Determination of endograft apposition at the early post-EVAR CT scan can predict later failure

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Disclosure

- Co-founder of Endovascular Diagnostics
• Current (CT, duplex, X-ray) post-EVAR FU is focused on complications (endoleaks, AAA growth)

• Slight changes in apposition, aortic neck morphology, and endograft dimensions are missed

• **FU imaging should prevent/predict complications and not only show complications**
Vascular Imaging Analysis (VIA) Software

- Dedicated, validated proprietary software
- 3D coordinates from 3Mensio workstation
Vascular Imaging Analysis (VIA) Software

A. Measure centerline and coordinates on vascular workstation

B. Export mesh, centerline and coordinates

C. Calculate boundaries from mesh, centerline and coordinates
Vascular Imaging Analysis (VIA) Software

D. Calculate neck and apposition surfaces on mesh between boundaries

E. Calculate endograft expansion, tilt, fabric distances and shortest apposition length from proximal fabric boundary
Vascular Imaging Analysis (VIA) Software
1. Introduction & implications
2. Technical validation
Perfect apposition and no change during FU

1 month post-EVAR

18 months post-EVAR
Short neck, good and stable apposition

Pre-EVAR  1 month post-EVAR  12 months post-EVAR
Short neck, loss of apposition at distal end

Pre-EVAR  
1 month post-EVAR  
59 months post-EVAR
Angulated neck, sustainable seal

Pre-EVAR

1 month post-EVAR

18 months post-EVAR
Angulated neck, insufficient seal, endoleak

Pre-EVAR

1 month post-EVAR

13 months post-EVAR
Loss of distal seal during FU
Determination of Endograft Apposition, Position, and Expansion in the Aortic Neck Predicts Type IA Endoleak and Migration After Endovascular Aneurysm Repair

Richte CL Schuurmann, Kim van Noort, Simon P Overeem, Ruben van Veen, Kenneth Ouriel, William D Jordan Jr, Bart E Muhs, Yannick W ’t Mannetje, Michel MPJ Reijnen, Bram Fioole, Çağdaş Ünlü, Peter Brummel, Jean-Paul PM de Vries

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Study design

• Four groups of elective EVAR patients
  o Type IA endoleak \( n = 36 \)
  o Migration (>10 mm) \( n = 9 \)
  o Type II endoleak \( n = 16 \)
  o Controls \( n = 37 \)

• Software analyse
  • endograft dimensions/ aortic neck measurements
    o First post-EVAR CTA (1 month)
    AND
    o CTA scan before complication (type IA & migration); or
    o Late (>1 year) CTA scan (type II & controls)
Study design
Study design

- Preoperative CTA
- First postoperative CTA
- Late CTA
- Complication CTA

Follow-up (months)
1 month CT (no differences)
Apposition length (CT scan *before* complication)
Apposition % neck (CT scan *before* complication)
Endograft expansion (CT scan *before* complication)
AAA sac expansion (CT scan before complication)
Other applications (iliac sealing)
Other applications (post-TEVAR)
A New Methodology to Determine Apposition, Dilatation, and Position of Endografts in the Descending Thoracic Aorta After Endovascular Thoracic Aortic Repair
A New Methodology to Determine Apposition, Dilatation, and Position of Endografts in the Descending Thoracic Aorta After Endovascular Thoracic Aortic Repair
Conclusions

• Detailed determination of position, and apposition of EVAR and TEVAR on regular postoperative CTA scans is feasible with new VIA software.

• Early detection of changes in (T)EVAR apposition may prevent disastrous complications, and enables timely reinterventions.

• Today, a part of the early (T)EVAR morphological changes will be missed with standard CT (reports)
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