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Delay of COVID-19 diagnosis due to aspiration pneumonia

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ABSTRACT

COVID-19 was first confirmed in December 2019 in Wuhan, China and is now spreading worldwide. Diagnosis of COVID-19 is sometimes difficult due to the absence of symptoms and its tendency to be masked by other diseases. In this paper, we report a COVID-19 case in which diagnosis was delayed due to aspiration pneumonia. A 64-year-old man visited our department for evaluation of swallowing function. However, during the examination, the patient aspirated testing food and subsequently developed a fever. Based on his medical history and computed tomography (CT) images, he was diagnosed with aspiration pneumonia and admitted to the hospital to begin treatment. However, after admission, his respiratory condition deteriorated, and the result of a COVID-19 polymerase chain reaction (PCR) test was positive. Previous reports have shown that CT images in cases of COVID-19 pneumonia were normal in the early phase, and abnormalities usually appeared approximately 6–11 days after onset. Common findings of COVID-19 are consolidation, ground-glass opacities, and a distribution of lesions predominantly in the bilateral inferior lung field periphery. It is difficult to differentiate COVID-19 pneumonia from other types of pneumonia; it should therefore be listed as a differential diagnosis during the current pandemic.

1. Introduction

The outbreak of the new coronavirus was confirmed in December 2019 in Wuhan, China and the virus was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) because it is phylogenetically similar to the SARS-CoV [1]. The coronavirus disease 2019 (COVID-19) is now widespread throughout the world. The spread is particularly difficult to control because asymptomatic infected patients can become "super spreaders," [2] and the presence of other underlying pulmonary diseases may inhibit the diagnosis of COVID-19. In the past, during the spread of SARS, there were cases in which the diagnosis of SARS was delayed because aspiration pneumonia masked the findings and allowed the infection to spread. The diagnosis of respiratory infection can therefore be delayed due to comorbidity with other lung lesions [3]. In this paper, we report a case in which aspiration pneumonia was initially suspected but COVID-19 was ultimately diagnosed during hospitalization.

2. Case presentation

The patient was a 64-year-old man. He had a past medical history of cerebral infarction, emphysema, bullous pemphigoid, diabetes mellitus, and diabetic nephropathy, and he required steroid intake and hemodialysis. He complained of dysphagia since the onset of cerebral infarction, and was hospitalized for aspiration pneumonia caused by dysphagia 2 years ago. His SpO_2 level was originally more than 95%

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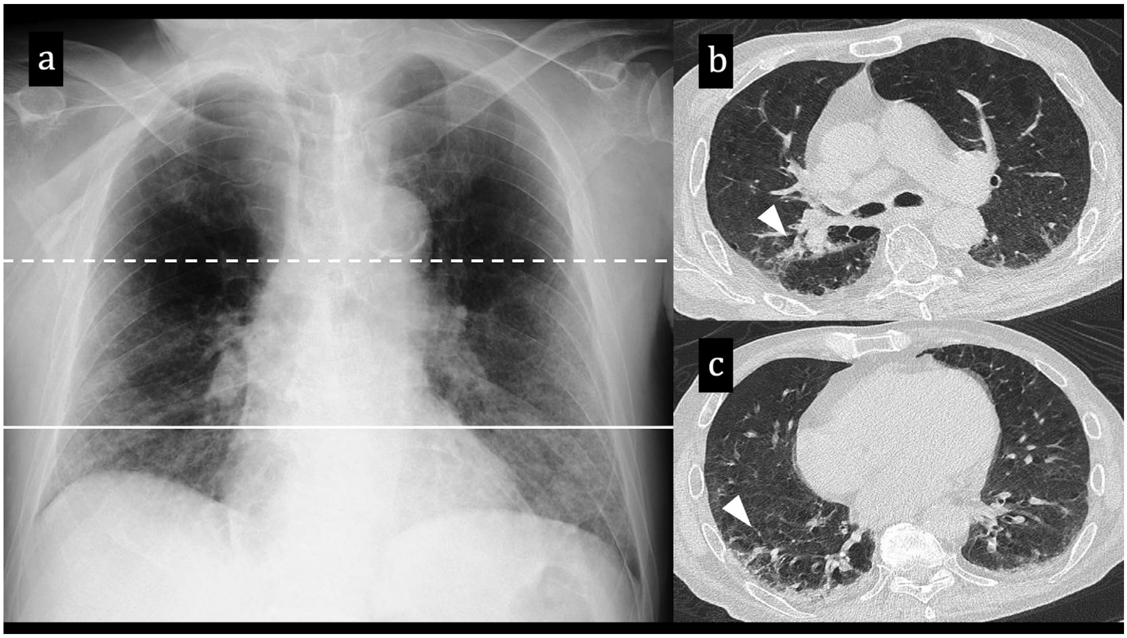

Fig. 1. The initial radiological findings of the patient in the emergency department.
Fig. 1a is a standing chest radiograph which shows consolidation in the right lower lung. Figs. 1b and c show a chest computed tomography scan with the axial view on the white dotted (b) and white lines (c). The consolidation is indicated with a white arrow in Fig. 1b.

without oxygen demand, and he required adjustment of his dysphagia diet. He visited our department for the evaluation of his swallowing function. A flexible endoscopic evaluation of swallowing (FEES) was performed, and it showed dysphagia with a Hyodo score of 8. Subsequently, he underwent videofluoroscopic swallowing study (VFSS), and aspiration of the testing food was observed at that time. VFSS was performed using thin and thick barium. He aspirated 5 mL of thick barium and 3 mL of thin barium. This resulted in a temporary drop in the SpO_2 levels to 93% with room air, which later improved spontaneously. The test was suspended, and the patient returned home. However, when a nurse visited his home 2 days after the examination, he had a fever and hypoxia, and was therefore was admitted to our hospital. On examination, his body temperature was 37.7 °C, his respiratory rate was 22 bpm, and he had hypoxia with a SpO_2 level of 90% (nasal O_2, 2 L). Blood tests revealed the following: C-reactive protein (CRP) 4.33 mg/dL, white blood cell 8000/μL, hemoglobin 13.4 g/dL, and platelet 192 × 10^3 μL. The arterial blood gas test showed the following: pH, 7.513; pO_2, 93 mmHg; pCO_2, 38.6 mmHg; and P/F ratio, 258. Chest CT showed consolidation in the dorsal, peripheral, and lower lobes of the lungs (Fig. 1). Since the white blood cell count was within normal limits and there was no increase in the neutrophils, bacterial infection was not suspected. However, he had been hospitalized for aspiration pneumonia in the past and had an episode of aspiration just before the onset of fever. Therefore, he was diagnosed with aspiration pneumonia and admitted to the hospital to begin treatment with antibiotics. On hospitalization day 5, the patient's SpO_2 levels dropped to 80% (oxygen mask, 10 L), and the arterial blood gas test showed the following: pH, 7.462; pO_2, 56 mmHg; pCO_2, 33.1 mmHg; and P/F ratio, 56. Chest radiographs showed additional shadows in the left lung, and plain chest CT images showed extensive ground-glass opacities (GGOs) in the lower lobes of the lungs, which is observed in cases of COVID-19-related pneumonia (Fig. 2). The patient met the criteria that are presented by the Japanese Government to suspect COVID-19 infection, including fatigue, difficulty in breathing, feeling of chills, body temperature ≥ 37.5°C for more than 4 days, and a past medical history of diabetes [4]. However, we did not perform a PCR test for COVID-19 because all of the symptoms and clinical course matched those of aspiration pneumonia. As the rapid deterioration of respiratory condition and the drastic change of the chest CT findings indicated the presence of another pathogenesis, we then performed PCR to examine the presence of COVID-19 and we obtained a positive result. Afterwards, the sputum retention was strong and the state of frequent hypoxia continued. On the 7th day of hospitalization, he was admitted to an intensive care unit (ICU) and underwent endotracheal intubation, and was placed on mechanical ventilation. Subsequent PCR tests were conducted from samples collected from the intubation tube, and the results continued to be positive. Extubation was attempted on the 19th day of intubation; however, the patient was reintubated on the same day because of difficulty controlling the sputum. Later, his oxygenation did not improve, and a tracheostomy was performed under general anesthesia in the operating room on the 29th day of hospitalization after the diagnosis. The tracheostomy was performed according to the guidebook for tracheostomy published by The Oto-Rhino-Laryngological Society of Japan [5]. After the operation, the patient was discharged from the ICU, and the ventilator was removed. On postoperative day 130 (159th day of onset) the

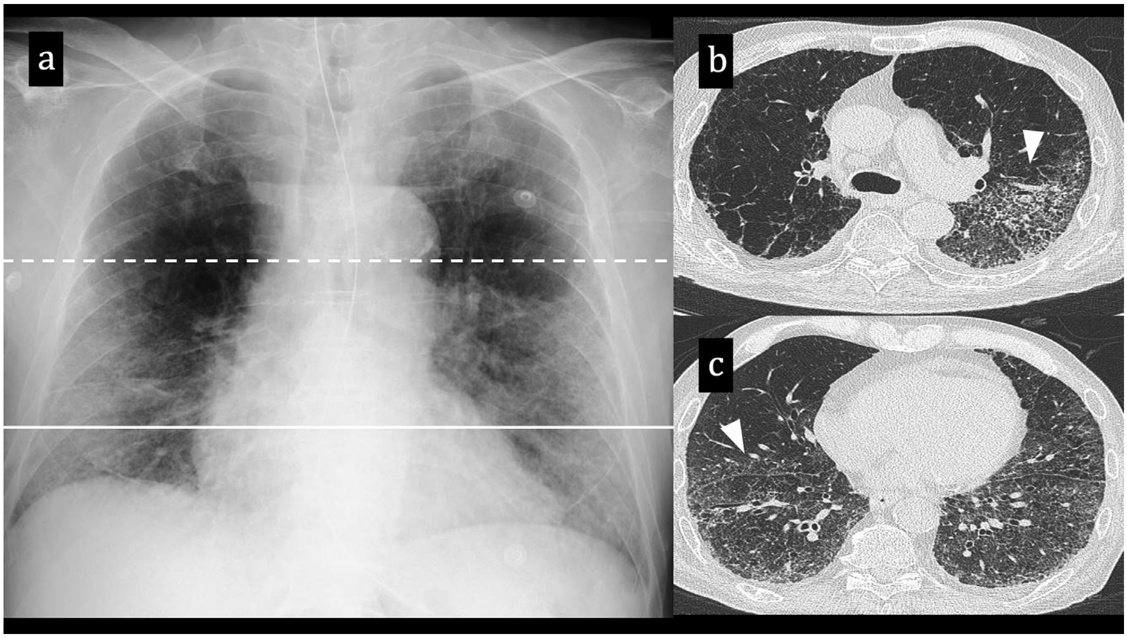

Fig. 2. The radiological findings of the patient on the fifth day of hospitalization.
Fig. 2a is a standing chest radiograph, which shows additional shadows in the both lungs. Figs. 2b and c show a chest computed tomography scan with the axial view on the white dotted (b) and white lines (c) with extensive ground glass opacity present in the left lower lobe of the patient's lungs, as indicated by the white arrows.

patient remained under treatment with an oxygen mask, and the PCR result remained positive.

3. Discussion

The symptoms of COVID-19 vary from mild to severe, and it is reported that symptoms develop within 2 to 14 days after exposure to the virus. Symptoms include fever, cough, tachypnea, dyspnea, malaise, myalgia, headache, olfactory and taste abnormalities, sore throat, nasal discharge, nausea/vomiting, and diarrhea [6]. CT images are useful for an objective examination. CT findings are normal in mild cases and at the onset, but abnormalities are usually seen about 6–11 days after the onset of symptoms. Common findings are consolidation, ground-glass opacities (GGOs), and a distribution of lesions predominantly in the bilateral inferior lung field periphery. Following onset, the lesions exhibit reticulation and a mixed-pattern disease, and over time, they present with a "crazy-paving" pattern and an "atoll" sign. The presentation of pneumonia lasts for approximately one month, and patients with consolidation are likely to require treatment in an ICU, but the GGOs are often mild [7,8]. However, there are cases without obvious abnormalities in the clinical or laboratory findings, which make diagnosis difficult. During the SARS pandemic, there were cases in which individuals who had been in contact with confirmed patients with SARS died of respiratory failure after having been diagnosed with aspiration pneumonia [3]. In those cases, although radiographic evidence of ground-glass shadows in the bilateral inferior lung fields was observed, the initial symptoms were only mild dysphagia, and no symptoms such as fever or cough were present. Therefore, SARS was not suspected not suspected in such patients, and they were only treated for aspiration pneumonia, which allowed the infection to spread. Likewise, because there was an episode of aspiration just before the onset of symptoms, the patient in the present case report was given a definitive diagnosis of aspiration pneumonia despite the fact that this occurred during the COVID-19 pandemic. This delayed the diagnosis of COVID-19. In addition, his medical history related to dysphagia, hospitalization for the aspiration pneumonia, and low Hyodo score misled our diagnosis. After being discharged from the hospital due to aspiration pneumonia in the past, the patient was instructed to follow a diet as advised for his dysphagia; however, he did not follow the instructions and consumed regular meals, leading to events of aspiration. The Hyodo score was 8 during FEES, and it is reported that a Hyodo score above 6 is a strong predictor for aspiration [9]. These factors delayed the proper diagnosis of COVID-19. We performed tracheostomy during treatment of the present patient, although many of the current global guidelines recommend that tracheostomy be performed 14 days after intubation and after confirmation of negative PCR for COVID-19-positive patients [10]. In this case, the PCR result was positive on the 20th day after diagnosis and on the 18th day after intubation, the patient had to be reintubated after a failed attempt at extubation. Early improvement in oxygenation was not expected; hence, a tracheotomy was performed to avoid long-term use of sedatives.

4. Conclusions

In this paper, we have reported a case of delayed diagnosis of COVID-19 due to aspiration pneumonia. There are several factors that complicate the diagnosis of COVID-19, such as being masked by other diseases (as in this case) and an absence of symptoms, even if the patient has had contact with an infected person. It is therefore crucial that healthcare providers are cautious and consider all possibilities when treating patients with suspicious symptoms during an outbreak of an infectious disease. In the COVID-19 pandemic, patients who complain of respiratory symptoms should always undergo PCR testing due to the possibility of COVID-19 infection.

Financial Disclosure

None.

Declaration of Competing Interest

The authors declare no conflicts of interest associated with this manuscript.

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