Intermittent endoleaks are a potent source of endotension

Endoleaks can be intermittent and these are a potent source of endotension, Geoffrey H White, clinical associate professor of surgery, University of Sydney, Australia, told delegates at the iCON conference in Phoenix, USA. He presented on how to diagnose and manage intermittent endoleaks

Geoffrey White

"We have identified a unique subset of patients who have evidence of an intermittent endoleak on colour duplex ultrasound, and the majority of these endoleaks were not shown on multiple CT scans," White said.

White added that intermittent endoleaks have been noted to be position-dependent, only seen with the patient placed in specific postures.

"Colour duplex ultrasound is now the primary imaging tool for long-term follow-up of abdominal aortic aneurysm endograft patients. The aneurysm sac can be regarded as 'stable' or 'unstable', and signs of instability include graft migration, graft and aneurysm sac pulsatility, echolucent regions in sac thrombus, sac growth and endoleaks. These signs should prompt special positioning of the patient to search for intermittent endoleaks," he advised.

White presented a case of an 80-year-old male where a Talent bifurcated endograft was used to treat a 6cm abdominal aortic aneurysm. Initial CT revealed a small endoleak which was not present at three months. At two year follow-up CT and duplex scan revealed no endoleak and sac size of 4.9cm. At three years follow-up CT scan revealed no endoleak and sac size was 5.8cm. Duplex scan revealed a type 3 endoleak from the right limb and sac size 5.8cm. At three and a half years follow-up the angiogram showed no endoleak, while the duplex scan showed a type 3 endoleak from right limb with sac size 6.1cm. The procedure involved relining the right iliac limb and the outcome was no further endoleak and sac shrinkage.

"We have now identified intermittent and/or positional endoleaks in 20 patients, which represented less than 1% incidence of all EVAR patients scanned with colour duplex ultrasound," White said. There were 45% type 3 endoleaks and 55% type 2 endoleaks. Eighty four per cent of these atypical endoleaks were not shown on other imaging methods including CT and angiography.

Options for managing intermittent type 2 endoleaks include conservative treatment or observation, transvascular embolisation or translumbar coils and glue; and for type 3 endoleaks management includes relining the graft limb, total relining of prior endograft and conservative treatment.

"Varying patient position can unveil endoleaks otherwise masquerading as 'endotension'," White said. "Identifying endoleaks is vital and may enable timely intervention," he concluded.

Is CT to blame for the decline in renal function after EVAR?

Renal function after EVAR deteriorates over one year when follow-up protocol includes contrast enhanced CT, a new study presented at the iCON conference, in Phoenix, USA, has shown

Jan Brunkwall, University of Cologne, Germany, told delegates that open repair patients have stable renal function over one year, and that contrast might be the cause of renal function deterioration in EVAR patients. The aim of study, he said, was to compare renal function during one-year follow-up in open repair patients, who did not have CT scan during follow-up, and in EVAR patients who had CT scans. Patients were followed at one, three, six and 12 months postoperatively.

Creatinine clearance tests with the Crockcroft-Gault formula showed statistically significant difference between EVAR and open repair patients at discharge and at 12 months. At discharge creatinine level was 67.3+/-28ml/min in EVAR patients and 78.5+/-33ml/min for open repair ($p<0.05$). At 12 months, creatinine level was 63.5+/-23ml/min in EVAR patients and 77.4+/-33ml/min for open repair patients ($p<0.01$).

Brunkwall said that tests using the Modification of Diet in Renal Disease (MDRD) formula also showed statistically significant difference at 12 months. Creatinine levels were 63+/-18ml/min for EVAR patients and 76.4+/-28ml/min for open repair patients ($p<0.001$).

In relation to age, Brunkwall presented data showing that patients over 70 years are more at risk of renal function deterioration. In the EVAR group, creatinine levels were 79.9+/-24ml/min for patients under 70 years and 54+/-17ml/min for patients over 70 years. Similar differences were also seen in the open repair group.

Brunkwall told delegates that ultrasound with contrast enhancement is one of the methods that may replace CT. He showed data from the paper 'Contrast-enhanced ultrasound versus computed tomographic angiography for surveillance of endovascular abdominal aortic aneurysm repair', by Ten Bosch et al (*J Vasc Interv Radiol*. 2010 May; 21(5):683-43). The results of this study showed that contrast-enhanced ultrasound demonstrated more endoleaks, predominantly of type II, compared with CT angiography (53% vs. 22% of the cases). "Ultrasound was as accurate as CT angiography in the assessment of maximal aneurysm sac diameters. The interobserver variability for aneurysm size measurement by ultrasound was low, given the interclass correlation coefficients of 0.99 and 0.98," he said.

In conclusion, Brunkwall said that fewer CT scans should be performed in order to preserve renal function. "Ultrasound with contrast enhancement and plain abdominal X-ray may replace CT."

Jan Brunkwall

Progress in EVAR navigation using electromagnetic sensors

Vincenzo Ferrari, Center for Computer Assisted Surgery, University of Pisa, Italy, showed the potentialities of a navigation system for endovascular procedures in an *in vitro* test session at the iCON conference in Phoenix, USA

Vincenzo Ferrari

"This navigator allows overcoming some drawbacks of current endovascular procedures: the need of high radiation dose, angiographic guidance, and difficulties in catheter navigation using only 2D projections," Ferrari said. "Moreover the system could be used to perform innovative endovascular procedures, challenging under fluoroscopic guidance, as the in situ fenestration of endograft."

The system is based on the integration of CT angiographic images (or images obtained with 3D rotational angiograph) and information provided by electromagnetic sensors mounted on the endovascular instruments. Pre-operative volumetric angiographic images are used to generate the 3D model of patient vasculature. "Those images can be acquired in a pre-operative session or using an intra-operative volumetric scanner," Ferrari told delegates.

"The navigator provides the surgeon a 3D virtual scene that allows him/her to perceive the spatial relation between surgical instruments and the 3D vasculature model. An additional window can be added to simulate an endoscopic view, rendered from a virtual camera positioned on the catheter tip. This virtual endoscopic view can be very useful for navigation and to perform in-situ fenestration," Ferrari explained. "We developed a technology to drill the endograft in the right position. Now it is mandatory to study a technology to drill taking into account endograft materials, hopefully with the prosthesis producers' collaboration."

The *in vitro* test session was conducted on ad hoc fabricated anthropomorphic phantom including a patient specific abdominal vasculature model realised using ABS and silicone.