MEDWIN PUBLISHERS
Committed to Create Value for Researchers

Review on Covıd-19 and Ground Glass Opacities

Şaban Tiryaki*

Radiology Department, Cappadocia University, Turkey

*Corresponding author: Saban Tiryaki, Radiology Department, Nevsehir State Hospital, 15 July, Neighborhood 148th Street No: 1 Center/Post Code: 50130; Nevsehir, Turkey, Email: sabant22@hotmail.com

Abstract

The purpose of this review is to examine the presentation of ground glass densities (GGOs) on chest tomography (CT), which is widely used in the diagnosis of coronavirus disease of 2019 (COVID-19). GGOs appear to be the earliest and most common presentation of lung sequelae in COVID-19. Thus, in the existing literature, the frequency of GGO varies between 14% and 100%. In line with the literature and our increasing experience, GGO is encountered as an early finding in COVID-19, and GGO is observed less often in patients diagnosed after the early disease period. In conclusion, in COVID-19, especially in the early disease stages, the most common finding on thoracic CT is GGO, and it can often be observed with consolidation.

Keywords: Chest Tomography; Ground Glass Densities; COVID-19

Abbreviations: GGOs: Ground Glass Densities; CT: Chest Tomography; nCoV-2019: Novel Coronavirus 2019; SARS-CoV-2): Severe Acute Respiratory Syndrome Coronavirus 2.

Introduction

The purpose of this review is to examine the presentation of ground glass densities (GGOs) on chest tomography (CT), which is widely used in the diagnosis of coronavirus disease of 2019 (COVID-19). GGOs appear to be the earliest and most common presentation of lung sequelae in COVID-19. COVID-19 appeared in Wuhan, China, as a disease of unknown cause in December 2019. Research has determined that the cause of the disease is a coronavirus, which is an RNA virus. This virus was initially named the novel coronavirus 2019 (nCoV-2019), then severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); the disease ultimately has been referred to as COVID-19 [1,2]. GGOs are focal fillings of air spaces in the lungs or slight parenchymal density increases that do not erase the vascular and bronchial structures as a result of interstitial thickening [3]. Although GGOs in COVID-19 were the earliest and the most typical thoracic CT finding [4-6], very different rates have been reported in the literature (Table 1).

Caruso D, et al. [4] found GGO positivity in 100% of patients with COVID-19, and Salehi S, et al. [8] reported a positive rate of 88%. Ai T, et al. [1] reported a lower GGO positivity rate of 46% in a large series. A study by Chen N, et al. [15] reported the lowest rate, 14%. Bernheim A, et al. [11] reported a rate of approximately 34%. Thus, in the existing literature, the frequency of GGO varies between 14% and 100%. In line with the literature and our increasing experience, GGO is encountered as an early finding in COVID-19, and GGO is observed less often in patients diagnosed after the early disease period [1,7,8,16,20]. From the literature, it appears that GGO is usually seen in both lungs and most frequently occurs in the lower lobes, with peripheral subpleural localization. Right lung lower lobe involvement is slightly more dominant in reported cases [1,5,7,21,22]. Song F, et al. [5], Bernheim A, et al. [11] and Han R, et al. [13] classified GGOs and GGOs with associated consolidation separately. In the literature, the association between GGO and consolidation has been documented at different rates (Table 2).

Author	n (number of patients)	%
Guan WJ, et al. [7]	1099	56
Ai T, et al. [1]	1014	46
Salehi S, et al. [8]	919	88
Bai HX, et al. [9]	219	91
Fan N, et al. [10]	150	62
Bernheim A, et al. [11]	121	34
Wang K, et al. [12]	110	27
Han R, et al. [13]	108	60
Zhao W, et al. [14]	101	86
Chen N, et al. [15]	99	14
Li K, et al. [16]	83	98
Shi H, et al. [17]	81	65
Pan Y, et al. [18]	63	86
Caruso D, et al. [4]	58	100
Song F, et al. [5]	51	76
Fang Y, et al. [19]	50	72

Table 1: GGOs frequencies reported in the literature in COVID-19 patients.

Author	n (number of patients)	%
Fan N, et al. [10]	150	34
Bernheim A, et al. [11]	121	41
Wang K, et al. [12]	110	45
Han R, et al. [13]	108	41
Zhao W, et al. [14]	101	64
Song F, et al. [5]	51	59
Chung M, et al. [6]	21	29
Yoon SH, et al. [22]	9	50

Table 2: Prevalence of GGO and consolidation association in COVID-19.

Consolidation is defined as parenchymal densities caused by the filling of the alveoli with fluid or cells and the loss of aeration. In areas of consolidation, the counts of vascular structures are erased [3,8,10,23]. In a retrospective study of 64 cases by Ng MY, et al. [21], consolidation was reported as the most common CT finding (in 47%), and GGO occurred in 33%.

Conclusion

In conclusion, in COVID-19, especially in the early disease stages, the most common finding on thoracic CT is GGO, and it can often be observed with consolidation.

References

1. Ai T, Yang Z, Hou H, Zhan C, Chen C, et al (2020) Correlation of chest CT and RTPCR testing in coronavirus disease 2019 (COVID-19) in China: a report of 1014 cases. Radiology 296(2): 32-40.

2. Xu YH, Dong JH, An WM, Lv XY, Yin XP, et al. (2020) Clinical and computed tomographic imaging features of novel coronavirus pneumonia caused by SARS-CoV-2. J Infect 80(4): 394-400.

3. Hansell DM, Bankier AA, MacMahon H, McLoud TC, Muller NL, et al. (2008) Fleischner Society: glossary of terms for thoracic imaging. Radiology 246(3): 697-722.

4. Caruso D, Zerunian M, Polici M, Pucciarelli F, Polidori T, et al. (2020) Chest CT Features of COVID-19 in Rome, Italy. Radiology 296(2): 79-85.

5. Song F, Shi N, Shan F, Zhang Z, Shen J, et al. (2020) Emerging 2019 Novel Coronavirus (2019-nCoV) Pneumonia. Radiology 295(1): 210-217.

6. Chung M, Bernheim A, Mei X, Zhang N, Huang M, et al. (2020) CT Imaging Features of 2019 Novel Coronavirus (2019-nCoV). Radiology 295(1): 202-207.

7. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, et al. (2020) Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 382: 1708-1720.

8. Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A (2020) Coronavirus Disease 2019 (COVID-19): A Systematic Review of Imaging Findings in 919 Patients. AJR Am J Roentgenol 215(1): 87-93.

9. Bai HX, Hsieh B, Xiong Z, Halsey K, Choi JW, et al. (2020) Performance of radiologists in differentiating COVID-19 from viral pneumonia on chest VT. Radiology 296(2): 46-54.

10. Fan N, Fan W, Li Z, Shi M, Liang Y (2020) Imaging characteristics of initial chest computed tomography and clinical manifestations of patients with COVID-19 pneumonia. Jpn J Radiol 21: 1-6.

11. Bernheim A, Mei X, Huang M, Yang Y, Fayad ZA, et al. (2020) Chest CT Findings in Coronavirus disease-19 (COVID19): Relationship to duration of infection.

Şaban Tiryaki. Review on Covıd-19 and Ground Glass Opacities. Int J Nuclear Med Radioactive Subs 2021, 4(1): 000140.

Copyright© Şaban Tiryaki.

Radiology 295(3): 202-207.

12. Wang K, Kang S, Tian R, Zhang X, Wang Y (2020) Imaging manifestations and diagnostic value of chest CT of coronavirus disease 2019 (COVID-19) in the Xiaogan area. Clin Radiol 75(5): 341-347.

13. Han R, Huang L, Jiang H, Dong J, Peng H, et al. (2020) Early clinical and CT manifestations of coronavirus disease 2019 (COVID-19) pneumonia. AJR Am J Roentgenol 215(2): 338-343.

14. Zhao W, Zhong Z, Xie X, Yu Q, Liu J (2020) Relation between chest CT findings and clinical conditions of coronavirus disease (COVID-19) pneumonia: a multicenter study. AJR Am J Roentgenol 214(5): 1072-1077.

15. Chen N, Zhou M, Dong X, Qu J, Gong F, et al. (2020) Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 395(10223): 507-513.

16. Li K, Wu J, Wu F, Guo D, Chen L, et al. (2020) The clinical and chest CT features associated with severe and critical COVID-19 pneumonia. Invest Radiol 55(6): 327-331.

17. Shi H, Han X, Jiang N, Cao Y, Alwalid O, et al. (2020) Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: a descriptive study. Lancet Infect Dis 20(4): 425-434.

18. Pan Y, Guan H, Zhou S, Wang Y, Li Q, et al. (2020) Initial CT findings and temporal changes in patients with the novel coronavirus pneumonia (2019-nCoV): a study of 63 patients in Wuhan, China. Eur Radiol 30(6): 3306-3309.

19. Fang Y, Zhang H, Xie J, Lin M, Ying L, et al. (2020) Sensitivity of chest CT for COVID-19: comparison to RT-PCR. Radiology 296(2): 115-117.

20. Hosseiny M, Kooraki S, Gholamrezanezhad A, Reddy S, Myers L (2020) Radiology Perspective of Coronavirus Disease 2019 (COVID19): Lessons from Severe Acute Respiratory Syndrome and Middle East Respiratory Syndrome. AJR Am J Roentgenol 214(5): 1078-1082.

21. Ng MY, Lee EYP, Yang J, Yang F, Li X, et al. (2020) Imaging Profile of the COVID-19 Infection: Radiologic Findings and Literature Review. Radiology: Cardiothoracic Imaging 2(1): 200034.

22. Yoon SH, Lee KH, Kim JY, Lee YK, Ko H, et al. (2020) Chest Radiographic and CT Findings of the 2019 Novel Coronavirus Disease (COVID-19): Analysis of Nine Patients Treated in Korea. Korean J Radiol 21(4): 494-500.

23. Ding X, Xu J, Zhou J, Long Q (2020) Chest CT findings of COVID-19 pneumonia by duration of symptoms. Eur J Radiol 127: 109009.