Symptomatic „Migraine with Aura” Due to Occipital Arteriovenous Malformation or “Headache Attributed to Arteriovenous Malformation (AVM)” Associated with Simple Partial Seizures in an Adolescent Patient – Case Presentation –

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ABSTRACT

Arteriovenous malformations (AVMs) of the brain consist in a network of dilated vessels that form an abnormal communication between the arterial and venous system. The clinical presentation of AVM could be with acute haemorrhagic stroke, due to their rupture or with seizures or recurrent headache.

We present the case of 12 year old male child who was admitted in our clinic for „migraine with visual aura”-like episodes with visual positive phenomena. On cerebral MRI (T1, contrast enhancement) we found a right occipital arterio-venous malformation of 2-3 cm in diameter. The patient was referred to gamma knife stereotactic radiosurgery treatment.

Keywords: arteriovenous malformations, symptomatic migraine, gamma knife
INTRODUCTION

Arteriovenous malformations (AVMs) of the brain are genetically determined errors in brain vasculature development. AVMs consist in a network of dilated vessels that form an abnormal communication between the arterial and venous system.

The clinical presentation of AVM could be with acute haemorrhagic stroke, due to their rupture or with seizures or recurrent headache.

Headache with migraine–like features was reported in patients with arteriovenous malformations, both as migraine without aura and migraine with aura characteristics. Migraine with aura was reported in up to 58 % of women with AVM according to ICHD 3 (1).

CASE REPORT

We present the case of a 12-year-old male child who was admitted in our clinic for „migraine with visual aura”–like episodes. He is a product of a normal pregnancy, with a good intellectual and physical development.

He experienced only visual positive phenomena (scintillating white lights in the left visual hemifield), with very short duration (few seconds), without negative phenomena (without scotoma), followed by right-sided throbbing headache. The symptoms were triggered by physical activity.

The visual phenomena were interpreted as simple partial seizures. Their short duration and lack of associate negative phenomena differentiate them from a typical visual aura. Intertictal EEG revealed posterior temporo-occipital paroxysmal activity.

There was no family history of migraine. The clinical and neurological interictal examination were unremarkable.

The clinical presentation rise suspicion of a secondary headache that differs from a typical migraine by the presence of short duration positive visual phenomena only on the left half of visual field, without scotoma and hemicranias always on the right side – suggesting a structural lesion in the right occipital lobe.

On cerebral MRI (T1, contrast enhancement) found a right occipital arterio-venous malformation of 2-3 cm in diameter (Figure 1).

The digital subtraction arteriography confirmed AVM diagnostic, disclosed 2 feeding arteries from right posterior cerebral artery and draining veins directed to superior sagittal sinus and to straight sinus.

Stereotactic radiosurgery is an effective treatment strategy for selected group of patients with cerebral arteriovenous malformations (AVMs) (2).

The patient was referred to gamma knife stereotactic radiosurgery treatment. The cerebral MRI was repeated 1 year after gamma knife (Figure 2 a, b). There is a reduction in size of the AVM, but vascular trajects are still visible in the right occipital lobe. The AVM is surrounded by perilesional glisis secondary to the gamma knife procedure.

EEG after the intervention revealed the lack of paroxysmal discharges.

Post-interventional evolution was favorable. Headache disappeared after the occipital AVM treatment (3). Also, visual phenomena ceases after 1 year.

DISCUSSION

In large AVM series, presenting features frequently included epilepsy or focal deficits with or without haemorrhage and, much more rarely, migraine-like symptoms.

In this case is difficult to differentiate a secondary headache (Headache attributed to ar-

FIGURE 1. The image rise the suspicion of AVM - inhomogeneous signal void on T1 weighted sequences, a tangle of dilated serpiginous vessels were present in right temporo-occipital region (red arrow). The digital subtraction arteriography confirmed AVM diagnostic.
teriovenous malformation (AVM) and associated with simple partial seizures) or a primary headache (migraine with aura triggered by the presence of AVM – symptomatic migraine) or the coexistence of both entities in the case of this young adolescent.

We have arguments to sustain the diagnosis of Headache attributed to arteriovenous malformation (AVM), according to the International Classification of Headache Disorders, 3rd edition. An arteriovenous malformation (AVM) has been diagnosed. Causality was demonstrated by the fact that headache has developed in close temporal relation to other symptoms of AVM (simple partial seizures) and the headache has led to the discovery of an AVM, also headache improved in parallel with improvement of the AVM after the treatment. More than this, headache is localized at the site of AVM (right side).

On the other hand, the presence of AVM can cause attacks of migraine with aura (symptomatic migraine). The aura is the complex of neurological symptoms that occurs usually before the headache. Visual aura is the most common type of aura, occurring in over 90% of patients of migraine with aura. Typical visual aura often presents as a fortification spectrum: a zigzag figure with a scintillating edge that may spread from one side and is followed by a scotoma.

In our case, because he experienced only visual positive phenomena (scintillating white lights in the left visual hemifield) and no negative (scotoma), and the duration was very short duration (seconds) these could be interpreted as simple partial seizures.

Among the cortical locations, occipital AVMs had the lowest rate of seizure presentation (21.5%, P = 0.0012) (4). Lamotrigine was recommended (50 mg x2/day, for 2 years), with simple partial seizures remission and disappearance of interictal paroxysmal EEG activity. Perilesional gliosis secondary to the gamma knife procedure could also be responsible for the few post-interventional seizures, but after 1 year the visual phenomenon ceased.

Also, lamotrigine is the drug of choice for treatment of visual auras (5).

We cannot exclude that these visual symptoms are in fact visual auras, because in children and adolescents visual auras are less typical and because the visual symptoms are followed by headache.

\[ \text{FIGURE 2. Cerebral MRI-T2 (Figure 2a) and FLAIR (Figure 2b), 1 year after gamma knife. There is a reduction in size of the AVM, but vascular tracts are still visible (red arrow) in the right occipital lobe. The AVM is surrounded by perilesional gliosis (blue arrow) secondary to the gamma knife procedure.} \]
The underlying mechanism of visual aura is cortical spreading depression of Leao, regional cerebral blood flow is decreased in the occipital cortex, above the ischaemic threshold. Blood flow reduction starts posteriorly and spreads gradually anteriorly. After 1 to several hours, gradual transition into hyperaemia occurs in the same region.

The occipital location of AVM may be linked to cortical spreading depression – a key factor in migraine with aura pathogeny (6, 7). There are haemodynamic modifications in arteriovenous shunt that could determine either isch-emic (due to „steal” phenomenon) or haemorrhagic (due to sudden high blood pressure) events in the proximity of AVM. In the environment of an occipital AVM, these events could trigger cortical spreading depression.

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REFERENCES