

## A Case of Silent COVID-19 Pneumonia Found by an Optional Chest CT Scan During a Health Check

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We experienced a case of silent Coronavirus disease 2019 (COVID-19) pneumonia that was found by an optional chest computed tomography (CT) scan during a health check. A 62-year-old man with a present medical history of hypertension visited the health screening center at Tokai University Tokyo Hospital on August 7<sup>th</sup>, 2020. Prior to entry into the hospital, his body temperature was measured and his history was obtained (called 'COVID-19 triage'), but there were no remarkable findings. Subsequently, patchy ground glass opacities were observed with peripheral distribution in bilateral multiple lobes. Based on this finding COVID-19 pneumonia was highly suspected. Subsequently, a PCR test was positive for COVID-19.

Even in health check settings, we should be aware of possible encounters with COVID-19 infections. The high risk of silent spread plays a significant role in the ongoing pandemic. Chest CT scans, which can efficiently identify silent COVID-19 pneumonia, should be performed earlier during health check examinations, at least before gastroendoscopy, which causes significant droplet dispersion. Health check examination providers should not cancel or postpone health checks; rather, it is necessary for them to provide health check examinees with a safe environment with minimal delay in access to recommended health care services.

**Key words:** Coronavirus disease 2019 (COVID-19), silent pneumonia, COVID-19 pneumonia, chest CT scan, health check examination

### INTRODUCTION

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Although some people with COVID-19 require hospitalization and intensive care, some people remain asymptomatic while still able to transmit the virus to others [1]. A systematic review suggested that at least one third of SARS-CoV-2 infections are asymptomatic [2]. Therefore, healthcare providers must be aware that there are some COVID-19-positive individuals, even among apparently healthy people visiting for health checks [3, 4].

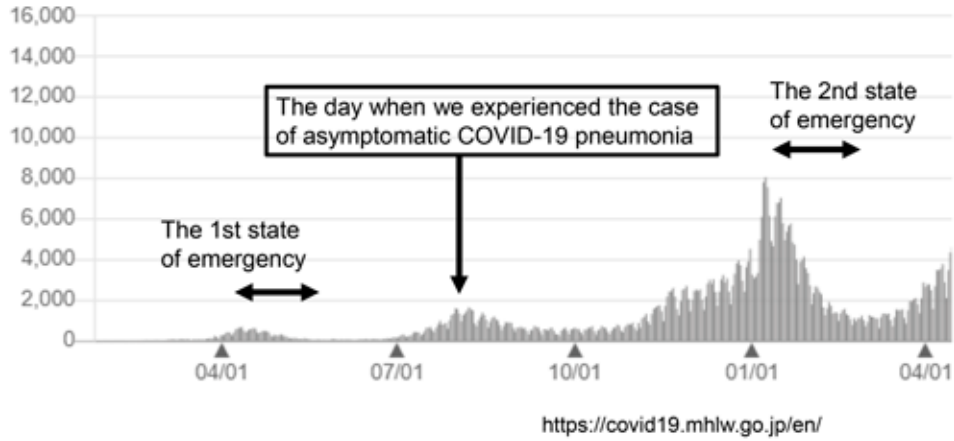
COVID-19 was first detected in China in December 2019. In Japan, the Government announced the first state of emergency in seven prefectures, including Tokyo and Osaka, on April 7<sup>th</sup>, 2020. This was lifted on May 25<sup>th</sup>, 2020. The number of COVID-19 patients initially decreased after the first state of emergency; however, a second wave of COVID-19 occurred in August 2020 [5] (Fig. 1). Tokai University Tokyo Hospital is located near Tokyo's largest COVID-19 hotspot area, Shinjuku. On August 7<sup>th</sup>, 2020, we experi-

enced a case of silent COVID-19 pneumonia that was found by an optional chest computed tomography (CT) scan during a health check (Fig. 1).

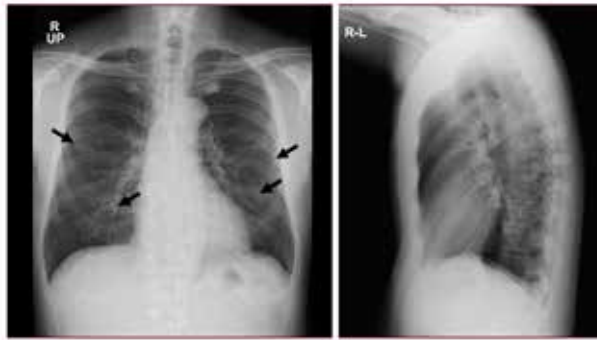
### CASE REPORT

A 62-year-old man with a present medical history of hypertension visited the health screening center at Tokai University Tokyo Hospital on August 7<sup>th</sup>, 2020. It was his first visit to our hospital. He underwent health checks at another hospital the previous year and no abnormalities were found in a chest X-ray examination. He had a past history of bronchial asthma at 42-45 years of age, but had been well without treatment. He was a social drinker and a never smoker. He had been a teleworker and had little contact with other people, with the exception of his son, who lived with him. He enjoyed jogging every day and had a morning jog without breathing difficulty on the day of the health check.

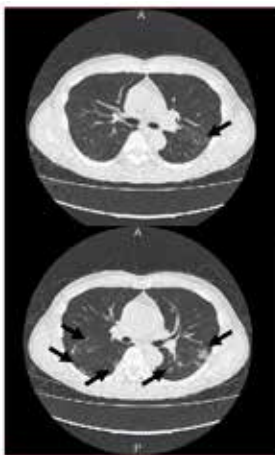
Prior to entry into the hospital, all outpatients, health examinees and their attendants undergo body temperature measurement and history taking (called 'COVID-19 triage'). If the body temperature exceeds



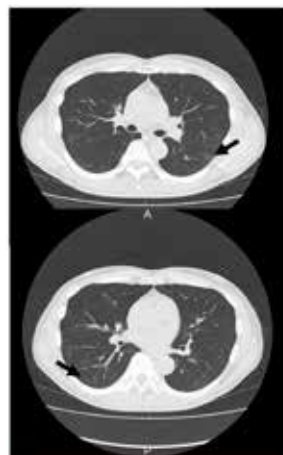
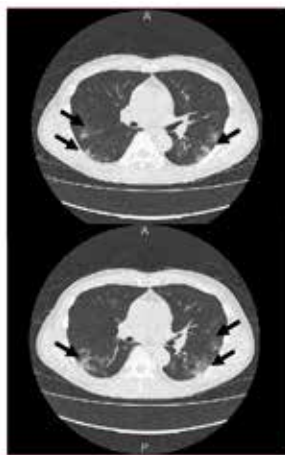
**Fig. 1** Number of newly infected people in Japan. The number of COVID-19 patients initially decreased after the first state of emergency; however, a second wave of COVID-19 occurred in August 2020. It was August 7<sup>th</sup>, 2020 when we experienced a case of silent COVID-19 pneumonia.



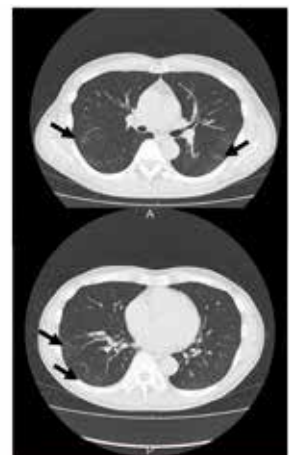
**Fig. 2** Plain chest radiography at the onset. Plain chest radiography revealed suspected pulmonary infiltration in the bilateral mid and lower lung fields.



**Fig. 3** Chest computed tomography (CT) scans at the onset. Patchy ground glass opacities with peripheral distribution highly suspected of COVID-19 pneumonia were observed in bilateral multiple lobes (black arrows).



**Fig. 4** Chest CT scans at one month after the onset. Residual pneumonic shadows were found on the CT images obtained one month after the onset (black arrows).



**Table 1** The findings of laboratory examinations

<b>Blood examination</b>			
WBC	5050 / $\mu$ l	AST	33 U/l
Neutr	57.4 %	ALT	22 U/l
Baso	0.6 %	$\gamma$ -GT	41 U/l
Eosino	2.2 %	Cre	0.88 mg/dl
Lympho	34.7 %	BUN	18.1 mg/dl
Mono	5.1 %	UA	4.7 mg/dl
RBC	$444 \times 10^4$ / $\mu$ l	LDL-C	107 mg/dl
Hb	13.3 g/dl	HDL-C	52 mg/dl
Ht	39.4 %	TG	78 mg/dl
MCV	89 fl	Glu	93 mg/dl
MCH	30.0 pg	CRP	0.1 mg/dl
MCHC	33.8 %		
Plt	$24.6 \times 10^4$ / $\mu$ l		
<b>Urinalysis</b>			
protein	(-)		
sugar	(-)		
occult blood	(-)		

37.5°C and/or the person indicates that they have any of the following conditions (indicated by checkboxes), they are not allowed to enter the hospital: a fever within the past 14 days, sore throat, cough or sputum, breathing difficulty, impaired taste or smell, fatigue, or close contact with a COVID-19 patient. The temperature of this case was 36.0°C and he had not checked any checkboxes. He was allowed to enter the hospital and the health checks were started with a mask on his face. After ultrasonography, electrocardiography, a vision test, audiometry, anthropometry and a blood test, he underwent X-ray testing. He was not obese (BMI 22.4 kg/m<sup>2</sup>), normotension (Blood pressure 127/74 mmHg) and afebrile (Body temperature 36.0°C). With the exception of radiology, none of the laboratory examinations showed any particular findings (Table 1). As the radiological technologist performed his examination found the abnormal shadows on the plain chest radiography (Fig. 2) and CT (Fig. 3), he immediately called the attending doctor. Chest CT showed patchy ground glass opacities with peripheral distribution in bilateral multiple lobes. In this case, Aquilion Prime SP / iEdition: 0.5 mm  $\times$  80 row/160 Slice CT System (Canon Inc.) was used, and the radiation dose was about 1/4 of the normal chest CT procedure. Based on these findings, COVID-19 pneumonia was highly suspected. The doctor with full personal protective equipment transferred him to a negative-air-pressure room. His SpO<sub>2</sub> value was 98% on room air. Nucleic acid polymerase chain reaction (PCR) testing of a nasopharyngeal swab sample was performed and he went home. The remaining health check examinations, including gastroendoscopy, were discontinued. All hospital staff who performed his health examinations wore surgical masks and face shields as required for standard precautions.

Two days later, the PCR test was reported to be positive for COVID-19. The patient stayed at home for 10 days and had no symptoms during the period. On September 15<sup>th</sup>, he visited our hospital again for follow-up CT scans in order to find post-acute COVID-19 syndrome, particularly pulmonary fibrosis. Although

the patient was completely well, residual pneumonic shadows were found on the CT images obtained one month after the onset (Fig. 4).

## DISCUSSION

In this report, we first emphasize the possibility of encountering SARS-CoV-2 infection, even in health check settings. COVID-19 triage works; however, we must be aware that some asymptomatic COVID-19 patients can enter the hospital. The absence of COVID-19 symptoms in individuals infected with SARS-CoV-2 might not necessarily imply the absence of harm [6]. It has been suspected that infected individuals who remain asymptomatic play a significant role in the ongoing pandemic because of the high risk of silent spread [3, 4].

The rate of asymptomatic SARS-CoV-2 infections varies greatly among reports. In one of the most famous early studies on the *Diamond Princess* cruise ship, it was reported that 712 individuals were found to be infected with SARS-CoV-2 among the 3711 passengers and crew members, and 410 (58%) of these infected individuals were asymptomatic at the time of testing [7]. A narrative review of asymptomatic SARS-CoV-2 infection reported that asymptomatic individuals seem to account for approximately 40–45% of SARS-CoV-2 infections [8]. Recently, a systematic review suggested that at least one third of SARS-CoV-2 infections are asymptomatic [2].

Chest CT scans play a key role in the diagnosis and management of COVID-19 pneumonia [9]. The typical manifestations of COVID-19 pneumonia on a chest CT scan are ground glass opacities, consolidation, nodules, and linear opacities [10]. Multiple patchy ground glass opacities with peripheral distribution in the bilateral lobes are typical chest CT imaging features of the COVID-19 pneumonia. Asymptomatic COVID-19 pneumonia is often called silent pneumonia. Chinese researchers investigated the clinical characteristics of 24 cases with asymptomatic infection screened from close contacts and showed the transmission potential of asymptomatic COVID-19 virus carriers [11]. According

to their study, five cases (20.8%) developed symptoms (fever, cough, fatigue, etc.) during hospitalization. Twelve (50.0%) cases showed typical CT images of ground-glass opacity in the chest, and 5 (20.8%) showed stripe shadowing in the lungs. The remaining 7 (29.2%) cases showed normal CT images and had no symptoms during hospitalization [11]. Another report from China that analyzed 58 asymptomatic cases with COVID-19 pneumonia found ground glass opacities (n = 55, 94.8%) with peripheral distribution (n = 44, 75.9%), unilateral location (n = 34, 58.6%), with most cases involving one or two lobes (n = 38, 65.5%), often accompanied by characteristic signs [12]. After short-term follow-up, 16 patients (27.6%) presented symptoms, such as fever, cough and fatigue [12]. Although a chest CT scan is an optional examination in health check settings, if performed earlier during the health check examinations, at least before gastroendoscopy, which causes significant droplet dispersion, it would alert us that an examinee might have asymptomatic SARS-CoV-2 infection. Moreover, because the case showed residual pneumonic shadows at one month after the onset, careful attention is required for persistent symptoms and/or delayed or long-term complications beyond 4 weeks from the onset of symptoms (post-acute COVID-19 syndrome) [13]. Especially, pulmonary fibrosis has the long-term impact on COVID-19 survivors, which leads to chronic impairment of lung function and impaired quality of life [14].

Various strategies have been discussed, including the suspension of health screening examinations during the coronavirus lockdown. As a result of cancellations and postponements of cancer screenings, a large number of patients have been left without access to recommended health care services [15–18]. It is also undesirable for patients with lifestyle-related diseases to refrain from visiting hospitals and receiving advice to improve their lifestyles [19, 20]. While we are expecting efficient vaccination, it is necessary for us to provide health check examinees with an environment that is as safe as possible.

In conclusion, even in health check settings, we should be aware of the possibility of encountering individuals with SARS-CoV-2 infection. This plays a significant role in the ongoing pandemic because of the high risk of silent spread. Although COVID-19 triage works, it is less than perfect. Chest CT scans are more efficient for identifying silent COVID-19 pneumonia if they are performed earlier during health check examinations, at least before gastroendoscopy, which causes significant droplet dispersion. Health check examination providers should not cancel or postpone health checks. Rather, they must provide health check examinees with a safe environment with minimal delay in access to recommended health care services.

The authors state that they have no Conflict of Interest (COI).

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