Posterior Reversible Encephalopathy Syndrome Complicating Traumatic Pancreatitis

A Pediatric Case Report

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Abstract: We are reporting a case of posterior reversible encephalopathy syndrome (PRES) developed in an unusual clinical scenario without the presence of the most described symptoms. PRES is a neurological and radiological syndrome described in many different clinical conditions. In children it has been mostly reported in association with hematological and renal disorders.

Our patient was a 15 years old boy, admitted to our intensive care unit for pancreatitis after blunt abdominal trauma.

During the stay in the intensive care unit, he underwent multiple abdominal surgical interventions for pancreatitis complications. He had a difficult management of analgesia and sedation, being often agitated with high arterial pressure, and he developed a bacterial peritonitis. After 29 days his neurological conditions abruptly worsened with neuroimaging findings consistent with PRES. His clinical conditions progressively improved after sedation and arterial pressure control.

He was discharged at home with complete resolution of the neurological and imaging signs 2 months later.

The pathophysiology of PRES is controversial and involves disordered autoregulation ascribable to hypertension and endothelial dysfunction. In this case both hypertension and endothelial activation, triggered by sepsis and pancreatitis, could represent the culprits of PRES onset. Even if there is no specific treatment for this condition, a diagnosis is mandatory to start antihypertensive and supportive treatment. We are therefore suggesting to consider PRES in the differential diagnosis of a neurological deterioration preceded by hypertension and/or septic state, even without other “typical” clinical features.

PRES most often occurs in the setting of hypertensive crisis, preeclampsia, or septic state, even without the “typical” clinical features. However, a small number of patients could experience refractory intracranial hypertension, leading to residual neurological deficits or even decease.

INTRODUCTION

Posterior reversible encephalopathy syndrome (PRES) is a neurological syndrome defined by clinical and radiological features. The typical pattern includes headache, confusion, visual symptoms, and seizures, with magnetic resonance (MR) findings consistent with vasogenic edema predominantly localized to the posterior cerebral hemispheres. Patients in all age groups appear susceptible, but the real incidence of this condition is not known. A recent study estimated an incidence of 0.4% in a pediatric critical care unit. PRES most often occurs in the setting of hypertensive crisis, preeclampsia, or with cytotoxic immunosuppressive therapy, however many other clinical settings are reported (Table 1). In pediatric population it is mostly described in association with hematological or renal disorders.

The pathophysiology of PRES is not completely understood but it appears to be related to disordered cerebral autoregulation and endothelial dysfunction. PRES is usually benign, being fully reversible in many cases within 2 weeks after removal of the inciting factor and control of the blood pressure. However, a small number of patients could develop refractory intracranial hypertension, leading to residual neurological deficits or even decease.

PATIENT INFORMATION

A 15 years-old Egyptian boy was admitted to the emergency department of our hospital because of accidental abdominal trauma while playing. His medical history was negative. He arrived at the hospital complaining of abdominal pain; he was fully awake, without cardiovascular nor respiratory impairment.

Contrast enhanced computerized tomography (CT) scan of the abdomen demonstrated pancreatic injury with edema of the pancreatic head and uncinate process. Because of the high suspicion of perforation, he underwent an exploratory laparotomy that was negative for visceral lesions. After the surgery, the patient was extubated and admitted to our intensive care unit.

CLINICAL FINDINGS, DIAGNOSTIC ASSESSMENT, AND THERAPEUTIC INTERVENTION

During the following week he was hyperthermic (Figure 1, Panel B) and developed severe abdominal pain, partially controlled with epidural infusion of ropivacaine and sufentanil, and intravenous (IV) administration of paracetamol, nonsteroidal antiinflammatory drugs and opiates. He was agitated despite the amount of analgesia: so an IV infusion with propofol was started. His blood pressure was basically high (Figure 1, Panel A), with peak values around 150/80 mm Hg. On day 9 after admission he underwent a second exploratory laparotomy, demonstrating extended bowel ischemia. He was treated with...
logical status dramatically worsened with stupor and neck stiffness, vomiting episodes. Several days later, on day 29, his neurological status improved and on day 35 he was extubated. Antimicrobial therapy was also resumed. He had no fever, and his blood pressure was normal tending to hypertension. Sedative drugs were continued for 5 days with good control of the arterial pressure values. His neurological status improved and on day 35 he was extubated. He was alert and calm, and his blood pressure was corrected with transdermal clonidine. Four days later he was moved to the pediatric ward without neurological deficits. The antihypertensive therapy was no longer necessary and was suspended after a few days.

**OUTCOME**

Fifty days later he was discharged at home in good general conditions, after a brain MR demonstrating complete resolution of the lesions (Figure 2).

**DISCUSSION**

PRES is a clinical syndrome consisting of acute neurological symptoms usually including seizures, headache, visual disturbance, mental status alterations, and paralysis. At CT/MR imaging, the brain typically demonstrates focal regions of symmetric hemispheric edema. In a recent study of 96 PRES patients by Liman et al, edematous lesions, although detectable within the entire brain, involved the occipital and parietal lobes in the majority of cases. Frontal and temporal lobes were affected in about 50% of cases, the basal ganglia in about one-fourth of cases, the thalamus in about one-fifth of cases. In more than half of cases there were infratentorial lesions, mostly in the cerebellum and the pons. The pathophysiology of PRES involves disordered autoregulation and endothelial dysfunction. This has been classically attributed to severe rise in blood pressure, but it is now evident that direct endothelial damage, seen in immunosuppressant drugs use, autoimmune diseases, or eclampsia, can be the leading cause of this condition.

The role of hypertension in the onset of this syndrome is supported by the evidence that acute hypertension frequently accompanies PRES. Abrupt blood pressure rise, exceeding the threshold of cerebral blood flow autoregulation, can lead to hyperperfusion and blood–brain barrier disruption, inducing leakage of plasma and macromolecules in the interstitium. However, PRES is commonly seen even without hypertension or with only minor increase of blood pressure. This observation promotes the hypothesis that hypertension would be a consequence and not the trigger in PRES pathogenesis. Endothelial activation and dysfunction would play a crucial role, representing the common pathway shared by all clinical conditions associated with PRES onset.

The cytotoxic effects of immunosuppressive therapy on the vascular endothelium could explain the relationship between immunosuppressive drugs and PRES.
a crucial step in the progression of the septic response secondary
to an infective event, and could explain the association of
PRES with infection and sepsis.

In our case, the clinical onset of PRES was characterized
by a deterioration of the neurological status without the pre-
sence of seizures, a symptom described in 60% to 75% of
patients with PRES and in 9 of 10 cases from a pediatric
intensive care unit. Furthermore, in the pediatric population,
PRES is mostly described in association with hematological
diseases, neoplasms, or renal diseases, making our case an
unusual clinical scenario.

The neuroimaging has been the pivotal element for the
diagnosis, showing bilateral hypodense lesions in both occipital
and parietal lobes, consistent with literature findings. Other rare
diseases have a similar radiological pattern, in particular acute
disseminated encephalomyelitis (ADEM). However, the lack of
a viral infection preceding the neurologic deterioration and the
absence of pathological findings in the liquor make the diag-
nosis of ADEM unlikely.

Before the onset of PRES, our patient was mostly hyper-
tensive although without exceeding the values typically associ-
ated with loss of cerebral autoregulation. However, his blood
pressure values were similar to those reported in a pediatric
population of patient with PRES and are consistent with the
endothelial pathophysiological hypothesis. Moreover the
patient presented a status of sepsis with hyperthermia, high
PCT levels and leukocytosis and isolation of E. coli in the
abdominal fluid and this could represent a trigger for the onset
of PRES.

Interestingly a few cases of PRES in the setting of acute
pancreatitis with or without other possible triggers for
PRES (alcohol withdrawal, systemic lupus erythematosus,
acute intermittent porphyria) have been reported. In acute
pancreatitis there is a local and systemic activation of inflam-
matory pathways that could play a major role in the develop-
ment of extra pancreatic complications. Experimental
models of pancreatitis have suggested that the proinflammatory
cytokines, produced during pancreatitis, may have a pivotal role
in vasogenic brain edema formation, a pathogenic mechanism
similar to PRES. The development of brain edema has also been
implicated in the pathogenesis of pancreatic encephalopathy, an
uncommon complication of acute pancreatitis.

There is no specific treatment for PRES, but the disorder is
usually reversible once the precipitating cause is eliminated or
replaced. General consensus among clinicians suggests that
treatment of hypertension is important, although no studies
have been done to measure the effect of hypertension control
on the resolution of PRES. Patients with PRES have been
treated with dexamethasone, but, because of its associated risk
of hypertension, fluid overload, and electrolyte disturbance, this
is not a recommended therapy. In our case a supportive therapy
was carried out along with correction of hypertension.

FIGURE 1. Time-line of mean arterial pressure (Panel A), body temperature (Panel B), and white cells count and procalcitonin (Panel C)
during the stay in intensive care unit. The dotted gray line highlights day 29, when the brain CT was performed and the diagnosis of PRES
was made. WC, white cells count; PCT, procalcitonin.
Given the unusual association between PRES and pancreatitis and the lack of the most typical symptoms seen in this case, we would like to stress the importance of considering PRES in the differential diagnosis of neurological deterioration in children with mild hypertension and/or other potential triggering factors like sepsis.

CONCLUSIONS

We reported a case of PRES in a 15 years old boy admitted to our intensive care unit for abdominal trauma with acute pancreatitis. The clinical presentation was a sudden deterioration of the neurological status and the brain CT and MR showed the presence of typical PRES lesions. Hypertension, the septic state of the patient and the intense proinflammatory response triggered by the pancreatitis could represent the culprits of PRES developing. Even if there is no specific treatment for this condition, a diagnosis is mandatory to start antihypertensive and supportive treatment. We are therefore suggesting to consider PRES in the differential diagnosis of a neurological deterioration preceded by hypertension and/or septic state, even without other “typical” clinical features.

INFORMED CONSENT

Patient’s parents provided their informed consent for the publication of this case report.

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