

# Influenza A in children complicated by encephalitis - case study

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## ABSTRACT

Influenza is a seasonal disease that can cause annual outbreaks, especially during the cold periods of the year, in temperate areas. Symptomatology mainly involves the upper and lower respiratory tract, but varies greatly depending on the age and medical history of each person.

In this paper we present a clinical case of influenza type A complicated with encephalitis in a female child aged 5 years and 6 months with a personal pathological history of neurological damage (Guillain-Barre syndrome). The diagnosis of influenza was established on the basis of symptoms (productive cough, rhinorrhea, marked physical asthenia, high fever) and confirmed by laboratory tests (rapid influenza antigen test and influenza RT PCR from nasopharyngeal secretions - positive). Neurological involvement was clinically supported by the occurrence of bradykinesia, bradypsychia, broad-based gait, confirmed by neurological examination. The diagnosis of encephalitis was completed by analysis of cerebrospinal fluid (CSF) obtained by lumbar puncture in which influenza virus type A was identified and by electroencephalogram (EEG) showing altered tracing.

Under antiviral (Oseltamivir), pathogenic (corticosteroid therapy), brain depleting (mannitol solution), non-specific human and symptomatic immunoglobulins treatments, the evolution was slowly favorable with remission of symptoms.

The case presented argues that although influenza in immunocompetent children is generally a self-limiting and uncomplicated condition, it can evolve severely with the development of complications and after-effects and sometimes increased mortality especially in immunocompromised hosts.

**Keywords:** influenza type A, encephalitis, child

## INTRODUCTION

Infections caused by influenza viruses are one of the most common causes of seasonal epidemics, with the incidence in children ranging from 10-40% [1]. A recent study conducted in the pediatric wards of the National Institute of Infectious Diseases "Prof. Dr. Matei Bals" shows that influenza in the 2022 - 2023 season accounted for 22.9% of all viroids in hospitalized children, with influenza A being better represented (20.4%) compared to influenza B (2.5%). The same study states that the clinical forms of ill-

ness of respiratory viruses were more severe in the season analyzed compared to previous years, their etiology being frequently multiviral (association of several viruses - respiratory syncytial virus, SARS-CoV-2, parainfluenza viruses, adenoviruses, rhinoviruses) [2].

Children under the age of 2 and those with pre-existing conditions are at increased risk of hospitalisation or developing severe, complicated forms of the disease. The most common complications of influenza are otitis media, pneumonia, exacerbation of coronary lung disease, bacterial superinfections

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(*Streptococcus pneumoniae*, *Staphylococcus aureus*), but also neurological complications such as febrile seizures, encephalopathy and encephalitis, especially in those with pre-existing conditions and comorbidities [3,4].

The high incidence of the disease, the risk of developing complications or severe forms especially among the population under 2 years of age, highlights the importance of primary immunization against influenza of all persons over 6 months of age, as well as the initiation of antiviral treatment as early as possible. Influenza virus infections in children are usually associated with increased numbers of visits to the doctor, increased hospitalization and increased use of antibiotics.

## MATERIAL AND METHOD

We present a clinical case of a 5-year-old female child admitted to the Infectious Diseases Clinic IX - Pediatrics of the National Institute of Infectious Diseases "Prof. Dr. Matei Bals", with the diagnosis of influenza type A complicated with encephalitis.

The child, not vaccinated against influenza, was admitted to our clinic for high fever, rhinorrhea, productive cough, recently developed speech disorders (bradycardia) and temporo-spatial disorientation. The onset of symptoms was 5 days prior to admission with fever, productive cough and rhinorrhoea for which she was evaluated by her family doctor who established the diagnosis of acute pharyngitis, for which she received treatment with azithromycin. Since in evolution, after 2 days, she associated high fever (40°C) hardly responsive to antithermal treatment and marked physical asthenia, she presented to the emergency room of our clinic where she was diagnosed with influenza type A (rapid antigen-antibody test) and received home treatment with oseltamivir and symptomatics. The evolution is unfavorable: persistent fever, associated vomiting, bradycardia, bradypsychia, broad-based gait, which is why she is admitted to our clinic.

## RESULTS

Clinical examination on admission to our clinic revealed a conscious, afebrile child with a poor general condition, pale complexion, without eruptive elements, discrete hyperemic pharynx, sabural tongue, productive cough, symmetrically present vesicular murmur, bilaterally, without rales, cardiac and digestive balance, headache, difficulty in collaborating (responds with difficulty to simple questions, temporally and spatially disoriented, bradylalia, bradypsychia, no signs of meningeal irritation).

From the patient's personal physiological history, we note:

- rank I baby, from physiological pregnancy, delivered by caesarean section, at 38 weeks gestational age, birth weight 3040g, Apgar score = 10
- vaccinated according to Ministry of Health national scheme, not vaccinated against influenza
- showed hypovitaminosis D with anterior fontanel closure after 3 years of age, delay in psychomotor acquisition (held head after 6 months, sat after 8 months, walked independently at 1 year and 2 months), and expressive language (spoke after 2 years and 8 months).

Personal pathological history reveals an episode of acute gastroenterocolitis with *Campylobacter jejunii* complicated with Guillan Barre syndrome at the age of 3.

Laboratory investigations showed neutropenia (800/mm<sup>3</sup>), no other changes in blood count, biochemical samples within normal limits, no inflammatory syndrome (fibrinogen, CRP, procalcitonin - within normal limits). Positive RT PCR test for influenza confirms the diagnosis of influenza type A. Cardiopulmonary radiography shows acute interstitial pneumonia.

Neurological consultation is performed which shows partially disoriented child, responds with delay to simple questions, does not recognize family members, shows repetitive gestures, echolalia, is bradylalic, bradyphic, maintains orthostatism, but shows particular wide-based gait and imbalances. In this context the suspicion of encephalitis in the context of influenza infection is raised and lumbar puncture and EEG are recommended.

Lumbar puncture reveals clear, hypertensive cerebrospinal fluid without pleocytosis (2 elements/mm<sup>3</sup>), acetic acid, negative Pandy reaction, normal glycoemia and proteinuria, increased lactic acid (28.6 mg/dl). CSF multiplex PCR test - positive for influenza A virus.

EEG shows slow waveform with presence of symmetrical delta waves in fronto-temporal leads (Figure 1).

Based on clinical, laboratory and paraclinical data, the diagnosis of influenza type A complicated with acute encephalitis and acute interstitial pneumonia is established.

Complex treatment is initiated:

- Etiologic: Oseltamivir (90 mg/day po - 5days),
- Pathogenic:
  - Dexamethasone 0.6mg/kgc/day for the first 2 days, then in progressively decreasing doses for 10 days)
  - Immunoglobulins (5 g/day iv - 2 days)
- Brain Depletter - Mannitol 20% (6 mg/kgc/day in decreasing doses for 3 days),

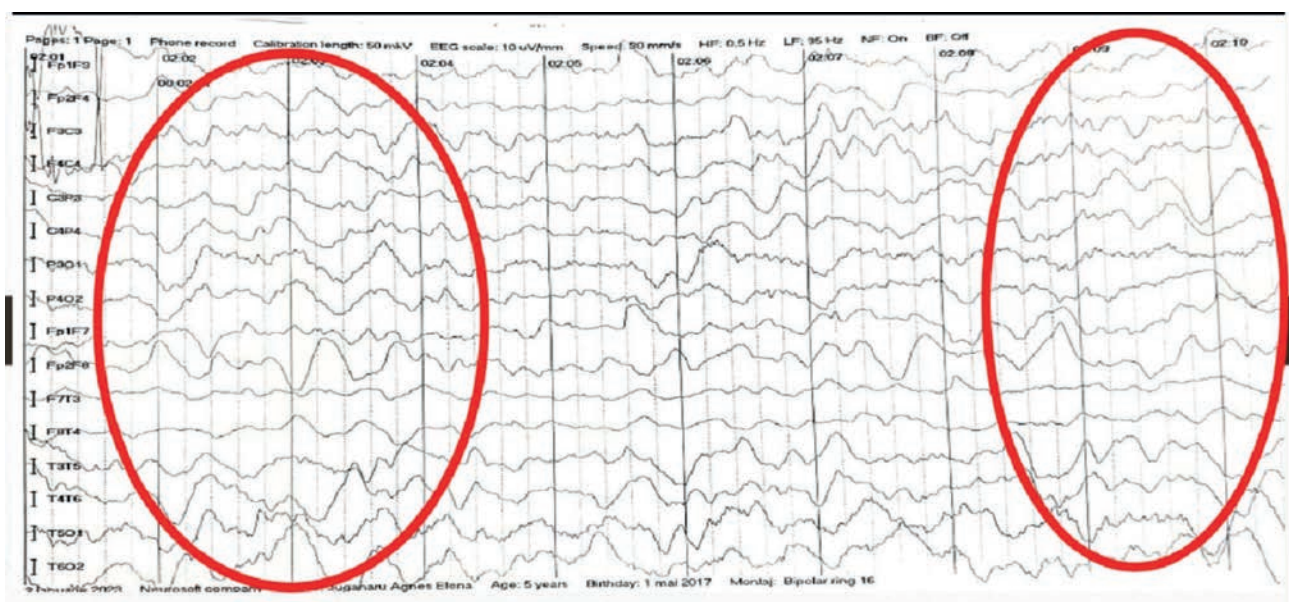


FIGURE 1. EEG tracing at admission

- Hydro-electrolyte and acid-base rebalancing
- Symptomatic: analgesic, antipyretic, antimotilic.

Progression was slowly favorable with recognition of family members 2 days after treatment initiation, independent walking possible, no balance disturbances from day 3 of treatment, no bradykinesia and bradypsychia from day 5 and remission of absence-type seizures from day 6 of treatment initiation.

She was discharged after 10 days of hospitalization with recommendation of cortisone treatment in progressively decreasing doses at home for another 10 days.

On reassessment 2 weeks after discharge, the child shows normal clinical examination except for cortisol facies, laboratory investigations without changes, and neurological consultation and control EEG are within normal limits.

## DISCUSSIONS

The case presented demonstrates that influenza is a disease with a polymorphic clinical picture, which is not free of complications, it can evolve severely especially in children and people with comorbidities [4]. Personal pathological history and predisposition to certain diseases are factors favoring the development of complications and prolonged forms of the disease. In the present clinical case, the history of Guillain Barre syndrome secondary to *Campylobacter* infection demonstrates the susceptibility of this patient to develop neurological complications after acute illness. In addition, viral or bacterial co-infections create the prerequisites

for a more severe and prolonged disease progression [5-9].

Similar cases of severe influenza with neurological complications have been reported by other authors in different seasons with different types of influenza viruses, some of them with unfavorable outcome and death [10,11]. Thus, we emphasize once again the importance of annual influenza vaccination of the population, especially for at-risk groups (children and people with comorbidities).

## CONCLUSIONS

Although an influenza virus infection is often a self-limiting and uncomplicated condition, the present case demonstrates that it can evolve severely and cause complications even in immunocompetent patients. However, the presented clinical case, due to personal pathological history, has an increased susceptibility to develop neurological complications in the context of infectious diseases.

Encephalitis associated with influenza A virus infection most likely occurred by immune mechanism, in a patient with a history of neuropsychological impairment (Guillain Barre syndrome and delay in psychomotor acquisition).

The present case would have benefited from an influenza vaccination, which would have prevented the onset of a severe complicated disease, with beneficial effect on the child's quality of life.

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