

CASE REPORT

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Hemorrhagic stroke as a rare complication of a migraine without aura

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Abstract

Background: Migraine is a chronic neurological disorder, characterized by recurrent headache attacks featuring specific clinical characteristics. Two-thirds of the migraineurs are women. It takes the second place among the world's causes of disability, and is one of the leading causes for direct and indirect government expenses. Migraine is well known to be associated with cerebrovascular diseases, in particular with stroke. Due to the recent studies, the risk of hemorrhagic stroke (HS) is 50% higher in between migraineurs in comparison to non-migraineurs, whereas only one study showed association of migraine without aura (MwtA) with increased HS incidence.

Case presentation: We present a case of 57-year-old White woman, who is a 20-year migraine sufferer admitted to the hospital with the signs of migraineous stroke. Upon evaluation after she had contrast enhancing brain magnetic resonance imaging (MRI), she was diagnosed with a neoplasm accompanied by a hemorrhage. However, the following magnetic resonance spectroscopy (MRS) as well as repeated contrast MRI did not prove the diagnosis. The patient was treated for 10 days, and discharged with complete clinical improvement.

Conclusion: The presented case highlights the importance of the accurate evaluation of the patients, suspicious of complicated migraine, even though suffering from MwtA, having no comorbidities and absent family history of cerebrovascular diseases.

Background

Being one of the most spread neurological disorders, and one of the leading neurological disabling disease, migraine has been the matter of interest for researches for the last several decades. Migraine is known to have a female predominance with the twofold risk of a stroke among active migraine sufferers [1–3]. The pathophysiology of the migraine is still disputable. Although, it is considered to involve the trigeminalvascular system, which comprises trigeminal nerve and its axonal projections to the intracranial vasculature [4]. The key factor for understanding the pathophysiological mechanism of a migraine and for the development of pathogenetic therapies was finding of signaling molecules, which take part in a migraine attack facilitation [5]. Nevertheless, there

is no confident data upon the incidence rate of migraine associated with HS, there are still some studies resultant for revealing mechanisms possibly responsible for a HS as a complication of a migraine. Following this, new research is needed to look for more data upon shared mechanisms for migraine and HS, as well as risk factors and preventive treatment for migraine associated HS.

Case presentation

A 57-year-old White woman admitted to the hospital accompanied by her daughter complaining of the severe headache and behavioral changes during the last 4 days. The patient reports of suffering from severe MwtA for more than 20 years. She was diagnosed with an episodic migraine without aura according to the International Headache Society criteria, on the second year of the disease. The patient underwent a head MRI, but by the time of the present admission, she did not have the results. Usually, her migraine attacks are severe with vomiting,

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phonophobia and lasting period of maximum 72 h, MIDAS grade IV (47 score). She takes zolmitriptan 5 mg together with 2 ml of metoclopramide intramuscular injection to treat a migraine attack, which used to bring a relief. Four days before the admission she complained of having another migraine attack, followed by two time vomiting and phonophobia. The migraine attack onset was quite usual for her, without any preceding provocative factors or head trauma. The headache was described as a unilateral, left-sided, pulsating character, worsening with the physical activity and in the presence of loud sound and bright light, evaluated as 8 scores by VAS. She unsuccessfully tried to treat this attack using her regular medications. The relatives of the patient decided to refer her to the doctor 2 days after the headache onset, when they mentioned the signs of sensory aphasia and personality changes in terms of unusually prolonged headache attack. Upon the evaluation, the patient was hardly reachable for a verbal contact because of the severity of the headache, she was notable to have signs of sensory aphasia and phonophobia, the deep tendon reflexes were symmetrically exaggerated, there were no signs of paresis or other focal neurological deficit. The fundoscopy was not performed. General blood analysis was unremarkable HGB 135 g/l, RBC $4.28 \times 10^{12}/l$, PLT $192 \times 10^3/\mu l$, total leukocyte count of $6.7 \times 10^9/l$, except for elevated ESR 38 mm/h. The patient underwent also biochemical analysis of the blood which did not reveal any abnormal values (glucose 7 mmol/l, total cholesterol level 225 mg/dl, AST 23 U/L, ALT 21 U/l, creatinine 0.62 mg/dl, total bilirubin

22 $\mu\text{mol/l}$). She has no history of family cerebrovascular diseases, no history of any other comorbid diseases. The patient's daughter denied any consumption of the psychotropic substances by her mother, taking any regular medication, as well as any other medication during the migraine attack, except for zolmitriptan and metoclopramide. A brain MRI scan, performed on Philips Achieva 3.0T, India, was significant for revealing intraparenchymal hemorrhage in the left temporal lobe, with perifocal edema and two subdural hematomas in frontal and temporal regions on the left (Fig. 1).

Computed tomography angiography (CTA), performed on Siemens, Somatom Sensation 16, did not reveal any aneurysmatic dilatations vascular malformations (Fig. 2).

The patient was suspicious for having either primary or secondary neoplastic lesion of the left temporal lobe with consequent hemorrhage in it. She was referred to the neurosurgeon, where she was prescribed to take dexamethasone 4 mg once per day and regular hemorrhagic stroke treatment until getting the control contrast enhancing MRI scan and spectroscopy. She was discharged without any clinical symptoms in 10 days. Control brain MRI scan (Philips Achieva 3.0T), which was performed in 2 weeks (Fig. 3) revealed decrease in size of the intraparenchymal hemorrhage, complete involution of the subdural hematomas. MR spectroscopy did not prove the diagnosis of a neoplasm.

Based on patient's medical history, the results of clinical, laboratory and neuroimaging studies, the diagnosis of a complicated migraine was made. The

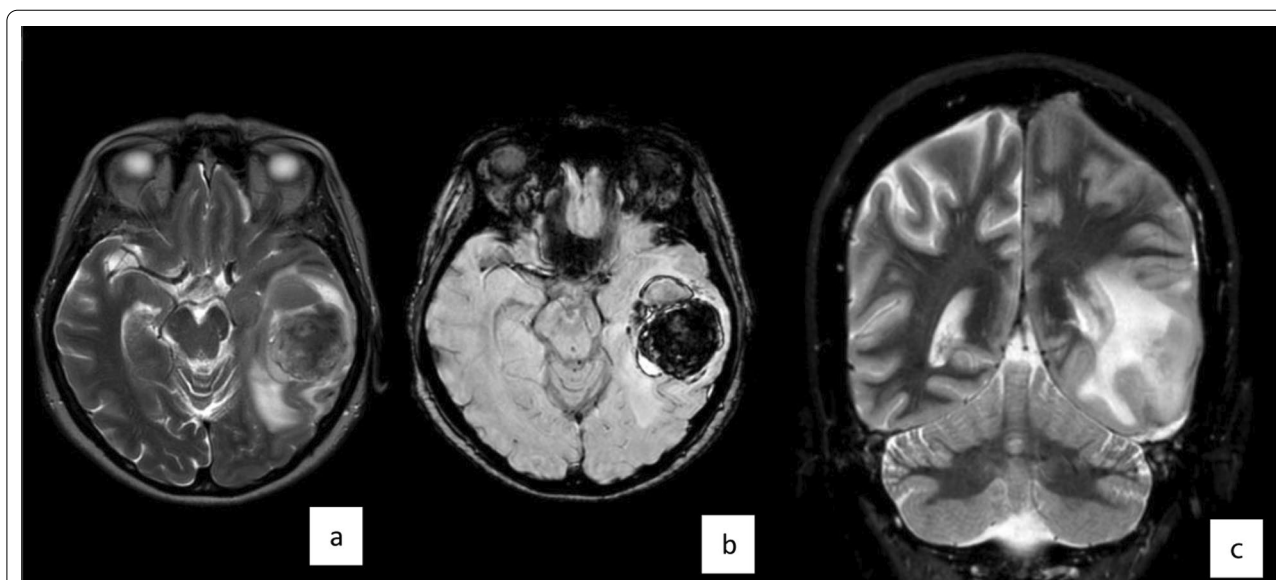


Fig. 1 The non-enhancing brain MRI: **a** axial T2 showed isointense of the left temporal lobe surrounded by hyperintense edema and medium structures dislocation; **b** axial SWI showed hypointense lesion in the left temporal lobe; **c** coronal T2 showed two subdural hematomas, left hemisphere edema

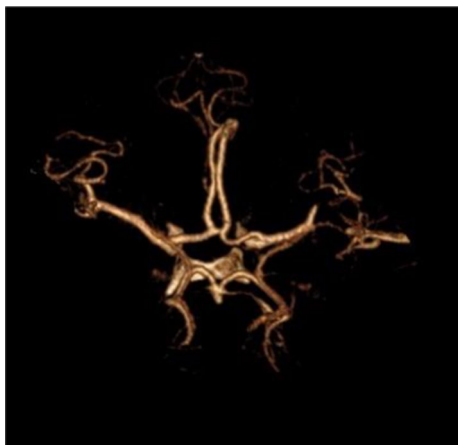


Fig. 2 The contrast filling defect was found in the left M2 segment

patient was prescribed candesartan 4 mg/day with the weekly increase of dosage for 4 mg up to 16 mg/day, with both blood pressure control and migraine prophylaxis aim. On the follow-up visit in 3 weeks, the patient was without any signs of neurological deficit presence, the blood pressure controlled at the level of 110/70 mm/Hg. None of the adverse effects were present. The consent for participation and publication of the study was received from the patient. The study was approved by the local ethics committee.

Discussion

Migraine is a neurological disorder which is characterized by the recurrent episodes of headache [6] moderate-to-severe, with unilateral predominance, photo- or

phonophobia, nausea or vomiting, and exaggeration from physical activities. When there is any somatosensory symptom present before the migraine attack, this is called a migraine with aura (MwA) [7]. There is also a complicated and simple migraine. A migraine attack followed by a stroke received the name of complicated migraine. A number of researches on the connection of migraine and cerebrovascular disease and migraine and stroke, did not reveal consistent results [1, 3, 8–10]. However, the next two cohort studies [11, 12] showed an association between MwA and HS, and one of them showed an association between MwA and HS [11]. In the cohort prospective study of Kurth and colleagues, they found that women with active MwA had no increased risk for a hemorrhagic stroke [12]. A big nationwide, population-based cohort study of a Danish group of investigators revealed an increased risk among the patients with migraine for any cerebrovascular pathology, including HS. And in contrast to the results of the previous study, it was stated that the women suffering from the MwA have also higher risk for a HS [13]. Another study performed in Denmark among the migraineurs, showed a higher risk for cerebrovascular events among the migraineurs being treated with the triptans [14]. In one of the latter studies on the mechanisms and risk factors for association of a migraine and stroke by Hassan and colleagues they mentioned several shared mechanisms for strokes in migraineurs. The first one is based on the combination of decrease of progenitor endothelial cells quantity circulation together with vessel wall changes [15]. The second one is a hypertension, hyperlipidemia and

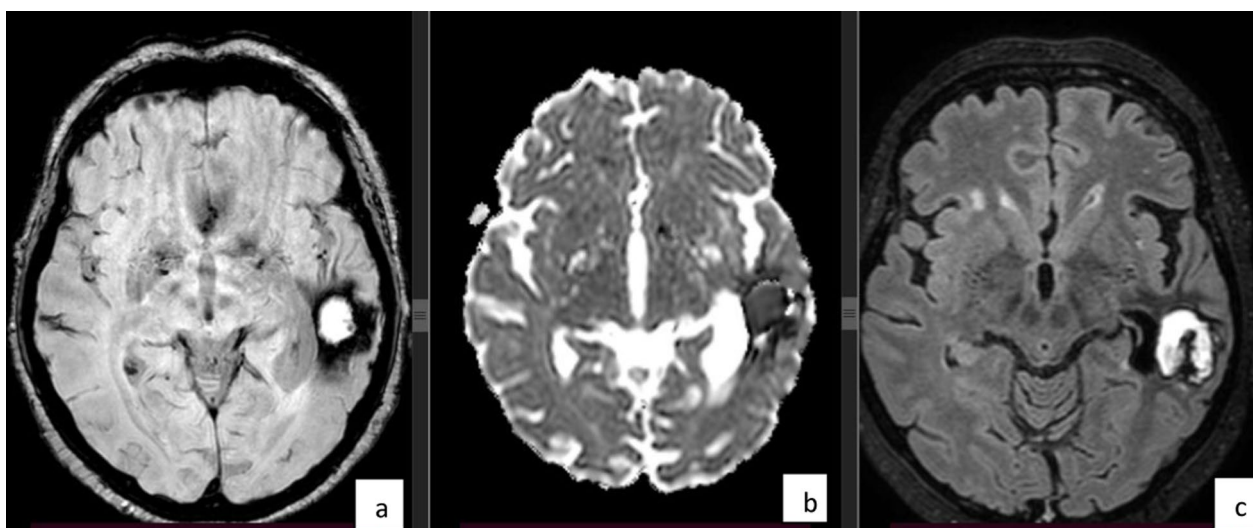


Fig. 3 **a** Axial SWI suggestive of left temporal HS with the signs of blood fragmentation. **b** Axial ADC maps show reduced values consistent with late subacute phase. **c** FLAIR shows a hyperintensive focus in the left temporal subcortical area with perifocal edema

platelet dysfunction [16]. The third one is based on the NSAIDs overuse during migraine attacks, which leads to antithrombotic effect [17].

However, our patient does not have any comorbid states, she does not take NSAIDs during her migraine attacks and moreover, she has a MwtA. Unfortunately, the patient did not undergo a head CT or fundoscopy, as well as genetic analysis for CADASIL or any other genetic cerebrovascular disease. However, the performed MRI and spectroscopy were helpful in excluding the differential diagnosis of neoplasm or secondary lesion. One of the most well known risk factors for HS is hypertension [18–20]. And although, our patient was not suffering from hypertension, migraine attacks are known to be followed by an increased blood pressure [21], which by itself or in the combination with other risk factors, such as a triptan intake, could lead to a HS in this case. Since the patient does not have vascular malformation, and the intraparenchymal hemorrhage size greatly decreased on the control brain MRI, as well as the absence of neurological symptoms, no surgical treatment is needed. The patient is supposed to continue taking migraine prophylactic treatment to control the blood pressure and migraine attacks. She expects no further complications of this event, as well as recurrent HS.

Conclusion

Our case is important for indicating the possibility of connection between MwtA and HS, which could play an important role in prevention of such a complication of the migraine as a HS. However, the relatively low number of migraine-related HS and attributable risk should caution against definitive conclusions and requires further confirmation of these observations. It also underlines the importance of knowing of the possibility of occurrence of HS in patients suffering from MwtA.

Abbreviations

HS: Hemorrhagic stroke; MwtA: Migraine without aura; MIDAS: The Migraine Disability Assessment Test; MRI: Magnetic resonance imaging; CTA: Computed tomography angiography; SWI: Susceptibility weighted imaging; MwtA: Migraine with aura; NSAID: Non-steroidal anti-inflammatory drugs.

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Author contributions

TS, IS contributed to the study conception and design; IH, TS made analysis and interpretation of the data; TS, AS contributed to draft manuscript preparation; AS, IS, IH made critical revision of the article. All authors reviewed the results and approved the final version of the manuscript.

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Availability of data and materials

Available on a reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the local ethics committee. The name of the head of the ethics committee D. Koshyk. The date of the protocol approval is 04.06.22.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Competing interests

The authors declare no competing interests.

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