EVAR: Progress and Promise

Juan Carlos Parodi, MD, the inventor of endovascular aneurysm repair, discusses the obstacles that have been overcome and the innovations on the horizon.

How would you describe the progress that endovascular repair of abdominal aortic aneurysms (EVAR) has seen in the 19 years since you treated the first patient using this therapy?

The progress has been rapid, and several players through competition have generated excellent devices we can use today.

What does EVAR need to show in order to be considered more durable than open repair? For instance, what data would make EVAR a more attractive option in younger patients?

Durability is what everybody expected to be achieved. Device-related failures, such as the experience with Vanguard, disappointed many people, but confidence has been regained with the new generation of approved devices. We do not currently have enough experience with endograft technologies, with the majority of implanted devices having less than 10 years of follow-up, but I do not expect future negative experiences such as those we saw with early iterations. With the devices available today, young patients should be confident but aware that they could need a secondary procedure including conversion. Sexual dysfunction is the main argument young patients bring to the table.

What is the next necessary step in the evolution of EVAR devices?

Device-wise, clinicians seek platforms that are low profile, flexible, and steerable, and everybody in the field eagerly expects fenestrated and branched endografts.

The biology of aneurysms has been studied for more than a decade. Today, we understand that in the pathophysiology of aneurysms, there is inflammation, degradation of elastin and collagen, apoptosis of smooth muscle cells, and lack of healing. Those complex mechanisms are being studied extensively. Statins and doxycycline are effective in humans, and although studies are still few, a group from Washington University published that doxycycline administered orally after EVAR prevented neck dilatation and promoted aneurysmal shrinkage. This is just the beginning of the road of association between mechanical and biological methods.

Do you think manufacturers will be able to maintain or improve upon current EVAR results if they must alter the current designs in order to innovate?

When attempting to reduce the profile of the delivery systems required for EVAR, some tradeoff may be necessary, such as a thinner graft material or more compact stent elements. Very resistant, thin fabric grafts have been developed without compromising resistance to wear. There are PTFE membranes more resistant than Kevlar.

What is the lowest-profile delivery catheter you think is possible, while still maintaining current outcomes expectations?

Sixteen French seems reasonable.

Do you believe physicians will be comfortable with new devices based on previous generations' longer-term data?

Confidence in devices has grown among interventionists over the years. We are all aware that secondary procedures are needed in EVAR compared to the open option, and we are also confident that industry will soon come up with the ideal device.

What types of clinical trials must still be undertaken? In other words, what don't we know about EVAR that we should?

What we do not know is how to recognize a normal (healthy) segment of the aorta in which to deploy the endograft. Normal-appearing macroscopic aortas often have severe changes in structure, and it is well known that the necks of aneurysms have increased MMP activity and fragmented elastic fibers accompanied with inflammation. The thoracic aorta similarly shows normal appearance, and over the years, dilatation occurs. ■