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Case report

Cryptogenic postpartum stroke

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ABSTRACT

An estimated 25–40% of ischemic strokes are classified as cryptogenic, which means the cause of the cerebral infarction remains unidentified. One of the potential pathomechanisms – especially among young patients with no cardiovascular risk factors – is paradoxical embolism through a patent foramen ovale. Pregnancy, cesarean delivery and the postpartum period are associated with an increased risk of cerebrovascular events. Factors that may contribute to ischemic strokes during gestation and puerperium include classic cardiovascular risk factors, changes in hemostaseology/hemodynamics, and pregnancy-specific disorders such as pre-eclampsia, eclampsia, postpartum cerebral angiopathy or peripartum cardiomyopathy. In this case report, we present a 36-year-old thrombolysis candidate undergoing mechanical thrombectomy 3 weeks after a cesarean section due to HELLP-syndrome. After evaluation of anamnestic and diagnostic parameters, closure of the patent foramen ovale has been performed. In the absence of specific guidelines, diagnostic work-up for cryptogenic stroke should be oriented after the suspected pathomechanism based on patient history and clinical picture. As long as definite evidences emerge, management of cryptogenic stroke patients with pathogenic right-to-left shunt remains individual based on the mutual decision of the patient and the multidisciplinary medical team.

1. Introduction

An estimated 25–40% of ischemic strokes are classified as cryptogenic, which means the cause of the cerebral infarction remains unidentified [1]. Potential etiologies include paroxysmal atrial fibrillation, patent foramen ovale (PFO), atherosclerotic plaques of the aortic arch, congenital and acquired prothrombotic states, etc. [2]. Pregnancy, cesarean delivery and the postpartum period are associated with an increased risk of cerebrovascular events, especially in the first 6 weeks after childbirth [3,4]. Factors that may contribute to ischemic strokes during gestation and puerperium can be classified as conventional cardiovascular risk factors, aspecific changes in hemostaseology/hemodynamics, and pregnancy-specific disorders such as pre-eclampsia, eclampsia, postpartum cerebral angiopathy or peripartum cardiomyopathy [5].

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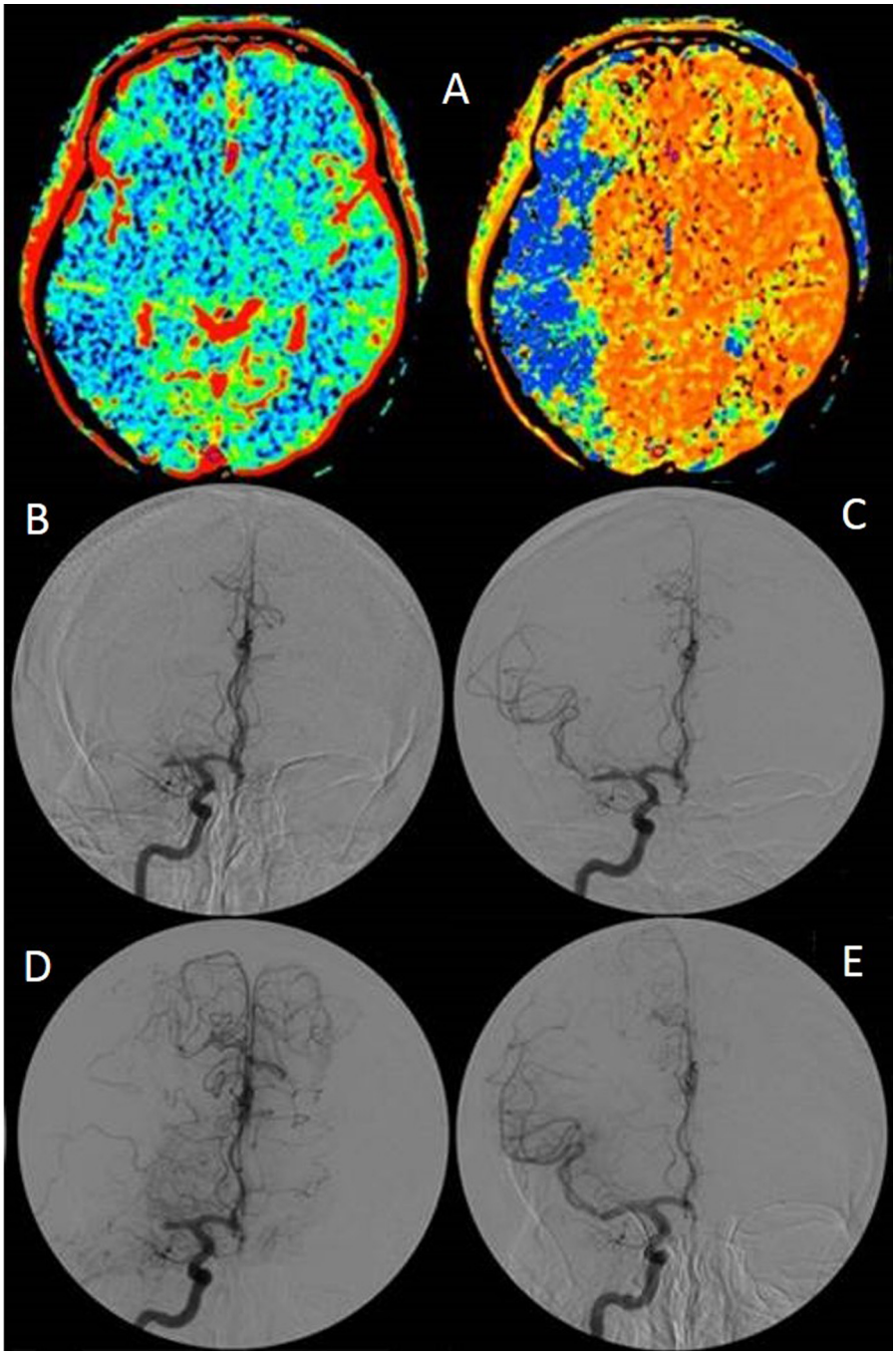

Fig. 1 – (A) Perfusion CT images showing a significant cerebral blood volume-mean transit time mismatch in the right middle cerebral artery (MCA) M1 field. (B) Angiography before intervention confirming the occlusion of the right MCA stem. (C, D) Consecutive incomplete stent retriever thrombectomies resulted in early reocclusion. (E) Angiography after microstent deployment in the right MCA M1 segment.

2. Case presentation

A 36-year-old female patient was admitted to our facility with left-sided weakness developing on the toilet 2.5 h earlier. She had a history of HELLP-syndrome (severe, potentially life-threatening complication of pre-eclampsia with hemolysis, elevated liver enzymes and low platelet count) necessitating acute cesarean section during the 29th week of her pregnancy, 3 weeks before her present admission. Neurological examination revealed right-sided conjugated gaze deviation, left-sided hemiplegia, homonymous hemianopsia and neglect syndrome (National Institute of Health Stroke Scale [NIHSS]: 22 points). CT scan of the brain including CT angiography and perfusion images showed an occlusion of the right middle cerebral artery (MCA) M1 segment with significant perfusion mismatch (Fig. 1A). Due to the recent cesarean section, systemic thrombolysis was withheld and mechanical thrombectomy

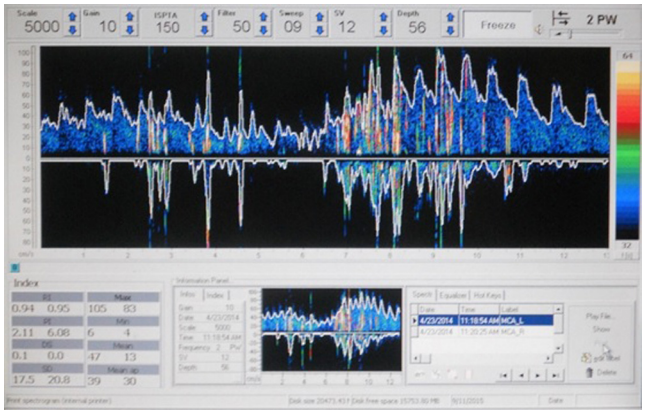

Fig. 2 – Contrast-enhanced transcranial Doppler demonstrating numerous high intensity transient signals (HITS) during Valsalva maneuver.

was considered. Pre-interventional diagnostic angiography confirmed the occlusion of the right MCA stem (Fig. 1B). Since consecutive incomplete stent retriever thrombectomies resulted in early reocclusion (Fig. 1C, D), a microstent has been deployed in the right MCA M1 segment (Fig. 1E). Control angiography presented patent distal lenticulostriatal perforators, however parieto-temporal branches remained occluded. 24 h after intervention, neurological symptoms improved rapidly with only moderate left-sided hemiparesis persisting (24 h NIHSS: 9 points). Control CT scans of the brain showed parenchymal hypodensity in the parieto-temporal region of the right MCA field confirming the vessel status seen in the angiographic images. Based on anamnestic parameters (absence of classic cardiovascular risk factors, HELLP-syndrome, cesarean delivery), negative carotid duplex ultrasound/cardiological findings and symptoms occurring on the toilet (presumably during Valsalva maneuver), paradoxical embolization through a right-to-left shunt (RLS) was assumed as the etiology of stroke. Therefore, contrast-enhanced transcranial Doppler (c-TCD) was performed demonstrating numerous high intensity transient signals (HITS) during Valsalva maneuver (Fig. 2). The presence of the PFO was then verified by transesophageal echocardiography. Because of the stented right MCA, dual antiplatelet medication with aspirin and clopidogrel was initiated for the next 3 months followed by anti-platelet monotherapy. After 3 months of rehabilitation the patient was discharged with a modified Rankin Score (mRS) 1. Hematological investigation revealed no hereditary thrombophilia. Corfirming the presence of the RLS along with the above-mentioned precipitating factors and considering paradoxical embolization as the etiology of stroke, closure of the PFO was settled after cardiologist and patient consultation. Post-interventional c-TCD showed no HITS verifying the termination of the pre-existing RLS.

3. Discussion

A 25% prevalence of PFO in the general population and 40% among cryptogenic stroke (CS) patients implies a causal relationship [6]. The lately introduced RoPE-score (RoPE: Risk of Paradoxical Embolism) was designed to stratify CS patients after the probability of PFO pathogenicity: obtaining a score between 0 and 10 with analyzing six variables (age, history of conventional cardiovascular risk factors [hypertension, diabetes, previous stroke/TIA, smoking], and cortical infarct on imaging), higher points refer to higher PFO-relation [7]. In our case, a calculated RoPE-score of 9, patient history (Valsalva-maneuver at symptom onset, pregnancy-related precipitating factors), and verified presence of a PFO justified the theory of a PFO-related paradoxical embolism. Whether CS patients with pathogenic PFO should be treated pharmacologically or should undergo PFO closure, is still a matter of debate. Recent randomized trials have failed to show significant benefits comparing the two therapeutic regimens [8–10]. However, results should be interpreted cautiously due to the lack of stroke-etiology-based patient selection, low event rates and variousness in medical therapy.

4. Conclusion

The postpartum period is associated with increased stroke prevalence. Since these patients are often young and devoid of any classic cardiovascular risk factors, less common causes of stroke may have to be taken into account. In the absence of specific guidelines, diagnostic work-up for CS should be oriented after the suspected pathomechanism based on patient history and clinical picture. As long as definite evidences emerge, management of CS patients with pathogenic PFO remains individual based on the mutual decision of the patient and the multidisciplinary medical team.

Conflict of interest

None declared.

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None declared.

Ethics

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; Uniform Requirements for manuscripts submitted to Biomedical journals.

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