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Case Report

Varicella challenges: A case of respiratory tract complications in an elderly patient

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Abstract

Varicella, caused by the varicella-zoster virus (VZV), is rarely reported in the elderly but often complicates with pneumonia. In this case report, we present a case of varicella pneumonia in the elderly. A 60-year-old man presented to the emergency room with vesicles filled with clear fluid that had appeared all over the body for the past four days. The patient also reported fever, headache, pain when swallowing, and itching. Initially, the rash consisted of pink macules that progressed to papules, vesicles, pustules, and crusts. The patient experienced a cough and shortness of breath one day before the hospital visit but did not report any chest or abdominal pain. Notably, the patient's two grandchildren had a history of chickenpox. The patient had been living with diabetes for five years and was undergoing treatment with insulin injections. The patient was also an active smoker for 40 years. On physical examination, several vesicles with varying degrees of redness were observed, along with yellow-black crusts, pustules, and erosions. Diagnostic tests revealed multinucleated giant cells on a Tzanck smear; pulmonary inflammation with thickening of the right hilum on a chest X-ray; extended-spectrum beta-lactamases *Klebsiella pneumoniae* in the sputum culture; and elevated hemoglobin A1c, blood sugar level, and liver and kidney function markers on laboratory examination. Based on the clinical findings, the patient was diagnosed with varicella, community-acquired pneumonia, diabetes, acute renal failure, and elevated transaminase enzymes. The patient was treated with acyclovir, paracetamol, salicylate 2% powder, fusidic acid 2% cream, moxifloxacin, N-acetylcysteine, curcuma, and insulin. The patient's clinical condition improved, the complaint of dyspnea decreased, and the patient was discharged to outpatient care after eight days of hospitalization. This case highlights that while varicella is rare in the elderly, it often presents with severe varicella pneumonia, making early detection and comprehensive management essential to prevent complications and mortality.

Keywords: Varicella, elderly, varicella pneumonia, tropical disease, immunosenescence

Introduction

Varicella, commonly known as chickenpox, is a contagious primary infection caused by the varicella-zoster virus (VZV). This virus leads to a lifelong latent VZV infection in sensory and autonomic neurons and induces immunity to VZV [1]. Cases of varicella in the elderly are extremely rare, with only a few documented instances [2-4]. However, elderly and immunocompromised individuals often experience complications [5]. Approximately 5–15% of adult varicella cases involve pneumonia, the most frequent and severe respiratory complication [6]. This severe condition can be fatal and is marked by symptoms such as cough, shortness of

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breath, rapid breathing, high fever, pleuritic chest pain, cyanosis, and coughing up blood, usually occurring one to six days after the rash appears [2,6].

For immunocompromised patients, managing varicella often involves intravenous antiviral therapy, which results in higher blood levels compared to oral administration [4]. This therapy is administered for seven to ten days and can be switched to oral administration 48 hours after the last lesion appears or once all lesions have crusted [5]. It's important to note that intravenous antivirals, including acyclovir, are nephrotoxic and require dose adjustments for patients with renal dysfunction [1,2]. This careful management helps mitigate the risk of severe complications and improves patient outcomes. A case study reported an Indonesian adult with chronic hepatitis B experienced respiratory failure due to varicella pneumonia and required a mechanical ventilator [7]. Here, we present a case of varicella pneumonia in an elderly patient and highlight some of the challenges.

Case

A 60-year-old man presented to the emergency room of Dr. Soetomo General Academic Hospital, Surabaya, Indonesia, with the chief complaint of clear-fluid-filled vesicles that had appeared all over the body in the past four days. The patient reported having a fever two days before the vesicles appeared. Additionally, the patient complained of headaches, painful swallowing, and body itching. The initial signs of the rash included rose-colored macules to papules, which progressed to vesicles, pustules, and crusts. The patient stated that the rash first appeared on the face and rapidly spread to the patient's trunk and extremities one day before the lesion appeared. No lesions were observed on the mucosa. The patient also experienced coughing and shortness of breath one day before the visit but did not report any chest pain or abdominal pain. The patient sought treatment at the emergency room due to the lack of improvement of the symptoms.

Two of the patient's grandchildren had chickenpox two weeks before the patient's symptoms appeared. The patient stated that there had been no previous experience with these symptoms and had long forgotten the vaccination history. The patient had diabetes for five years and was currently being treated with insulin injections. The patient had no history of high blood pressure, food allergies, or drug allergies. The patient was an active smoker, consuming approximately six cigarettes per day for 40 years.

Upon physical examination, the patient exhibited blood pressure of 140/80 mmHg, heart rate of 72 beats/minute, respiratory rate of 24 times/minute, body temperature of 36.4°C, and oxygen saturation of 96% without breathing aids. Physical examination revealed multiple vesicles of various stages discovered on erythematous skin scattered throughout the body, including vesicles filled with cloudy fluid, yellow-black crusts, multiple pustules, and multiple erosions. No hemorrhagic vesicles or purpura were found. Additionally, the patient's right leg had been amputated due to diabetes. The skin lesions are presented in **Figure 1**.

Laboratory examination upon admission revealed hemoglobin at 10.7 g/dL, leukocytes at 12,380/µL, platelets at 191,000/µL, blood urea nitrogen (BUN) at 23 mg/dL, serum creatinine at 1.92 mg/dL, serum glutamic oxaloacetic transaminase (SGOT) at 92 U/L, serum glutamic pyruvate transaminase (SGPT) at 66 U/L, albumin at 2.39 g/dL, and procalcitonin at 0.61 ng/mL. Blood sugar profile reported fasting blood sugar of 203 mg/dL, hemoglobin A1c (hbA1c) of 8.2%, and two-hour postprandial blood sugar of 223 mg/dL. The Tzanck smear examination found multinucleated giant cells (**Figure 2A**). The chest X-ray examination showed pulmonary inflammation with thickening of the right hilum (**Figure 2B-C**). The sputum culture identified extended-spectrum beta-lactamase (ESBL) *Klebsiella pneumonia sp*. The blood culture did not reveal any aerobic or anaerobic bacteria, hyphae, or spores.

Based on the clinical findings, the patient was diagnosed with varicella, community-acquired pneumonia (CAP), diabetes, acute renal failure, and elevated transaminase enzymes. The patient was hospitalized in an isolated room and received a comprehensive treatment regimen for ten days, which included acyclovir therapy 800 mg tablet every five hours, paracetamol 500 mg every eight hours as needed for fever or pain, salicylic 2% powder on intact blisters, fusidic acid 2% cream on the abrasion areas, injection of moxifloxacin 400 mg every 24 hours, N-acetylcysteine 500 mg every eight hours, curcuma tablet every eight hours, and insulin 16 IU injections every eight hours. Moxifloxacin was indicated in this case based on sputum culture results. After eight

days in the hospital, the patient's clinical condition improved, with a reduction in shortness of breath, and the patient was discharged and scheduled for outpatient care, as supported by laboratory and radiology results. After being discharged, the patient visited the outpatient clinic twice. At the first visit, seven days following discharge, the crusts had dried and partially flaked off, with no additional complaints. Fourteen days had passed since the initial discharge, all crusts had peeled off, and there had been no more complaints.

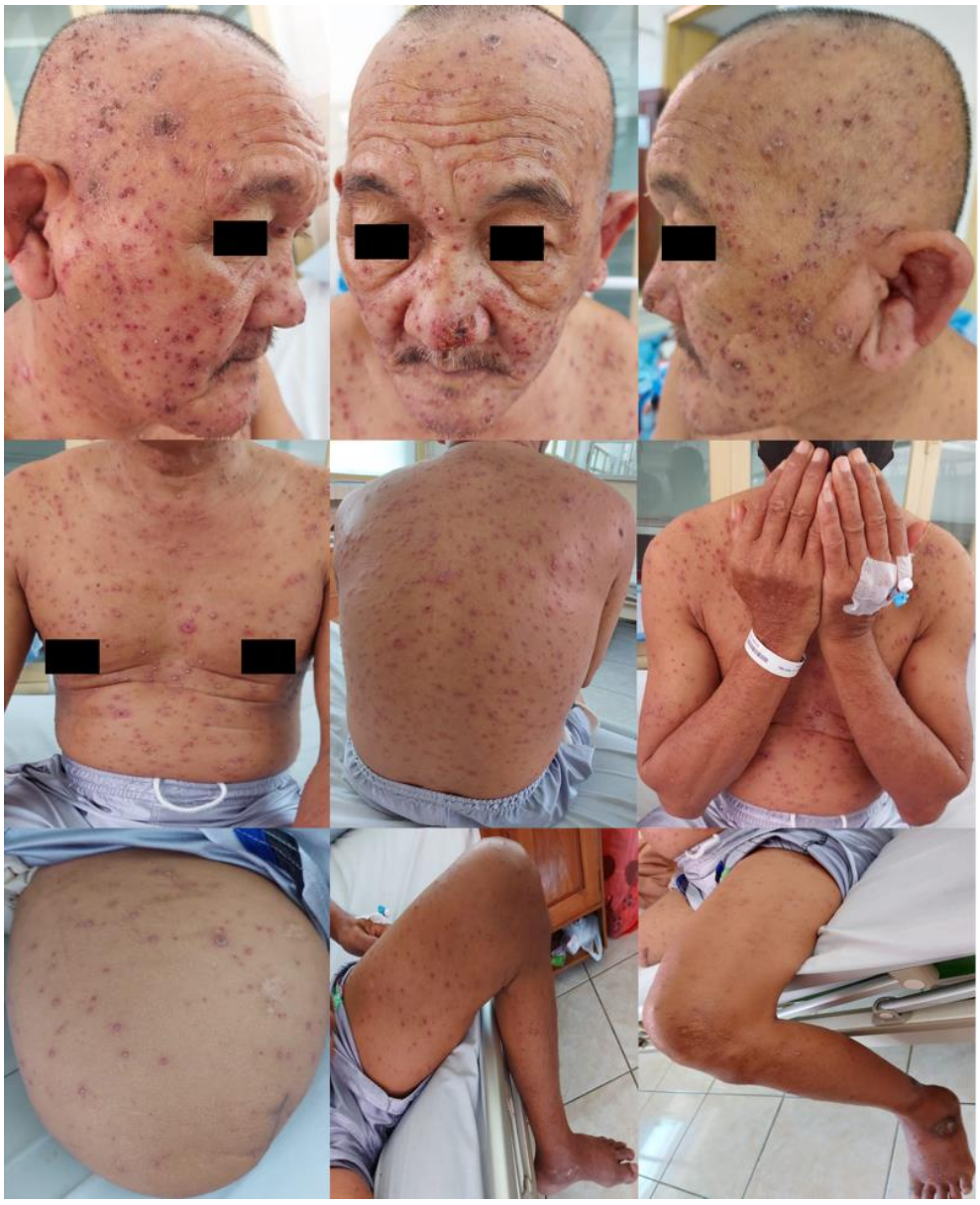

Figure 1. Multiple vesicles at various stages scattered throughout the patient's body, including vesicles filled with cloudy fluid, yellow-black crusts, pustules, and erosions.

Discussion

VZV is the etiology of varicella, and the primary infection is acquired through the respiratory tract, with an incubation period of 10–21 days, after which a characteristic vesicular rash develops on the skin [8]. A history of contact with an infected individual can often be identified. The diagnosis of varicella is supported by the patient's clinical presentation, including vesicles filled with cloudy fluid, yellow-black crusts, multiple pustules, and widespread erosions [9]. The presence of multinucleated giant cells found in the Tzanck smear examination further substantiates the diagnosis [10]. In this patient's case, typical lesions were observed, and multinucleated giant cells were identified on the Tzanck smear examination.

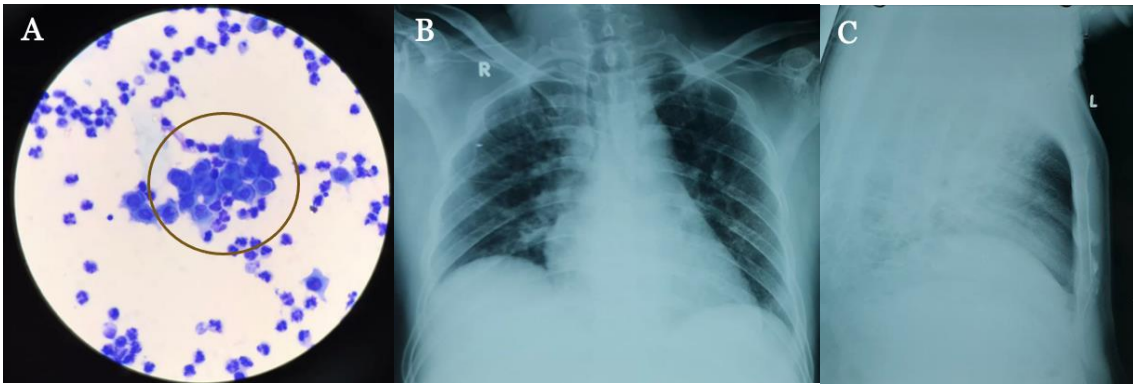

Figure 2. Supporting examination of the patient. (A) Tzank smear examination revealed a multinucleated giant cell (red circle). (B-C) The chest X-ray showed a thickening of the right hilum.

The innate, humoral, and cell-mediated immunity systems contribute to the elimination of varicella infection [2]. Upon infection, CD4+ T cells release gamma interferon (IFN-γ), which stimulates CD8+ T cells and increases the expression of major histocompatibility complex class II (MHC-II) on infected cells [3]. This upregulation facilitates the lysis of the pathogen by CD4+ T cells in the skin. T cell-mediated immunity declines with age, leading to diminished B cell and T cell responses to pathogens, thereby increasing susceptibility to infections [10]. This age-related decline in immune function is known as immunosenescence. Immunocompromised patients exhibit significantly lower cell-mediated immunity compared to healthy individuals, which makes them more susceptible to severe symptoms or complications [12].

Complications commonly observed in elderly individuals include pneumonia, encephalitis, and secondary skin infections [2]. In the presented case, the patient, being elderly and immunocompromised, developed a VZV infection likely due to exposure to VZV and impaired immune response. The increased incidence of pulmonary infections in this population is associated with declines in the innate immune functions of alveolar macrophages and neutrophils, as well as alterations in toll-like receptor (TLR) signaling, and changes in cytokine and chemokine production. These factors contribute to diminished bacterial clearance and reduced bactericidal activity in elderly individuals [13].

Varicella pneumonia, a severe complication of VZV, is associated with significant morbidity. A study indicates that varicella pneumonia is a serious condition with a high clinical impact [11]. The clinical presentation typically includes cough, dyspnea, pleuritic chest pain, and hemoptysis, which usually manifest one to six days after the appearance of the varicella rash [3]. Another study conducted in an Iranian hospital reported that over one-third of pneumonia patients were elderly, with a higher prevalence among males compared to females [14]. In this case, the patient was male with underlying conditions, including a high-risk chronic obstructive pulmonary disease (COPD) due to a long history of smoking, as well as diabetes. Although varicella can be an etiological factor for pneumonia, *K. pneumonia* and smoking are additional risk factors, especially in the elderly [7,9]. Overall, varicella pneumonia mortality ranges from 10% to 30%, with mechanical ventilation patients seeing rates as high as 50% [15].

The radiological chest X-ray of varicella pneumonia reveals multiple bilateral nodules measuring 5–10 mm with ill-defined borders. These nodules may overlap but are not consistently present [16]. High-resolution computed tomography (CT) scan could further highlight these features, including a diffuse ground-glass halo appearance in both lungs [17]. A characteristic chickenpox-like rash in patients with infiltrates on a chest computed tomography scan was identified as varicella pneumonia [18]. Occasionally, lymphadenopathy, reticular opacity, and pleural effusion may also be detected [3]. In this case, inflammation and thickening were observed in the right hilum of the lung based on the chest X-ray.

In immunocompromised patients with varicella, intravenous antiviral therapy achieves higher systemic drug levels compared to oral administration. The standard course of intravenous therapy typically lasts 7–10 days and may be transitioned to oral antivirals once the patient has been free of new lesions for 48 hours or when all lesions have crusted [1,5]. It is important to note

that intravenous antivirals, such as acyclovir, have nephrotoxic potential [1,5,19]. In the population-based study of older adults, oral acyclovir was not associated with a higher risk of acute kidney injury compared with famciclovir [20]. In cases of renal impairment, adjustments to antiviral therapy may be necessary. In this patient, due to pre-existing renal issues and the appearance of the final lesion for more than 48 hours with progression to the crusting stage, oral antivirals rather than intravenous were administered.

The patient's culture results revealed a secondary infection of *K. pneumoniae* due to pneumonia, consistent with several previous studies [11,21]. *K. pneumoniae* is a Gram-negative bacterium recognized as an opportunistic pathogen that could cause a wide range of infections in humans. It is traditionally associated with bacteremia, pneumonia, and urinary tract infections in immunocompromised or frequently hospitalized individuals [22]. This bacterium also commonly colonizes human mucosal surfaces, including the gastrointestinal tract and oropharynx [23]. *K. pneumoniae* may also be associated with co-infection in cases of severe varicella pneumonia in adults [24].

Conclusion

Varicella is uncommon in the elderly population; however, when it does occur, it frequently presents with varicella pneumonia, which can exacerbate the condition. If severe complications are not promptly addressed, they may result in mortality. Therefore, early detection and comprehensive management are crucial for elderly patients, particularly those who are immunocompromised or have additional systemic disorders that may influence therapeutic considerations.

Ethics approval

Written informed consent was obtained from the patient for publication.

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Competing interests

All the authors declare that there are no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available as part of the article.

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