



Should computed tomography (CT) be used as a screening or follow-up tool for asymptomatic patients with SARS-CoV-2 infection?

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Introduction

The corona virus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), was first reported in China in December 2019. As of 10 AM on March 28, 2020, there have been 571,678 confirmed patients and 26,494 deaths around the world, and the affected area is still expanding (1). The gold standard for the diagnosis of COVID-19 is the real-time reverse transcriptase-polymerase chain reaction (RT-PCR) assay of the pharyngeal swab specimen. However, due to its inadequate test kit in some areas, computed tomography (CT) examination has been used as a screening and follow-up tool in China (2,3). Symptomatic patients with negative initial RT-PCR detection might show lesions on CT (4). There are mainly four types of intrapulmonary lesions of COVID-19 including pure ground-glass opacity (GGO), GGO lesions with reticular and/or interlobular septal thickening, GGO with consolidation, GGO with reticular and/or interlobular septal thickening. Pulmonary lesions are frequently confined to the peripheral area of the lungs and involved bilateral lungs with the right lower lobe most affected (5,6). Mediastinal lymphadenopathy, pleural effusion, pulmonary emphysema and other signs are rare.

However, CT examination has the disadvantage of

radiation dose and COVID-19 can be self-limiting. Bernheim *et al.* (7) reported that CT was normal in 56% of patients within 0–2 days after symptoms appeared, indicating that CT was thereby unlikely a reliable stand-alone tool to rule out COVID-19 infection. Xu *et al.* (8) reported two asymptomatic children and adolescent RT-PCR confirmed patients (50% of their family cluster cases) had no lesion both on initial and follow-up CT. Wang (9) pointed out that in the general population, the proportion of patients with no or few symptoms would be larger, and the positive rate of CT would be lower, but such rate in asymptomatic patients is still unknown. Therefore, the application of CT in screening and the follow-up of asymptomatic COVID-19 patients is controversial.

Case presentation

We reviewed in total 7 patients who were asymptomatic throughout the course from the 99 consecutive patients with COVID-19, diagnosed by the real-time RT-PCR assay of the pharyngeal swab specimen, of three hospitals (Huashan Hospital of Fudan University, Fourth People's Hospital of Yiyang and People's Hospital of Shaodong) in China from January 23, 2020 to February 20, 2020. The clinical and CT features were collected in *Table 1*. Among them, the number

Table 1 Basic information and CT findings of patients

Number	Age (years)	Gender	First CT scan	Interval (days)	Second CT scan	Interval (day)	Third CT scan
1	17	Female	No lesions	7	No lesions	–	–
2	49	Female	No lesions	3	No lesions	–	–
3	15	Male	No lesions	7	No lesions	–	–
4	22	Female	No lesions	7	No lesions	3	No lesions
5	46	Female	No lesions	7	GGO in the left lower lobe with the maximum area of 110 mm ²	3	GGO with reduced size and density in the left lower lobe with the maximum area of 80 mm ²
6	22	Female	–	–	–	–	–
7	60	Female	–	–	–	–	–

GGO, ground-glass opacity.

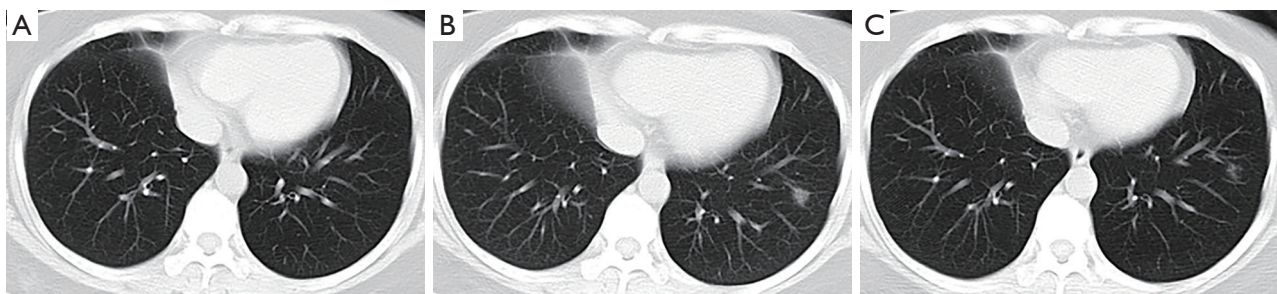


Figure 1 CT images of patient 5. A 46-year-old female who was asymptomatic throughout the course, with the following results of laboratory test: decreased white blood cell count ($3.73 \times 10^9/L$), decreased percent of neutrophils (39.20%), increased percent of lymphocytes (50.11%), and normal liver function test and myocardial enzyme measurement. Antiviral therapy was used. The chest CT scan (A) was performed 1 day after the real-time RT-PCR assay, and no lesion was showed in the lung. After 10 days, a ground glass opacity was noted with a maximum cross-sectional area of about 110 mm² in the lower lobe of the left lung (B). Furthermore, intravenous infusion of gamma globulin was used for treatment. Three days later, the lesion reduced in size and density (C).

and size (in the section with the largest area of the lesion) of lesions were evaluated by two radiologists with more than 10 years of diagnostic experience in chest CT. In our study, there were 6 female and 1 male included, with a mean age of 32 years old (range, 17–50 years). Five patients came from the same hospital, and the initial CT scan and the RT-PCR assay were performed at the same day. They had follow-up CT scans once or twice (the last CT examinations were all performed after real-time RT-PCR test turned negative). There were no lesions of COVID-19 in the initial and follow-up chest CT of 4 patients. The remaining one presented a small ground glass opacity 6 days after the initial CT, but the lesion became smaller with decreased density 4 days later (*Figure 1*). Another two asymptomatic patients in the other hospitals were treated with antiviral therapy

and remained asymptomatic until real-time RT-PCR test turned negative and they didn't undergo CT examination.

Discussion

In this review, we found five asymptomatic patients with SARS-CoV-2 infection showed no or few abnormalities on CT examination throughout the course of the disease. It suggested that when the patient is asymptomatic, the lungs may not be involved or be less so. And the other two asymptomatic patients, who did not have CT examination through the whole course of the disease, had antiviral treatment after diagnosis and were discharged after the nucleic acid test turned negative. Although CT is an important tool to evaluate the condition of patients, the indications for CT are not completely clear

until now. The cases inspired us that maybe for asymptomatic patients, isolation and antiviral treatment can be adopted, and CT is not necessary so as not to increase the patient's physical and economic burden.

To sum up, the role of CT in COVID-19 patient's management course remains undefined and its application as a diagnostic tool may be unjustified among regions with low COVID-19 prevalence (low pre-CT test probability) (10). In addition, CT carries a risk of cancer and there is another risk of cross-infection between infected and uninfected patients. CT examination may not be necessary as a screening tool for asymptomatic suspicious patients with SARS-CoV-2 infection, nor as a follow-up tool for asymptomatic confirmed patients.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/qims.2020.04.10>). The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patients for publication of this manuscript and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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