CASE REPORT

A Case of Nosocomial Coinfection of SARS-CoV-2 and Influenza A Virus in a Hospitalized Patient with Acute Myocardial Infarction

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SUMMARY

Background: Inpatients in cardiovascular medicine departments often have complicated conditions, long hospital stays, and a high risk of nosocomial infection. Good infection control is of great importance for the treatment and rehabilitation of inpatients in cardiovascular medicine departments. Methods: We report a case of coinfection with the 2019 novel coronavirus (SARS-CoV-2) and influenza A virus in a hospitalized patient with acute myocardial infarction. We used reverse transcription real-time fluorescence quantitative PCR to detect SARS-CoV-2 and influenza A virus and used the Ct value to represent the relative concentration of the above two viruses. Results: The patient was tested for SARS-CoV-2 nucleic acid and influenza A and B virus nucleic acid in the early stage of hospitalization, and the results were negative. On the 39th day of admission, the nucleic acid test result for SARS-CoV-2 was positive (ORF1ab gene, Ct value 24.63; N gene, Ct value 24.55); on the 48th day of admission, the nucleic acid test result for influenza A virus was positive (Ct value, 21.32), indicating hospital-acquired respiratory virus coinfection. Conclusions: Clinicians should be highly cognizant that SARS-CoV-2 may become a new high-incidence pathogen of nosocomial infection. In-hospital monitoring of common respiratory viruses should be considered to detect infected patients early and prevent common respiratory viruses from spreading in hospitals.


KEYWORDS

SARS-CoV-2, influenza A virus, coinfection, nosocomial infection

INTRODUCTION

According to the Report on Cardiovascular Health and Disease in China 2021: An Updated Summary released in 2022, the number of individuals with cardiovascular disease in mainland China has reached an astonishing 330 million, and among disease mortality rates, that for cardiovascular disease ranks first [1]. Nosocomial infection is a common complication in cardiovascular medicine departments. The occurrence of nosocomial infections not only increases the mortality rate but also increases patient suffering and medical staff workload, reduces the hospital bed turnover rate, and causes signifi-
cant additional economic losses for patients and society [2]. Since March 2023, China’s domestic 2019 novel coronavirus (SARS-CoV-2) infection rate has shown a low-level epidemic trend, and that for influenza A virus infection has shown a clear upward trend. Herein, we report the case of 1 patient with acute myocardial infarction with hospital-acquired SARS-CoV-2 and influenza A virus coinfection.

CASE PRESENTATION

The patient, a 76-year-old male, was admitted to the Cardiology Department of our hospital due to an acute myocardial infarction on February 11, 2023. During the admission period, which coincided with the high incidence of nosocomial respiratory virus infections, the patient underwent nucleic acid screening tests for SARS-CoV-2 and influenza A and B viruses on March 4, and the results were negative. Later, because the patient presented paroxysmal shortness of breath and chills at night, nucleic acid tests for influenza A and B viruses were repeated on March 19, and the results were negative. On March 22, the nucleic acid test result for SARS-CoV-2 was positive ORF1ab gene, Ct value 24.63; N gene, Ct value 24.55 (Figure 1). After several days of anti-SARS-CoV-2 treatment, the patient was diagnosed with influenza A virus infection on March 31 (Ct value 21.32, Figure 2), and chest computed tomography (CT) indicated bilateral pneumonia on April 5 (Figure 3). The patient was monitored for SARS-CoV-2 and influenza A virus until April 15, when tests for both were negative (Figure 4).

DISCUSSION

Influenza is an acute respiratory infectious disease caused by influenza virus. Before the novel coronavirus 2019 (COVID-19) pandemic, the peak of influenza A infection in mainland China generally occurred in autumn and winter [3,4]. However, at the end of February 2023, the number of people infected with influenza A increased rapidly, approximately 2 months after the previous normal influenza season. The reasons for this late peak may include the following. First, the influenza A virus has not been circulating in mainland China in the past three years due to the various measures to prevent COVID-19. In addition, the vaccination rate for influenza A is low, resulting in a decrease in the preexisting immunity of the population, especially children and elderly individuals, against influenza A virus. Second, after the implementation of “managing COVID-19 with measures against Class B infectious diseases” in mainland China at the beginning of 2023, the movement of the international population and domestic population in China and the normalization of social activities led to an influenza A infection peak after the SARS-CoV-2 infection peak, and thus, the probability of nosocomial infections in hospitals greatly increased. Twenty days after admission, the patient underwent SARS-CoV-2 and influenza A and B virus nucleic acid screening tests, and the results were negative. Later, he tested positive for SARS-CoV-2 and influenza A virus, indicating a nosocomial infection event. Based on Ct values for the viruses (Figure 4), the patient was coinfected with SARS-CoV-2 and influenza A virus. The two virus strains were sent to the Centers for Disease Control and Prevention of Shaoting City, where the strains were identified as Omicron BA.5 (SARS-CoV-2) and influenza A H1N1 virus. The patient was infected with SARS-CoV-2 and influenza A virus concurrently, possibly due to the following factors. 1) SARS-CoV-2 was highly infectious at the time, and influenza A infection peaked in the same period. 2) This elderly patient presented declining body functions, poor organ reserve function, accompanied by different degrees of decline in immune function and significantly weakened resistance; therefore, he was susceptible to infection by pathogens [5]. 3) The patient had diabetes, and his ability to resist infection was significantly weakened [6]. 4) The patient’s long-term bed rest led to severe pulmonary capillary congestion and poor alveolar elasticity, providing favorable conditions for virus reproduction in the lungs. 5) The patient received invasive treatment measures (such as endotracheal intubation and various puncture treatments), disrupting his defense functions to varying degrees, thus leading to the invasion and reproduction of pathogens. In view of the above risk factors, we believe that in the clinical treatment of elderly inpatients in cardiovascular medicine departments, more attention should be paid to elderly patients, primary diseases should be actively treated, and blood glucose levels should be controlled. After patients are admitted to the hospital, health education should be provided to guide them to develop good hygiene habits; patients who can exercise should be instructed to do so appropriately; patients who are bedridden long-term should be turned over regularly and have their back patted regularly, and those with abundant respiratory secretions should undergo sputum suction in a timely manner; windows should be opened regularly to increase air circulation. When no one is in the ward, ultraviolet disinfection can be performed; additionally, visitation can be appropriately restricted to reduce floating pathogenic microorganisms in the air. Medical staff should study the relevant regulations regarding nosocomial infection management, improve their understanding of nosocomial infections, and develop good daily work habits, such as strict aseptic techniques when performing various invasive procedures. Hospital-acquired respiratory virus infections typically occur in tertiary care hospitals, with rhinovirus, influenza virus, and respiratory syncytial virus being the most common hospital-acquired respiratory viruses prior to COVID-19 pandemic [7,8]. Judging from the recent research data and the current epidemic situation, SARS-CoV-2 infections among the population are not season-
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CONCLUSION

In conclusion, there are many risk factors for nosocomial infections in elderly patients in cardiovascular medicine departments. Active prevention should be provided to high-risk patients and should include the active treatment of primary and comorbid diseases and rational drug use; further nosocomial infection prevention and control should be conducted through the management of the ward environment and operating procedures and improvements in the quality of medical care. Importantly,
SARS-CoV-2 may become a new high-incidence pathogen of nosocomial infections, and thus, hospital monitoring of common respiratory viruses should be considered to detect infected patients early and prevent common respiratory viruses from spreading in hospitals.
Sources of Support:  
This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Declaration of Interest:  
All authors declare that they have no competing interests.

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