Optimal Current Treatment for Type II Endoleaks: Is Cross-sectional Imaging Helpful?

NOTES

Richard A. Baum, MD, Boston, MA

Treatment of endoleaks depends on origin and aneurysm sac status. Until recently, treatment was performed either in an endovascular suite or with cross-sectional imaging (computed tomography [CT], magnetic resonance imaging). Recent advances in imaging have made guidance of needles and catheters faster and more accurate. Hybrid endovascular suites that are able to perform both conventional x-ray angiography and cross-sectional imaging (with the same equipment) have recently been introduced. This presentation will describe how these state-of-the-art suites can be used to perform secondary intervention after endovascular aneurysm repair. We will also explore the possibility and potential advantages of using this equipment to perform primary endovascular aneurysm repair (EVAR).

There are inherent advantages in merging cross-sectional imaging with fluoroscopy. Cross-sectional imaging provides precise guidance and localization for needles and devices, and fluoroscopy allows for real-time manipulation of these devices. An example is ultrasonography, which has become completely integrated in the modern IR suite. Combining different imaging modalities has always required different machines being present in the same room at the same time. Suites have been designed with long tables or gantries. Patients travel on these gantries from fluoroscopy to CT and back again. This clearly is not an ideal solution.

Over the past decade, there has been a revolution in digital imaging. This has affected the way images are acquired, manipulated, and viewed. Film is a thing of the past. Today, in modern radiology departments, images are digitally acquired and viewed on workstations. This revolution has recently been introduced to the IR suite with digital fluoroscopy. Instead of x-rays producing images after interaction with a collimator, they interact with digital detectors producing attenuation values. These detectors produce real-time fluoroscopic images, and because the images are digital, they are easily manipulated after they are acquired.

Cross-sectional imaging using CT also relies on multiple detectors that acquire attenuation values as they rotate around the patient. Using these same principles, digital fluoroscopy units can be modified to produce near real-time cross-sectional images similar to that of a CT scanner. This is done by rotating the c-arm around the patient and acquiring attenuation values. These are then put through the same mathematical algorithms used in CT scanners to produce a cross-sectional image.

Having access to near real-time cross-sectional imaging integrated into a standard endovascular suite would be of particular benefit in patients undergoing endovascular aneurysm repair as well as related secondary interventions. During deployment, for example, a three-dimensional view of the renal arteries would be possible prior to deployment. This may be of particular benefit in fenestrated endografts where the anatomy of the entire visceral segment of the aorta is critical. Treatment of endoleaks after EVAR is also greatly facilitated with the use of this type of combined imaging. Aneurysm sac puncture and entry into the endoleak cavity is easily accomplished using CT guidance. Embolization is then performed using fluoroscopy.

There is still much to learn about these devices and how to best integrate them into practice, but clearly this technology represents a major advance in image-guided intervention.