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Case Report

Late Presenting Central Pontine Myelinolysis Post-tonsillectomy in a Child: Case Report

Magd Ahmed Kotb, Menat-allah Mahmoud Elzabet*, Walaa Elnaggar
Department of Pediatrics, Faculty of Medicine, Cairo University, Cairo, Egypt
* Correspondence: menaallah.m.mohammed@students.kasralainy.edu.eg
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Abstract:
Central pontine myelinolysis (CPM) is a notorious grave complication of rapid correction of hyponatremia. CPM is a noninflammatory demyelination. It presents clinically with variable degrees of loss of coordination, unconsciousness, blurred vision, cranial nerve affection, progressive spasticity, quadriparesis, pseudo bulbar palsy up to locked in syndrome, coma and death. We report a 4.5-year-old who presented to emergency room (ER) with generalized tonic-clonic seizures, and sepsis. His parents reported that he underwent un-eventful tonsillectomy 3 days earlier. Two days post-tonsillectomy he developed fever. On third day post-tonsillectomy he developed an attack of convulsions at home, 3 hours prior to presenting to ER. He presented to the ER by another attack of seizures. His seizures were controlled on IV midazolam and levetiracetam loading dose. His conscious level was clouded beyond the postictal 30 minutes. His Glasgow Coma scale was 12 which necessitated Pediatric Intensive Care Unit (PICU) admission. His condition was complicated by acute liver and kidney injury that improved within 48 hours. Upon admission his sodium level was 141 mmol/L, and did not drop below 140 mmol/L all through the hospital stay. By the 7th day after admission the child developed left sided convergent squint (6th cranial nerve palsy) and progressive spasticity. Magnetic resonance imaging revealed CPM. The isolated CPM in this child developed irrespective of hemodynamic stability, lack of hyponatremia and its rapid correction. CPM in our studied child might be an isolated presentation of sepsis associated encephalopathy, or a late complication post-tonsillectomy.

Level of Evidence of Study: IV (*1*)**.**
Keywords: Central pontine myelinolysis; post-tonsillectomy; child; sepsis
Abbreviations: CPM: Central pontine myelinolysis; ER: emergency room; PICU: Pediatric Intensive Care Unit

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Introduction

Central pontine myelinolysis (CPM) is a non-inflammatory demyelination that is caused by rapid correction of hyponatremia (*2*). Hyponatremia affects approximately 5% of adults and 35% of patients who are hospitalized (*3*). There is no cut-off hyponatremia level that when reached pontine demyelination occurs, yet levels of 120-123 mEq/L when rapidly corrected were reported to be associated with CPM. Hence the name, osmotic demyelination syndrome. It is assumed that the rapid rise of sodium and consequent brain dehydration results in CPM (*4*). To avoid CPM it is recommended that the rate of sodium correction does not to exceed 8-12 mEq/L/day. Causes of pontine demyelination is not limited to hyponatremia. Pontine myelinolysis might be precipitated by leukoencephalopathy, autoimmune or infectious encephalopathy, or brain stem infarct. CPM was considered a lethal condition, yet death is expected in 5% of cases, only a quarter would improve and symptoms would resolve without neurologic deficit, yet almost a third would suffer serious incapacitation and progression of deficit (*5*). Post-liver transplant CPM due to hyponatremia has worse prognosis. While, hyponatremia is a recognized cause, other recognized of CPM are systemic lupus erythematosus, diabetes mellitus, hemodialysis, severe hypophosphatemia and others (*6*). CPM post-tonsillectomy is a rare but recognized complication post-tonsillectomy attributed to iatrogenic hyponatremia due to multiple hypotonic infusions or to inappropriate secretion of antidiuretic hormone, or to cerebral salt wasting syndrome (*7*). CPM is not related to the surgical technique of tonsillectomy. It is interesting however, that CPM was reported to present up to 15 days post-tonsillectomy in an adult (*8*).

Case Presentation

A 4.5-year-old presented to emergency room (ER) with generalized tonic-clonic seizures, and sepsis. His parents reported that he underwent un-eventful tonsillectomy 3 days earlier. His parents reported that he underwent un-eventful tonsillectomy 3 days earlier. Two days post-tonsillectomy he developed fever. On third day post-tonsillectomy he developed an attack of convulsions at home, 3 hours prior to presenting to ER. He presented to the ER by another attack of seizures. The parents reported that he had no history of headache or signs of raised intracranial tension. They reported that he was on ceftriaxone daily dose since the tonsillectomy (3 days). They reported that he underwent hernia repair at age of 6 months, upper jaw fracture repair at age of 2 years, upper gastrointestinal endoscopy at age of 2.5 years to remove a coin he swallowed.

In the ER his seizures were controlled on IV midazolam and levetiracetam loading dose. The child weight and height were on the 25th and 75Th percentile for age respectively. By examination his conscious level was clouded beyond the postictal 30 minutes and had a Glasgow Coma scale of 12. He had low grade fever, blood pressure 120/70, c-reactive protein was 105 mg/dL (lab normal= 6mg/dL). Then he vomited a small amount of dark coffee ground vomitus. He was admitted to Pediatric Intensive Care Unit (PICU). By examination there was no clinical abnormality detected apart from the clouded consciousness. Fundus examination revealed no papilledema and no Kayser-Fleischer rings of copper deposition. Despite the lack of jaundice his alanine amino transferase was 2398 IU (lab normal 36IU), aspartate amino transferase was 2154 IU (lab normal 36IU), international normalized ratio (INR) 2.8, creatinine was 1.29 and blood urea nitrogen 22.5 mg/dL. Serum ceruloplasmin level was normal and copper in 24 hours urine was 20 µg. Cerebrospinal fluid analysis revealed no abnormality. Blood culture was negative. Upon admission his sodium level was 141 mmol/L, and did not drop below 140 mmol/L all through the hospital stay. It fluctuated daily to be 141, 142, 145, 153, 153 148 and 140 mmol/L respectively. His condition stabilized within 48 hours, with normalization of INR and kidney functions. His GCS improved within 4 days. He underwent echocardiography that revealed no abnormality.

By the 7th day after admission the child developed left sided convergent squint (6th cranial nerve palsy), quadriparesis and progressive spasticity but no pseudo bulbar palsy. Clinically he had hyperreflexia, pathological reflexes (patellar, adductor and Babinski). Sensations were intact. Magnetic resonance imaging (MRI) revealed CPM. It revealed multiple pontine foci of altered signal of high T2 weighted and FLAIR and subtle low signal in T1 weighted images. There was no restricted diffusion and no perifocal edema signal. There was no other cerebral parenchymal areas of abnormal signal intensity, and no areas of fresh blood signal intensity or blood degradation products signal intensity. MRI revealed normal size and shape of ventricular system, no abnormality of the rest of the posterior fossa structures, no midline shift and no sizable extra-axial collections. Anti-epileptic medications were withdrawn and the child did not suffer from further seizures.

After initial progression of spasticity for 3 weeks, the spasticity became stationary. Liver enzymes dropped back to normal a month later.

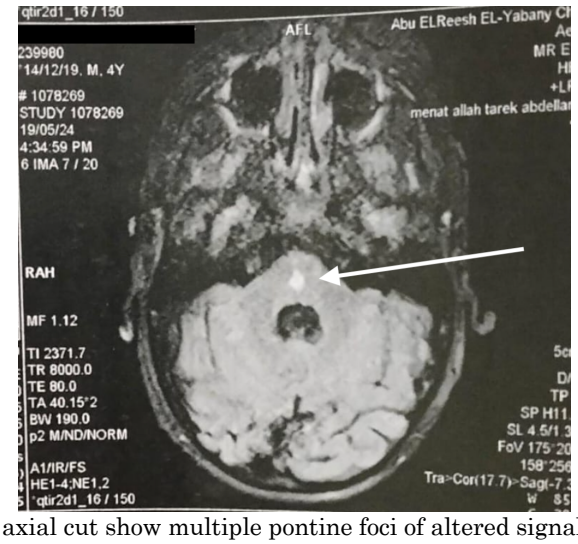

Figure 1. MRI brain , axial cut show multiple pontine foci of altered signal (high abnormal in T2).

Discussion

CPM is an-uncommon post-tonsillectomy complication. It may be severe to cause death. CPM post-tonsillectomy is related to acute hyponatremia. It may develop because of iatrogenic excessive infusion of hypotonic fluids, or related to inappropriate antidiuretic hormone secretion, or to cerebral salt wasting syndrome (*7*). We are not aware of the operative details, hence we cannot rule out acute hyponatremia intra-operatively. Yet, we do not have any evidence of hyponatremia all through the hospital stay in the PICU and at Children Hospital, Cairo University, as the sodium levels did not drop below 140 mEq/L. Our reported child did not undergo correction of hyponatremia at any point. Our reported child suffered from CPM following post-tonsillectomy. There was no documentation of hyponatremia all through the course of the 3 day illness and no documentation of hyponatremia all through the hospital stay. Following the tonsillectomy he spent uneventful 2 days at home, on the third day he developed fever and on the fourth day he suffered from frequent attacks of generalized tonic clonic convulsions. His blood pressure upon admission and all through did not fall. He was hemodynamically stable all through. Hence, the rapid correction of hyponatremia is not likely to be incriminated in our reported child. We cannot exclude late post-tonsillectomy CPM in our reported child. In late post-tonsillectomy CPM, the CPM develops 15 days after correction of the hyponatremia post-tonsillectomy (*8*). Hence, if indeed our reported child underwent rapid correction of hyponatremia post-tonsillectomy on day of tonsillectomy, and he was active for 2 days before symptoms appeared, then he might have suffered late post-tonsillectomy CPM.

CPM is a recognized serious and severe complication in liver transplant patients who undergo rapid correction of hyponatremia The liver decompensation is seen as a facilitator or precipitating factor that works in concert with the rapid correction of hyponatremia but not an isolated cause of CPM (*9*).

CPM is notorious to complicate rapid correction of hyponatremia, but not all CPM is related to hyponatremia. However, less commonly CPM may develop without hyponatremia. CPM may complicate chronic alcohol dependence and/or withdrawal irrespective of the hyponatremia (*10*). CPM may complicate excessive bleeding (*11*), Wilson disease (*12*), and cytomegalovirus infection (*13*). All these were excluded in our reported child.

CPM is not a common but recognized complication of severe sepsis. The sepsis associated encephalopathy is mostly multifocal that might rarely include CPM. Sepsis associated with isolated CPM was not reported earlier. It seems that culmination of the seizures that the child sustained along with the hepatorenal decompensation irrespective of shock and hemodynamic stability induced the CPM. Sepsis associated encephalopathy is a well-known encephalopathy where a systemic immune cascade in response to the infection causes diffuse cerebral dysfunction with or without clinical or laboratory evidence of direct brain infection or other types of encephalopathy. Sepsis associated encephalopathy is multifactorial, vascular damage, endothelial activation, breakdown of the blood brain barrier, altered brain signaling, brain inflammation, and apoptosis are all incriminated (*14*). All these factors would contribute to osmotic brain disequilibrium that is not limited to ionic substances but would include organic covalent ones as well. The compilation of organic covalent substances may be responsible for this osmotic CPM and not only the ionic substances that cause brain edema and shrinkage. The idiogenic osmoles, were reported to play a major role in brain edema associated with renal dialysis (*15*). They may be incriminated as well in our reported case, as he suffered from acute kidney injury, and they may not be incriminated as his acute kidney injury did not necessitate renal dialysis.

Ceftriaxone the third generation cephalosporin, was not reported to cause CPM (*16*). We find it unlikely to cause CPM in our reported case. CPM is a non-inflammatory demyelination, yet, sepsis induced CPM in our reported child was an isolated sepsis associated encephalopathy.

Conclusion

The isolated CPM may develop irrespective of hemodynamic stability, lack of hyponatremia and its rapid correction. Though sepsis associated encephalopathy is a multifocal condition, non-hyponatremic isolated CPM maybe a sole presentation of sepsis associated encephalopathy, or a late presenting post-tonsillectomy CPM in response to subtle undocumented hyponatremia.

Author Contributions

All authors shared in drafting the manuscript and approved the final manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest in connection with the reported study. Authors declare veracity of information. The datasets generated and/or analyzed for this study are available from the corresponding author upon reasonable request.

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