Do Not Assume Abdominal Aortic Aneurysm Growth after an Excluder Endograft Is Due to Permeability: Abdominal Aortic Aneurysm Enlargement in This Setting is Multifactorial

NOTES

Mark F. Fillinger, MD, Lebanon, NH

Objective
Recent reports have raised concern about the percentage of enlarging abdominal aortic aneurysms (AAAs) after endovascular repair with the original Gore Excluder device. As part of the investigation into this issue, a morphologic analysis was performed on enlarging aneurysms in the Excluder Bifurcated Endoprosthesis Pivotal clinical trial.

Methods
Computed tomography (CT) scans were obtained on all patients identified with at least 4-year follow-up and enlarging aneurysm (5 mm increase by Core lab). Data were sent to Medical Metrx Solutions (W Lebanon, NH) for three-dimensional reconstruction, and a set of 24 standard morphologic measurements was performed, as well as analysis of potential enlargement mechanisms.

Results
Thirty patients (30%) were identified with enlarging aneurysms at 4 years postoperativly. For these 30 patients, data were obtained from 130 CT scans (3,120 measurements). The mean interval between scans was 10.6 months. By diameter criteria, 23% demonstrated interval growth from the prior scan, and 45% demonstrated growth relative to the initial scan. By three-dimensional volume (renal artery-aortic bifurcation) however, 56% demonstrated interval growth from the prior scan, and 80% demonstrated growth relative to the initial scan ($p < .0001$ versus diameter, chi-square analysis). On average, enlargement was detected by volume 12.8 months before it was detected by diameter.

Only 20% of scans had apparent endoleak, but lack of delayed-contrast studies may underestimate the true percentage of cases with endoleak. AAAs with apparent endoleak demonstrated a greater interval growth rate, however (4.5 ± 4 versus 2.1 ± 4 mm, $p < .002$). Although the etiology of enlargement may be endotension or device permeability in 80% of cases, other potential causes of aneurysm enlargement included: neck apposition length less than 15 mm (30%); large aortic diameter relative to device (17%); large iliac diameter (13%); and iliac apposition length < 15 mm (20%). There was no significant device migration, neck angulation, or device deformation. Multiple potential etiologies of enlargement were present in 50% of AAAs.

Conclusions
The etiology of aneurysm enlargement with the original Excluder endograft is likely multifactorial, including endoleak, inadequate attachment length, and "endotension" or device permeability. Device migration and deformation did not appear to play a role in the pivotal trial results. Notably, three-dimensional volume criteria detected aneurysm enlargement more frequently and on average 1 year sooner than standard diameter criteria.