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AN UNCOMMON CASE OF VARICELLA PNEUMONIA IN AN IMMUNOCOMPETENT INDIVIDUAL

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ABSTRACT

Varicella pneumonia is a rare but serious complication of the infection with the common varicella-zoster virus. This is typically seen in immunocompromised individuals; however, it can also occur in immunocompetent adults. We report this case of a previously healthy middle-aged male smoker who presented with a vesicular rash and rapidly developed signs of respiratory distress.

KEYWORDS

Varicella-zoster, type 1 respiratory failure, pneumonia, acyclovir, corticosteroids

LEARNING POINTS

- Varicella pneumonia can occur in immunocompetent individuals, particularly in high-risk groups such as smokers and pregnant females.
- Early recognition and initiation of intravenous acyclovir is the cornerstone of treatment and is associated with reduced mortality. This case also highlights the importance of offering maximum ventilatory support in those who develop respiratory failure.
- The role of adjunctive corticosteroids remains controversial. There is limited evidence suggesting that they may reduce intensive care stay in severe cases, however, current data is limited.
- This case highlights the importance of varicella vaccination in adults without prior immunity.

INTRODUCTION

Varicella zoster is a common childhood infection characterised by a generalised vesicular rash. It typically follows an uncomplicated course; however, in adolescents and adults, complications are more likely to occur. This case report details the clinical presentation of varicella in an immunocompetent adult who was later diagnosed with varicella pneumonia as a complication. The patient's rapid deterioration underscores the importance of early recognition and management of the condition. This report

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also discusses the treatment strategies employed and the patient's outcome, emphasising that steroid treatment was not necessary for clinical improvement.

CASE DESCRIPTION

A 49-year-old Caucasian man presented to the emergency department with a 3-day history of bifrontal headache, photophobia, fever and an erythematous vesicular rash over his back and torso *(Fig.1)*. Oral acyclovir had been initiated by his general practitioner on the same day of presentation. The patient denied any symptoms of dyspnoea, cough, or other respiratory complaints at the time of admission.

On physical examination, vital signs were as follows: pulse rate of 85 beats per minute, blood pressure of 123/76 mmHg, and a temperature of 36.7°C. His oxygen saturation was 96% on room air. Chest auscultation revealed fine crepitations at the right lung base. Neurological examination revealed no signs of meningeal irritation, with negative Kernig's and Brudzinski's signs. Heart sounds were normal, and his respiratory rate was 20 breaths per minute.

His past medical history included hypertension and anxiety. He had a significant smoking history of 25 pack years. He had no regular medications or known drug allergies.

Initial laboratory investigations revealed the following:

- Elevated C-reactive protein (CRP): 164 mg/l (0-5 mg/l)
- Hyponatraemia with a serum sodium: 124 mmol/l (135-145 mmol/l)
- A normal total leukocyte count, but a mild lymphopenia: 0.56 $\times 10^9$/l (1.3-3.6 $\times 10^9$/l)
- Thrombocytopenia with a platelet count of 116 $\times 10^9$/l (146-302 $\times 10^9$/l).

A chest X-ray on admission showed bilateral lung consolidations, with patchy air space shadowing noted in the left retrocardiac area and right lower lung zone, suggesting a possible infectious process involving both lungs *(Fig. 2)*.

The patient was admitted for further management of bilateral pneumonia, hyponatremia and observation. Intravenous co-amoxiclav was initiated alongside oral acyclovir. Later the same evening, shortly after presentation, the patient became dyspnoeic and had signs of respiratory distress, with his oxygen saturation dropping to 82% on room air. On chest auscultation, right basal crepitations were noted, along with a diffuse expiratory polyphonic wheeze heard throughout all lung fields, and a respiration rate of 30 breaths per minute. High flow oxygen at 10 litres per minute via standard face mask was commenced. 2.5 mg of nebulised salbutamol and 0.5 mg of nebulised ipratropium bromide were given to the patient. An arterial blood gas analysis taken on the above oxygen settings revealed type 1 respiratory failure. The pH was 7.42 (7.35-7.45), partial pressure of oxygen (PaO_2) was 93.6 mmHg (60-80 mmHg), partial pressure of carbon dioxide ($PaCO_2$) was 36.7 mmHg (35-45 mmHg), and bicarbonate (HCO_3^-) was 24.06 mmol/l (22-26 mmol/l). This indicated the need for increased oxygen support with target saturations of >94%, and thus oxygen was upgraded to 15 litres per minute via non-rebreather mask.

A computed tomography pulmonary angiogram (CTPA) was performed to rule out pulmonary embolism as a cause for the respiratory failure *(Fig. 3)*. This came back negative for a pulmonary embolus but revealed multiple bilateral ground glass changes and patchy areas of consolidation, with increased reticular pattern, mostly prominent in the lower lobes. These radiological findings were in keeping with that of a viral pneumonia.

He was tested for coronavirus disease 2019 (COVID-19), atypical infections, namely Legionella and Mycoplasma, human immunodeficiency virus, and fungal infections, with the use of β-D-glucan and galactomannan. All results were unremarkable. However, varicella-zoster virus (VZV) IgM antibodies returned positive. In the context of a characteristic vesicular rash, recent exposure, and serological evidence, a diagnosis of varicella pneumonitis was established.

In view of the increasing oxygen requirements, the patient was transferred to a high dependency medical unit and



Figure 1. Widespread vesicular rash over back (left) and over abdomen (right).

commenced on humidified high-flow therapy (HFT). Acyclovir was escalated to intravenous (IV) administration at a dose of 10 mg per kg every 8 hours (patient weight 96 kg), resulting in a regimen of 1 g hourly. Broad spectrum antibiotic coverage with piperacillin and tazobactam 4.5 g IV every 8 hours was also initiated. Regular nebulised bronchodilators were administered in view of a persistent wheeze. The administration of corticosteroids was initially considered, however, after consulting with infectious diseases and reviewing the literature, they were withheld in view of insufficient evidence supporting their use.

He was successfully weaned off HFT after 4 days. In total he received a 10-day course of IV acyclovir and piperacillin and tazobactam to good effect. There was a good clinical and biochemical response, as he no longer remained dyspnoeic and had down trending oxygen requirements, CRP and normalisation of sodium levels. The rash had resolved, and the patient was discharged home.

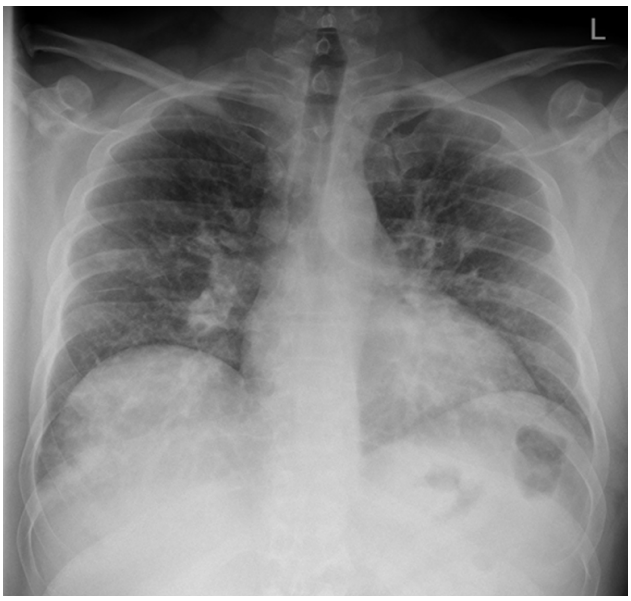


Figure 2. Chest X-ray posterior to anterior view showing patchy airspace shadowing at the left retrocardiac and right lower lung zone areas, in keeping with bilateral pneumonia.

DISCUSSION

VZV is one of the eight herpesviruses known to cause human infection[1]. The varicella virion consists of a nucleocapsid surrounding a core that contains the linear, double-stranded deoxyribonucleic acid genome. A protein tegument separates the capsid from the lipid envelope, which incorporates the major viral glycoproteins[2]. The initial clinical presentation of varicella typically begins with a prodromal phase characterized by malaise, decreased appetite, and fever, followed by the development of a generalized, vesicular, pruritic rash. VZV is highly transmissible, spreading through aerosolized droplets and by direct cutaneous contact with the vesicle fluid from skin lesions. Pneumonia, though rare, is one of the most serious complications associated with varicella infection. The probability of developing varicella pneumonia in healthy adults is approximately 1 in 400, with an overall mortality rate between 10 and 30%[1]. Risk factors for the progression of varicella pneumonia include cigarette smoking, pregnancy, immunosuppression, and male sex[1]. In this case, the patient had hypertension as a comorbidity, but was also a heavy smoker and male, which increased his risk for developing varicella pneumonia.

Varicella pneumonia typically presents 1-6 days after the development of the vesicular rash[2]. Symptoms may include dry cough, shortness of breath, tachypnoea, pleuritic chest pain, chest tightness, or haemoptysis. In our case, the patient presented with acute-onset shortness of breath and type 1 respiratory failure, as confirmed by arterial blood gases. Early identification of clinical deterioration and prompt management are crucial in improving prognosis for these patients.

HFT is a non-invasive treatment typically delivered through a nasal cannula, providing a stable fraction of inspired oxygen. HFT is well tolerated, easy to set up, and ideally applied at 37°C for optimal humidification of inspired gas. The flow rate and fraction of inspired oxygen should be tailored to the patient's inspiratory effort and the severity of hypoxemia. Physiological benefits of HFT include improved mucociliary

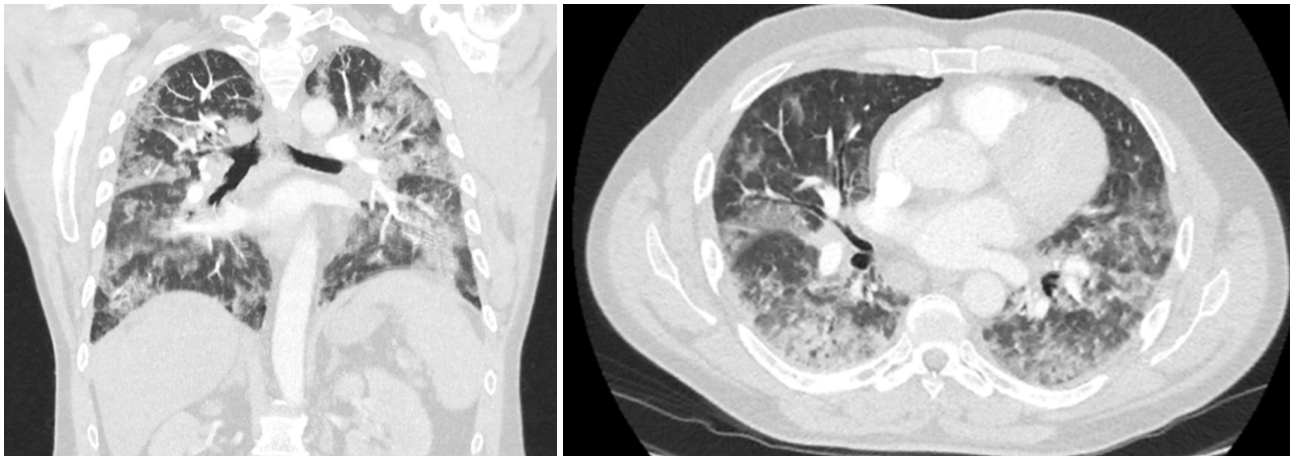


Figure 3. Computed tomography pulmonary angiogram, sagittal view showing multiple bilateral ground glass changes and patchy consolidation with increased reticular pattern, prominent mediastinal and hilar lymph nodes (left) and axial view showing multiple bilateral ground glass changes and patchy areas of consolidation (right).

clearance, enhanced dead space washout, and optimisation of pulmonary mechanics[3].

Our patient was promptly transferred to the Critical Care Unit due to rapid deterioration and type 1 respiratory failure. He was started on HFT, and his antiviral therapy was escalated from oral to intravenous acyclovir. The use of steroids was discussed in light of the CTPA findings showing bilateral pneumonitis. However, after consultation with infectious disease specialists, it was decided that there was insufficient evidence in previous studies to support steroids offering a prognostic benefit, and they were therefore excluded from the treatment regimen[4].

Radiological findings in this case, particularly the bilateral ground-glass opacities and reticular consolidation, were consistent with viral pneumonitis. In such cases, it is important to rule out other potential viral causes of pneumonia, including COVID-19[5].

The patient clinically improved with the treatment provided, and his hypoxemia resolved, allowing for gradual weaning off oxygen support. He completed a total of 10 days of intravenous acyclovir due to the presence of pneumonitis.

This case highlights the management of varicella pneumonia, a rare but serious complication of varicella. The patient's clinical improvement without the need for steroid treatment further supports the lack of prognostic benefit of steroids in cases of varicella pneumonia, and the need for larger prospective trials. Additionally, this case underscores the importance of vaccination in preventing severe and potentially life-threatening VZV infections.

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