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INFLUENZA-A IN AN IMMUNOCOMPROMISED PATIENT WITH HIV: A CASE REPORT

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ABSTRACT

Influenza virus A is a highly contagious respiratory pathogen that has significant risks for individuals who are severely immunocompromised, especially those people living with HIV/AIDS (PLHA) and diabetes mellitus. These populations are at a greater chance of suffering from severe disease, prolonged illness, and complications requiring intensive monitoring. A 51- year-old female with HIV was on antiretroviral therapy since 2020 and has type-2 diabetes for 24 years, now diagnosed with Influenza A. She was presented with fever, fatigue, and intermittent dizziness and admitted to the hospital. Laboratory investigations found severe hyperglycemia (random blood glucose: 337 mg/dL), neutrophilic predominance (85.8%), and positive influenza A status. The patient was managed with oseltamivir empirically. Measures were taken to control her blood sugar while in the hospital; this had led to clinical improvement and successful discharge. The case highlights the complexities of influenza management in those who are immunocompromised, hence the need for early antiviral therapy, glycemic control, and close monitoring to prevent complications.

KEYWORDS: Influenza, HIV, immunocompromised, type II diabetes mellitus, acute respiratory distress syndrome.

INTRODUCTION

A contagious and ever-changing viral disease called influenza A predominantly affects the respiratory tract, with common symptoms such as fever, cough, myalgia, and fatigue. Influenza A is one of the four types of influenza Virus A, B, C, D and types A and B are primarily involved in seasonal influenza epidemics. By definition, influenza A comprises the other human flu viruses, with its capability of infecting a much wider audience, including humans,

birds, and pigs, thus increasing further chances for zoonotic transmission, also pandemic spread based on genetic reassortment and antigenic drift.[1,2]

The virus is a member of the Orthomyxoviridae family and has an enveloped, segmented negative-sense RNA genome. Its segregation makes genetic reassortment possible when two dissimilar influenza viruses infect the same cell, giving rise to new strains with greater virulence or transmissibility.[3] Its hemagglutinin (H) and neuraminidase (N) surface glycoproteins are critical to viral entry and replication and form the foundation of its subtype classification (e.g., H1N1, H3N2). The ongoing antigenic drift of these proteins requires constant revision of influenza vaccines to keep them effective.[4]

The greatest risk is found in vulnerable populations like young children, older adults, pregnant women, and those with chronic diseases like cardiovascular disease, diabetes, and chronic respiratory illness.[5] Worldwide, seasonal flu infections cause an estimated 3–5 million severe illnesses and as many as 650,000 deaths from respiratory causes yearly.[6] Early identification by molecular tests, including reverse transcription-polymerase chain reaction (RT-PCR), and prompt use of neuraminidase inhibitors such as oseltamivir or zanamivir can greatly minimize disease severity and complications.[7]

Moreover, the emergence of several highly pathogenic avian influenza subtypes such as H5N1 and H5N2 also continues to pose a grave public health threat, given their zoonotic properties and high human mortality rates.[8]

Influenza A emerges as one of the most prevalent viral infections globally, accounting for a considerable amount of disease burden and death, especially in high-risk groups. It spreads quickly through respiratory droplets and affects mainly the upper and lower respiratory tracts. An individual with good immune system, make a full recovery without complications, although those with compromised immune systems, such as those afflicted with HIV/AIDS and diabetes mellitus, are at increased risk for more severe disease, prolonged illness, and subsequent bacterial complications. HIV infection causes immunosuppression via its impairment of cellular immunity, creating a boost in viral replication, a delay in viral clearance, and a prolongation of disease duration. In addition, PLHIVs with a low CD4 count are more prone to suffering from influenza complications that include but are not limited to bacterial pneumonia, opportunistic fungal infections, and sepsis. The severity of influenza is compounded by diabetes through impairment of neutrophil function, disruption of cytokine regulation, and promotion of systemic inflammation. Hyperglycemia also contributes to immune system disruption, conferring increased odds of developing severe viral infections and responses from cytokine storms. Given these risks, early antiviral therapy, optimized glycemic control, and supportive management are crucial for improving outcomes in the patient.

CASE PRESENTATION

A 51-year-old female was admitted to the hospital with complaints of high-grade fever for three days, severe fatigue that has progressively worsened for two days, headache, and a history of giddiness on and off. There were no complaints of cough, breathlessness, sore throat, or chest pain. However, since she was immunocompromised due to her HIV infection and had long- standing diabetes, it raised concerns about the possible development of pneumonia or metabolic decompensation. She has a medical history of HIV/AIDS and has been on antiretroviral therapy (ART)-Forstavir 3 since 2020. She also had a history of type 2 diabetes mellitus for 24 years and was managed with Metformin-500mg. She had an LSCS and hysterectomy done at the age of 41. On general examination, the patient

appeared weak, febrile, and mildly dehydrated. Upon admission, her vitals showed low blood pressure of 100/60 mmHg, increased pulse rate of 100 beats per minute, respiratory rate of 20 breaths per minute, and oxygen saturation of 98%. Body temperature was found to be 101.9°F. Cardiovascular and pulmonary systems were within normal limits, though the respiratory system had minimal bilateral basal crepitations in the lungs, the abdomen was soft and there were no focal neurological deficits noted in the central nervous system. Her random glucose level was significantly higher which was 337 mg/dl as compared to the normal range of 60-140 mg/dl. Hematological parameters like Hb and PCV showed a slight decline from the normal range and there was a significant decrease in the lymphocytes which indicates there was a infection and immunological reactions involved as indicated in the table *1*. Her renal parameters were more or less normal except for a slight decrease in the sodium levels as indicated in the table *2*. Liver function was normal as depicted in the table *3*. Procalcitonin test was also done to rule out the possibility of bacterial infection, procalcitonin level was at 0.06 ng/ml in this patient, which was lower than the reference range of <0.5 ng/ml.

Laboratory Investigations

Table 1: Hematological Investigations.

Lab parameters	Observed value	Reference value
Hb	10.6 g/dl ↓	12-16 g/dL (Female)
PCV	35% ↓	36 - 46%
WBC	6560 cells/mm³	4000 - 11000 cells/mm³
RBC	4 mill/mm³	3.8 - 4.8 mill/mm³
MCV	87 fL	80 - 100 fL
MCH	27 pg/cell	27 - 31 pg/cell
MCHC	31 g/dl	31 - 35 g/dl
RDWCV	12.3%	11.6 - 14 %
Platelet	223000 cells/mm³	150000-450000 cells/mm³
Neutrophils	85.8%	40 - 80%
Lymphocytes	8.1% ↓	20 - 40%
Monocytes	5.5%	2 - 10%
Eosinophils	0.3%	1 - 6%
Basophils	0.3%	0 - 1%

Table 2: Renal Function Test.

Lab parameters	Observed value	Reference value
Blood Urea Nitrogen	24 mg/dl ↑	13- 43 mg/dl
Creatinine	0.59 mg/dl ↓	0.6 - 1.1 mg/dl
Sodium	132 mmol/L ↓	136 - 145 mmol/L
Potassium	4.10 mmol/L	3.5 - 5.1 mmol/L

Table 3: Liver Function Test.

Lab parameters	Observed value	Reference value
ALT	20 U/L	1 - 34 U/L
AST	20 U/L	1 - 31 U/L

Culture Test

The culture and sensitivity test showed no bacterial growth after 24 hours, indicating no significant bacterial infection. The viral panel results confirmed a positive test for Influenza A, while tests for SARS-CoV-2, Influenza B, and RSV were negative. This suggests that the patient's symptoms were likely due to influenza A rather than other common respiratory viruses.

Diagnosis

Based on clinical presentation and laboratory findings, the patient was diagnosed with influenza. An infection in the setting of HIV and uncontrolled type 2 diabetes mellitus.

Treatment and Management

The patient was initiated on a multidisciplinary treatment approach to address influenza A infection, HIV, and uncontrolled type 2 diabetes mellitus (T2DM) while preventing complications associated with her immunocompromised status. Given the increased risk of secondary bacterial infections, empirical broad-spectrum antibiotic therapy with Piperacillin- Tazobactam (Piptaz) 4.5 g IV twice daily was administered. Concurrently, Oseltamivir (Tamiflu) 75 mg twice daily was started promptly to limit viral replication and disease progression. Fever management was achieved using paracetamol (Calpol) 500 mg every six hours, and pantoprazole 40 mg at night was administered to prevent acidity. Since the patient experienced upper respiratory symptoms, Cetirizine 10 mg once daily was prescribed to relieve allergic manifestations, and Codistar syrup (5 ml once daily) was included for cough suppression and symptomatic relief.

Given the patient's HIV-positive status, her antiretroviral therapy (Forstavir-3, a Tenofovir-based regimen) was continued as per standard protocol to maintain viral suppression and immune function stability. Additionally, B-Complex supplementation was administered once daily to enhance nutritional status and immune resilience. Considering the significantly elevated blood glucose levels (random blood glucose: 337 mg/dL), glycemic control was a priority. Her existing Metformin therapy (Glyciphage-SR)-500mg was continued post-meals to optimize insulin sensitivity and prevent further metabolic derangement. Intravenous fluids were administered to ensure hydration and correct electrolyte imbalances associated with fever and hyperglycemia.

Upon clinical improvement, the patient was discharged with a structured outpatient regimen to support her continued recovery and prevent post-infectious complications. She was prescribed Oseltamivir (Tamiflu) 75 mg twice daily for four days to complete the antiviral course, Pantoprazole 40 mg once daily for five days, and Econom (1-0-1) for three days as a gastroprotective agent. Paracetamol (Calpol) 500 mg (1-1-1) for five days was advised for persistent fever, while Cetirizine 10 mg at night for five days was continued to address any residual respiratory symptoms. Forstavir-3 (ART) and B-Complex supplementation were continued as per protocol to ensure HIV viral suppression and overall health maintenance. Metformin (Glyciphage-SR)-500mg (1-0-1) post-meals remained a critical part of her diabetes management plan. Additionally, Codistar syrup (5 ml three times daily for five days) was prescribed for cough relief, and Ketonov 10 mg was given on an SOS basis for symptomatic management for headache.

The patient was to follow up with a series of lab investigations one week post-discharge, including FBS, PPBS, CBC, RFT, LFT, HbA1C, and urine examination, to assess glycemic control, infection resolution, and the general organ's functions. This comprehensive and systematic strategy achieved the treatment of the patient’s acute influenza infection together with the preparations for potential metabolic and immunological risks, which led to complete recovery.

DISCUSSION

The Influenza A virus is capable of causing severe illnesses in humans. These diseases may range from mild ones, such as respiratory tract infections, to life-threatening complications like pneumonia, acute respiratory distress syndrome (ARDS), and even multi-organ failure.[9] Influenza presents unique dilemmas among immunocompromised patients,

especially those with HIV/AIDS and diabetes.[10] The latter, with usually higher viral loads among most HIV-positive individuals and prolonged viral shedding, presents the greatest risk for severe disease and development of secondary bacterial infections.[11] In particular, those with CD4 counts lower than 200 cells/μL are at a higher risk for complications associated with influenza.[12] Although this patient's CD4 count was unknown, her history of HIV and ART therapy indicated a compromised immune system, further compounded by diabetes, which also increases the severity of infections.[13]

The treatment plan supported an early initiation of oseltamivir to reduce viral replication and disease severity, along with empiric antibiotic therapy to mitigate the incidence of secondary bacterial pneumonia.[14] Glycemic control measures were also implemented to prevent metabolic complications associated with diabetes.[15] Given the high risk of bacterial superinfection in immunocompromised patients, empirical antibiotic coverage serves as a crucial therapeutic adjunct to reduce the likelihood of pneumonia.[16] Otherwise, the patient would be at risk for ARDS, severe bacterial superinfection, and metabolic complications from hyperglycemia.[17]

CONCLUSION

The case brings the need for early diagnosis and immediate use of antiviral drugs with metabolic management in immunocompromised patients suffering from influenza. The combination of oseltamivir treatment with appropriate glycemic management has had a significant impact on reducing morbidity and hospitalization due to greater severity variations of influenza in HIV- positive patients coinfected with diabetes. Moreover, preventive strategies, particularly annual influenza vaccination, should be accorded the highest priority for vulnerable populations, which include individuals having HIV/AIDS (PLHA) and those with diabetes. Vaccination should be strengthened as the case strikes the action: optimal control of glycemia and timely use of antiviral agents, lead to an improvement in the outcome of high-risk patients with influenza.

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