

Varicella Pneumonia in an Adult with Immunocompromised Status: Case Report

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Research Article

Keywords: varicella, varicella pneumonia, Varicella-Zoster Virus (VZV), hyp immunity

Posted Date: September 13th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-880702/v1>

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Abstract

Varicella is an acute infectious disease caused by the varicella zoster virus. It mainly occurs in infants and preschool children, the morbidity is only 2% in adults. Adult chickenpox is a self-limited disease, which is easier to control the development of rashes to some certain extent, shorten the course of the disease, reduce or avoid long-term complications. We present the case of a 23-year-old man with varicella. He had a two-day fever and four-hour erythematous rashes. The rashes spread around the face, two arms, and trunk. No special finding was in laboratory examination but low immunity. Computed tomography of the chest revealed obvious pneumonia manifestation of two lungs. Varicella pneumonia was considered and antiviral therapy, as well as Chinese patent drug of inhibiting lung-energy and dispersing heat, were applied. Fourteen days later, he was fully recovered. Varicella pneumonia was one of the severe forms, especially in hypimmunity patients while low immunity may be its main cause. All patients with varicella should detect immunity-related laboratory tests included in lymphocyte subsets, which was important to help their recovery and cut costs.

Introduction

Varicella, also called chicken pox, is an acute and highly contagious disease caused by the Varicella-Zoster Virus (VZV), also called varicella virus (VZ) or Zoster Virus (ZV), a member of the alpha herpesvirus (HPV) family [1], in which fever, red maculopapule, herpes and crustaceous eruption on the skin and mucous membrane all over the body were included in the main features. The rash presents a centripetal distribution, mainly on the skin of the chest, abdomen, back, and few limbs. Respiratory droplets or direct contact with infection is the major route of chicken pox transmission. Patients with herpes fluid and oral secretions contain the pathogen of VZV. The morbidity and mortality due to the primary and secondary diseases that VZV causes, varicella and herpes zoster (HZ), are significant [2]. The incidence of HZ increases with age or immunosuppression [1]. And the symptom of an infected adult can be serious, usually accompanying with pneumonia or encephalitis, especially in immunocompromised cases. Fortunately, available both vaccines to prevent varicella and effective antiviral drugs diminish the incidence and ameliorate sequelae of HZ [2]. We herein present a case who was infected by VZV and eventually developed into pneumonia, the main cause being the hypimmunity.

Case Presentation

A 23-year-old Chinese man presented to our hospital with a two-day fever (the top temperature being 37.7°C) and four-hour erythematous rashes. He complained of sore throat, stuffy nose, runny nose, dizziness, and chills at a fever. Additionally, he developed rashes during the fever, which emerged first on his face and immediately spread around his body, accompanied by itching. He took ibuprofen or xiaochaihu granules for antipyretic, cefuroxime or cefaclor for antibacterial, oseltamivir for antiviral. However, his conditions were steadily worsening. He took part in the Chinese national routine immunization program as he was growing up while he claimed that he had been being healthy over the past few years and denied any exposure to infectious diseases included of varicella.

The physical examination showed a heart rate of 72/min, blood pressure of 143/86 mmHg, respiration rate of 18/min, body temperature of 36.7°C. There were erythematous rashes and vesicular rashes with itching all over his face, two arms, and trunk, part of rashes with ulceration. There were blushes around the rashes, part of them with pustules in the center or pits in the center (see Fig. 1). He had laryngeal mucosal hyperemia and normal tonsil while he had also no thick breathing, rhonchi, or moist crackles. And superficial lymph nodes were not enlarged.

On admission, laboratory testing revealed normal white blood cell (WBC) count ($4.5 \times 10^9/L$) (reference range: $3.5-9.5 \times 10^9/L$), elevated neutrophil percentage (78.8%) (40.0–75.0%), decreased lymphocyte percentage (12.9%) (20.0–50.0%) and count ($0.58 \times 10^9/L$) ($1.1-3.2 \times 10^9/L$). The serum procalcitonin (PCT) (0.32ng/mL) (0-0.05ng/mL) and serum C reaction protein (CRP) (31.44mg/L) (0-10mg/L) were elevated. Peripheral blood lymphocyte subsets examination revealed that lower CD3 + CD4 + T percentage and count, CD4 + T /CD8 + T ratio, B cell percentage and count, and higher CD3 + CD8 + T cells percentage, NK cell percentage and count. Both CD16+/56 + NK cells and CD3 + CD16+/56 + NKT cells were with higher percentage and normal counts close to the lowest limit of reference ranges. The percentage and count of CD3 + T cells and the count of CD3 + CD8 + T cells were normal (see Table 1). The other laboratory evaluation indicators were generally normal.

Table 1
Laboratory findings for lymphocyte subsets

Project	Results	Reference ranges
CD3 + T%	72.19 %	64.60 ~ 77.10%
CD3 + CD4 + T%	28.39 %	32.70 ~ 44.20%
CD3 + CD8 + T%	42.70 %	24.80 ~ 36.00%
CD4 + T/CD8 + T Ratio	0.66	0.80 ~ 1.72
CD19 + B%	7.96 %	14.50 ~ 30.30%
CD16+/56 + NK%	15.76 %	6.40 ~ 12.50%
CD3 + CD16+/56 + NKT%	12.13 %	1.05 ~ 6.05%
CD3 + T count	830 cells/ μ L	1100 ~ 3200 cells/ μ L
CD3 + CD4 + T count	326 cells/ μ L	550 ~ 1440 cells/ μ L
CD3 + CD8 + T count	491 cells/ μ L	320 ~ 1250 cells/ μ L
CD19 + B count	92 cells/ μ L	90 ~ 360 cells/ μ L
CD16+/56 + NK count	181 cells/ μ L	150 ~ 1100 cells/ μ L
CD3 + CD16+/56 + NKT count	139 cells/ μ L	

The initial computer tomography (CT) of chest showed multiple nodular high density shadows in the upper lobe of two lungs and the lower lobe of the left lung (see Fig. 2) .

Based on the skin presentation and CT scanning of the chest, he was diagnosed with varicella pneumonia. The patient was treated with valaciclovir and LianHua QingWen granule. Three days later, his symptoms significantly improved. Then, he was discharged and isolated at home with “valaciclovir, LianHua QingWen granule, moxifloxacin hydrochloride ”. Fourteen days later, he presented to be fully recovered.

Written informed consent was obtained from the patient for publication of this study and any accompanying images. And all procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013).

Discussion

Chickenpox is a childhood disease responsible for complications and deaths, particularly in the high-risk population. And a survey from Poland in 2017, there was a slight increase in the number of smallpox cases compared to the previous year. The incidence of varicella in 2017 was 450.8 per 100,000 and was higher than in 2016 [3]. The efficacy of routine vaccination has been demonstrated with a decrease in chickenpox incidence and with the development of herd immunity [4]. Over time, the protective antibody titer of vaccinated people decreases and caused part of them to become easier to catch chickenpox. In one seroprevalence survey for varicella from Italy, 784 (93.3%) vaccinated people of all ages over 18 years were protected for VZV IgG antibodies level, but protection levels for varicella are inadequate, and no significant difference was found between males and females [5]. The patient was a 23-year-old Chinese male adult who had taken part in the national routine immunization program, it is possible that the lower VZV antibody level contributed to his VZV infection and varicella.

Varicella infection is considered to be benign from a clinical point of view, but complications, which included in infectious disease as pneumonia, neurological, and hematological sequelae as encephalitis or purpura, can occur in 2–6% of cases [6].

Microbial pathogens possess an arsenal of strategies to invade their hosts, evade immune defenses and promote infection. In particular, they use virulence factors to manipulate host cellular processes and establish a replicative niche. In the face of such a challenge, it is required host mechanisms to detect and counteract these pathogen-specific virulence strategies [7]. However, eukaryotes have evolved to detect effector-mediated virulence strategies through a phenomenon termed effector-triggered immunity (ETI). Although ETI was discovered in plants, animals also detect pathogen infection through ETI and effector-mediated responses [8]. The innate immune cells rely on their pattern recognition receptors (PRR) to recognize conserved pathogen-associated molecular patterns (PAMPs) and microbe-associated molecular patterns (MAMPs) such as microbial nucleic acids, lipoproteins, and carbohydrates that are expressed only in pathogens and not in the host [9] and inhibit or kill the pathogen. Lymphocyte subsets

examination showed that this case had inactive and lower cellular immunity and humoral immunity through increased NK and NKT could partly help prevent some pathogens. Just as immunodeficiency, his conditions caught VZV, and got worse, and eventually caught varicella pneumonia. Inflammation also plays an essential role in the control of pathogens and in shaping the ensuing adaptive immune responses. The patients on immunosuppressive therapy have more opportunistic infectious events, in which the most frequent (68%) were caused by HPV [10]. Likewise, the patients who accepted immunosuppressive treatment had a shorter time to catch varicella and develop varicella cellulitis, sepsis, and cerebellitis [11]. One survey from the USA, the incidence of VZV was highest in patients with bone marrow or stem cell transplant (43.03 %) followed by solid organ transplant, human immunodeficiency virus (HIV) infection, and systemic lupus erythematosus (SLE). VZV incidence rates were higher among persons on immunosuppressants/chemotherapy than among non-users [12].

In conclusion, this case was a patient with weaker immunity, which caused him to catch VZV and develop varicella, and eventually pneumonia. This case suggested that all patients with varicella should detect immunity-related laboratory tests included in lymphocyte subsets, which was important to help their recovery and cut costs.

Declarations

Ethics Approval and Consent to Participate

Written informed consent was obtained from patients with approval by the Institutional Review Board in The First Hospital of Hebei Medical University.

Consent for Publication

Not applicable.

Availability of Data and Materials

The data that support the case report are available on request from the corresponding author.

Conflicts interests

The authors have no conflicts of interest to declare.

Funding and supporting

This work was supported by the Natural Science Foundation of Hebei Province (No. C2018206037) Key Science and Technology Research Programme of Health Commission of Hebei Province (NO. 20180224 and No. 20201159), Geriatric Disease Project of Hebei Province (No. LNB201902), Key Research and Development Projects of Hebei Province (No. 1827772727D), The introduction project of returnees (C20210347).

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Figures

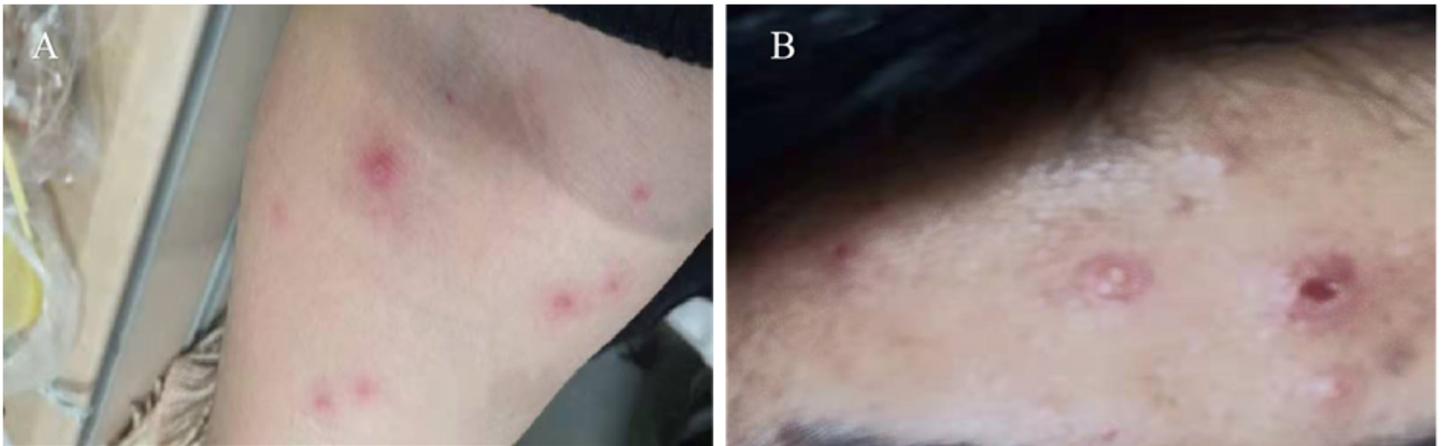


Figure 1

The arm (A) and the forehead (B) of the patient. The picture shows vesicular rashes, in which some have pustules or pits in the center.

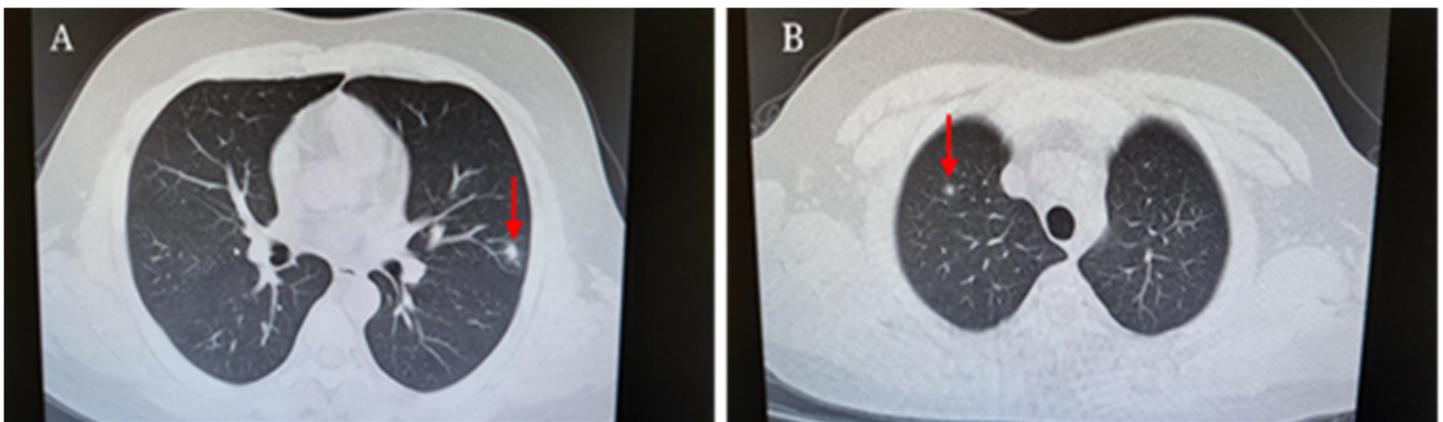


Figure 2

The results of chest tomography scanning on admission in two different sections.