Robert Y. Rhee, MD

The Chief of Vascular and Endovascular Surgery at Maimonides Medical Center in Brooklyn discusses the optimal tools and techniques for CLI and AAA management, as well the benefits of hybrid operating room technology.

What is your preferred endovascular aneurysm repair (EVAR) device?

Selecting an EVAR endograft is generally a decision based on experience, comfort level of the operator relative to the particular device, and the perceived short-and long-term performance in challenging anatomic situations. Fortunately, most currently available EVAR systems perform extremely well when the instructions for use guidelines are followed. Therefore, the question really becomes, "Which system allows for the treatment of the widest range of patients with a single device?" The proximal anatomy (neck) of the aorta is clearly the most limiting factor in determining the feasibility of performing an EVAR procedure. The sealing characteristics and the ability of the endograft system to deploy accurately in the specific planned region of the aortic neck are prima facie in the operative and long-term success of EVAR procedures.

To that end, my first-choice EVAR system is the C3 Excluder system (Gore & Associates, Flagstaff, AZ). It is currently the only available device that can be adjusted to conform and deploy precisely within the available neck. Most bifurcated endograft systems have a certain "flex" pattern in the main body segment (preferential conformability based on the configuration of the iliac limbs), which must be taken into account with each angled deployment. The C3 system allows one to adjust that angle, even after deployment, which can increase the chances of adequate sealing in hostile neck situations. This adjustability (along with the inherent flexibility of the original Excluder system) allows for multiple deployments (if needed) of the endograft near the renal arteries to minimize or obliterate the distal renal artery to proximal endograft distance. This concept can also be applied when performing snorkel procedures to extend the neck even further up to the level of the mesenteric arteries. The risk of unintentional visceral or renal artery coverage is significantly reduced with the ability to reposition the endograft system and start over. Overall, the main advantage of the C3 system is that it allows the operator to have more confidence in achieving the expected outcome.

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In what ways have repositionable endografts changed the way you approach patients with abdominal aortic aneurysms (AAAs)?

The introduction of repositionable endografts has clearly extended the ability of the vascular specialist to treat patients with complex infrarenal necks. In conjunction with the currently available fenestrated endograft systems, we now have the capability of treating most patients with AAA disease with an endovascular approach. However, fenestrated systems carry limitations, including the complexity of the deployment process, the lack of widespread availability, and the extended waiting period associated with manufacturing a customized endograft. Fortunately, the reality in 2013 is that 70% to 80% of all patients with AAA disease can be successfully treated with currently available infrarenal endograft systems when correctly placed in the ideal position.

Repositionable endograft systems have been particularly useful in the treatment of patients with hostile necks (15 to 10 mm or severely angulated [> 60º angulation]), due to the operator's ability to "redo" the actual placement of the sealing portion in the infrarenal neck. This has revolutionized the treatment of complex AAA patients, and I believe the ability to accurately place these endografts will be the key to long-term success. The future of EVAR therapy will be in the development of successful repositionable platforms for all types of endografts. It will become the standard of care, as will ultra-low-profile systems. Branched and fenestrated systems will likely have this capability in the future as well.

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What you do think will be the next step in improving endovascular treatment for ruptured AAAs?

Most patients with adequate proximal neck anatomy can be successfully treated with EVAR, but many of these patients do not survive due to ongoing bleeding in the retroperitoneum and in the ruptured aneurysmal sac. We need a way to curb or arrest this process utilizing endovascular or adjunctive surgical means. Several options for stabilization of this continued bleeding outside of the mainstream aortic repair are on the horizon. The development of an endovascular approach to place a hemostatic or solidifying agent into the AAA sac immediately after the procedure to arrest the bleeding is clearly desirable. A similar yet more direct approach could also be used if open repair is chosen. In addition, a "flow-through" aortic occlusion balloon that allows "shunting" of blood and secondary wires into the distal circulation is also something that most vascular surgeons would love to see in the future.

Why do you believe women are less likely to undergo aneurysm evaluation than men? Is outreach a necessary step in improving the outcomes of early/elective intervention?

Women's aortas are generally smaller; therefore, the threshold of treatment for aortic aneurysms should be different. I personally have a much lower threshold for treating a woman with a 5-cm aneurysm than a man because the baseline aorta is generally 3 to 5 mm smaller in women. Because AAA disease has been traditionally viewed as a disease process that occurs in male hypertensive smokers, women are screened significantly less than men, as they have a lower incidence of those risk factors. Recently, there has been growing evidence that the incidence of AAA disease in women is increasing. There is significant recent evidence based on national databases suggesting that women have worse outcomes than men when undergoing both endovascular and open AAA repair. I believe this is because women are treated at a later stage of disease, when their overall physiologic health is worse, and the aneurysms are larger relative to their native aorta.

Elective, early intervention is paramount in decreasing mortality rates in women. Screening high-risk patients (such as smokers, patients with coronary artery disease, chronic obstructive pulmonary disease, etc.) may help diagnose and treat women earlier. Consideration should be given to screening women at a younger age, especially those with significant risk factors.

How do you typically treat young patients (< 50 years) with lower extremity disease? What tools might help improve their outcomes?

This is a very unique patient population that generally exhibits aggressive, accelerated atherosclerosis. These younger patients manifest a very different type of clinical scenario when they present. Their arteries are generally severely inflamed and respond very poorly to both surgery and endovascular treatment. Surgical outcomes have historically been poor, even with aortoiliac reconstruction in this patient population. Therefore, most vascular surgeons delay treatment of this group of patients for as long as possible. My approach has been to offer treatment only if the symptoms are extremely severe. Endovascular therapy, although not optimal, is still my first treatment approach due to the lowered and less-severe complication rates. These patients have shown a higher rate of wound infections and arterial occlusions after surgical bypass. It makes sense to do as little as possible when initiating therapy. Of course, all of these patients should be made aware of the prognostic situation before beginning any type of endovascular or surgical therapy.

In terms of tools, I try to not place any bare-metal or covered stents in this group of patients. I generally perform endovascular balloon angioplasty or atherectomy in these patients, with the philosophy of treating only the most severely lifestyle-limiting disease conditions. In the future, drug-eluting balloons or bioabsorbable stents may also have a role in treating this select group of high-risk patients, but currently, there are no hard clinical data nor are they available in the United States.

What is your standard approach to treating patients with critical limb ischemia (CLI)?

I believe that surgical bypass with a good-quality greater saphenous vein is still the gold standard. If the patient presents with CLI with multivessel tibial artery disease and is not at high surgical risk, my preference is to proceed with a primary bypass procedure. However, in most vascular surgeons' practices, these types of patients are extremely rare—either the patients do not have suitable vein, or they are relatively high risk for any type of surgical intervention. Therefore, endovascular therapy has become the mainstay for CLI patients, mostly related to the inherent risk factors, as well as availability of a good, usable conduit in these patients. When reasonable patient selection is practiced, I believe that excellent results can be achieved with endovascular management. The long-term data are clearly better with surgical bypass in the 5- to 10-year range in this group of patients.

How has your practice changed since introducing a hybrid operating room at your institution?

In the modern era, the hybrid room has become an essential tool of the vascular surgeon or specialist. It is no longer a luxury; it is a necessity for successful practice. The imaging capabilities cannot be duplicated with portable C-arms, and the radiation exposures are significantly less. Therefore, it is safer for the patient, as well as for the physicians performing the procedure. The hybrid room is not only useful because of its imaging capabilities but also because we are now able to perform many of these truly hybrid procedures in these specialized rooms. Performing complex endovascular interventions (such as chimney techniques and arch debranching procedures) is not only less cumbersome but safer in the hybrid room.

As we embark on the next stage of endovascular aortic therapy (repair of the entire thoracoabdominal aorta), the hybrid room will become paramount to the success of any aortic program. Unless you have full high-fidelity imaging and full surgical capabilities in a single location, I believe that you place patients at unnecessary risk. ■

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