The Advantages of Universal Guiding Catheters for the Transradial Approach

Cath Lab Digest talks with Sandeep Nathan, MD, MSc, FACC, FSCAI, Associate Professor of Medicine, Medical Director, Cardiac Intensive Care Unit, Director, Interventional Cardiology Fellowship Program and Co-Director, Cardiac Catherization Laboratory at the University of Chicago Medicine, Chicago, Illinois.

A universal catheter has a specialized curve or curves, usually meant for use from a right radial approach, recognizing the greater tortuosity and leveraging the increased contact points with the large vessels of the arm and the aorta in coming from a right radial (versus a left) radial approach. A universal catheter is meant to cannulate multiple vessels in a single use, whereas most femoral catheters are meant for a single, dedicated application, such as a catheter for the native left system, a catheter for the native right coronary artery, and different catheters for various types of bypass grafts. With a universal catheter, the expectation is that you will cannulate multiple vessels — often all vessels — with a single catheter, which allows for efficiencies during the procedure. More importantly, use of a universal guiding catheter from a radial approach minimizes the number of passes through the arm, and therefore the potential for irritating the vessel and precipitating radial spasm.

Is universal guiding catheter use unique to a particular access site?

Most operators would say that it is unique to the radial approach. There are catheters that you can potentially use from a femoral approach that would work in a universal capacity, but practically speaking, there are very few dedicated catheters for that purpose. Someone who feels comfortable using Amplatz catheters could potentially use an Amplatz catheter from the leg, but you have to be fairly skilled with Amplatz catheters to avoid traumatizing coronary ostia. If we look back in history, the original technique of selective coronary angiography involved the use of a single catheter, manipulated in the aortic root in order to cannulate multiple vessels. The current multipurpose catheter bears a resemblance to the original multipurpose catheters, but very few practicing interventionalists remember those days, let alone practice the technique, simply because dedicated catheters came into existence for cannulating different vessels, primarily from a transfemoral approach. Dedicated catheters have allowed operators even with a limited skill set to successfully and efficiently cannulate all of the vessels by utilizing multiple catheter curves. When our lab shifted to a radial-first approach, the initial reason for moving to a universal catheter wasn’t so much to avoid excess time with multiple catheters, but to minimize the number of passes through the arm. I believe the failure of radial access is often related to certain, specific technical issues. First, the operator may have inadvertently found themselves in a branch, a recurrent vessel, or in an anomalous vessel, and the associated spasm and patient discomfort are often a cause for failure. Second, failure may result from the inability to find a catheter that cannulates properly from a right radial approach. The right radial is quite different from the femoral approach in terms of catheter manipulation, seating, and engagement. Specifically, finding backup is very different from a radial approach, whether it is left or right radial. In the United States, the majority of the time, a right radial approach is used versus the left radial. The distal radial approach has gained a lot of popularity (interestingly, through Twitter and other non-traditional electronic presentation formats) and has really taken on a life of its own. In high-volume Japanese labs, the distal radial approach, specifically the left distal radial approach, has become very commonplace. It is the default access point in many cases. In complex cases that require multiple guides, bi-radial access can be used. Occasionally, operators will opt for proximal or conventional radial plus ipsilateral distal radial in the same arm, utilizing “slender” or low-profile access techniques. However, conventional or proximal right radial is still the default for most labs in the U.S. doing radial. The left radial approach is appealing from the standpoint of catheter manipulation, but is quite unappealing from the standpoint of ergonomics for an operator leaning over a patient. A conventional left radial approach can be a backbreaker if you are working from the right side of the table.

What universal guiding catheter are you using?

The Hearttrail series of guides with the Ikari curves are some of the most commonly used in our lab (Terumo Interventional System); most often, the Ikari left 3.5 or 3.75 left guiding catheter, which is a very unique catheter. We typically think about femoral guiding catheters with primary and secondary curves. The Ikari has at least three different curves. If you put it down on a flat surface, you can see that the tip lifts up slightly from the surface, meaning that the catheter itself is shaped in three dimensions. The Ikari catheter curves were designed in a bench model using load testing and maneuverability exercises, and capitalize not only on the angle of the brachiocephalic artery as it arises from the aorta, but also on what is known as the theta angle: the angle made by the body of the catheter engaged in the coronary artery and the opposite wall of the ascending aorta. These attributes are meant to increase the back wall support of the guide catheter when coming from a right radial approach. It maintains a nice balance between support and flexibility, and its surface is quite unique among catheters. While it has a braid or a skeleton inside it like every guide catheter (and some diagnostic catheters have braiding inside them as well), the texture of the braiding can’t be felt from the surface. The surface of the Ikari catheter feels slicker than most guide catheters. While it does not have a true hydrophilic coating, it retains some of those tactile properties. The engineers who designed it created a micro-dimpled surface on the catheter that decreases drag. It effectively makes the surface feel slick using the same mechanism that allows a golf ball to derive lift: a dimpled surface. The dimples on a golf ball create air pockets that increase its lift through the air. The micro-dimpled surface of this catheter decreases friction by decreasing the contact surface as the catheter traverses arteries. I think it is a clever and innovative design that is more than just an engineering stunt; in my opinion, it really bears dividends when coming from a radial approach, where there is a great deal more contact between the catheter and the vessel wall becomes much more relevant.

Do you always use a universal guide catheter when going from a right radial approach?

Figure 1. HEARTTRAIL® Coronary Guiding Catheter. ©2019 Terumo Medical Corporation. All rights reserved.
If I think there is anything that needs to be intervened upon or even needs physiologic assessment or intravascular imaging, I will start right out of the gate with a universal guide catheter. Universal catheter use obviates the need for catheter exchanges and I have the ability to do what is necessary with that single catheter rather than wasting time and money crossing over a small fraction of a time to the leg or having the vessel lock up. Obviously there is a price difference between universal guide catheters (or any guide catheters) versus diagnostic catheters. The price differential is going to vary from catheter to catheter and lab to lab depending on contracting, but the dollar difference is not that much. At the end of the day, you are often using one universal guiding catheter versus two or three diagnostic catheters, and saving time in the process. If we look at a comprehensive cost model at our lab, one minute of lab time is associated with a quantifiable expenditure. Perhaps you are using diagnostic catheters and need a different shape or French size, but you don’t have it in the room and someone has to go get it from your supply area. If you are idling for even a few minutes, you have likely eaten up the differential cost of just using a universal catheter right out of the gate. If you plan in advance for your case, in the sense that there is something you know you will need to fix or at least evaluate, there are operational efficiencies to be gained, in my opinion, by starting with a universal catheter right off, assuming you are comfortable doing so. One population at our institution that requires assessment every single year is the heart transplant population. By protocol, we do intravascular ultrasound (IVUS) of the proximal one-third to one-half of the left anterior descending coronary artery, and we compare it year after year to look for cardiac allograft vasculopathy, serving populations at our institution that require angiograms year after year, and with a little bit of torque on the catheter, it will pop in. Most times, however, you need to go down to the cusp in the ipsilateral sinus of Valsalva, and look up into it in its native configuration first and then alter the secondary curve, making the catheter straighter in order to engage different vessels. This, too, may feel a little unfamiliar. So while there is a learning curve, once you are comfortable, it certainly offers some advantages.

You mentioned economic benefits and time savings with universal guiding catheter use. What have you learned?

It is data we have considered formally collecting, but don’t have on hand as yet. It stands to reason, though, that there may be potential for cost savings and it is based on our own observations. We have done estimates of procedure times with universal versus Judkins catheters, both used by experienced hands. Often procedure times are a few minutes shorter with universal catheters, especially in native anatomy. The reason to care about a few minutes is that one minute of cath lab time can be fairly expensive. While the actual number will try in its native configuration first and then alter the secondary curve, making the catheter straighter in order to engage different vessels. This, too, may feel a little unfamiliar. So while there is a learning curve, once you are comfortable, it certainly offers some advantages.

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