The “seagull cry” in a patient with a cerebral arteriovenous malformation

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KEYWORDS

Transcranial Doppler sonography;
Cerebral arteriovenous malformation;
Murmurs.

Abstract *Introduction:* The “seagull cry” is an acoustic phenomenon heard during duplex ultrasound. It is caused by harmonic covibrations of a vessel wall in the presence of high-velocity blood flow. It has been reported in a few cases of cerebrovascular disease, such as severe intracranial stenosis, vasospasm or carotid-cavernous fistula.

Material and methods: A 35-year-old man underwent transcranial color-coded sonography (TCCS) for work-up of a severe new-onset headache.

Results: Doppler spectral analysis of the right intracranial carotid bifurcation revealed multiple pairs of mirror-image parallel strings, and a high-frequency seagull cry was heard. Computed tomography-angiography and magnetic resonance imaging of the brain showed an arteriovenous malformation in the right temporal lobe.

Discussion: The seagull cry is a “musical murmur” with single or multiple frequency that sounds like a musical tone. This is the first report of this phenomenon in a cerebral arteriovenous malformation.

Sommario *Introduzione:* “Il pianto del gabbiano”, fenomeno acustico eccezionale agli ultrasuoni che risulta della covibrazione armonica della parete dei vasi causata dall’incremento della velocità del sangue, è stato descritto raramente nella patologia cerebrovascolare.

Materiali e metodi: Riportiamo il caso clinico di un giovane uomo sofferente di cefalea dovuta a una malformazione cerebrale arterovenosa (MAV) in cui “il pianto del gabbiano” è stato documentato all’eco-color-Doppler transcranico.

Risultati: Il paziente fu sottoposto all’esame eco-color-Doppler transcranico. L’analisi spettrale della biforcazione carotidea intracranica destra mostrava la presenza di multiple stringhe parallele speculari ed era udibile un pianto del gabbiano ad alta frequenza. L’angio-TC e la risonanza magnetica dell’encefalo documentarono una MAV.

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Discussione: Il murmure musicale, noto anche come "pianto del gabbiano", è un murmure con frequenze single o multiple che risuona con un tono musicale. "Il pianto del gabbiano" in una MAV non è stato ancora descritto.

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Introduction

A musical murmur (MM), also called a “seagull cry,” is a murmur with a single or multiple frequency that sounds like a musical tone. Doppler imaging usually reveals mirror-image parallel strings or bands of low to moderate frequency. MMs have been putatively attributed to regular vibrations of a cardiac structure-with or without turbulent flow, to vortex shedding that occurs when blood flows past an obstruction, and to oscillating structures and pressure fluctuations in intracranial cerebral arteries [1–3]. MMs are usually described in the heart. They are seldom mentioned in connection with cerebrovascular disease [4,5]. We report the case of a man who presented with a headache that was caused by a cerebral arteriovenous malformation (cAVM). A seagull cry was clearly heard during the transcranial color-coded sonography (TCCS) examination. To the best of our knowledge, this is the first time this acoustic phenomenon has been described in connection with a cAVM.

Case report

A 35-year-old man underwent noncontrast computed tomography (CT) of the brain for evaluation of severe, new-onset headache. Imaging demonstrated a serpiginous area of mild hyperdensity within the right temporal lobe. TCCS was performed, and Doppler spectral analysis of the right intracranial carotid bifurcation (performed through the transtemporal window) revealed multiple pairs of mirror-image parallel strings (Fig. 1). A high-frequency seagull cry was also heard (audio file on web page). CT angiography (Figs. 2 and 3) and magnetic resonance imaging of the brain (Fig. 4) revealed a cAVM. Lumbar puncture revealed no evidence of subarachnoid hemorrhage. The patient underwent uncomplicated stereotactic radiosurgery and arterial embolization. A repeat angiogram showed a reduction in the size of the cAVM. At the 7-month follow-up, the patient was headache-free.

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Written consent has been obtained from the patient.

Discussion

The seagull cry is a remarkable acoustic phenomenon encountered during duplex ultrasound. It is the result of harmonic covibration of the vessel wall caused by increased blood flow velocity [2]. MMs are seldom heard in patients with cerebrovascular disease, such as severe intracranial stenosis, vasospasm or carotid-cavernous

fistula. Thus far the seagull cry has not been reported in relation to a cAVM.

MMs may be detected with or without simultaneous turbulent flows, or very close to a site of high-intensity frequency turbulent flow (with systolic spindles). MMs are more commonly detected in intracranial vessels than in the extracranial cervical arteries. The latter vessels are characterized by larger lumen diameters, greater intima-media thickness, the presence of soft tissue surrounding the vessel, and higher arterial blood flow, which usually cause randomized rather than harmonic vibrations of the vascular walls [5].

Harmonic covibrations of the vessel wall can occur when blood flows through a markedly narrowed residual lumen.

Figure 1 Transcranial color-coded sonography. Doppler spectral analysis showed mirror-image parallel strings (visual correlates of a musical murmur) at different pulse repetition frequency settings. Spectral image analysis clearly revealed that the murmur consisted largely of harmonics of the fundamental frequency.

Figure 2 CT angiography (maximum intensity projection – coronal reconstruction) revealed a cAVM in the right temporal lobe, which was fed by the middle cerebral artery and drained by superficial veins extending into the superior sagittal sinus.

MMs may also reflect a merely “functional phenomenon” caused by blood flow that is too high for the size of the vessel, such as that occurring during the activation of the anterior communicating artery (intracranial or extracranial carotid artery stenosis). The covibrations are most prominent during systole and/or early diastole of each cardiac cycle, with the typical mirror-image strings on Doppler imaging. MMs may point to a relatively unstable

Figure 3 CT angiography: volume rendering 3D reconstruction (posterior–anterior view).

Figure 4 Axial T2-weighted MRI revealed a tangle of serpiginous flow voids in the right hemisphere.

hemodynamic condition. We agree with Lin et al. [5] that “the presence of MMs in color-coded carotid duplex and TCCS implies severe underlying vascular diseases.” In our opinion, these acoustic phenomena are an indication for further diagnostic studies, i.e., cerebral MRI or CT-angiography, and prompt treatment of the underlying disease.

Conflict of interests

The authors have no conflict of interest to disclose.

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