Imaging Surveillance of Patients Post-endovascular Abdominal Aortic Aneurysm Repair (EVAR)

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Learning objectives

EVAR presents peri-operative morbidity and mortality lower than those of Open Surgery.

Background

However, long term results are less favourable, with a significant number of complications arising up to 8 years after treatment; so EVAR requires "life-long" imaging surveillance, to assess: aneurysm sac size, that is the most important marker; endoleak detection and characterization; graft morphology, position, patency and infection.

Findings and procedure details

CT-Angiography (CTA) is the most frequently employed method, but it has well-known limits due to ionizing radiation exposure and iodinated contrast medium administration. Follow up during the first year usually consists of CTA at 1-3 and 12 months. If neither endoleak nor aneurysm enlargement is observed, Colour Duplex US (CDU) - supplemented by abdominal radiography - is suggested as an alternative to CTA for annual surveillance (Fig.1). If a type 2 endoleak or other abnormality of concern is demonstrated by early examination, repeated CTA at 6 months is recommended. The presence of a type 2 endoleak should prompt continued CTA follow up to ascertain whether the aneurysm is increasing in size; however, if the sac is shrinking or stable, surveillance with CDU is suggested (Fig.2). A sac enlargement and/or a new endoleak, detected by CDU after prior imaging studies have shown no abnormality, should prompt evaluation by CTA, followed possibly by CEUS and DSA, to characterize an endoleak, identified but not classified by non-invasive modalities (Fig.3).

Images for this section:
**Fig. 1:** FIG.1 Post-EVAR follow up without complications a) CTA after 1 month axial scan: stent-graft is patent; no Endoleak is observed; aneurysmal sac shows maximum AP diameter of 53mm and maximum axial diameter of 51mm. b-c) CTA after 12 months, axial scan (b) and 3DVR reconstruction (c): stent-graft is patent, no endoleak is observed; scarce shrinkage of volume of the sac (AP diameter: 53mm; transverse diameter 50mm; volume 182cc) is visualised. d-e) US (d) and colour-duplex US (e) after 12 months; CTA findings, in particular the maximum diameters (AP 53mm; transverse 48mm) are confirmed.

**Fig. 2:** Fig 2 Post-EVAR follow up with a type II endoleak a-b) CTA after 3 months, axial scans with a cranio-caudal direction: stent-graft is patent; the aneurysmal sac shows maximum diameters of 60x70mm (a); more caudally a posterior type II endoleak (arrow), supplied by a lumbar artery is observed. c) CTA after 6 months, axial scan: the aneurysmal sac shows a slight enlargement (maximum diameters of 63x72mm); endoleak persists (not showed). d) CTA after 12 months, axial scan: the aneurysmal sac shows a slight shrinkage (maximum diameters of 61x72mm); endoleak persists (not showed). e-f) US (e) and CEUS (f) after 12 months, transverse scans: the sac (diameters 61x72mm) (e) are similar to those seen on CTA; CEUS (f) confirms type II posterior endoleak (arrow).
Fig. 3: Fig. 3 Post-EVAR follow up with the appearance of a type II endoleak 2 years after the treatment. a-b) US (a) and CEUS (b) transverse scans: the aneurysmal sac thrombus shows a non homogeneous echo-structure (a), slight anterior leak (b: arrow) is observed. c-d) CTA: the anterior leak is confirmed (c) Inferior Mesenteric Artery (IMA) is patent (d) but is not possible to know if the IMA is a afferent or efferent branch. CEUS (not showed) that was performed in the same time did not add any information. e-f) DSA after super-selective catheterization of the Riolano arch: contrast medium opacifies the left colic artery (e), the IMA trunk and the aneurysmal sac (f: arrow); so DSA demonstrates that the IMA is a afferent branch of the sac.
Conclusion

Finally CDU or non-contrast CT, with volume assessment of aneurysm sac, is recommended for patients with renal failure.

Personal information

References


