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Gadolinium-enhancement of the aneurysm wall in extracranial carotid artery aneurysms.

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ABSTRACT

Background: The natural history and cerebral outcome of extracranial carotid artery aneurysms (ECAAs) are unknown. Gadolinium-enhancement of the aneurysm wall may reflect aneurysm wall inflammation and instability. In this study we investigated the feasibility of ECAA wall imaging and explored a potential relationship of aneurysm wall-enhancement with aneurysm growth and presence of (silent) brain infarcts and WMLs.

Methods: Fourteen conservatively treated patients with fifteen asymptomatic ECAAs underwent gadolinium-enhanced 3T-MRI at two time-points with a 12-month interval. Primary outcome was feasibility of gadolinium-uptake, secondary outcomes were growth of the aneurysm sac (≥2.0mm), presence of (silent) brain infarcts and white matter lesions (WMLs) at baseline and follow-up. MR-images were reviewed by two independent observers and inter- and intraobserver reproducibility was assessed.

Results: Eight (57%) patients were male; median age was 54 years (range 40-66). Eleven ECAAs (73%) were saccular (mean size 10.5mm, range 5.5-38.5) and four were fusiform (mean size 21.5mm, range 10.0-40.0). Eleven aneurysms (69%) exhibited gadolinium-enhancement (Gd+) at baseline. Four aneurysms (27%) showed growth at follow-up imaging, two Gd+ and two Gd- (p=.245). Three patients (20%) had ipsilateral brain infarcts at baseline, one of them showed new silent brain infarcts at follow-up imaging (Gd+). Eight patients (57%) showed bilateral WMLs at baseline. In three patients increased WML severity was observed at follow-up (two Gd+). All observations showed excellent inter- and intraobserver reproducibility.

Conclusions: In this explorative study we demonstrated that ECAA wall-imaging was feasible. Future well powered studies are needed to investigate if ECAA gadolinium-enhancement predicts aneurysm growth and thrombo-embolic complications.

BACKGROUND

The natural history and cerebral outcome of extracranial carotid artery aneurysms (ECAAs) are unknown.

Gadolinium(Gd)-enhanced MRA is supposed as an indicative tool of both vascular wall instability and cerebral lesions.

PURPOSE

Investigate the feasibility of ECAA wall imaging and explore a potential relationship of aneurysm wall-enhancement with aneurysm growth and presence of (silent) brain infarcts and WMLs.

METHODS

- Pilot study of n=15 asymptomatic ECAA patients
- Gd-enhanced 3T MRA at baseline & 1 year after
- Two independent observers
- Pre-defined scoring protocol
  - Diameter (growth ≥2.0mm)
  - Gd-uptake
  - Infarcts + white matter lesions (WML)
- Outcome
  - Feasibility of Gd-uptake
  - Uptake ~ growth & cerebral lesions

RESULTS

Due to one drop-out, 14 patients with 15 ECAAs underwent both MRAs.

Eight (57%) patients were male; median age was 54 y-o (40-66). Twelve ECAA were saccular, and median diameter was 11.5 mm (5.5-41.0).

All MR observations showed excellent intra- and interobserver reproducibility.

- Diameter (ICC) ≥0.965
- Gd-uptake/Infarcts (K) ≥0.913
- WML (wK) ≥0.818

RESULTS

Figure 1. Examples of aneurysm *without* (A,B) and *with* enhancement (C,D).

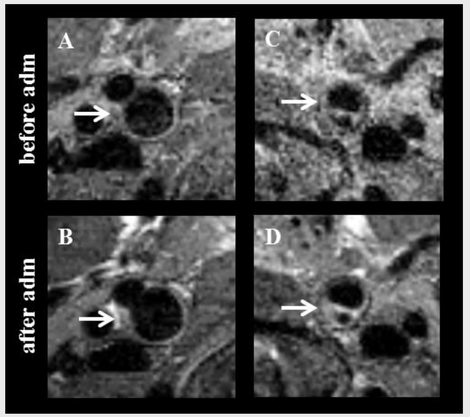
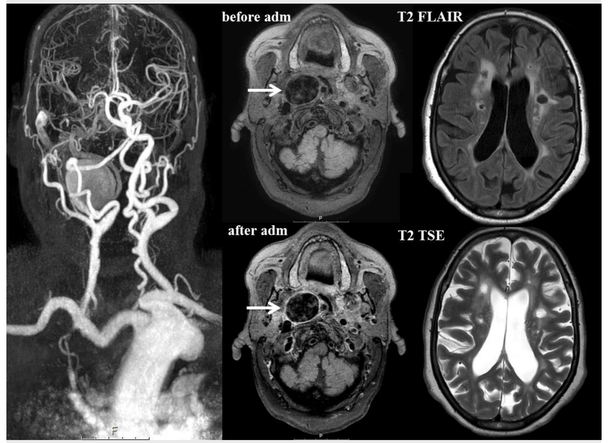


Figure 2. Overview of wall + cerebral imaging.



RESULTS

Gd-enhancement

- Eleven (73%) aneursyms exhibited Gd wall-enhancement at baseline.

Growth of aneurysm

- Four (27%) ECAAs showed growth after 1yr, only two exibited Gd+ (p=0.245).

Infarcts

- Three patients showed infarcts at baseline (2 lacunar, 1 cortical).
- One patient showed bilateral increase in lacunar infarcts (Gd+).

White matter lesions

- 8/14 (57%) showed bilateral WML.
- In three patients increased WML severity was observed at follow-up, two of them were Gd+.

CONCLUSION

- ECAA wall imaging is feasible.
- Well powered studies are needed to explore if ECAA Gd-uptake predicts aneurysm growth and cerebral lesions.

DISCLOSURES

The authors declare to have no disclosures.