



## MASQUERADING TINNITUS- A DURAL AV FISTULA

### Neurology

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### ABSTRACT

Pulsatile tinnitus (PT) is usually an initial symptom of dural arteriovenous fistula (dAVF), although commonly neglected or overlooked if not suspected on initial diagnostic work-up. Here we are presenting a case of pulsatile tinnitus of over a decade duration without any neurological impairment and its complete resolution after embolization with almost complete resolution of tinnitus. Hence, not only otolaryngologists but also neurologists and neurosurgeons should be aware of this entity and meticulously evaluate patients with PT. In almost all cases PT originating from dAVF can be cured with trans-arterial embolization irrespective of its location and its venous drainage pattern.

### KEYWORDS

Pulsatile Tinnitus, Dural Arteriovenous Fistula; Embolization

### INTRODUCTION-

Tinnitus is defined as the ringing sensation inside the ear when there is no source of external sound, which usually is noticed while being in silent surroundings. Broadly there are two types of tinnitus: somatoform tinnitus and sensorineural tinnitus. Somatoform tinnitus can be divided into vascular tinnitus, myogenic tinnitus and patulous Eustachian tube syndrome (1). Pulsatile tinnitus usually originates within a venous blood vessel (2) and is known to be due to non-laminar blood flow via a vessel. It can occur in conjunction with various diseases, including exudative otitis media, anemia, thyrotoxicosis, glomus jugulare, dural arteriovenous fistula (dAVF), skull base tumor and intracranial hypertension (3), dAVF being the most common cause of pulsatile tinnitus resulting from vascular lesions (4).

dAVF is an abnormal connection between the meningeal arteries and veins and commonly occurs in the cavernous sinus, lateral sinus and sigmoid sinus. It accounts for 10-15% of all intracranial vascular malformations with the incidence of dAVF common in the fourth to sixth decade. We performed MRI Brain followed by DSA-Cerebral angiography to diagnose a patient suffering from pulsatile tinnitus and performed embolization for treatment of the patient.

### CASE REPORT

A 54 year-old man was admitted to hospital with insidious onset gradually progressive swooshing, pulsatile sound in the left ear for the past 10 years. Patient had been evaluated in his country for similar complaints and was given vestibular sedatives following which patient had subtle improvement in his complaint. Patient had undergone multiple CT head scans and MRI Brain, which were reported to be normal. Patient was evaluated at our centre for similar complaints. MRI Brain revealed multiple flow voids in left temporal and lower parietal regions on T2 weighted sequences (Figure. 1). MR Venogram revealed multiple tortuous blood vessels consistent with dural arteriovenous fistula in left temporal region (Figure. 2). Patient was subjected to DSA-Cerebral angiography which revealed left dural arteriovenous fistula involving left transverse sinus with cortical venous reflux (Figure. 3). Subsequently, patient had undergone embolization of arterial feeder and the venous feeding vessel. Following the angiographic intervention, patient had complete resolution of the pulsatile tinnitus without any post-procedural neurological deficit.



Figure. 1. Showing flow void in left temporal lobe.



Figure. 2. MR Venogram revealing left dural AV fistula in left temporal region.

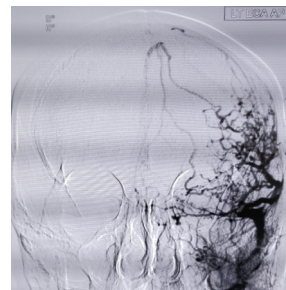


Figure 3. DSA image showing left dural AV fistula (dAVF).

### DISCUSSION

Pulsatile tinnitus is described as the perception of a swooshing sound that beats in synchrony with the heartbeat. It can be subjective or

objective. Plausible mechanism includes turbulences of blood flow in vascular channels. The transverse-sigmoid sinus (70.0%) was the most common site of dAVF that presented solely with PT, followed by the hypoglossal canal (10.0%) and the middle cranial fossa (6.7%) (5). Anatomical proximity of the lesion to the inner ear results in relatively more frequent presentation with PT in dAVFs originating from the transverse and sigmoid sinus compared to dAVFs from other vascular structures (6,7). General approaches for the management of dAVFs include conservative treatment, endovascular intervention, surgery, and radiosurgery. Due to the recent efficacy of endovascular therapy, microsurgical obliteration is often reserved for cases in which endovascular embolization has failed or is not feasible (8). Dural arteriovenous fistulas are classified based on venous drainage (Table - 1)(9).

**Table 1. Borden classification of dural arteriovenous fistula (9).**

Type	Venous Drainage
I	Direct drainage of meningeal arteries to a meningeal vein or dural venous sinus with normal antegrade flow
II	Shunts between the meningeal arteries and dural sinus, with cortical venous reflux into the subarachnoid veins
III	Venous drainage directly into subarachnoid veins (i.e., cortical venous reflux only)

Given that pulsatile tinnitus can be accompanied by serious complications, history-taking and physical examination must be performed in detail, although most of the times physical examination may be normal. Nevertheless, endovascular embolization is recommendable as the initial treatment of choice for these benign types of dAVFs because TFCA carries a relatively low rate of morbidity, and the stable natural history of these dAVFs does not justify the risk of sinus sacrifice. General approaches for the management of dAVFs include conservative treatment, endovascular intervention, surgery, and radiosurgery. Although we preferred embolization via a trans arterial method, the optimal way of endovascular treatment remains controversial. The rates of complete ablation by trans venous embolization have been reported to be 71–100% (10,11).

#### CONCLUSION –

- Pulsatile tinnitus (PT) is usually an initial symptom of dural arteriovenous fistula (dAVF), although commonly neglected or overlooked if not suspected on initial diagnostic work-up.
- In almost all cases PT originating from dAVF can be cured with trans-arterial embolization irrespective of its location and its venous drainage pattern.

#### Abbreviations-

dAVF- Dural arteriovenous fistula; PT- Pulsatile tinnitus

#### REFERENCES-

1. Park SN. Tinnitus: recent treatment. *Res Vestib Sci* 2009;8:108-16.
2. Madani G, Connor SE. Imaging in pulsatile tinnitus. *Clin Radiol* 2009;64:319-28.
- 3) Sismanis A. Pulsatile tinnitus. A 15-year experience. *Am J Otol* 1998; 19:472-7.
4. Waldvogel D, Mattle HP, Sturzenegger M, Schroth G. Pulsatile tin-nitus--a review of 84 patients. *J Neurol* 1998;245:137-42.
5. An YH, Han S, Lee M, Rhee J, Kwon OK, Hwang G, Jung C, Bae YJ, An GS, Lee K,
6. Koo JW, Song JJ. Dural arteriovenous fistula masquerading as pulsatile tinnitus: radiologic assessment and clinical implications. *Sci Rep*. 2016 Nov 4;6:36601. doi: 10.1038/srep36601. PubMed PMID: 27812001; PubMed Central PMCID: PMC5095646.
9. Kiyosue, H. et al. Treatment of intracranial dural arteriovenous fistulas: current strategies based on location and hemodynamics, and alternative techniques of transcatheter embolization. *Radiographics: a review publication of the Radiological Society of North America, Inc* 24, 1637–1653, doi: 10.1148/rg.246045026 (2004).
10. Gandhi, D. et al. Intracranial dural arteriovenous fistulas: classification, imaging findings, and treatment. *AJNR. American journal of neuroradiology* 33, 1007–1013, doi: 10.3174/ajnr.A2798 (2012).
11. Pradilla, G., Coon, A. L., Huang, J. & Tamargo, R. J. Surgical treatment of cranial arteriovenous malformations and dural arteriovenous fistulas. *Neurosurg Clin N Am* 23, 105–122, doi: 10.1016/j.nec.2011.10.002 (2012).
12. Wachter, D., Hans, F., Psychogios, M. N., Knauth, M. & Rohde, V. Microsurgery can cure most intracranial dural arteriovenous
13. fistulae of the sinus and non-sinus type. *Neurosurg Rev* 34, 337–345; discussion 345, doi: 10.1007/s10143-011-0318-5 (2011).
14. Kiyosue, H. et al. Treatment of intracranial dural arteriovenous fistulas: current strategies based on location and hemodynamics, and
15. alternative techniques of transcatheter embolization. *Radiographics: a review publication of the Radiological Society of North America, Inc* 24, 1637–1653, doi: 10.1148/rg.246045026 (2004).
16. Gandhi, D. et al. Intracranial dural arteriovenous fistulas: classification, imaging findings, and treatment. *AJNR. American journal of neuroradiology* 33, 1007–1013, doi: 10.3174/ajnr.A2798 (2012).