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Wernicke encephalopathy in children

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ABSTRACT

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Practical implications

Frequency of pediatric WE is estimated to be similar to WE in adults, although it is an underdiagnosed condition. In our reports, the nutritional deficit (caused by persistent vomiting and prolonged partial parenteral feeding) triggered signs and symptoms of WE. Therefore, pediatric WE should be considered as a differential diagnosis in all patients at risk for nutritional deficiency, increasing clinical suspicion and early treatment.

Introduction

Wernicke Encephalopathy (WE) is an acute neurological disorder caused by thiamine deficiency. Usually associated with alcoholism in adults, WE can also occur in children with other etiologies.¹ The classic triad of symptoms is present in a small number of patients. As a medical emergency, once suspected, high doses thiamine treatment should be started in order to decrease comorbidities and improve prognosis.^{1,2}

Case report 1

A 7-year-old male with known Landau-Kleffner syndrome, on corticosteroid weaning, was admitted with nausea, persistent vomiting and anorexia. Neurological examination was consistent with his established baseline, presenting severe deficit in language comprehension and disturbed behaviour. Gastroenterological and endocrinological evaluations were unremarkable. On day 27 of illness, he complained of headache associated with photophobia and somnolence. In the following days, there was a neurological worsening with altered mental status (GCS 8), ophthalmoparesis, with bilateral limitation of abduction, vertical nystagmus, and axial ataxia. On day 35, he underwent a head CT scan that revealed bilateral thalamic hypodensities followed by a brain MRI (figure 1 a-i) that showed bilateral and symmetrical areas of T2/FLAIR hypersignal in the dorsomedial thalami, mammillary bodies, tectal plate, periaqueductal gray matter, pontine tegmentum, area postrema, cerebellar vermis, caudate nucleus, putamina and frontal cerebral cortex. Post-contrast enhancement was present in the mammillary bodies, dorsomedial thalami, periaqueductal gray matter and tectal plate. There was restricted diffusion in the head of the caudate nucleus and in the frontal cerebral

cortex lesions. These lesions were suggestive of WE. The patient immediately started intravenous thiamine 250mg tid during three days, followed by 100mg/day. A low serum thiamine value (12ng/mL) was later demonstrated. There was a progressive clinical improvement. After 44 days with intravenous thiamine therapy, the serum thiamine level was 109 ng/mL. Follow-up brain MRI was performed 2 months after diagnosis and showed near complete resolution of the signal intensity abnormalities and marked atrophy of the mammillary bodies (figure 1 j).

Case report 2

A 14-year-old adolescent male with an unremarkable medical history, was admitted with acute appendicitis and generalized peritonitis. The patient underwent open appendicectomy, and developed sepsis and prolonged ileus, requiring reintervention for bowel obstruction due to intestinal adhesions. Due to intolerance to oral food intake, partial parenteral nutrition was initiated. After 27 days, the patient presented with tachycardia, vomiting, dizziness and blurred vision. Physical examination showed binocular diplopia, bilateral horizontal nystagmus and bilateral lateral rectus palsy. Brain MRI revealed areas of hypersignal intensity on FLAIR in the mammillary bodies and in the tectal plate (figure 2). The topographic distribution of these findings was typical of WE. Thiamine intravenous therapy was initiated (100mg/day for 7 days) with normalization of symptoms in 24hours. Low levels of serum thiamine was subsequently confirmed (13ng/mL). After the diagnosis, parenteral nutrition was reviewed and showed no thiamine supplementation. A follow-up brain MRI one month after the diagnosis revealed complete resolution of the lesions. Neurological examination and serum values of thiamine at follow-up were entirely normal (37ng/mL).

Discussion

Although typical of adult alcoholics, WE still remains underdiagnosed in pediatric and non-alcoholic population.^{2,3} The classic triad of encephalopathy, ophthalmoparesis and ataxia is present in only 16% of WE.^{1,4} Therefore it is extremely important to have a high level of clinical suspicion, especially in conditions that could lead to thiamine deficiency.^{2,4} In situations of prolonged parenteral nutrition, thiamine supplementation is crucial.

Brain MRI is helpful in diagnosis and follow-up, with high specificity and medium sensitivity in WE.² Typical findings consist of symmetrical lesions with T2/FLAIR hypersignal in the thalamus, mammillary bodies, periaqueductal area and tectal plate. These findings were

present in both cases. Symmetric hyposignal in the same areas may be visible in the T1 weighted sequence. Atypical findings, as lesions in putamina and cerebral cortex, may also be seen.^{3,5,6,7} A few weeks after the onset of encephalopathy there will often be atrophy of mammillary bodies, a phenomenon well described in alcoholic patients, and this was also noted in case 1.⁵ After treatment, neuroimaging changes may completely resolve, as documented in case 2, or persist. The latter is associated with worse prognosis.³

Although highly valuable, neuroimaging should not delay the beginning of treatment when there is high clinical suspicion. Clinical condition is sufficient to establish a diagnosis and justify emergent treatment, even prior to laboratory confirmation. If proper treatment is not started early, permanent neurological deficit and death may occur.^{1,6} There are no defined guidelines for the treatment of pediatric WE. However, guidelines in WE in adults may guide the adapted therapeutic regimens.^{1,2} In patients at risk for WE oral absorption of thiamine is unreliable and intravenous treatment is recommended with 200mg tid.²

Appendix 1: Authors

Name	Location	Contribution
Andreia Forno, MD	Department of Pediatrics, Hospital Central do Funchal, Madeira, Portugal	Collected and synthesized the data; participated in literature review; drafted the manuscript for intellectual content
Bruno Cunha, MD	Department of Neuroradiology, Centro Hospitalar Lisboa Central, Lisbon, Portugal	Collected and synthesized the data; participated in literature review; drafted the manuscript for intellectual content
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Marta Moniz, MD	Pediatric Intensive Care Unit, Department of Pediatrics, Hospital Prof.	Revised the manuscript for intellectual content

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Carla Conceição, MD	Department of Neuroradiology, Centro Hospitalar Lisboa Central, Lisbon, Portugal	Revised the manuscript for intellectual content

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Figure 1 - Case 1. Day 35 brain MRI (a-i). Two months follow-up brain MRI (j).

a, b Axial T2 weighted images showing bilateral and symmetrical hypersignal in the mammillary bodies (*arrows, a*), tectal plate (*arrow heads, a*), dorsomedial thalami (*arrow heads, b*) and putamina (*arrows, b*). **c, d** Axial FLAIR images showing symmetrical hypersignal in the caudate nucleus (*arrows, c*) and frontal cerebral cortex (*d*). **e, f** Diffusion weighted imaging and apparent diffusion coefficient map demonstrating restricted diffusion in the head of the caudate nucleus (*arrows*). **g** Sagittal T1 weighted image showing hyposignal in the mammillary bodies (*arrow head*). **h, i** Axial T1 weighted contrast enhanced images showing post-contrast enhancement in the mammillary bodies (*arrows, h*), periaqueductal gray matter, tectal plate (*arrow heads, h*) and dorsomedial thalami (*arrow heads, i*). **j** Two months follow-up MRI. Sagittal T1 weighted image showing marked atrophy of the mammillary bodies (*arrow head*).

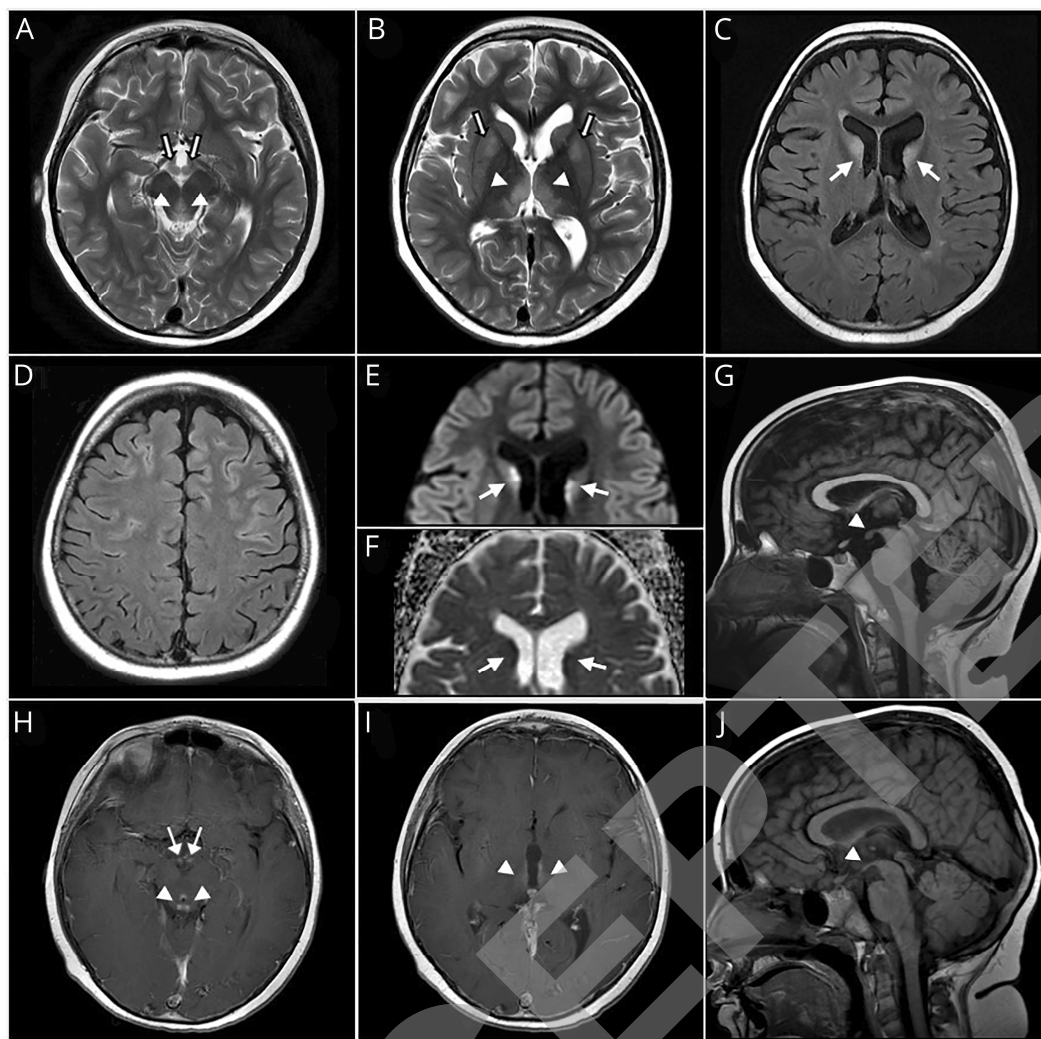


Figure 2 - Case 2. Brain MRI.

a, b Axial FLAIR images showing bilateral and symmetrical hypersignal in the mammillary bodies (arrows, *a*) and tectal plate (arrows, *b*). **c** Sagittal T1 weighted image showing hyposignal in the mammillary bodies (arrow head).



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