INVITED COMMENTARY

Commentary on ‘Changes in Aortoiliac Anatomy after Elective Treatment of Infrarenal Abdominal Aortic Aneurysm with a Sac-anchoring Endoprosthesis’

J.P. Archie
University of North Carolina, Chapel Hill, NC, USA

Anchoring of endografts in the lumen of abdominal aortic aneurysms by means of polymer filled sacs attached to the prosthesis is an interesting concept and a potentially valuable technique if the devices can be safely placed and they prevent endoleaks and migration. Boersen and colleagues¹ present their initial experience and early outcomes with the Nellix endosystem (Endologix, Irving, CA, USA). Their thorough documentation of a sac-anchoring endograft insertion technique and geometric measurements of vessel lengths, diameters, volumes, and angulation (tortuosity) before and after device placement should be of value to current and potential users. The 27 patients selected for aortic aneurysm repair with sac-anchoring endoprosthesis had favorable vascular anatomy. The device was successfully placed in all patients with no Type I or II endoleaks on completion angiography. The authors found several adjunctive procedures necessary, including stent extension of iliac limbs in four patients and stenting of one iliac dissection. They also noted incomplete polymer filling of one endosac, resulting in new luminal thrombus formation. There was no 30-day mortality or Type I or II endoleaks on CT.

The pre and post procedure CT derived geometric measurements are of value. The authors used a 3Mensio work-station to compute 3D reconstructions, allowing them to precisely measure vessel geometry including angulation with a tortuosity tool. They found that the sac-anchoring endoprosthesis tends to straighten the iliac arteries and that the endo-bags slightly shorten aneurysm length while increasing diameter and volume. Perhaps this is not unexpected given the recommended 180 mmHg sac inflation pressure. These geometric changes provide insight into how the sac-anchoring endograft model may be effective in preventing endoleaks in addition to device migration. Mean abdominal aortic aneurysm length decreased by 2% while the mean diameter increased by 2%. Based on these mean length and diameter changes, the volume of a theoretical prolate spheroid aneurysm (ellipsoid of revolution about the major axis) would increase about 2.5%. In contrast, the authors found the measured increase in mean total aneurysm volume to be 0.5%. Although these geometric changes are small, this fivefold discrepancy between predicted and measured aneurysm volume change is real, resulting from loss of intraluminal thrombus volume. In this group of patients mean aneurysm volume prior to the procedure was 57% blood flow lumen and 43% intraluminal thrombus. After the procedure, mean aneurysm blood flow lumen volume (now made up of the endograft and two polymer filled sacs) increased by 5.0% and mean intraluminal thrombus volume decreased by 4.5%. Although not all patients had a decrease in thrombus volume, the mean decrease was statistically significant (p = .04). As the authors point out, device sac pressure of 180 mmHg at the time of polymer fixation should increase aneurysm volume. Where did 4.5% of intraluminal thrombus volume go? Thrombus volume cannot change because it is incompressible at physiologic pressures; however, it is deformable. The post procedure CTs, from which changes in geometry were computed, were made after 1 month after device implantation. As suggested by the authors, some of the more semi-liquid thrombus components may have been forced into patent lumbar and/or inferior mesenteric arteries. Perhaps some thrombus reabsorbed (exogenous fibrinolysis?) over the 30 days? Future CT scans may determine if further thrombus loss occurs over time in these patients. The answer to the puzzle of intraluminal thrombus loss after sac-anchoring endoprosthesis placement may prove to be interesting. Similar to the observation that intraluminal thrombus can lower aortic aneurysm wall stress, intraluminal thrombus may turn out to be an asset to sac-anchoring endoprosthesis in preventing endoleaks by plugging the gaps and spaces between the true aneurysm wall and the polymer filled sacs in the aneurysm lumen, as well as obstructing patent lumbar and inferior mesenteric arteries. It will be of interest to see if future studies confirm that these devices significantly decrease the incidence of endoleaks and if they are successful in patients with adverse arterial anatomy.

REFERENCE