

CORRESPONDENCE

**Pulsatile Tinnitus: Imaging and Differential Diagnosis**

by Prof. Dr. med. Erich Hofmann, Prof. Dr. med. Robert Behr, Prof. Dr. med. Tobias Neumann-Haefelin, Prof. Dr. med. Konrad Schwager in volume 26/2013

**No Indication for DSA Without Prior Ultrasound**

The recommended examination strategy to use imaging studies, including cranial imaging, only after taking a thorough history is certainly to be welcomed.

As the authors state, vascular ultrasonography is an essential part of the workup. One would have liked to read that the cause of the tinnitus can often already be revealed by means of ultrasonography – not only using digital subtraction angiography (DSA). Ultrasonography does not only detect vascular stenoses, arteriovenous fistulae can also be clearly identified using Doppler ultrasonography based on the abnormally increased perfusion of the fistula vessels, provided the shunt volume is sufficiently high. In addition to the routine examination procedure, a targeted investigation of the branches of the external carotid artery, in particular the occipital artery, is performed (1). In case the shunt volume of the fistula is low, ultrasonography will fail to diagnose the condition, but the pulsatile tinnitus will be absent too. Therefore, we can definitely not agree with the statement that a pulsatile tinnitus without detectable cause is an indication for DSA.

Our ultrasonography laboratory has diagnosed dural fistulas in seven patients with pulsatile tinnitus using ultrasound in the first half of this year alone, while MRI and MRA scans were unremarkable in most cases. In some cases, the diagnosis was established in advance by office-based colleagues using ultrasonography and confirmed by us. All imaging results of dural fistula were confirmed by angiography, because DSA is required for the evaluation of venous drainage and therefore for the assessment of the bleeding risk (2). Our concept “DSA only in case of abnormal ultrasound findings“ has proven its benefits over many years and is recognized beyond the service area of our hospital.

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**Prof. Dr. med. Christian Arning**  
Abteilung Neurologie,  
Asklepios Klinik Wandsbek, Hamburg  
c.arning@asklepios.com

**In Reply:**

We would also have liked to write that it is possible to establish the diagnosis of dural arteriovenous fistula—and, above all, to reliably exclude its presence—with minimally invasive diagnostic methods. Several papers demonstrate these efforts to find a non-invasive screening technique (1–3). MRI is insufficient and even MRA often provides only subtle and indirect signs. It is to the credit of our colleague Prof. Arning that all fistulas diagnosed using ultrasonography could be confirmed using DSA. However, he cannot provide information about the sensitivity of ultrasonography. But this would be of interest when looking at a screening method.

An ultrasound scan performed by a skilled practitioner represents a helpful complementary technique prior to DSA, because, if positive, it increases the probability of detecting a fistula. This can help the patient to decide to actually undergo DSA. However, it is not possible to exclude a fistula requiring treatment based on the evidence provided by ultrasonography. As an example, we like to highlight one of our patients, recently diagnosed by us using DSA with a dural fistula from a branch of the ascending pharyngeal artery which caused a pulsatile tinnitus. Doppler ultrasonography was – unsurprisingly – unremarkable. Prof. Arning’s concept “DSA only in case of abnormal ultrasound findings“ gives rise to the critical question, how many fistulas have gone undetected in his department.

Based on the data from the literature and our own experiences, we cannot move away from our recommendation: DSA has unfortunately to remain the gold standard.

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**On behalf of the authors:**

**Prof. Dr. med. Erich Hofmann**  
Klinik für Diagnostische und Interventionelle Neuroradiologie, Klinikum Fulda  
ehofmann.raz@klinikum-fulda.de

**Conflict of interest statement**

The authors of both contributions state that no conflict of interest exists.