

Prospective evaluation of a combined MRI/ MRA protocol in patients with suspected cervical artery dissection

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Introduction:

MR has gained increasing acceptance in the evaluation of patients with suspected cervical artery dissection (CAD). However prospective qualitative or quantitative data about the diagnostic value is not available. Purpose of this study was to assess the diagnostic efficacy of MRI including MRA in the detection of CAD using a comprehensive MR-protocol.

Materials and Methods:

From 6/2003 to 9/2004 69 consecutive patients (39 m, 30 f, mean age 42 years) with clinically suspected CAD were included in the study. MRI was performed at 1.5 T (Gyrosan Intera, Philips) within 24 hrs. using the following parameters: Axial fat-suppressed (FS) T1w-TSE (TR/TE: 550 ms/ 8 ms), axial T2w-TSE (TR/TE: 4000ms/80 ms) and axial contrast enhanced (CE) FS T1w-TSE sequences (referred to as MRI) as well as a CE-MRA (TR/TE/FA: 4.5ms/1.6ms/40°).

Images were assessed by three radiologists in consensus with regard to presence of specific vessel alterations seen on MRI such as mural hematoma and increased external diameter or detected with MRA such as pseudoaneurysm, string or flame sign. Occlusion or vessel stenosis were graded as unspecific signs. To evaluate the visual aspect of an external vessel enlargement quantitative measurements of the suspected vessel as well as the equivalent contralateral vessel segment were performed. Diagnosis of CAD was hypothesized, if any specific sign, undetermined if an unspecific sign and normal if no pathologic sign were present. The definite diagnosis of cervical artery dissection was proven by clinical and radiological follow-up.

Fig.: 1a

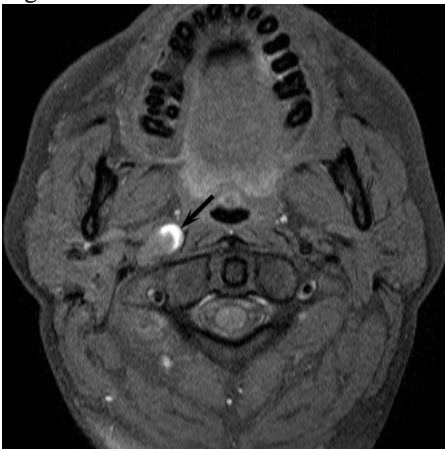


Fig.: 1b

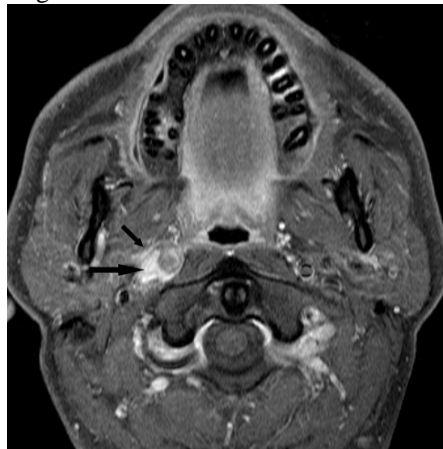


Fig.: 2

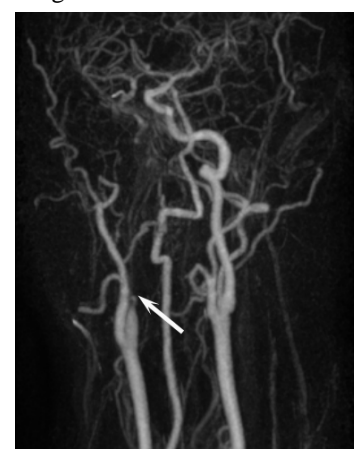


Fig.: 1, 2: Acute right ICA dissection of a 35-year old patient in the distal C1-segment. Unenhanced FS T1w (a) demonstrates a clearly enlarged vessel (compared to the contralateral side) with a hyperintense crescent shaped mural hematoma (arrow). After Gd application (b) enhancement is seen in the thrombus (arrow) as well as perivascularly. Corresponding CE-MRA equally depicts the dissected artery demonstrating a flame shaped occlusion of the proximal C1-segment (white arrow) due to retrograde thrombosis.

Results:

In 26 patients specific vessel alterations could be detected in 14 internal carotid (ICA) and 12 vertebral arteries (VA). Specific signs were detected in 10 patients with MRI and MRA, in 10 patients only with MRI and in 6 patients only with MRA. Measurements in those 20 patients with vessel alterations detected by MRI demonstrated a significant increase in external diameter either in the ICA (8.2 mm vs. 5.1 mm ($p=0.001$)) or the VA (5.3 mm vs. 4.0 mm ($p=0.03$)). 32 patients did not show any evidence of CAD. In this cohort no specific or unspecific signs were seen. In the remaining 11 patients MRI and MRA diagnosed a vessel occlusion, but the etiology remained undetermined. Neither for the series without evidence of cervical artery dissection nor for the undetermined cases a significant difference in vessel diameter was found.

Conclusion:

The presence of a specific sign either in MRI or MRA yields a high positive predictive value in the diagnosis of CAD. The increase of the external vessel diameter is a highly significant sign for an acute dissection. Furthermore, CAD can be excluded confidently in patients with normal imaging findings. Thus, the presented MR-protocol including MRI and MRA is recommended as method of choice in patients with suspected CAD, assessing both vessel-wall pathology and luminal patency.