CASE REPORT

Arteriovenous malformation in the carotid artery bifurcation as a rare cause of syncope: a case report

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Abstract

Background: Arteriovenous malformation (AVM) is defined as a convolute of abnormally connected arteries and veins, where capillary bed is missing. The most common localization of AVM is intracranial. Brain malformations are about 20 times more frequent than extracerebral ones. Clinical signs depend on the localization of the malformation; besides local pain or bleeding, steal phenomenon often can be seen.

Case report: We present a case of a 61-year-old woman, who was admitted to the hospital because of recurrent syncope. During the neurosonologic examination we could see the acceleration of blood flow in the left common carotid artery (133 cm/s), a huge convolute of the vessels in the area of its bifurcation and accelerated, low resistant flow in the origin of external carotid artery with PSV 270 cm/s and low resistance index (0.3–0.4). The changes were seen also in the venous part, with signs of arterial flow there. Magnetic resonance angiography was performed, and confirmed a large malformation in the carotid artery bifurcation (about 8 cm). The patient was sent to endovascular diagnostics and treatment; on digital subtraction angiography, a high-flow malformation of left lingual artery on the left half of the tongue was diagnosed. The selective embolization of the lingual artery by the coils was performed with very good radiologic and clinical outcome.

Conclusions: A thorough neurosonologic examination is important and can raise the suspicion of an arteriovenous malformation, as in this very unusual case.

Keywords: Arteriovenous malformation, Carotid artery bifurcation, Neurosonology, Selective embolization.
Introduction

Arteriovenous malformation (AVM) is defined as a convolute of abnormally connected arteries and veins, where capillary bed is missing. The most common localization of AVM is intracranial. Brain malformations are about 20 times more frequent than extracerebral ones [1, 3].

Clinical signs depend on the localization of the malformation; besides of local pain or bleeding, steal phenomenon can also often be seen [2, 4].

Case report

We present a 61-year-old woman, retired stock-clerk, who was in January 2011 admitted to the Department of Internal Medicine for recurrent syncopes. She complained of dizziness and general weakness several weeks prior to the admission. Her medical history included cholecystectomy and arthroscopy of the knee joint years ago, hypertension for which she had been taking an ACE inhibitor for 7 years, hyperlipidaemia for 5 years (taking Atorvastatine 10 mg per day). Her mother died at 72 years due to stroke. The patient had never smoked and drank minimal alcohol.

On examination: height 1.66 m, weight 75 kg, blood pressure 160/95 mmHg, pulse 76 bpm, otherwise normal physical and neurological findings. Basic laboratory assessment was normal, including thyroid stimulating hormone, full blood count, and coagulation parameters. She had slightly elevated level of cholesterol 5.6 mmol/l (2.9-5.0) and triglyceride 2.02 (0.45-1.7). Investigations performed: normal ECG, chest X-ray, 24-hour ECG monitoring, echocardiography, EEG. The patient was then presented to neurosonologic examination.

When we started the examination on the left common carotid artery (CCA), we could see slight velocity increase with peak-systolic velocity (PSV) 133 cm/s, end-diastolic velocity (EDV) 42 cm/s, and no signs of stenosis. Similar velocity increase was seen also in left the internal carotid artery (ICA) (121/29 cm/s). At the origin of the left external carotid artery (ECA) there was an increase of PSV 212 cm/s and EDV 104 cm/s. About 1 cm distal to the ECA origin there was a huge convolute of vessels mostly with low-resistant flow—resistance index (RI) 0.32 and pulsatility index (PI) 0.39 (Figure 1a, Video 1 and 2). Changes were also seen in the venous part, which had arterialized flow (Figure 1b). Other vessels examined were normal—right CCA, ICA, ECA, bilateral vertebral arteries, and, transcranially, vessels of the circle of Willis.

Magnetic resonance angiography was performed, and showed a large arteriovenous malformation in the left parapharyngeal area, about 8 cm large and fed by the left ECA (Figure 1c and 1d). Digital subtraction angiography demonstrated a high-flow AVM of the left half of the tongue, fed by the left lingual artery, and dilatation of the lingual artery to 6 mm (Figure 1e). Because it was in the tongue, AVM could not be solved by total embolization. Selective partial embolization with coils was performed with very good radiologic outcome (Figure 1f).

One month after (in March 2011), during neurosonologic examination, we could see on left ECA origin a certain flow velocity decrease, with PSV 193 cm/s and EDV 97 cm/s, RI raised from 0.32 to 0.51, flow velocity decrease was seen in left CCA and ICA, and there was a normal, mildly accelerated venous flow in draining vein (50 cm/s).

After 2 years of follow up the patient did not have any other problems, no syncopes, and the neurosonologic finding remains the same as in March 2011. On examination, we can only see dilated veins in the left half of her tongue, which sometimes makes her swallowing difficult and painful (Figure 2).

Videos accessible at http://ijcnmh.arc-publishing.org

Video 1. Convolution of vessels in the origin of left external carotid artery—longitudinal plane.

Video 2. Convolution of vessels in the origin of left external carotid artery—cross-sectional plane.
Figure 1. (a) Accelerated low-resistant flow distal to the origin of left external carotid artery; (b) Arterialized flow in draining vein; (c) Magnetic resonance angiography—Large arteriovenous malformation in the left parapharyngeal area; (d) 3D magnetic resonance angiography—arteriovenous malformation in the left carotid artery bifurcation; (e) Digital subtraction angiography—filling of the left lingual artery; (f) Digital subtraction angiography after embolization—artery nearly eliminated, filling from collaterals.
Arteriovenous malformation in the carotid bifurcation

Discussion

An AVM localized at the carotid artery bifurcation is extremely rare. In this case, the clinical state of the patient is good after endovascular treatment. Neurosonological findings improved, without any further progression in flow velocities. We conclude that the huge AVM in the carotid artery bifurcation could have caused recurrent syncopes by its steal phenomenon, with regard to the hemodynamic changes which were seen in the whole carotid area, although another possible cause of the syncope could be the local pressure and stimulation of the carotid sinus by the AVM [5, 6]. Further follow-up of the patient will be necessary.

Abbreviations

ACE: Angiotensine-converting enzyme; AVM: Arteriovenous malformation; CCA: Common carotid artery; DSA: Digital subtraction angiography; ECA: External carotid artery; EDV: End-diastolic velocity; ICA: Internal carotid artery; PI: Pulsatility index; PSV: Peak-systolic velocity; RI: Resistance index

Competing interests

The authors declare no conflict of interest.

References


Figure 2. Dilated veins in the left half of the tongue—area of arteriovenous malformation.