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Spectrum of CT Chest Findings in Asymptomatic COVID-19 Patients

Dr. Krishnaraj Kumar Nethala

Final Year Postgraduate in Department of Radiodiagnosis, GSL Medical College and General Hospital, Rajahmundry, Andhra Pradesh, India
Email ID: *krishnarajkumarnethala[at]gmail.com*

Abstract: ***Learning objectives:*** ***Early identification of the disease process through imaging and preventing the spread of infection and decrease case fatality rate.*** ***Background: Radiological examinations of COVID-19 positive patients play a vital role in early diagnosis and disease course assessment. Asymptomatic infected individuals are the infectious sources of SARS-CoV-2, and some progress rapidly, even resulting in acute respiratory distress syndrome (ARDS) with a high case-fatality rate. This study presents you the imaging findings of COVID -19 as most COVID-19 infected patients were diagnosed with pneumonia and characteristic C.T. imaging patterns.*** ***Imaging findings: 1.Ground glass opacities Total) 2. Simple ground glass opacities.3.Ground glass opacities with Crazy paving pattern.4. Consolidation. 5. Ground glass with a sub pleural curvilinear line etc.*** ***Conclusion: Asymptomatic patients are the asymptomatic transmitter, and some patients can progress rapidly in the short term, it is essential to early diagnose asymptomatic patients with COVID-19. C.T. scan has excellent sensitivity in screening and detecting patients with COVID-19 pneumonia as early identification of COVID-19 cases is vital.***

Keywords: Coronavirus disease 2019 (COVID-19), Asymptomatic patients, Computed tomography

1. Background

- COVID-19, formerly known as 2019 novel coronavirus (2019-nCoV), was declared to be a global health emergency by the World Health Organization on 30th January 2020 [1].
- C.T. imaging patterns and radiological examinations have become vital in early diagnosis and assessment of disease course [2].
- Thin-slice chest C.T. plays a vital role in early detection, observation, and disease evaluation [2].
- Asymptomatic infected individuals, called "asymptomatic carrier or transmitter" may also become the contagious source of SARS-CoV-2, and some of them progress rapidly, even resulting in acute respiratory distress syndrome (ARDS) with a high case-fatality rate[3, 4].
- In the absence of specific therapeutic drugs or vaccines for 2019 novel coronavirus disease (COVID-19), it is essential to detect the diseases at an early stage and immediately isolate the infected person from the healthy population [5].
- The low sensitivity of RT-PCR implies that many COVID-19 patients may not be identified and may not receive appropriate treatment in time; such patients constitute a risk for infecting a larger population given the virus highly contagious nature [6].
- Chest CT is a conventional, non-invasive imaging modality with high accuracy and speed. The chest C.T. scans showed a higher sensitivity for COVID-19 infection diagnosis than initial RT-PCR results[7].
- Imaging is a critical component of the diagnostic workup, monitoring disease progression, and follow-up in coronavirus-related pulmonary affection [8].
- Our study aims to understand the imaging spectrum of asymptomatic COVID-19 positive patients and to facilitate the detection and isolation of asymptomatic patients who act as the asymptomatic transmitter of the disease.

2. Materials & Methods

This study included 40 asymptomatic patients (16 males, 24 females) ranging from 20 to 60 years. They were referred for C.T. assessment of the chest for different causes. Most patients presented with a history of close contact with COVID-19 positive patients while other patients came for preoperative assessment and routine follow up.C.T. of the chest was done to all patients as requested.

Inclusion criteria

- Laboratory proved PCR positive COVID-19 tests
- Asymptomatic patient (regarding chest symptoms)

Exclusion criteria

- Patients who experienced clinically defined pulmonary infection symptoms
- Pregnant females
- Patients with severe artifacts on C.T. images.
- Patients with chest symptoms.
- Most patients presented with a history of close contact with COVID-19 positive patients while other patients came for preoperative assessment and routine follow up.

Equipment

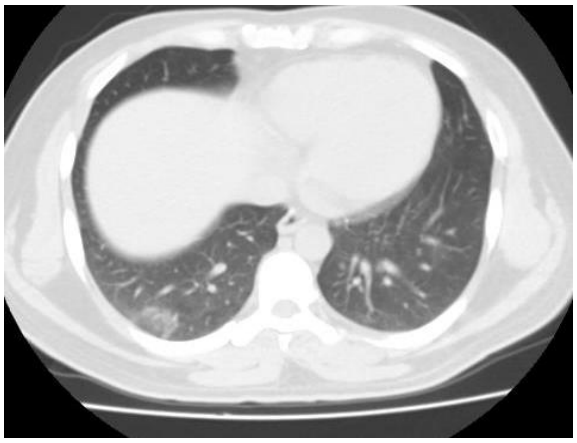
- TOSHIBA 16 SLICE CT, Slice thickness, 1.0mm, Reconstruction interval, 1.0–3.0mm.
- C.T. images obtained with the patient in the supine position with suspended full inspiration and without contrast medium

3. Results

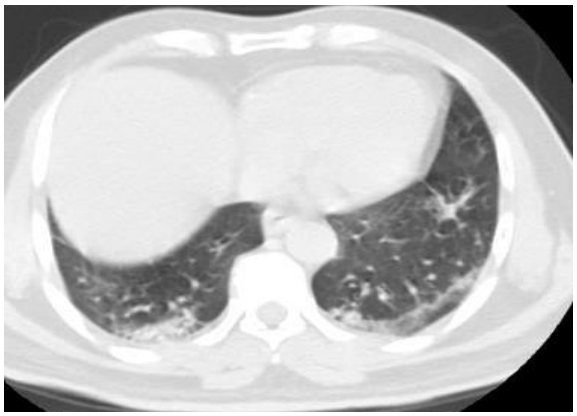
Our study showing various C.T. chest findings of asymptomatic COVID-19 patients

C.T. chest findings	Number of patients	Percent of patients
1) Ground glass opacities (total)	38	95%
2) Simple ground glass opacities	25	62%
3) Ground glass + reticulation (crazy-paving pattern)	7	17.5%
4) Consolidation	3	7.5%
5) Ground glass with a subpleural curvilinear line	1	2.5%

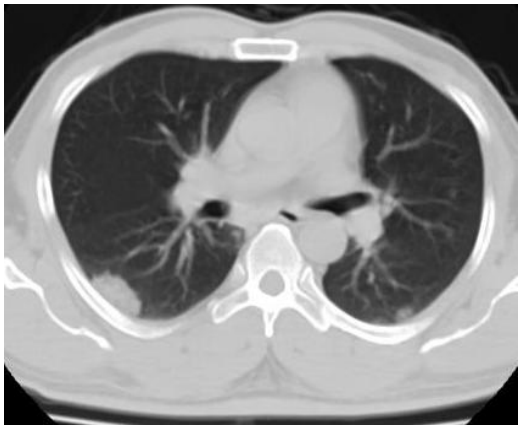
A 21-year-old male patient with no chest symptoms. C.T. chest showed small patchy G.G.O. in the anterior segment of the right upper lobe



A 32-year-old male patient with no chest symptoms. C.T. chest showed patchy ground-glass opacities in the posterior segment of the left lower lobe.



A 49-year-old male patient with no chest manifestations. C.T. chest showed G.G.O. in the left lower lung and subpleural curvilinear line in the right lower lung



A 49-year-old female patient with no chest manifestations. C.T. chest showed left lower lung basal segment consolidation and right lower lung basal segment small G.G.O.

4. Discussion

- Coronavirus disease 2019 (COVID-19) is a highly infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [09].
- C.T. examination is of great significance in diagnosing COVID-19 and monitoring disease progression and evaluating therapeutic efficiency [10].
- Asymptomatic infected individuals, called "asymptomatic carrier or transmitter" may also become the contagious source of SARS-CoV-2, and some of them progress rapidly, even resulting in acute respiratory distress syndrome (ARDS) with a high case-fatality rate [3,4].
- In our study, we noted that ground-glass opacity was the predominant radiological finding.
- We have noticed simple G.G.O. in 25 cases (62%), G.G.O. with interlobular septal thickening in 7cases (17.5%), consolidation in 3 cases (7.5%), and G.G.O. with a subpleural curvilinear line in 1 patient (2.5%).
- The ground-glass opacities and consolidation changes were peripheral in most patients.

5. Conclusion

- C.T. images of asymptomatic cases with COVID-19 pneumonia have definite characteristics.
- As the COVID-19 pandemic continues to claim lives world wide, early diagnosis of asymptomatic COVID-19 patients is essential as they act as a covert transmitter. Once diagnosed, limiting their physical contact with others is one way to slow the spread.
- Although the use of reverse transcriptase-polymerase chain reaction (RT-PCR) is the gold standard yet, RTPCR is not 100% accurate, as there are false-positive and false-negative test results. C.T. plays "a vital role in early detection, observation, and disease evaluation."
- So, our study emphasizes the role of C.T. chest in early diagnosis of asymptomatic COVID patients and thus reduces the spread of such an epidemic.

References

[1] World Health Organization, Novel coronavirus (2019-nCoV) Situation Report -11.2020.
[2] Zi Y, Meng D et al. (2020) Coronavirus disease 2019 (COVID-19): a China's perspective. Radiology 295:3.
[3] Nishiura H, Kobayashi T et al. Estimating the asymptomatic ratio of novel coronavirus infections (COVID-19) Int J Infect Dis. 2020 Mar 13.
[4] Roman W, Victor M et al. Clinical presentation and virological assessment of hospitalized cases of coronavirus disease 2019 in a travel-associated transmission cluster.medRxiv.Doi:10.1101/2020.03.05.20030502.
[5] Tao A, Zhenlu Y et al. (2020) Correlation of chest C.T. and RT-PCR testing in coronavirus disease 2019 (COVID-19) in China: A Report of 1014 Cases.Radiology 195:2.
[6] Huang P, Liu T et al. (2020) Use of chest C.T. in combination with negative RT-PCR assay for the 2019 novel coronavirus but high clinical suspicion. Radiology 10.
[7] Hosseiny M, Kooraki S, Gholamrezanezhad A et al. (2020) Radiology perspective of coronavirus disease 2019 (COVID-19): lessons from severe acute respiratory syndrome and the Middle East respiratory syndrome. AJR 214(5):1078–1082.
[8] Al-Tawfiq JA, Zumla A, Memish ZA (2014) Coronaviruses: severe acute respiratory syndrome coronavirus and the Middle East respiratory syndrome coronavirus in travelers. Curr Opin Infect Dis 27:411–417.
[9] Zhu N, Zhang D, Wang W, et al. (2020) A novel coronavirus from patients with pneumonia in China. Epub 2020.
[10] Zheng Y, Yun Z et al. Chest CT manifestations of new coronavirus disease 2019 (COVID-19): a pictorial review. European Society of Radiology 2020.

Author Profile

Dr. Krishnaraj Kumar Nethala is Final Year Postgraduate in Department of Radiodiagnosis, GSL Medical College and General Hospital, Rajahmundry, Andhra Pradesh