Original Article

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대한영상의학회지

Chest CT Findings of COVID-19 Patients with Mild Clinical Symptoms at a Single Hospital in Korea

경증의 임상 소견을 보이는 COVID-19 환자들의 흉부 CT 소견

Woon Young Baek, MD[1], Young Kyung Lee, MD[1]*, Suhyun Kim, MD[2], Chorom Hahm, MD[2], Mi Young Ahn, MD[2], Dong Hyun Oh, MD[2], Jae-Phil Choi, MD[2]

Departments of [1]Radiology, [2]Internal Medicine, Seoul Medical Center, Seoul, Korea

Purpose To retrospectively evaluate the chest computed tomography (CT) findings of coronavirus disease 2019 (COVID-19) in patients with mild clinical symptoms at a single hospital in South Korea.

Materials and Methods CT scans of 87 COVID-19 patients [43 men and 44 women; median age: 41 years (interquartile range: 26.1–51.0 years)] with mild clinical symptoms (fever < 38°C and no dyspnea) were evaluated.

Results CT findings were normal in 39 (44.8%) and abnormal in 48 (55.2%) patients. Among the 48 patients with lung opacities, 17 (35.4%) had unilateral disease and 31 (64.6%) had bilateral disease. One (2.1%) patient showed subpleural distribution, 9 (18.8%) showed peribronchovascular distribution, and 38 (79.2%) showed subpleural and peribronchovascular distributions. Twenty-two (45.8%) patients had pure ground-glass opacities (GGOs) with no consolidation, 17 (35.4%) had mixed opacities dominated by GGOs, and 9 (18.8%) had mixed opacities dominated by consolidation. No patients demonstrated consolidation without GGOs.

Conclusion The most common CT finding of COVID-19 in patients with mild clinical symptoms was bilateral multiple GGO-dominant lesions with subpleural and peribronchovascular distribution and lower lung predilection. The initial chest CT of almost half of COVID-19 patients with mild clinical symptoms showed no lung parenchymal lesions. Compared to relatively severe cases, mild cases were more likely to manifest as unilateral disease with pure GGOs or GGO-dominant mixed opacities and less likely to show air bronchogram.

Index terms COVID-19; SARS-CoV-2; Pneumonia, Viral; Computed Tomography, X-Ray

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***Corresponding author**
Young Kyung Lee, MD
Department of Radiology,
Seoul Medical Center,
156 Sinnae-ro, Jungnang-gu,
Seoul 02053, Korea.

Tel 82-2-2276-7230
Fax 82-2-2276-7241
E-mail ykradio@naver.com

ORCID iDs
Woon Young Baek
https://orcid.org/0000-0002-9331-410X
Young Kyung Lee
https://orcid.org/0000-0001-6953-0972
Suhyun Kim
https://orcid.org/0000-0002-7802-5967
Chorom Hahm
https://orcid.org/0000-0002-6027-2185
Mi Young Ahn
https://orcid.org/0000-0002-7312-8502
Dong Hyun Oh
https://orcid.org/0000-0002-9990-6042
Jae-Phil Choi
https://orcid.org/0000-0003-4805-7930

INTRODUCTION

In December 2019, cases of pneumonia of unknown etiology were reported in Wuhan, China. On January 7, 2020, the 2019 novel coronavirus [later renamed as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)] was identified as the causative virus, and the outbreak was subsequently named the coronavirus disease 2019 (COVID-19) (1). The World Health Organization declared this outbreak a public health emergency of global concern on January 30, 2020, and the disease was declared a pandemic on March 11, 2020.

As of June 17, 2020, 8061550 COVID-19 cases have been confirmed in 179 countries with 440290 deaths (5.5%). Altogether, 12198 COVID-19 cases have been confirmed in Korea with 279 deaths (2.3%) to date, placing Korea in the 57th position globally in terms of the number of COVID-19 patients (2). Interestingly, the mortality rate of COVID-19 in Korea is lower than the overall global mortality rate.

The clinical severity of COVID-19 is classified as mild, moderate, severe, or critical (3). Mild clinical symptoms of COVID-19 include fever < 38°C and the absence of dyspnea. With an increasing number of confirmed COVID-19 cases in Korea, there is a need for the evaluation of all COVID-19 cases, even in mild cases.

The aim of the present study was to investigate the chest computed tomography (CT) findings of COVID-19 in patients with mild clinical symptoms at a single hospital in South Korea. We performed a chest CT at admission for every patient with confirmed COVID-19 and analyzed the severity and extent of the lesions. The CT findings played an important role in early detection and close monitoring of pneumonia during hospitalization, and allowed for the best supportive care with adequate intervention through a team approach using the predictive parameters for the clinical course.

MATERIALS AND METHODS

PATIENTS

The present study was approved by the Institutional Review Board of our institute (IRB approval number: 2020-03-009). The requirement for informed patient consent was waived by the ethics committee for this retrospective study. The authors retrospectively reviewed the medical records of 111 COVID-19 patients whose diagnosis was confirmed with reverse transcription-polymerase chain reaction and who were admitted to our hospital from January 30, 2020 to March 16, 2020. We collected data regarding demographics, symptoms, vital signs at admission, and radiological examinations of the included patients. Confirmed COVID-19 patients were hospitalized through the emergency room, and the chest radiograph and CT were taken in the emergency room before being admitted to the hospital room. Antiviral agents were prescribed for patients with an initial chest CT documented pneumonia. Lopinavir/ritonavir was given as a first-line regimen (4). We excluded 6 patients who were transferred from other hospitals and 2 patients who had not undergone chest CT (1 pregnant patient and 1 pediatric patient with a normal chest radiograph and no symptoms). We also excluded 4 patients with bacterial coinfections to avoid a misleading evaluation of COVID-19 pneumonia.

Disease severity was assessed based on initial vital signs at admission, and 12 patients were

excluded based on severe symptoms at admission, including fever ≥ 38°C (6 patients) and dyspnea (5 patients). Thus, 87 COVID-19 patients with mild clinical symptoms were included in our study.

CHEST CT ACQUISITION

Non-enhanced chest CT was performed on admission using a 64-detector row CT scanner (SOMATOM Sensation 64, Siemens Healthcare, Erlangen, Germany). The CT parameters included a tube voltage of 100 kVp, low-dose tube current (reference mAs: 40) with automatic exposure control, slice thickness of 1.0 mm, and a reconstruction interval of 3.0 mm. CT scans were obtained with patients in the supine position and during full inspiration. The reconstructed images were transmitted to the workstation and the picture archiving and communication systems for post-processing multiplanar reconstruction.

IMAGE ANALYSIS

Two radiologists (Y.K.L. and W.Y.B. with 20 years and 2 years of experience in chest CT interpretation, respectively) reviewed the CT scans independently and resolved any discrepancies by consensus. The two readers analyzed both the axial and coronal images. Parenchymal lesions such as tuberculosis sequelae, calcified nodules, dependent densities, and areas of motion artifacts, which were not related to COVID-19, were excluded from the analysis.

CT scans were evaluated for the laterality, extent, distribution, and density of lesions and the presence or absence of ground-glass opacities (GGOs), consolidation, intralobular interstitial thickening, CT halo sign, linear opacities, traction bronchiectasis, air bronchogram, pleural effusion, and enlarged lymph nodes.

The laterality of the lesions was classified as unilateral or bilateral. A semi-quantitative scoring system was used to quantitatively estimate the pulmonary involvement of all these abnormalities based on the area involved. Each of the 5 lung lobes were visually scored from 0 to 5 as: 0, no involvement; 1, < 5% involvement; 2, 5–25% involvement; 3, 26–49% involvement; 4, 50–75% involvement; and 5, > 75% involvement. The total CT score was the sum of the individual lobar scores and ranged from 0 (no involvement) to 25 (maximum involvement) (5).

The distribution pattern of the lesions was classified as predominantly subpleural, predominantly peribronchovascular, or both. The zonal distribution of lesions was classified as upper [lesions located exclusively in the upper lung zone (above the carina)], lower (lesions located exclusively in the lower lung zone below the carina), or both. In addition to the exclusive zonal distribution, we also assessed the zonal predilection for being upper or lower and right or left.

The density of the lesions was classified as pure GGOs, GGO-dominant mixed opacities, consolidation-dominant mixed opacities, and consolidation without GGOs.

STATISTICAL ANALYSIS

Continuous variables were expressed as medians [interquartile ranges (IQR)], and categorical variables were presented as the numbers (percentages). For continuous variables, the Mann-Whitney U test was used to determine the differences in means between the groups. For categorical variables, Pearson's chi-squared test and Fisher's exact test were used to test for equality between the groups. *p*-values were based on a two-sided significance level of 0.05. Statistical

analysis was performed using IBM SPSS Statistics version 23 (IBM Corp., Armonk, NY, USA).

RESULTS

PATIENT CHARACTERISTICS

In the present study, 87 patients underwent chest CT within 2 days of a confirmed diagnosis of COVID-19.

Patient characteristics of the included COVID-19 patients with mild clinical symptoms are presented in Table 1. Among the included patients [43 males, 44 females, median age 41 years (IQR: 26.1–51.0 years)], 17 (19.5%) were asymptomatic, and 70 (80.5%) exhibited mild symptoms. The median duration of symptoms before the diagnosis was 4.5 days (IQR: 3.0–7.0 days) (Table 2). The most common symptom was fever or chills (n = 42), followed by cough (n = 34), and sore throat (n = 20). Other symptoms included myalgia (n = 13), sputum (n = 10), headache (n = 7), diarrhea (n = 3), chest pain (n = 3), general weakness (n = 1), and rhinorrhea (n = 1).

Thirty-nine (44.8%) patients had normal CT findings, while 48 patients (55.2%) had abnormal CT findings. Patients with normal CT findings included 22 men and 17 women with a median age of 34.0 years (IQR: 23.0–51.0 years). Patients with abnormal CT findings included 21 men and 27 women with a median age of 46.0 years (IQR: 28.3–50.8 years). Patients with normal CT findings were significantly younger (34.0 years vs. 46.0 years, p = 0.034) than those with

Table 1. Characteristics of COVID-19 Patients with Mild Clinical Symptoms

	All Patients (n = 87)	Patients with Normal CT Findings (n = 39)	Patients with Abnormal CT Findings (n = 48)	p-Value
Age	41.0 (26.1–51.0)	34.0 (23.0–51.0)	46.0 (28.3–50.8)	0.034
Gender				0.240
Men	43 (49.4)	22 (56.4)	21 (43.8)	
Women	44 (50.6)	17 (43.6)	27 (56.3)	
Symptoms				0.196
Asymptomatic	17 (19.5)	10 (25.6)	7 (14.6)	
Symptomatic	70 (80.5)	29 (74.4)	41 (85.4)	
Symptoms at admission				
Fever (< 38°C) or chills	42 (48.3)	17 (43.6)	25 (52.1)	0.430
Cough	34 (39.1)	17 (43.6)	17 (35.4)	0.437
Sputum	10 (11.5)	5 (12.8)	5 (10.4)	0.748
Sore throat	20 (23.0)	10 (25.6)	10 (20.8)	0.596
Myalgia	13 (14.9)	3 (7.7)	10 (20.8)	0.087
Headache	7 (8.0)	3 (7.7)	4 (8.3)	0.999
Diarrhea	3 (3.4)	1 (2.6)	2 (4.2)	0.999
Chest pain	3 (3.4)	1 (2.6)	2 (4.2)	0.999
General weakness	1 (0.1)	0 (0.0)	1 (2.1)	0.999
Rhinorrhea	1 (0.1)	0 (0.0)	1 (2.1)	0.999

Data are presented as median (interquartile range) and number (percentage).
CT = computed tomography

abnormal CT findings.

Among the patients with normal CT findings, 10 (25.6%) patients were asymptomatic and 29 (74.4%) patients exhibited mild symptoms. Among the patients with abnormal CT findings, 7 (14.6%) patients were asymptomatic and 41 (85.4%) patients exhibited mild symptoms. Patients with normal CT findings and those with abnormal CT findings showed no statistically significant differences in symptoms, including the presence or absence of symptoms and symptom types.

Table 2 shows the difference in the duration of symptoms between symptomatic patients with normal CT findings and symptomatic patients with abnormal CT findings. The median duration of symptoms in 29 symptomatic patients with normal CT findings was 3 days (IQR: 2.0–5.0 days). The median duration of symptoms in 41 symptomatic patients with abnormal CT findings was 6 days (IQR: 4.0–8.0 days). Patients with normal CT findings had a significantly shorter duration of symptoms before diagnosis (3 days vs. 6 days, $p < 0.001$) than those with abnormal CT findings.

CHEST CT MANIFESTATIONS

Among the 87 COVID-19 patients with mild clinical symptoms, 48 patients (55.1%) had abnormal CT findings and were evaluated in detail (Table 3).

Among the 48 patients with lung opacities, 17 (35.4%) patients had unilateral disease (Figs. 1-3) and 31 (64.6%) patients had bilateral disease. According to the semi-quantitative scoring system, the CT score of each lobe was 0.0 (0.0–1.0) in the right upper lobe, 0.0 (IQR: 0.0–1.0) in right middle lobe, 1.0 (IQR: 1.0–2.0) in right lower lobe, 1.0 (IQR: 0.0–1.0) in left upper lobe, and 1.0 (IQR: 1.0–2.0) in left lower lobe. The total CT score was 3.5 (IQR: 2–5.3).

One (2.1%) patient showed subpleural distribution (Fig. 1), 9 (18.8%) patients showed peribronchovascular distribution (Fig. 2), and 38 (79.2%) patients showed subpleural as well as peribronchovascular distribution.

Lesions were located exclusively in the lower lung zones (below the carina) in 24 (50.0%) patients, while they were located in both the upper and lower lung zones in 24 (50.0%) patients. No patient showed an only upper lung zone distribution. Among the 24 patients with both upper and lower lung zone distribution, 13 (27.0%) patients showed a predilection for the lower lung zones, 2 (4.2%) patients showed a predilection for the upper lung zones, and 9 (18.8%) patients showed no significant upper or lower lung zone predilection. Seventeen (35%) patients showed a right lung predilection, 19 (39.6%) patients showed a left lung predilection, and 12 (25.0%) patients showed no right or left lung predilection.

Twenty-two patients (45.8%) had pure GGO lesions with no consolidation (Fig. 4), and 26 (54.2%) patients had mixed opacities, including GGOs and consolidation. Among the 26 pa-

Table 2. Duration of Symptoms before Confirmation of COVID-19 in Symptomatic Patients

	All Symptomatic Patients (n = 70)	Symptomatic Patients with Normal CT Findings (n = 29)	Symptomatic Patients with Abnormal CT Findings (n = 41)	p-Value
Duration of symptoms (days)	4.5 (3.0–7.0)	3 (2.0–5.0)	6 (4.0–8.0)	< 0.001

Data are presented as median (interquartile range).
CT = computed tomography

Table 3. Chest CT Manifestations of COVID-19 in Patients with Mild Clinical Symptoms

	n = 48
Location	
Unilateral	17 (35.4)
Bilateral	31 (64.6)
Distribution	
Subpleural	1 (2.1)
Peribronchovascular	9 (18.8)
Both subpleural and peribronchovascular	38 (79.2)
Zonal distribution	
Upper lung zone	0 (0.0)
Lower lung zone	24 (50.0)
Both upper and lower lung zone	24 (50.0)
Density	
Pure GGO	22 (45.8)
Mixed, GGO-dominant	17 (35.4)
Mixed, consolidation-dominant	9 (18.8)
Consolidation without GGO	0 (0.0)
Others	
Intralobular interstitial thickening	35 (72.9)
CT halo sign	1 (2.1)
Linear opacities	7 (14.6)
Traction bronchiectasis	7 (14.6)
Air bronchogram	10 (20.8)
Pleural effusion	0 (0.0)
Enlarged lymph nodes	0 (0.0)
CT score in each lobe	
Right upper lobe	0.0 (0.0–1.0)
Right middle lobe	0.0 (0.0–1.0)
Right lower lobe	1.0 (1.0–2.0)
Left upper lobe	1.0 (0.0–1.0)
Left lower lobe	1.0 (1.0–2.0)
Total CT score	3.5 (2.0–5.3)

Data are presented as number (percentage) and median (interquartile range).
CT = computed tomography, GGO = ground-glass opacity

tients with mixed opacities, 17 (35.4%) had GGO-dominant mixed opacities, and 9 (18.8%) had consolidation-dominant mixed opacities. No patient demonstrated consolidation without GGOs.

Thirty-five (72.9%) patients showed intralobular interstitial thickening. Air bronchograms were observed in 10 (20.8%) patients, linear opacities were observed in 7 (14.6%) patients, and traction bronchiectasis was observed in 7 (14.6%) patients. The CT halo sign was observed in 1 (2.1%) patient. No patients demonstrated pleural effusion or enlarged lymph nodes.

The CT scores of the 7 asymptomatic patients with abnormal CT findings were 0.0 (IQR: 0.0–0.0) in the right upper lobe, 0.0 (IQR: 0.0–0.5) in right middle lobe, 1.0 (IQR: 1.0–1.0) in right lower lobe, 1.0 (IQR: 0.0–1.0) in left upper lobe, 1.0 (IQR: 0.0–1.5) in left lower lobe. The total

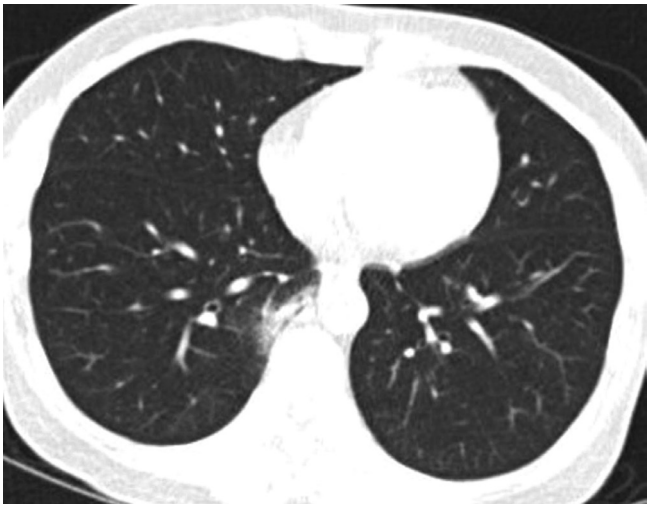
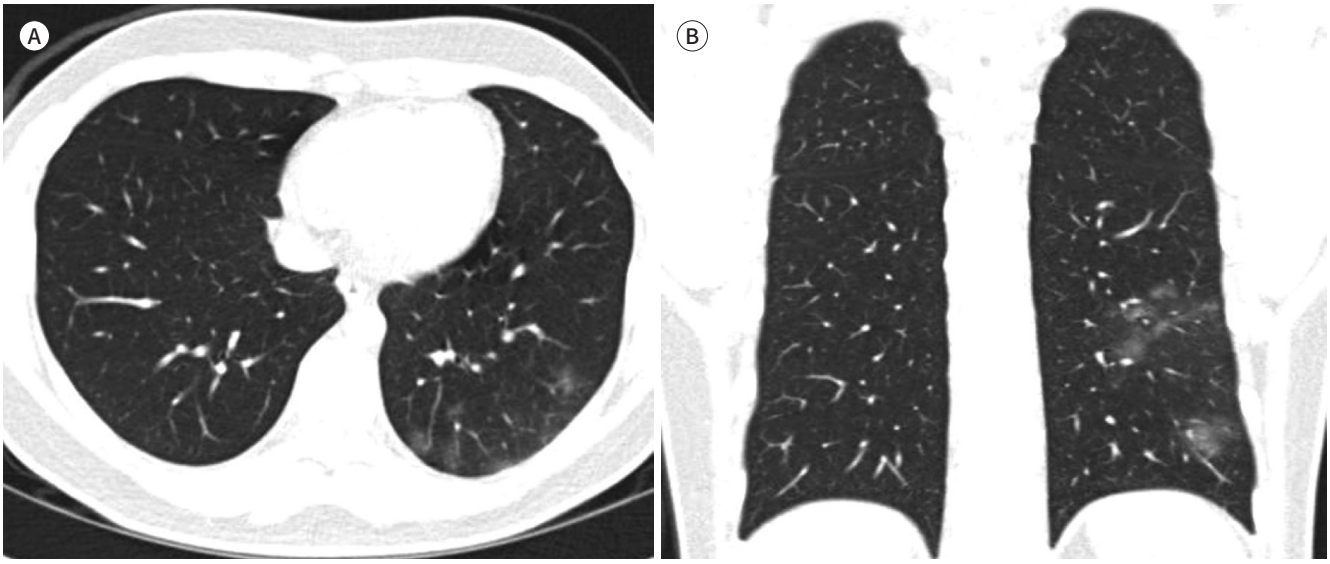


Fig. 1. Chest CT image of a 47-year-old woman with COVID-19 pneumonia manifesting as a single subpleural lesion.
Axial chest CT image shows ill-defined subpleural mixed opacities (ground-glass opacities and consolidative lesions) in the right lower lobe.

Fig. 2. Chest CT image of a 51-year-old woman with COVID-19 pneumonia manifesting as a single peribronchovascular lesion.
Axial chest CT image shows peribronchial nodular mixed ground-glass opacities and a consolidative lesion in the left lower lobe.

Fig. 3. Chest CT images of a 25-year-old man with COVID-19 pneumonia manifesting as unilateral multiple lesions.
A, B. Axial (A) and coronal (B) chest CT images show multifocal ill-defined patchy ground-glass opacities in the left lower lung.



CT score was 2.0 (IQR: 2.0–3.5). Four (57.1%) patients had pure GGO lesions and 3 (42.9%) patients had GGO-dominant mixed opacities. No patient demonstrated consolidation-dominant mixed opacities or consolidation without GGOs.

Fig. 4. Chest CT images of a 52-year-old woman with COVID-19 pneumonia manifesting as pure ground-glass opacities with no consolidation.
A, B. Axial (A) and coronal (B) chest CT images show patchy pure ground-glass opacities in the right lower lobe.

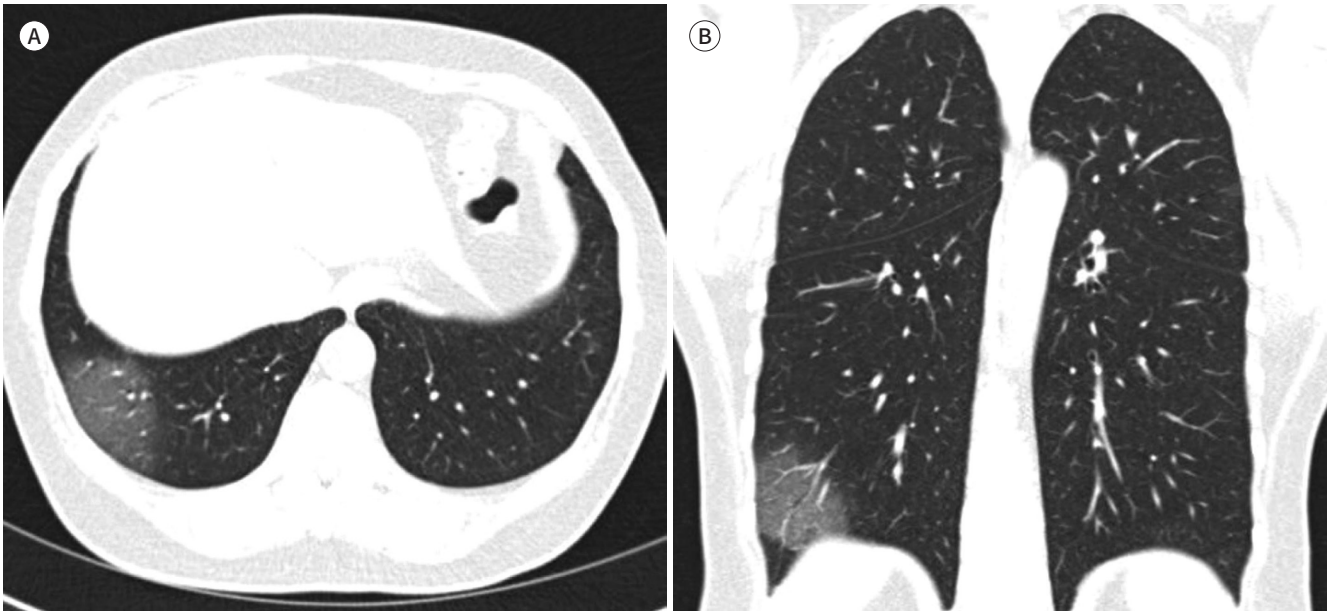
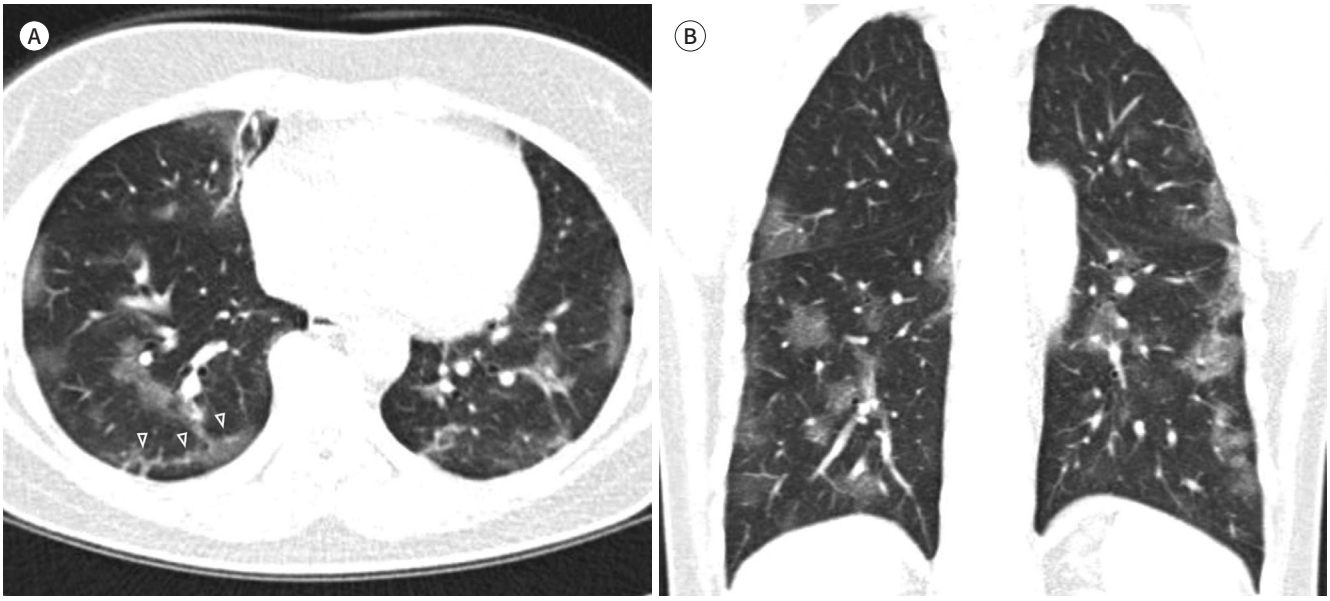


Fig. 5. Chest CT images of a 49-year-old woman with COVID-19 pneumonia manifesting as bilateral multiple subpleural and peribronchovascular GGO-dominant lesions with lower lung predilection.
A. Axial chest CT image shows multifocal peribronchial and subpleural patchy GGO-dominant mixed opacities and curvilinear opacities (arrowheads) in both lungs.
B. Coronal chest CT image shows multifocal GGO-dominant mixed opacities in both lungs with a lower lung predilection.
GGO = ground-glass opacity



DISCUSSION

The purpose of this single-center, retrospective, observational study was to evaluate the CT findings of COVID-19 in patients with mild clinical symptoms. Since chest radiography is not sensitive enough for the detection of GGOs and may lack the sensitivity to identify some of the manifestations of COVID-19 in the lungs (6-8), we decided to focus on the chest CT findings.

In this study of 87 COVID-19 patients with mild clinical symptoms, 39 (44.8%) patients had normal CT findings, while 48 (55.2%) patients had abnormal CT findings. Patients with normal CT findings were younger (34.0 years vs. 46.0 years, $p = 0.034$) and had a significantly shorter duration of symptoms before the diagnosis (3 days vs. 6 days, $p < 0.001$) than those with abnormal CT findings.

Among the 48 patients with lung opacities, 17 (35.4%) had unilateral disease and 31 (64.6%) had bilateral disease. The total CT score was 3.5 (IQR: 2–5.3). One (2.1%) patient showed subpleural distribution, 9 (18.8%) showed peribronchovascular distribution, and 38 (79.2%) showed subpleural as well as peribronchovascular distribution. Twenty-two patients (45.8%) had pure GGO lesions with no consolidation, 17 (35.4%) had GGO-dominant with mixed opacities, and 9 (18.8%) had consolidation-dominant with mixed opacities. No patients demonstrated consolidation without GGOs. Air bronchograms were observed in 10 (20.8%) patients and no patients demonstrated pleural effusion or enlarged lymph nodes.

Shi et al. (9) examined the CT scans of 81 patients with COVID-19 and reported that COVID-19 pneumonia tends to manifest on lung CT scans as bilateral involvement (79%), subpleural distribution (54%), GGOs (65%) with air bronchograms (47%), ill-defined margins (81%), and smooth or irregular interlobular septal thickening (35%). A slight predominance in the right lower lobe was also observed. In a study by Guan et al. (10) that included 1099 patients, 56.4% of the patients showed GGOs (non-severe: 44.5% and severe: 60.5%), 41.9% showed local patchy shadowing (non-severe: 39.2% vs. severe: 55.1%), and 51.8% showed bilateral patchy shadowing (non-severe: 45.5% vs. severe: 82.0%) on chest CT. No radiographic or CT abnormalities were found in 157 (17.9%) out of 877 patients with the non-severe disease and in 5 (2.9%) out of 173 patients with severe disease. In a similar study regarding CT findings in 104 COVID-19 cases from the cruise ship the "Diamond Princess" (11), 80% of symptomatic patients, and 54% of asymptomatic patients demonstrated lung opacities. Among the patients with abnormal CT findings, asymptomatic cases showed a predominance of GGOs (75%), while consolidation was predominant in the symptomatic cases (17%). In the present study, 7 (41.1%) asymptomatic patients out of 17 showed abnormal CT findings. These patients had fewer abnormal lesions and lower total CT score, and had pure GGOs or GGO-dominant mixed opacities. No patient demonstrated consolidation-dominant mixed opacities or consolidation without GGOs.

Jin et al. (12) described CT findings of COVID-19 in 5 stages (ultra-early, early, rapid progression, consolidation, and dissipation) according to the time of onset and the body's response to the virus. Ultra-early refers to the stage with no clinical manifestation and primary imaging manifestations of single, double, or scattered focal GGOs; centrilobular nodules surrounded by patchy GGOs; patchy consolidation; and air bronchogram. Early refers to the stage 1–3 days after the onset of clinical manifestation and CT findings may include single or multiple scattered patchy or agglomerated GGOs separated by honeycomb-like or grid-like thickened inter-

lobular septa. Rapid progression refers to the stage 3–7 days after the onset of clinical manifestation and CT findings may include a fused large consolidation with air bronchogram. In the consolidation stage, which refers to a period of 7–14 days after the onset of clinical manifestations, CT may show multiple patchy consolidations with lower density and smaller size. The dissipation stage refers to a period of 2–3 weeks after the onset of clinical manifestation and CT may show patchy consolidation or strip-like opacities, interlobular septal thickening, and bronchial wall thickening.

In the present study, among the 87 COVID-19 patients with mild clinical symptoms, a high percentage of patients (44.8%) demonstrated normal CT findings. The percentage of patients with normal CT findings in our study was considerably higher than in previous reports of COVID-19 pneumonia in China (0% to 22%) (9, 10, 12-15) but was similar to the percentage of asymptomatic patients with normal CT findings (46%) on the cruise ship the "Diamond Princess" (11). Bernheim et al. (15) examined 121 patients with a confirmed diagnosis of COVID-19 and reported that 56% of the patients who underwent imaging 0–2 days after the onset of symptoms (classified as 'early') had normal CT findings (as opposed to 9% of patients with 'intermediate' imaging and 4% with 'late' imaging). Thus, chest CT has limited sensitivity and negative predictive value for COVID-19 in patients with mild clinical symptoms or short duration of symptoms, and negative CT findings should not be used to rule out the diagnosis of COVID-19 (16).

As mentioned earlier, patients with normal CT findings were younger and had a shorter duration of symptoms before the diagnosis than those with abnormal CT findings. Interestingly, the comparison of symptoms (presence or absence and symptom types) did not show significant differences between patients with normal CT findings and those with abnormal CT findings.

In the present study, the most common CT manifestation of COVID-19 in patients with mild clinical symptoms was bilateral multiple GGO-dominant lesions with subpleural and peribronchovascular distribution and lower lung predilection (Fig. 5). This finding is consistent with previous reports of COVID-19 (9, 10, 12-14, 17-19). No patient demonstrated pleural effusion or enlarged lymph nodes, which is also consistent with the findings from previous reports of COVID-19 (6, 13, 20).

However, COVID-19 patients with mild clinical symptoms tended to demonstrate a greater incidence of unilateral disease (35.4%) (9-11, 14), pure GGO lesions (45.8%) or GGO-dominant mixed opacities (35.4%) (9, 10, 14), and a lower incidence of air bronchogram (20.8%) (9, 14). It is well known that the CT density of lesions in COVID-19 varies from pure faint GGOs to dense consolidation. Our results, indicating a relative lack of consolidation in patients with mild clinical symptoms, suggest that the extent, as well as the density of the lesions (proportion of GGOs and consolidation), affects the clinical severity of COVID-19 pneumonia. It might be also related to the interval between symptom onset and the CT scan.

The present study has several limitations. Clinical symptoms were evaluated based on initial vital signs at the time of admission, and the previous use of antipyretic drugs before admission was not considered. Therefore, disease severity may have been underestimated. Due to the retrospective nature of the study, with data collected from the medical records, some information may be incomplete or not included. Moreover, the present study is an interim evaluation report during the phase of an increasing number of COVID-19 patients at our hospital.

Since most of the patients are still undergoing inpatient treatment, the further course and prognosis of the disease were not analyzed in the present study. The clinical and radiological course and the prognosis of COVID-19 patients are being evaluated for further analysis.

In conclusion, the most common CT manifestation of COVID-19 in patients with mild clinical symptoms was bilateral multiple GGO-dominant lesions with subpleural and peribronchovascular distribution and lower lung predilection. The initial chest CT of a considerable number of COVID-19 patients with mild clinical symptoms showed no lung parenchymal lesions. Compared to the relatively severe cases of COVID-19 in previous reports (9-11, 14), mild cases were more likely to manifest as unilateral disease and pure GGOs or GGO-dominant mixed opacities, and were less likely to show air bronchograms.

Author Contributions

Conceptualization, B.W.Y., L.Y.K., K.S.; data curation, B.W.Y., L.Y.K.; formal analysis, B.W.Y., L.Y.K., A.M.Y., O.D.H.; funding acquisition, L.Y.K.; investigation, B.W.Y., L.Y.K.; methodology, B.W.Y., L.Y.K.; project administration, B.W.Y., L.Y.K.; resources, B.W.Y., L.Y.K.; software, B.W.Y., L.Y.K.; supervision, L.Y.K., C.J.; validation, B.W.Y., L.Y.K.; visualization, B.W.Y., L.Y.K.; writing—original draft, B.W.Y., L.Y.K.; and writing—review & editing, B.W.Y., L.Y.K., K.S., H.C.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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경증의 임상 소견을 보이는 COVID-19 환자들의 흉부 CT 소견

백운영[1] · 이영경[1*] · 김수현[2] · 함초롬[2] · 안미영[2] · 오동현[2] · 최재필[2]

목적 경증의 임상 소견을 보이는 coronavirus disease 2019 (이하 COVID-19) 환자들의 흉부 CT 소견에 대하여 후향적으로 평가하고자 한다.

대상과 방법 경증의 임상 소견(발열 < 38°C, 호흡 곤란 없음)을 보이는 87명의 COVID-19 환자의 흉부 CT 소견을 평가하였다.

결과 39명(44.8%)의 환자는 정상 CT 소견을 보였으며, 48명(55.2%)은 비정상 CT 소견을 보였다. 폐 실질 병변이 있는 48명의 환자 중 17명(35.4%)이 일측성 분포 보였으며, 31명(64.6%)이 양측성 분포를 보였다. 1명(2.1%)의 환자는 흉막하 분포를 보였고, 9명(18.8%)은 기관지 혈관 주위 분포를 보였으며, 38명(79.2%)은 흉막하 및 기관지 혈관 주위 분포를 보였다. 22명(45.8%)의 환자는 경화 없는 순수 간유리 음영 병변을 보였고, 17명(35.4%)은 간유리 음영이 우세한 혼합 밀도의 병변을 보였고, 9명(18.8%)은 경화가 우세한 혼합 밀도의 병변을 보였다. 간유리 음영 없는 경화 병변을 보인 환자는 없었다.

결론 경증의 임상 소견을 보이는 COVID-19 환자의 가장 흔한 CT 소견은 흉막 하 및 기관지 혈관 주위 분포를 보이는 양측성 다발성 간유리 음영 우세 병변이었다. 경증의 임상 소견을 보이는 COVID-19 환자의 거의 절반의 초기 흉부 CT상 폐 실질 병변을 보이지 않았다. 경증의 COVID-19는 상대적으로 중증의 COVID-19과 비교하여 일측성 병변의 비율이 높고, 순수 간유리 음영이나 간유리 음영 우세 병변의 비율이 높으며, 공기기관지 음영의 비율은 낮다.

서울의료원 [1]영상의학과, [2]내과