Intracranial dural arteriovenous fistula: which MR angiography is the best for diagnosis?

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Purpose:

Intracranial dural arteriovenous fistula (DAVF) is an arteriovenous shunting disease of the dura. Intra-arterial digital subtraction angiography (ISDSA) remains the best diagnostic tool for hemodynamic information and anatomical details of DAVF. However, IADSA has a risk because of its nature, intra-arterial procedure. MR angiography (MRA) is a safer alternative method in evaluation of DAVF, but which kind of MRA is the best method in clinical use remains to be established. The purpose of this exhibit is to present the MRAs, including time-of –flight MRA, contrast-enhanced time-resolved MRA and non-contrast MR digital subtraction angiography in diagnosis of DAVF and to understand the limitation and pitfalls of each MRA method.

Outline of contents:

We will explain clinical features of DAVF, consisting of general features of imaging findings, differential diagnosis, pathology, classification and clinical issues.

We will present examples that illustrate the MRA key findings in DAVF in details.

1) In general, conventional TOF-MRA has been a valuable tool for the diagnosis of DAVF with intra venous abnormal signal or dilated abnormal vessels (Fig.1) [1].

2) Though time-resolved contrast enhanced MRA (i.e. MRDSA) was found to have limited value for depicting all of the anatomic details of DAVFs, this technique has been a useful tool in the evaluation of DAVFs because it can directly demonstrate AV shunts (Fig.2) and has improved diagnostic capability [2].

3) Recent advanced technique, non-contrast MR digital subtraction angiography [3] also provides hemodynamic information and demonstrates shunts directly without contrast material (Fig.3).

Limitation and pitfalls for each sequence in detail will be also discussed. For example, TOF-MRA's limitation, lack of hemodynamic information is fatal one because hemodynamic information is needed for the classification of this disease.

We will also discuss the suggestive sequence parameters and imaging option for each MRA in clinical use.

Summary:

This exhibit will demonstrate the various MRA findings in each sequence seen in intracranial DAVF, compared with IADSA images. Although it is difficult for radiologists to reach comprehensive diagnosis with a MRA imaging technique, complementary combination use of two or more MRA techniques will be helpful for diagnosis of DAVF.

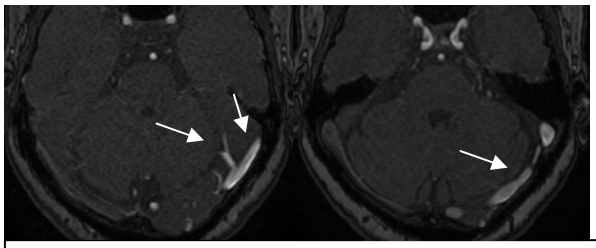

Figure 1. Dural AVF in a 70-year-old woman. The 3D TOF-MRA source image shows hyperintensity in the left transverse sinus and dilated cortical vein (arrows), indicating DAVF.

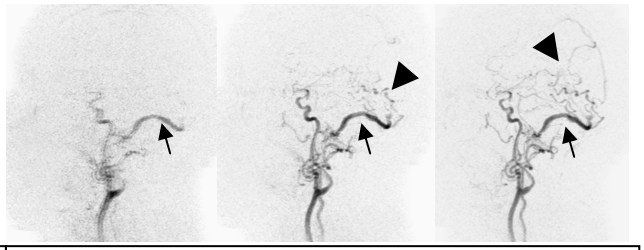

Figure 2. Dural AVF in a 70-year-old woman. Contrast-enhanced MRDSA shows early enhancement of the left transverse sinus (arrow) and cortical vein reflux (arrow head).

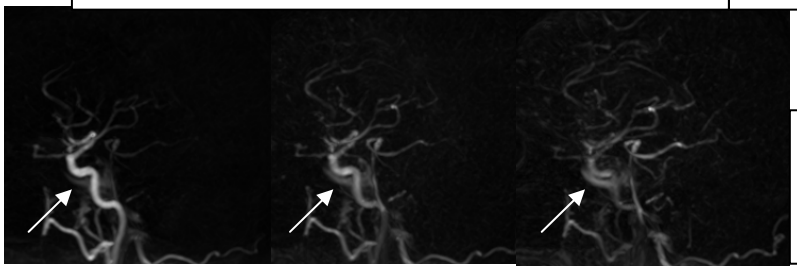

Figure 3. Serial maximum intensity projection images in the sagittal plane of the Time-SLIP MRDSA with 100 msec temporal resolution directly demonstrates early filling within the right cavernous sinus (arrows).

Reference: [1] Kwon Bj, et al. AJNR 2005;26:2500-07. [2] Akiba H, et al. AJNR 2008;29:1652-1657.[3] Hori M, et al. JMRI 2009;30:214-218.