



# Disseminated Varicella Pneumonia in an Adult with Substance Use History: Successful Critical Care Management in Resource Limited Settings

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**Background:** Varicella-zoster virus (VZV) infection is typically mild in children but can lead to severe, life-threatening complications in adults. Varicella pneumonia is among the most serious manifestations, with mortality rates reported up to 30–50% in critically ill patients. In low-resource settings such as Somalia, limited access to vaccination, antiviral therapy, and intensive care capacity increases the vulnerability of adults to disseminated disease.

**Case Presentation:** We report a 30-year-old Somali male with a history of polysubstance use who developed disseminated primary varicella complicated by severe pneumonia and acute hypoxemic respiratory failure. He presented with a generalized vesicular rash and rapidly progressive dyspnea. Chest imaging demonstrated diffuse bilateral ground-glass opacities consistent with viral pneumonia. The patient required invasive mechanical ventilation and was treated with intravenous acyclovir and evidence-based supportive critical care. Despite severe hypoxemia on admission, he showed rapid clinical improvement, was extubated within 48 hours, and discharged in good condition. Full recovery was confirmed at one-month follow-up.

**Conclusion:** Disseminated varicella pneumonia remains a potentially fatal condition in adults, particularly in countries without vaccination programs. This case demonstrates that prompt recognition, rapid initiation of antiviral therapy, and adherence to evidence-based critical care can lead to survival and recovery, even in fragile health systems. Preventive measures, including the introduction of vaccination and public health strategies targeting at-risk populations, remain essential to reduce the burden of severe varicella in Somalia and similar settings.

**Keywords:** disseminated varicella, varicella pneumonia, substance use, critical care, resource-limited settings, Somalia

## Background

Varicella-zoster virus (VZV), a neurotropic alpha herpes virus, is responsible for primary infection (varicella or chickenpox) and secondary reactivation (herpes zoster or shingles).<sup>1</sup> Usually, it is only a mild illness in healthy children, but VZV infection may cause more severe symptoms and complications in adults and people whose immune system is weak.<sup>2</sup>

Before the widespread use of varicella vaccination in high-income countries, annual mortality from varicella in the United States ranged from 0.29 to 0.46 per million, with adults accounting for more than half of the deaths.<sup>3</sup> Following the introduction of universal childhood vaccination, incidence, hospitalization, and mortality rates have fallen dramatically.<sup>3</sup> Varicella (chickenpox) is globally endemic, but the epidemiology of varicella in Africa is poorly characterized due to limited surveillance data and the absence of routine varicella vaccination programs on the continent. A systematic review of VZV-associated morbidity and mortality in Africa highlighted that most available data are from case series and seroprevalence studies rather than population-based surveillance, and that weak health systems and high prevalence of risk factors such as HIV may influence disease burden and outcomes.<sup>4</sup> In low-income and conflict-affected countries such as Somalia, where varicella vaccination is not part of the national immunization schedule, a substantial

proportion of adolescents and adults remain susceptible to primary infection.<sup>5</sup> Population-level epidemiologic data on varicella and varicella pneumonia in Somalia remain limited, with minimal published surveillance data available.

Pulmonary involvement, particularly varicella pneumonia, is the most common and severe complication of primary varicella infection in adults, occurring in approximately 5–15% of cases.<sup>6</sup> Risk factors for the development of varicella pneumonia include older age, pregnancy, co-existing pulmonary disease, and a weakened immune system (eg, HIV infection, cancer, steroid treatment.<sup>2</sup> Smoking and tobacco use have also been identified as risk factors that may predispose patients with varicella to progression to pneumonia.<sup>6</sup> Severe disease has also been reported in individuals who were previously healthy and immunocompetent.<sup>6</sup>

The respiratory symptoms such as cough, fever, and shortness of breath are often the clinical presentation in a typical case and usually occur within one to six days after the appearance of the vesicular rash which is characteristic.<sup>7</sup> Radiographic features are generally symmetrical opacifications, nodular infiltrates, merging consolidations, and ground-glass opacities.<sup>2</sup> The disease has the ability to quickly extend and lead to acute respiratory distress syndrome (ARDS), thus causing the need for invasive mechanical ventilation in over half of affected patients.<sup>7</sup> Death rates due to varicella pneumonia are very high, which peak at 50% in adults and 43% in critically ill patients requiring mechanical ventilation, thus making it the leading cause of death in varicella patients.<sup>2</sup>

VZV infection is mainly diagnosed clinically based on the characteristic rash.<sup>8</sup> Tzanck smear that shows multi-nucleated giant cells, can be confirmation of the diagnosis.<sup>2</sup> Confirmation of VZV is usually done by polymerase chain reaction (PCR) of viral DNA in the skin lesions, bronchoalveolar lavage fluid, or cerebrospinal fluid.<sup>1</sup> On the other hand, in resource-limited settings such as Somalia, advanced diagnostic tools like polymerase chain reaction (PCR) and enzyme-linked immunosorbent assay (ELISA) for VZV are usually not available, requiring clinicians to base diagnoses predominantly on clinical presentation and historical data.<sup>9</sup> In resource-limited countries, diagnostic delays and lack of antivirals worsen outcomes. We report a successfully managed case of disseminated varicella pneumonia in an adult from Somalia, highlighting challenges and lessons relevant to similar settings.

## Case Presentation

A 30-year-old Somali male was referred from a secondary hospital with two days of rapidly progressive shortness of breath. Six days before admission he developed fever, headache, abdominal pain, and malaise, followed within 24 hours by a generalized eruption of erythematous, fluid-filled vesicles. Approximately five days after rash onset he developed cough and worsening dyspnea; there was no prior history of chickenpox and no known varicella contact. The patient had no history of varicella vaccination, as varicella vaccine is not part of the routine national immunization schedule in Somalia. He had polysubstance use history (opioids and sedative-hypnotic/anxiolytic agents; non-medical tricyclic antidepressant use) (Table 1) and no history of tobacco smoking or alcohol use. The patient worked in the transportation sector, was unmarried, and came from a low-income household. On arrival he appeared acutely ill, disoriented, and uncooperative. He had a Glasgow Coma Scale (GCS) score of 9 and was tachypneic (45 breaths per minute), with prominent accessory-muscle use, and had decreased air entry with fine crackles bilaterally and bilateral lower-limb pitting edema. Vitals were SpO<sub>2</sub> 52% on a non-rebreather mask at 15 L/min, Blood pressure 137/79 mmHg, heart rate 69

**Table 1** Urine Analysis Examinations: Multi-Drug Test

Test Name	Test Result
Tramadol	Positive (+)
Cotinine	Positive (+)
Benzodiazepine	Positive (+)
Marjiuna	Positive (+)
Tricyclic antidepressant	Positive (+)

beat per minute, body temperature 37.8 °C, capillary glucose 106 mg/dL. Arterial blood gas (ABG) on supplemental oxygen showed pH 7.40, PaCO<sub>2</sub> 35.8 mmHg, PaO<sub>2</sub> 52 mmHg, HCO<sub>3</sub><sup>-</sup> 22.5 mmol/L. Laboratory testing demonstrated White Blood Cells (WBC) 12.53×10<sup>9</sup>/L, platelets 68×10<sup>9</sup>/L, C-reactive Protein (CRP) 107 mg/L, and transaminases (ALT 146 U/L; AST 223 U/L) with creatinine 0.8 mg/dL, Na 143.5 mmol/L, K 4.1 mmol/L; total and direct bilirubin were 0.95 and 0.72 mg/dL, respectively. Laboratory trends and key clinical parameters during hospitalization are summarized in (Table 2). A referring-facility chest radiograph reported bilateral lower-lobe homogeneous opacities with small pleural effusions (Figure 1). Non-contrast chest computed tomography (CT) demonstrated diffuse bilateral ground-glass opacities with thickened inter- and intralobular septa and a small left pleural effusion, with normal cardiac size, consistent with non-cardiogenic pulmonary edema due to viral pneumonia (Figure 2).

The clinical picture supported disseminated primary varicella complicated by severe pneumonia causing acute hypoxemic respiratory failure (ARDS), suspected sepsis, biochemical hepatitis (defined as isolated elevation of alanine aminotransferase and aspartate aminotransferase levels greater than three times the upper limit of normal, without clinical features of acute liver failure), and thrombocytopenia. He was admitted to the intensive care unit (ICU) and intubated for refractory hypoxemia. Management consisted of lung-protective ventilation (tidal volume 4–6 mL/kg predicted body weight with higher PEEP (positive end-expiratory pressure), conservative fluids, IV acyclovir 750 mg every 8 h (~10 mg/kg) with renal monitoring, and empiric meropenem 1 g IV every 12 h. Intravenous acyclovir was administered for a total duration of 7 days, while empiric meropenem was continued for 5 days and discontinued after clinical improvement and

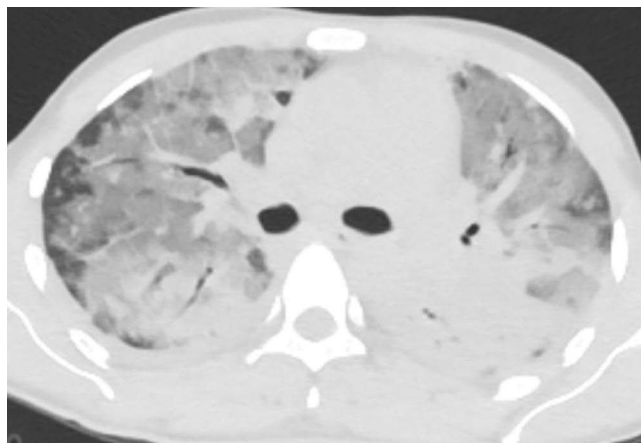
**Table 2** The Laboratory Investigations Results

Tests	Reference Range	On Admission	At the Ward	On Discharge
White cell count (WBC, *10 <sup>9</sup> /L)	4.00–10.00	12.53	7.4	8.6
Hemoglobin (HB, g/dl)	12.0–16.0	13.3	14.4	12.5
Platelet (PLT, *10 <sup>9</sup> /L)	100-300	68	240	198
C-reactive protein (CRP, mg/L)	2.5–10	107.4	76.7	46.1
Aspartate transaminase (AST-U/L)	6-38	223	115	31
Alanine transaminase (ALT, U/L)	6-40	146	95.4	25.2
Creatinine (Creatinine, mg/dl)	0.4–1.4	0.88	0.95	1.2
Blood urea (Blood urea, mg/dl)	10-50	33.55	27.3	23.4
Sodium (Na+, mmol/l)	135.0–145.0	143.9	142.2	139.6
Potassium (K+, mmol/l)	3.5–5.5	4.18	3.6	3.9
Calcium (Ca+, mmol/l)	2.12–2.62	2.01	2.26	2.24
Prothrombin time (PT, sec)	10-14	12.6	13.8	13.2
Activated partial Thromboplastin time (APTT, sec)	11-45	38.6	28	32.8
INR (International Normalized Ratio)	0.8–1.1	1.05	1.15	1.1
HBsAg (IU/mL)	0.05-1	<0.05		
Anti-HCV	0.01-1	0.04		
HIV	0.01-1	0.12		
Albumin (mg/dl)	3.5–5.3	3.6		
D.Bilirubin (mg/dl)	0-0.4	0.72		
T.Bilirubin	0.1–1.2	0.95		

Notes: \*Multiplication Sign.

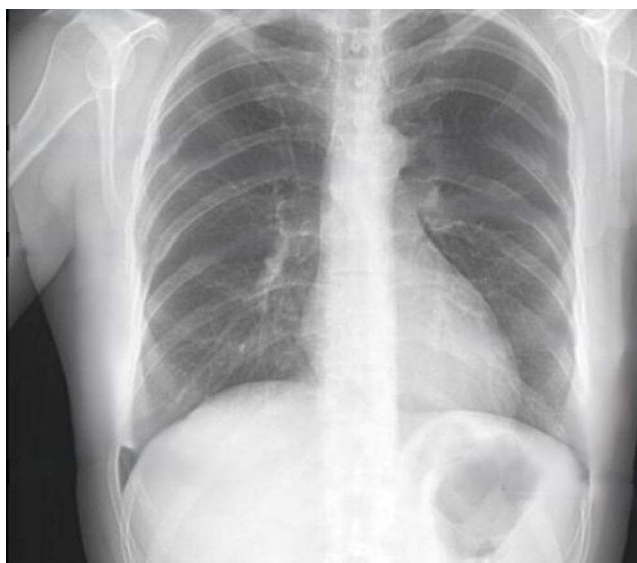


**Figure 1** Chest radiograph on admission showing bilateral diffuse reticulonodular and ground-glass opacities, consistent with viral pneumonia.



**Figure 2** Axial non-contrast chest computed tomography demonstrating extensive bilateral ground-glass opacities with interlobular septal thickening, consistent with acute respiratory distress syndrome secondary to varicella pneumonia.

absence of evidence for secondary bacterial infection. Hydrocortisone 100mg Iv every 6hrs was administered for a total duration of 3 days as adjunctive therapy for sepsis and refractory hypoxemia, in accordance with sepsis management principles, and was discontinued once hemodynamic stability and clinical improvement were achieved. Other medications included enoxaparin 40 mg subcutaneous daily with platelet monitoring, omeprazole 40 mg IV twice daily, and paracetamol 1000 mg IV as needed. Fluids included (D5/NS) 1 L/24 h, then Ringer's lactate 125 mL/h with potassium chloride (KCL) 20mmol supplementation from day 3 for emerging hypokalemia. He was extubated on ICU day 2 to a non-rebreather then simple mask, transferred to the ward on day 4, with oxygen weaned to room air by day 5, and inflammatory markers falling. He was discharged on day 8 with clinical and laboratory improvement. Follow-up chest radiograph one week after discharge was normal ([Figure 3](#)). At one-month follow-up he reported full recovery and affirmed counseling to avoid non-medical drug use.



**Figure 3** Follow-up chest radiograph one week after discharge showing complete resolution of pulmonary infiltrates and radiologic recovery.

## Discussion

This case illustrates the clinical course and successful management of severe disseminated varicella pneumonia in a young adult from a resource-limited setting, highlighting the challenges posed by delayed presentation, limited diagnostic capacity, absence of routine varicella vaccination, and coexisting polysubstance use. Although severe varicella pneumonia is a recognized complication in adults, reports from low-resource settings such as Somalia, particularly those addressing substance use as a potential contributing factor, remain limited.

Varicella (chickenpox) is classically regarded as a common, self-limited childhood illness, with most infections occurring in early life and resulting in long-lasting immunity.<sup>4</sup> In many regions, infection during childhood is associated with mild disease and low complication rates.<sup>4</sup> However, when primary varicella infection occurs in adolescents or adults, the clinical course is often more severe, with a markedly higher risk of systemic complications, particularly pulmonary involvement.<sup>4</sup>

Although primary VZV infection in adults is relatively rare in regions where varicella infection commonly occurs in childhood, when it does occur it carries a substantially higher risk of severe complications compared to childhood disease.<sup>3</sup> Pneumonia, hepatitis, encephalitis, and acute respiratory distress syndrome (ARDS) are among the most feared outcomes, with varicella pneumonia associated with mortality rates as high as 24% in ICU settings, even in well-resourced health systems.<sup>7</sup>

Transmission occurs via respiratory droplets or direct contact, with the virus establishing latency after primary infection.<sup>8</sup> In countries lacking routine varicella vaccination, such as Somalia, many adults escape childhood infection and remain susceptible well into adulthood.<sup>5</sup> Established risk factors for severe varicella pneumonia include smoking, pregnancy, chronic lung disease, and immunosuppression.<sup>2</sup> Smoking impairs mucociliary clearance, disrupts alveolar macrophage function, and compromises host defense mechanisms, thereby facilitating viral replication and secondary bacterial infections in the lungs.<sup>10</sup> Substance use may similarly predispose patients to malnutrition, delayed health-seeking behavior, and poor adherence to treatment, all of which may worsen prognosis in critical illness.<sup>10</sup> Our patient, while HIV-negative and not receiving immunosuppressive therapy, had a history of chronic polysubstance use, which may have contributed to immune dysregulation.

The patient's presentation, including a widespread vesicular rash, severe hypoxemia, bilateral ground-glass opacities on imaging, biochemical hepatitis, and thrombocytopenia, was consistent with disseminated primary varicella and viral pneumonia.<sup>11</sup> Pulmonary symptoms began approximately five days after the onset of rash, a timeline in line with previous reports.<sup>2</sup> The clinical diagnosis in this case was supported by a typical vesicular rash and characteristic

radiologic findings. In Somalia and similar low-resource settings, advanced diagnostics such as polymerase chain reaction (PCR) and ELISA testing for varicella-zoster virus are often unavailable, requiring clinicians to depend mainly on clinical and radiologic assessment.

In a large French multicenter ICU cohort, 80% of patients with severe varicella pneumonia developed ARDS, and over half required invasive mechanical ventilation.<sup>7</sup> In the present case, we were able to follow recent evidence-based practices for management of severe varicella.

The patient was started on intravenous acyclovir, in keeping with contemporary recommendations which support use of IV acyclovir (10 mg/kg every 8 hours) for varicella pneumonia in adults to reduce viral replication and improve survival.<sup>12,13</sup> Alongside antiviral treatments, we provided oxygen therapy, careful fluid balance, and continuous clinical monitoring.<sup>12,14</sup> The favorable outcome in our case reflects the benefits of prompt antiviral therapy documented in other series.<sup>6</sup>

Recent case reports and cohort studies from comparable low-resource and middle-income settings have described similar presentations of severe varicella pneumonia in adults, including immunocompetent patients requiring invasive mechanical ventilation. These reports consistently emphasize delayed presentation, rapid respiratory deterioration, and reliance on clinical and radiologic diagnosis in the absence of molecular confirmation, mirroring the challenges observed in our case. Early initiation of intravenous acyclovir and supportive critical care was likewise associated with favorable outcomes in these settings, reinforcing the generalizability of our management approach.<sup>12,15</sup>

What makes this case notable is that such evidence-based interventions were implemented in Somalia, where fragile health systems, limited drug supply, and shortages of intensive care capacity remain ongoing barriers.<sup>5</sup> By adhering to recommended management despite these challenges, this case demonstrates that timely recognition and decisive supportive care can still alter the course of a potentially fatal infection.

The lack of routine varicella vaccination in Somalia leaves a wide immunity gap in the adult population. Evidence from countries with established vaccination programs shows substantial reductions in varicella incidence and adult mortality following vaccine introduction.<sup>3</sup> Introducing catch-up immunization campaigns targeting high-risk adults could reduce the frequency of severe cases such as this. Furthermore, public health messaging should address substance use as a potential contributor to delayed care and increased risk of complications.

This report has several limitations. A clinical photograph of the vesicular rash was not available, as images were not captured at the time of presentation. Virologic confirmation using polymerase chain reaction or serologic testing was not available, and diagnosis was based on characteristic clinical features and radiologic findings, reflecting routine practice in resource-limited settings. In addition, follow-up was limited to one month, which restricts assessment of long-term pulmonary outcomes. Nonetheless, the case provides meaningful insight into the successful management of a potentially fatal condition in a fragile healthcare system.

## Conclusion

Disseminated varicella pneumonia represents a rare but potentially lethal complication of primary varicella infection in adults, capable of causing acute respiratory failure even in otherwise healthy individuals. This case demonstrates that early recognition, prompt initiation of antiviral therapy, and careful ventilatory and supportive management can lead to full recovery, even in a limited-resource environment. It emphasizes the importance of rapid diagnosis and evidence-based critical care to reduce mortality. Strengthening preventive strategies, particularly the introduction of varicella vaccination and public health awareness among susceptible adult populations, remains essential to lowering the burden of severe varicella disease in low-income countries.

## Abbreviations

VZV, varicella-zoster virus; ARDS, acute respiratory distress syndrome; DNA, deoxyribonucleic acid; ELISA, enzyme-linked immunosorbent assay; GCS, Glasgow Coma Scale; ICU, intensive care unit; PCR, polymerase chain reaction; PEEP, positive end-expiratory pressure; SpO<sub>2</sub>, peripheral oxygen saturation.

## Ethics and Consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying images. Institutional ethical approval was not required for publication of a single case report in accordance with local and institutional guidelines. The authors confirm that all identifying information has been omitted to protect patient privacy and confidentiality.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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