

Posterior Reversible Encephalopathy after Scorpion Envenomation, Two Cases with Review of the Literature

Samira Tadsaoui^{1*}, A. Nouri¹, S. Faiz¹, I. Zouita¹, D. Basraoui¹, H. Jalal¹

Radiology Department, Mother and Child Hospital, CHU Mohammed VI, Marrakech, Morocco

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*Corresponding author: Samira Tadsaoui

Radiology Department, Mother and Child Hospital, CHU Mohammed VI, Marrakech, Morocco

Abstract

Case Report

Posterior reversible encephalopathy (PRES) is a clinico radiological syndrome, which manifests itself by headaches, confusion, consciousness disorders or during a sudden rise in blood pressure but can be seen in other circumstances, such as during an immune reaction or a systemic infection. Its mechanism is explained by a lesion of the blood-brain barrier leading to a reversible vasogenic edema. The scarcity of sympathetic innervation of the posterior cerebral territories explains its usual localization. We report two cases of a 5 and 18 years old girl who presented with tonic-clonic seizures following a scorpion bite. An emergency brain MRI was performed, showing bilateral signal abnormalities of the posterior cortico-subcortical territories and basal ganglia, compatible with an atypical PRES syndrome. The diagnosis of PRES syndrome complicating a scorpion bite was retained.

Keyword: PRES syndrome, MRI, posterior localization.

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INTRODUCTION

Scorpion sting envenomation is a real public health problem in Morocco since it is the leading cause of poisoning according to studies by the Moroccan poison center. Neurotoxic and cardio-respiratory effects dominate the symptomatology and determine the severity of the clinical manifestations of scorpion envenomation. Posterior reversible encephalopathy syndrome, also known by the acronym PRES, is a radioclinical entity combining reversible central nervous system involvement with typical MRI or CT brain imaging. There is a great variability in the clinical presentation of this syndrome and imaging aspects are sometimes atypical. Management may therefore be delayed by diagnostic error or misdiagnosis. The diagnosis must be evoked on the basis of clinical circumstances and then confirmed by imaging [1].

OBSERVATION 1

This is a 5-year-old patient, living in a rural region near Marrakech, with no medical history,

admitted to intensive care for disorders of consciousness complicated by convulsive attacks following a scorpion sting. On admission, the Glasgow score was 10 with no focal signs and a blood pressure of 140/9 mmHg.

An emergency brain MRI was performed (Fig-1), showing bilateral and grossly symmetrical cortical-subcortical signal abnormalities visible at the fronto-parieto-occipital level and the cerebellar hemispheres, which is consistent with the atypical shape of the PRES syndrome associated with an ischemic and hemorrhagic component of the semi-ovate centers and the left lenticular nucleus.

The diagnosis of PRES syndrome complicating a scorpion bite was retained. The patient was intubated and ventilated and received anticonvulsant therapy. The evolution is marked by the normalization of blood pressure figures and the recovery of consciousness without sequels.

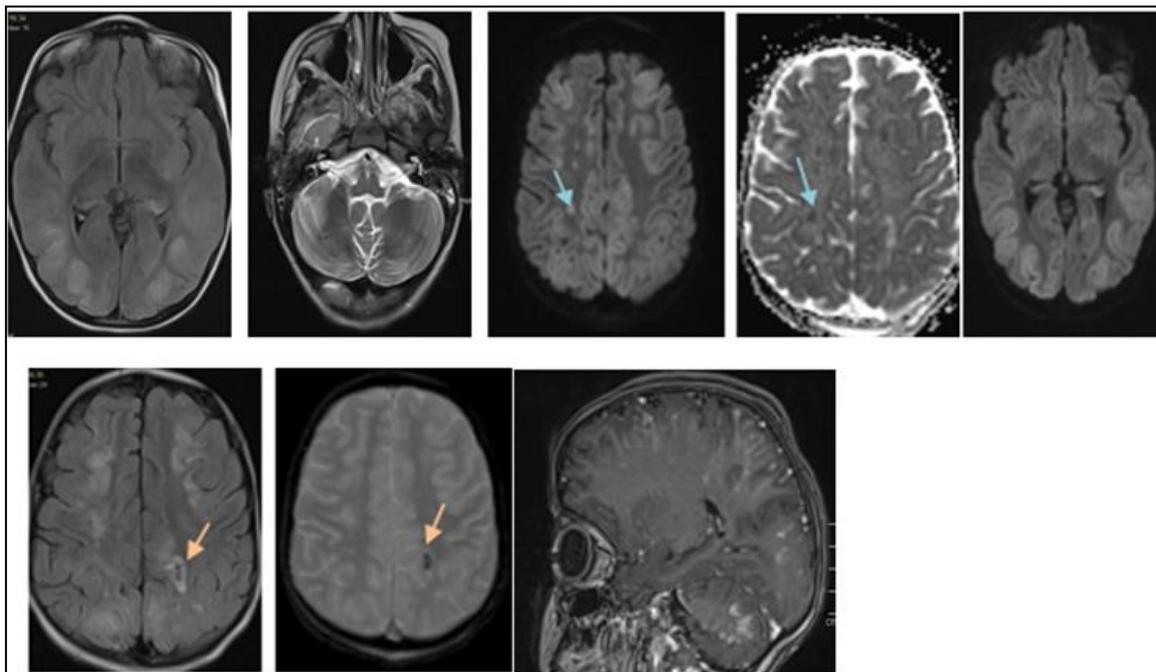


Fig. 1: Brain MRI: T2, FLAIR and DIFFUSION axial séquences: bilateral and grossly symmetrical cortical-subcortical signal abnormalities visible at the fronto-parieto-occipital level and the cerebellar hemispheres, which is consistent with the atypical shape of the PRES syndrome associated with an ischemic (Blue arrow) and hemorrhagic component of the semi-ovate centers

OBSERVATION 2

This is an 18 years old girl who presented following a scorpion bite with an interval of 15 hours, persistent fever, diffuse abdominal pain and intense headaches; complicated by generalized tonicoclonic convulsive seizures yielding to Diazepam. The clinical examination showed a Glasgow score of 12 with no signs of focalization and a blood pressure of 180/110 mmHg.

An emergency MRI of the brain was performed (Fig-2), showing bilateral and symmetrical

signal abnormalities in the posterior cortico-subcortical territories and basal ganglia, which is compatible with the atypical form of PRES syndrome.

The diagnosis of PRES syndrome complicating a scorpion bite was retained. The patient received symptomatic treatment associated with an antihypertensive infusion. The evolution is marked by the normalization of the blood pressure figures and the resumption of consciousness without sequels.

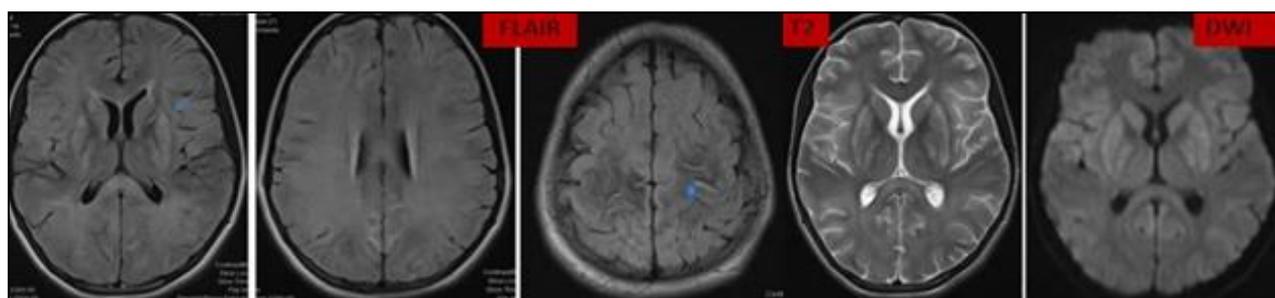


Fig. 2: Brain MRI: T2, FLAIR AND DIFFUSION axial sequences: bilateral and symmetrical corticosteroid signal abnormalities under bilateral occipito parietal cortical central gray nuclei and semi-oval centers in T2 hypersignal, Flair and diffusion (Blue arrow)

DISCUSSION

Scorpion envenomation is a relatively frequent occurrence in the tropics and subtropics of all five continents. Its frequency and the inherent morbidity and mortality make this accident a real public health problem in many countries of North Africa (the great

Sahara), India, Mexico and the Middle East. The toxins in scorpion venom are primarily neurotoxic; they act on the sodium channels of excitable cells, prolong the opening of the sodium channel and tend to cause lasting depolarization [2].

Posterior reversible encephalopathy syndrome is a rare, poorly understood condition and probably remains underdiagnosed [3]. The worldwide incidence of RPE is unknown [4].

This condition is characterized by a prolonged but spontaneously reversible vasoconstriction of the cerebral arteries, occurring spontaneously or in particular circumstances [5]. Two theories remain the most accepted [6].

The first theory is based on the sequence of hypertension, cerebral autoregulation, hyper perfusion, and vasogenic cerebral edema due to extracapillary fluid leakage. The perivascular sympathetic innervation exerting a protective effect is richer in the anterior circulation and the carotid system, hence the posterior predominance of lesions.

The second theory is in favor of cerebral vasoconstriction secondary to arterial hypertension or to a systemic process. This autoregulatory phenomenon would lead to a decrease in cerebral perfusion and thus to cytotoxic edema. This theory is supported by the absence of (or minimal) blood pressure elevation in some cases. It argues more in favor of a systemic process (infection, preeclampsia, transplantation, anticancer chemotherapy) responsible for activation of the immune system and endothelial cells followed by endothelial damage with secondary hypoperfusion (systemic or regional).

Indeed, there are many circumstances that favor the occurrence of RPE. The most frequent are: arterial hypertension, eclampsia, pre-eclampsia; chemotherapy such as cyclophosphamide; chronic renal failure, dialysis and autoimmune diseases [1].

The clinical manifestations are varied [6]. They combine in a variable way four cardinal neurological symptoms: headache, seizures, consciousness disorders and visual disorders, these signs are most often accompanied by an acute and brutal increase in blood pressure.

Radiologically, reversible posterior encephalopathy is manifested by white matter and gray matter abnormalities preferentially affecting the posterior regions suggesting edema of the parieto-occipital regions.

Imaging is essential and must be performed as soon as possible to allow early diagnosis in order to institute adequate treatment and limit the risk of irreversible lesions. On CT scan, the damage is marked by diffuse hypodensity. On MRI, the lesions appear in iso signal or hyposignal T1 and hypersignal T2 and FLAIR. There is usually no enhancement after injection of contrast medium [1].

The typical appearance shows diffuse cortical, subcortical and deep lesions. The lesions are mainly located in the posterior regions: the parietal or occipital lobes are affected in 98% of cases. However, lesions also frequently affect the frontal lobes (68%), the temporal lobes (40%) and the cerebellar hemispheres (30%) [8]. The bilateral and symmetrical nature of the lesions is very characteristic, although they are asymmetrical in 28% of cases.

Some radiological aspects are more atypical and should be known. More rarely, lesions may extend to the basal ganglia (14%), brainstem (13%) and deep white matter, including the splenium of the corpus callosum (10%) [8]. Unilateral involvement and DCP should not lead to a rejection of the diagnosis.

However, the clinical evolution is usually favorable with a more or less rapid improvement of the clinical signs and disappearance of the radiological images. Reversibility is usually complete, although there is a risk of neurological sequelae and even death [9].

CONCLUSION

Posterior reversible encephalopathy syndrome is a radio-clinical syndrome characterized by the association of variable neurological signs and white matter and gray matter abnormalities preferentially affecting the posterior regions. The evocative clinical context, as well as the rapidly reversible nature of the clinical and radiological abnormalities, suggests the existence of vasogenic cerebral edema related to a vasculopathy. Imaging, particularly MRI, plays an essential role in the diagnosis of this condition, which should be well known by radiologists and clinicians. Reversibility is conditioned by early diagnosis and correction of contributing factors. Moreover, knowledge of this syndrome should encourage the avoidance of unnecessary repeat imaging when the clinical course is favorable.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

Authors' Contributions

All authors have read and approved the final version of the manuscript.

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