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Diagnostic Challenges of Rubella Encephalitis in an Epileptic Adolescent: A Case Report from Ecuador

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ABSTRACT

We present a case of rubella-associated encephalitis in an adolescent with a history of epilepsy, admitted with new-onset convulsive status epilepticus. Despite the absence of rash or fever, rubella IgM/IgG seropositivity and the clinical response to acyclovir supported the diagnosis. Diagnostic limitations included lack of PCR and high-throughput sequencing access. This case highlights the need for empirical management, interdisciplinary evaluation, and broader diagnostic capacity in second-level hospitals in low- and middle-income countries.

KEYWORDS: Encephalitis, Viral · Rubella virus · Epilepsy · Status Epilepticus · Antiviral Agents · Developing Countries

INTRODUCTION

Epilepsy remains a major global public health challenge, particularly in low- and middle-income countries (LMICs), where it accounts for a substantial portion of the neurological disease burden. Its elevated prevalence and incidence in these settings are frequently linked to endemic infections, perinatal complications, and traumatic injuries, all compounded by insufficient healthcare infrastructure, diagnostic limitations, and a pronounced treatment gap estimated to exceed 75% in some regions[1].

The classification and understanding of epileptic seizures have evolved considerably from ancient descriptions to current neurophysiological models defined by the International League Against Epilepsy (ILAE). Accurate diagnosis continues to pose challenges, especially in settings with limited access to electroencephalography, neuroimaging, and serological testing[1,2]. Real-world cases often present with overlapping features, diagnostic ambiguity, or evolving semiology.

An additional layer of complexity arises when seizures and status epilepticus are the initial manifestations of a broader underlying encephalitic process. Rubella virus, though rarely associated with acute neurological complications, has been reported to cause encephalitis, polyradiculoneuritis, and transverse myelitis, even in the absence of

classical symptoms such as rash or known exposure[3]. In such cases, conventional diagnostic pathways may fail, and confirmation depends on advanced laboratory findings such as intrathecal synthesis of virus-specific antibodies.

This report presents and analyzes a complex clinical case of a young patient with a history of epilepsy who developed new-onset convulsive status epilepticus, ultimately attributed to a viral encephalitic process, with serological findings suggestive of rubella. This case exemplifies the diagnostic uncertainty and therapeutic decision-making dilemmas faced in second-level hospitals in LMICs.

CASE REPORT

A previously healthy male patient presented with a history of recurrent headaches beginning at the age of 14 years, initially diagnosed as tension-type headaches. Over time, these episodes evolved into transient periods of environmental disconnection and involuntary movements, eventually progressing to generalized tonic–clonic seizures at the age of 15 years, without sphincter involvement or tongue biting. A diagnosis of epilepsy was established, and treatment with valproic acid was initiated; however, adherence to therapy was inconsistent.

On March 16, 2025, the patient was admitted to the emergency department due to a severe headache lasting two days, followed by three generalized tonic–clonic seizures, each lasting approximately 15 minutes. Upon admission to the Intermediate Care Unit on March 19, 2025, neurological examination revealed somnolence and a Glasgow Coma Scale score of 11/15, without nuchal rigidity.

Laboratory and imaging studies were performed upon admission and during hospitalization. Biometric parameters at admission and following acyclovir treatment are presented in Table 1.

Table 1. Biometric control on admission and after acyclovir treatment.

Parameter	19/03/2025	23/03/2025	Reference values
WBC (10^3/μL)	7.26	7.23	3.98–10.04
Hemoglobin (g/dL)	13.0	12.3	10.5–13.5
Hematocrit (%)	39.0	36.4	37–45
Monocytes (10^3/μL)	1.42	0.61	0.24–0.36
Lymphocytes (10^3/μL)	1.42	1.16	1.8–3.74
Neutrophils (10^3/μL)	5.21	5.26	1.56–6.13
Platelets (10^3/μL)	335	376	182–369

Cerebrospinal fluid (CSF) analysis results are summarized in Table 2, demonstrating a crystal-clear appearance with mild pleocytosis (10 leukocytes/μL), normal glucose (55.4 mg/dL), normal protein (18 mg/dL), and normal lactate (2 mmol/L), findings compatible with viral encephalitis. Microbiological results are presented in Table 3.

Table 2. Cerebrospinal fluid (CSF) analysis.

Parameter	Result	Reference Range
Appearance	Clear ("crystal clear")	Clear
Leukocytes	10 cells/μL (60% mononuclear, 40% polymorphonuclear)	0–5 cells/μL
Glucose	55.4 mg/dL	50–80 mg/dL
Protein	18 mg/dL	15–45 mg/dL
Lactate	2 mmol/L	<2.8 mmol/L

Table 3. Microbiological results (culture, serology, and molecular testing).

Test	Result	Reference Range
Blood culture	Negative	Negative
CSF bacterial culture	Negative	Negative
Rubella IgG	30.5 IU/mL	Reactive ≥10 IU/mL
Rubella IgM	30.5 COI	Reactive ≥1 COI
CSF HSV-1 PCR* (RT-PCR, external laboratory)	Low-positive	Not detected

* CSF HSV-1 RT-PCR was performed on a sample obtained on day 7 of acyclovir therapy and yielded a low-positive result. Molecular testing for rubella virus was not available, as RT-PCR for rubella is not included in the national healthcare reimbursement schedule as of January 2026.

Serological testing of blood samples revealed significantly elevated rubella IgG and IgM titers. Brain computed tomography showed no acute abnormalities, and electroencephalography performed previously (December 14, 2023) revealed no acute epileptiform changes.

Despite the absence of documented fever throughout hospitalization (36.5–37.2°C) and negative bacterial cultures, empirical antiviral therapy with intravenous acyclovir was initiated based on strong clinical suspicion of viral encephalitis. Marked clinical improvement was observed within 72 hours, with resolution of neurological symptoms and no recurrence of seizures.

The CSF sample used for herpes simplex virus molecular testing was obtained on the seventh day of intravenous acyclovir therapy. RT-PCR returned a low-positive result for HSV-1, supporting the presence of herpesvirus infection, though the timing may have reduced the detectable viral load. Definitive confirmation of rubella could not be performed, as RT-PCR for rubella is unavailable in our institution as of January 2026.

The patient completed the recommended 10–14-day course of intravenous acyclovir without complications. Written informed consent for publication was obtained from both parents.

DISCUSSION

The present case illustrates the diagnostic complexity of viral encephalitis in adolescents, particularly in the context of atypical clinical presentations and limited access to

advanced diagnostic tools. The patient presented with generalized tonic–clonic seizures and altered mental status, without fever, rash, or known infectious exposure.

Rubella-associated encephalitis, although rare, is a recognized complication that may occur during acute infection or as a delayed immune-mediated phenomenon. As described by Roos (2007)[4], it can present with focal or generalized seizures in nearly half of reported cases, even in the absence of the characteristic exanthem[5].

A key finding was the post-discharge detection of HSV-1 by RT-PCR in CSF. The positive result, together with rapid improvement after acyclovir, strongly supports HSV encephalitis as a major contributor. As highlighted by Kiselev et al. (2020)[6], conventional methods such as PCR and ELISA have intrinsic limitations, and up to 40% of viral encephalitis cases remain etiologically undiagnosed[7].

High-throughput sequencing, particularly metagenomic next-generation sequencing, represents a powerful unbiased alternative capable of detecting known and novel pathogens directly from CSF[6,8,9]. Its integration into regional healthcare systems would enhance diagnostic accuracy[10,11]. In the absence of such technologies, clinicians must rely on a syndromic approach integrating clinical presentation, CSF analysis, and therapeutic response.

CONCLUSIONS

This case highlights the diagnostic complexity of viral encephalitis in adolescents with atypical features. The combination of acute deterioration, CSF pleocytosis, and rapid response to acyclovir supports HSV encephalitis, confirmed by a low-positive RT-PCR. The absence of fever or herpetic lesions underscores the need for a high index of suspicion.

This report underscores the impact of limited access to diagnostic tools on clinical decision-making in resource-constrained settings, emphasizing early empiric antiviral treatment and the urgent need to expand molecular diagnostics[12].

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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