MR Imaging improves endoleak detection in patients after endovascular abdominal aneurysm repair

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Introduction:
Endovascular repair for abdominal aortic aneurysm (EVAR) requires life-long postoperative imaging follow-up to detect complications[1]. A clinically relevant complication after EVAR is the occurrence of endoleaks. Endoleak is defined as leakage of blood into the abdominal aortic aneurysm (AAA) sac which may result in aneurysm growth and rupture. The current standard of care for the detection of endoleaks is biphasic CT angiography (CTA). In the first year after EVAR, CTA is performed every 3 months. However, CTA is not always able to detect the endoleak, not even in the presence of continuous aneurysm growth. An additional problem with CT is the lack of dynamic information about possible feeding vessels. Prior work has shown that MRI is more sensitive than CTA for endoleak detection, especially for slow flow and type II endoleaks[2]. Type II endoleaks are endoleaks with a retrograde flow from lumbar arteries or the inferior mesentery artery into the aneurysm sac, which may result in aneurysm growth and rupture. In patients with type II endoleaks and aneurysm growth ≥10mm, treatment is recommended[1]. Besides standard gadolinium contrast agents, albumin-binding agents can be used for MRI examinations, and are presumed to be of increased value in structures with high albumin content such as [2,3]. This work aimed to determine the diagnostic value of gadobenate dimeglumine (Bracco Imaging, Milan, Italy), a contrast agent with 5% albumin binding, for the detection of endoleaks in patients with AAA growth and no or uncertain endoleak on CT angiography.

Material and methods:
Patients after EVAR were included in the period between April and November 2011 if (1) there was continued AAA growth; and (2) no or uncertain endoleak at CTA. Multihance (gadopenate dimeglumine, Bracco, Italy) is a contrast agent with a weak protein interaction, resulting in an almost twofold increase in relaxivity compared with conventional gadolinium chelates without protein interaction[4]. The contrast agent was administered at a dose of 0.15mmol/kg and a flow rate 1.0ml/sec followed by 30 ml saline flush with the same flow rate. All MRI scans were performed on a 1.5-T clinical scanner (Ingenia (R4.2), Philips Healthcare, Best, The Netherlands). A 28-element phased-array body coil was used for signal reception. .The presence of endoleaks was assessed on pre-contrast and post-contrast T1-weighted fat suppressed dual-echo Dixon sequences. The following scan parameters were used: TR/TE1/TE2/α 5.9 ms/1.8 ms/4.0ms/15º; slice thickness 2mm, FOV 450x345mm^2, acquisition matrix 2x2x2mm, and acquisition time of 18 seconds. A regional saturation slab was located on the abdominal wall to prevent breathing artifacts. Post-contrast images were acquired 5 and 15 minutes after contrast administration. Two observers evaluated all MRI examinations in consensus for the presence of endoleaks. Endoleak was defined as high intensity signal inside the aneurysm sac on the post-contrast images not present on the pre-contrast images.

Results
In total, eight patients (median age 76 (IQR 69-85, 7 males) were evaluated. The median interval between EVAR and MRI was 36 months (IQR 13-45). The median aneurysm diameter was 74 mm (IQR 69-94). At CTA there were 6 patients (6/8; 75%) without any discernable endoleak. Two patients (2/8; 25%) had suspected but uncertain endoleak. Endoleaks were present in 8/8 patients (100%) on the post-contrast MRI images. All endoleaks were better visible at MR imaging on late post-contrast images in 6/8 patients (75%) (Figure 1).

Discussion and Conclusion
Our results demonstrate that gadobenate dimeglumine-enhanced MRI is a promising ancillary imaging technique to biphasic CTA in patients with aneurysm growth after EVAR in whom CTA does not detect the presence of endoleak.

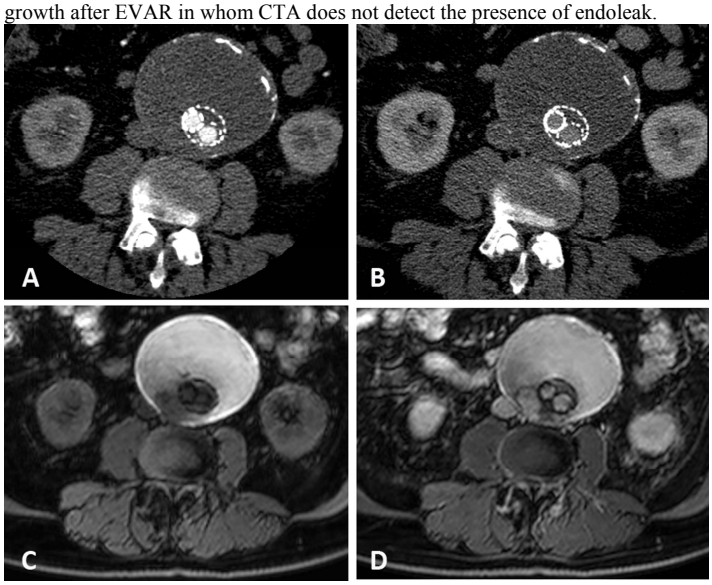

Figure 1
Patient post-EVAR with continued aneurysm growth with no endoleak on arterial phase (A) and late phase (B) CTA, and pre-contrast T1 fat suppressed images (C). The post-contrast T1 fat suppressed images (D) demonstrated a type II endoleak originating from a lumbar artery.

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