Imaging follow up after EVAR

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Disclosure

Speaker name: Paul Hayes

☐ I have the following potential conflicts of interest to report:
☑ Consulting
☐ Employment in industry
☐ Shareholder in a healthcare company
☐ Owner of a healthcare company
☐ Other(s)
☐ I do not have any potential conflict of interest
Ruptures after endovascular repair explain catch-up in aneurysm-related mortality in UK EVAR trials 10-year follow-up

Tuesday, 14 Dec 2010 15:01
Although modern EVAR devices are better designed, we are pushing them further…

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<th>Anatomical factors</th>
<th>Device factors</th>
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<td>Loss of fixation</td>
<td>Poor device choice</td>
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<td>Angulation</td>
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<td>Iliac issues</td>
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Which means the results are getting worse……

Schanzer et al, Circulation 2011
CT scan – the gold standard

- Accurate diameter measurements
- Possible volume measurements
- Easy to compare older images
- Single modality
- Quick to acquire
CT scan – the gold standard??

- Radiation dose around 10mSV (1000 CXR) Br J Radiol; 1997 to 31mSV (3100 CXR) JAMA; 2009
- Long term effects of repeated IV contrast: renal function fell v open AAA J Endovasc Ther 2008
- Expanding sac – no endoleak
- 2 or 3 phase CT
- Static image – where is leak from?
- Cost of a single CT €180
Duplex ultrasound

- Radiation free technique
- Can be done in the OPD
- Dynamic images showing direction of blood flow
- Contrast non-nephrotoxic
- Information about limb flow
- USS €80
Duplex ultrasound

- Operator and equipment dependent

- Images not easy to compare in the long term (or for teaching/lectures)

- 5-10% of patients poor views (gas/obesity) J Cardiovasc Surg 2011

- Most centres combine this with AXR 1mSV (50 CXR) Br J Radiol 1997

- Rate of migration is very low with modern devices – is an AXR cost-effective?

- USS €80
MRI/MRA

- Relatively time consuming
- OK for nitinol stents but too much artefact with stainless steel
- Not popular with patients
- MRI €380 – most expensive modality
But which is better?

**Duplex & CE USS v CT for the detection of endoleak after EVAR:**
- 21 studies in 2601 patients
- Sensitivity of USS as 0.77
  - but potential false +ve on CT and quality of USS f/u
- CEUS increased sensitivity to 0.98
  
  *Eur J Vasc Endovasc Surg.* 2010

**Endoleak: duplex better than CT at determining need for intervention:**
- True endoleak determined at intervention (n=944 studies)
  - duplex correct 74% of the time
  - CT only 42% (P < .05)
- duplex NPV 99% v CT 98%

*J Vasc Surg.* 2009
But which is better?

Duplex alone is sufficient for midterm EVAR surveillance:
DU and CT were each as likely to
- falsely suggest an endoleak when none existed
- to miss an endoleak. (n=250)


Duplex following EVAR: comparison with CT aorta:
All clinically significant endoleaks seen on CT also detected on DU


Despite all of this most intervene only on increasing sac size
Expanding sacs need to be investigated...
Cost - effectiveness

Long-term cost-effectiveness of EVAR v open repair for AAA based on four randomized clinical trials:

Models based on the results of the EVAR-1, DREAM or ACE trials did not find EVAR to be cost-effective at thresholds used in the UK (up to £30 000 per QALY)


UK costs: USS £45 v CT £129 v MRA £250

NHS tariff 2013

US costs: $525 for USS v $2779 for CT angio

_Vasc Endovascular Surg_. 2003 May-Jun;37(3):165-70
Cost - effectiveness

Duplex alone is sufficient for midterm EVAR surveillance
- Cost savings of $1595 per patient per year by eliminating CT scan surveillance
  

EVAR surveillance may not be necessary for the first 3 years after an initially normal post-operative study
- single early normal CT scan may mean no imaging needed for 3 yrs
  

Imaging modality does not affect rate of asymptomatic secondary interventions following EVAR
- a three-fold reduction in overall costs, with less radiation & contrast
  
  Eur J Vasc Endovasc Surg 2012. 43(3): 276-281
Selective follow up?

Do we need CT at all?
- perhaps for large AAAs a single 30d scan
- high risk for type 1 leak – neck<10mm or angulation >60

Do some high risk patients warrant increased frequency of f/u
- short/angulated necks
- large AAAs (? >7cm)
- signs of ectasia elsewhere
- family history of AAA/those developing AAA at early age

Need to reference scans against original size not just last scan
What do I plan to do…

Device used in IFU, AAA less than 7cm and low SGVI score
- USS at 1, 6 and 12 months
- no AXR
- annual USS unless >5mm sac expansion (then triple phase CT)
- any type 1 leak mandates CT

All others
- CT & USS at 1 month, USS at 6 months, then final CT at 12 months
- no AXR
- if no change in size between 1 & 12 month CTs then annual USS
Thank you
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