to patients later in life. Particularly in young patients, the challenge is having a durable option that's going to stay open long term and provide a durable improvement in quality of life.

What is pathologically unique about caval occlusions compared to iliac vein obstructions?

The pathologically unique feature of caval obstruction is that both legs are affected, impacting the unitary outflow of both legs (the IVC). This, paired with the length of disease (frequently, renal veins down through the inflow vessels), presents a unique challenge in terms of the length and sizes of available devices to both support the blood volume that needs to return to the heart as well as provide a durable solution for inflow disease, which is frequently present.

What does the workup of caval occlusions include?

The workup of IVC occlusion is somewhat site-specific. We use CT venography and have our protocols well established to get good images of the abdominal and pelvic extent of the disease. Duplex ultrasound is important to assess your inflow vessels—what does the common femoral vein look like? Pay special attention to the profunda as well. You need both axial imaging and duplex ultrasound working together to see the full extent of the disease. Specifically in iliocaval occlusion and especially in the United States, a large number are due to obstructed IVC filters, and axial imaging is important to really assess what is going on with the filter. CT has a very clear advantage over MRI here because MRI will have artifact issues with the metal.

Where are the gaps in trial data?

Thus far, the majority of data for deep vein obstruction are retrospective, single-center efforts and, more recently, prospective multicenter trials for device approval. Our approach was based on what high-volume practices were doing, which is good but also prone to bias. That's certainly the current case for IVC disease, and I put myself in that camp where I've reported my outcomes. The question is, are those outcomes reproducible on a more general extent? Now, prospective and multicenter trials with independent adjudication are enrolling specifically for iliocaval obstructive disease. As a result, some reporting bias will be removed and there will be an independent core lab confirming the results of stent placement, allowing for the ability to trust those outcomes.

Where are the gaps in available tools to treat caval occlusions?

There are currently no devices approved for the treatment of caval occlusion, and as a result, use of any device is off label. Some physicians use iliofemoral devices, some-

times in a double-barrel configuration, and tracheobronchial stents are sometimes used inside the IVC (all off label). Effectively, interventionalists are cobbling together what they can for IVC obstruction. Fortunately, we are now moving into the era of purpose-built devices for iliocaval obstruction, which we hope will make a difference in how these patients are treated and whether it offers more durable solution. Certainly, results of studies will help us see if this is the case.

In terms of a successful on-table outcome, what are you looking for? How do you know when you're done?

You want to see that you've covered all your disease, inflow is preserved and optimized, there is good flow through the segments on venography, that your imaging shows that you are not leaving any gaps, and that you bridged all the disease. It's very similar to iliofemoral disease, except that two legs are affected, not just one.

What is your long-term anticoagulation management and follow-up protocol, and what are you looking for in later visits? How do you define a successful long-term result?

The management approach is going to be similar to that of postthrombotic patients. In general, anticoagulation will be long term if not indefinite (if unprovoked or if the patient had multiple venous thromboembolism events). Even if a patient has only experienced a single event, they will remain on some sort of low-intensity anticoagulation, simply because there was a very significant burden of obstructive disease.

We do everything we can to keep the vein open, balancing safety from the blood thinner—which also means active surveillance. I typically see my patients more frequently in the first year or so, and then annually for up to 3 years. From single-center data from the higher-volume institutions, if they're open at that point, they are likely to stay open long term. At that point, follow-up visits can perhaps be spaced out to every other year, keeping in mind that we don't know what the very long-term outlook is in these cases.

What key dos and don'ts would you share with a junior colleague before their first cases?

It's cliche, but a key to approaching these cases is to have a plan. Make sure you have all the information beforehand. These cases are not emergent, so get the imaging, talk to senior partners, and talk to people around the country. The venous community is very giving with their experiences and knowledge; they'll be willing to help you, talk to you, and go over your images. Then, develop a procedural plan; if there are IVC filters, determine your strategy for management. After that, and probably just as important, have a rigorous follow-up plan. This develops your skill set outside of being just a technician—you should be thinking about the patient before, during, immediately after, and over the long term so that you can improve your skills and ensure that patients thrive. ■

Kush R. Desai, MD, FSIR
Professor of Radiology, Surgery, and Medicine
Chief, Division of Interventional Radiology
Northwestern Memorial Hospital
Northwestern University Feinberg School of Medicine
Chicago, Illinois
kdesai007@northwestern.edu
Disclosures: Speaker's bureau/consulting for Cook Medical, Boston Scientific, Becton Dickinson, Medtronic, Penumbra, Tactile Medical, and Philips; consultant to W.L. Gore, Asahi Intecc, enVVeno, Varian, Terumo, and Veryan.