If you perform TEVAR to treat acute type B dissection, do you use IVUS during the procedure?

Manish Mehta, MD
Associate Professor of Surgery
Director of Endovascular Services
The Institute for Vascular Health & Disease
Albany Medical Center

Adequate imaging is of paramount importance when planning thoracic endovascular aortic repair (TEVAR) for acute type B dissections. I have occasionally found intravascular ultrasound (IVUS) to be a valuable tool in navigating through the complexities of such procedures, although it is not necessarily an imaging tool that I utilize frequently, as long as I have adequate computed tomographic angiography (CTA) and the ability to perform digital subtraction angiography. The key to managing acute complicated type B dissections is to have the ability to identify the true and false lumens, vessels responsible for malperfusion, as well as the proximal and distal stent graft landing zones.

Of all the available imaging modalities, I have found CTA to be the most consistent tool for differentiating the previously mentioned factors and allowing me to establish a plan for navigating wires, catheters, and stent grafts through the aortoiliac segments. During the procedure, I have found the following steps to consistently allow the catheters to stay in the true lumen throughout the aortoiliac segments: (1) identify the true lumen at the level of the aortic bifurcation with a 5-F pigtail catheter; (2) incrementally advance the pigtail catheter cephalad, rather than wires; and (3) perform arteriography at the aortic bifurcation, juxtarenal aorta, mid-descending thoracic aorta, aortic arch, and ascending thoracic aorta using as little as 10 mL of contrast for each injection. Once the true lumen is established, CTA is used to determine stent graft landing zones, and arteriography is used to identify and treat vessels responsible for malperfusion.

With this approach, in our practice of managing acute complicated type B dissections, IVUS is infrequently used and has been reserved for situations when the identification of true from false lumen or identifying the malperfused visceral vessel is questionable. There is one caveat, instead of IVUS, we also routinely use transesophageal echocardiography to assess for retrograde type A dissections at the completion of TEVAR.

In the end, regardless of one's preference for using IVUS during endovascular management of complicated type B dissections, I think we all agree that IVUS is a tool that one needs to be comfortable using during these complex procedures.

Ross Milner, MD
Associate Professor of Surgery; Chief, Division of Vascular Surgery and Endovascular Therapy; and Vice Chair, Clinical Research in the Department of Surgery
Stritch School of Medicine at Loyola University in Chicago

IVUS serves as an exceptionally useful adjunct during endovascular treatment of type B aortic dissections. You can treat dissections without IVUS, but the use of IVUS improves the safety and efficacy of the procedure.

IVUS is valuable in several ways. It is initially useful in confirming wire location within the true lumen. This point is essential. It would potentially be a catastrophe to place a thoracic endograft within the false lumen. In addition, the IVUS catheter allows for rapid identification of the arch branch vessels and can identify the entry point of the dissection. Once the true lumen is entered in the distal arch, measurements can be taken with the IVUS catheter to confirm the measurements taken with CTA. Device sizing can be very challenging with aortic dissections due to the compromised true lumen.

Finally, the efficacy of the endovascular therapy can be assessed with IVUS. I attended an IVUS training course many years ago led by Drs. Rod White and Carlos Donayre. They taught me something at the course that is valuable for determining the completion of the procedure. There still remains debate regarding the most appropriate selection of device length. They treat until the true lumen expands with systole based on IVUS evaluation. In other words, they treat with as many devices as necessary to allow for true lumen expansion based on IVUS imaging to the level of the celiac. I think this is great advice and use IVUS readily in my practice when treating type B dissections.

Michael D. Dake, MD
Thelma and Henry Doelger Professor (III)
Department of Cardiothoracic Surgery
Stanford University School of Medicine
Falk Cardiovascular Research Center

IVUS is well recognized as a valuable tool in the evaluation and endovascular management of acute type B aortic dissection. In conjunction with TEVAR or interventions to address branch vessel compromise, its use can provide confirmation of preprocedural interpretations of CT or other imaging modalities obtained for diagnosis and management planning or to clarify discrepancies between the results of noninvasive imaging exams in terms of specific anatomical relationships associated with the dissection process. In addition, IVUS imaging can provide conspicuous detection of primary or secondary tears in the dissection septum that allow communication between the false and true lumens and help guide interventions to obliterate these tears.

Like any tool, however, it should be used on an as-needed basis. Depending on the complexity of the dissection process, comfort level for understanding the depictions of anatomic involvement provided by other imaging sources, and experience manipulating guidewires and catheters within a dissected aorta, the necessity and potential benefits of IVUS use may or may not be justified.

I do not use IVUS routinely for TEVAR placement in acute dissection, but I would not hesitate to employ it if I were confused or concerned about the true or false lumen position(s) of my catheters or the precise course of any intravascular devices as they track from the groin to their intended target locations. The one situation when I do use IVUS consistently in the setting of dissection is during the guidance of percutaneous balloon fenestration of the aortic septum to alleviate any branch vessel ischemic involvement. In these cases, IVUS control is the easiest, safest, and most secure technique for confidently facilitating needle puncture and transgression of the flap.

Edward Y. Woo, MD
Associate Professor of Surgery
Vice-Chief, Program Director
Director, Vascular Laboratory
Division of Vascular Surgery and Endovascular Therapy
Hospital of the University of Pennsylvania, University of Pennsylvania Health System

I use IVUS in every case. It is extremely important to identify the true lumen versus the false lumen and ensure that the endograft is placed in the true lumen. The wire can get into and out of the true and false lumen throughout the aorta, which could be devastating if the endograft follows this path. IVUS will help prevent this.

IVUS is also useful for determining whether the true lumen is adequately re-expanded in malperfusion cases. After placement of the endograft, the true lumen can sometimes still be compressed, especially more distally. Angiography only provides a two-dimensional view and can miss a situation of continued malperfusion. IVUS will provide a real-time three-dimensional image and full assessment of the true lumen. Finally, IVUS will reduce the number of angiographies needed, thereby decreasing the contrast load. This is helpful in patients with chronic renal insufficiency and those presenting with renal malperfusion.

Firas F. Mussa, MD
Assistant Professor of Surgery
Member, Section on Value and Comparative Effectiveness
NYU School Of Medicine

Yes. IVUS is indispensible during endovascular treatment of acute (and chronic) type B aortic dissection. I use a femoral approach and try to place the IVUS catheter in the same lumen throughout the procedure. If it is in the true lumen, I make sure that it stays there throughout the entire aorta and document the wire placement as well. If it is in the false lumen, I use it to verify lumen thrombosis (lack of color Doppler). IVUS is also key in making measurements, as the nongated CTA/magnetic resonance angiography may be misleading due to cardiac cycle variations. ■

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