Is HRCT indicated in a symptomatic, RTPCR negative patient?

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ABSTRACT

Covid-19, a deadly viral infection having its outbreak in Wuhan city, Hubei province, China has infected and claimed life of millions worldwide. The pandemic has affected people of all age group and gender. RTPCR (real-time reverse transcriptase polymerase chain reaction) being the diagnostic modality of choice has its own limitations and drawbacks, whereas HRCT (High resolution computer tomography) thorax has emerged as an important conjunct for diagnosing suspected patients with or without a positive RTPCR test. We through our case report will be discussing the importance of HRCT as a diagnostic and prognostic monitoring tool.

Keywords: Hrct Thorax, Covid-19, Ground Glass Opacity, Viral Pneumonia.

1. INTRODUCTION

In the current era, Covid 19 has emerged as the leading cause of death worldwide. According to the WHO (world health organization), India stands 3rd in total number of cases at the global level having approximately 1,582,581 cases with a total mortality of 34,995 and a daily addition of approximately 771 deaths as of 29/07/2020. On January 30, 2020, the World Health Organization declared COVID-19 a public health emergency and on March 12 it was declared as a pandemic. RT-PCR (Reverse transcriptase polymerase chain reaction) remains the definitive diagnostic tool due to direct inoculation of virus from the nasal and throat mucosa but it has its own limitations of having high false negative rates, lack of availability, cost of procedure and time taken for results (Tabatabaei et al., 2020; Prokop et al., 2020; Wanjari et al., 2020). In light of these limitations HRCT thorax has emerged as a highly sensitive and accurate mode of diagnosing COVID 19 in symptomatic suspected patients. It also acts as a prognostic tool and indicator of severity of the disease (Tabatabaei et al., 2020). In our case we are reviewing HRCT findings in COVID-19 patient with the review of literature.

2. CASE REPORT

A 44 year old male patient presented with dry cough and fever since 10 days and breathlessness since 7 days. There was no history of chills and rigors, or similar complaints in the family, the patient had a history of out station travel. On examination the patient was febrile, measuring 101°F, pulse measuring 76bpm, blood pressure of 110/90 mm Hg. There was no evidence of hepatosplenomegaly. Rest of the physical examination and auscultation did not reveal any other positive findings. In view of above findings, due to the

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current high incidence of COVID-19, oxygen saturation study was done which revealed a saturation of 92%. The patient was admitted in the isolation ward due to the history of outstation travel and history of fever and breathlessness. On admission he underwent a RT-PCR test which was negative for COVID 19. The patient did not respond to the antibiotic line of treatment and hence patient was referred for a HRCT thorax.

HRCT thorax revealed involvement of bilateral lungs with diffuse, irregular, patchy areas of ground glass opacity predominantly in the periphery with sparing of the immediate subpleural region and thickened interlobular septae giving a typical crazy paving pattern. All these findings were highly suspicious of COVID 19 and was graded 4 according to the CO-RADS classification system (Figure 1, 2).
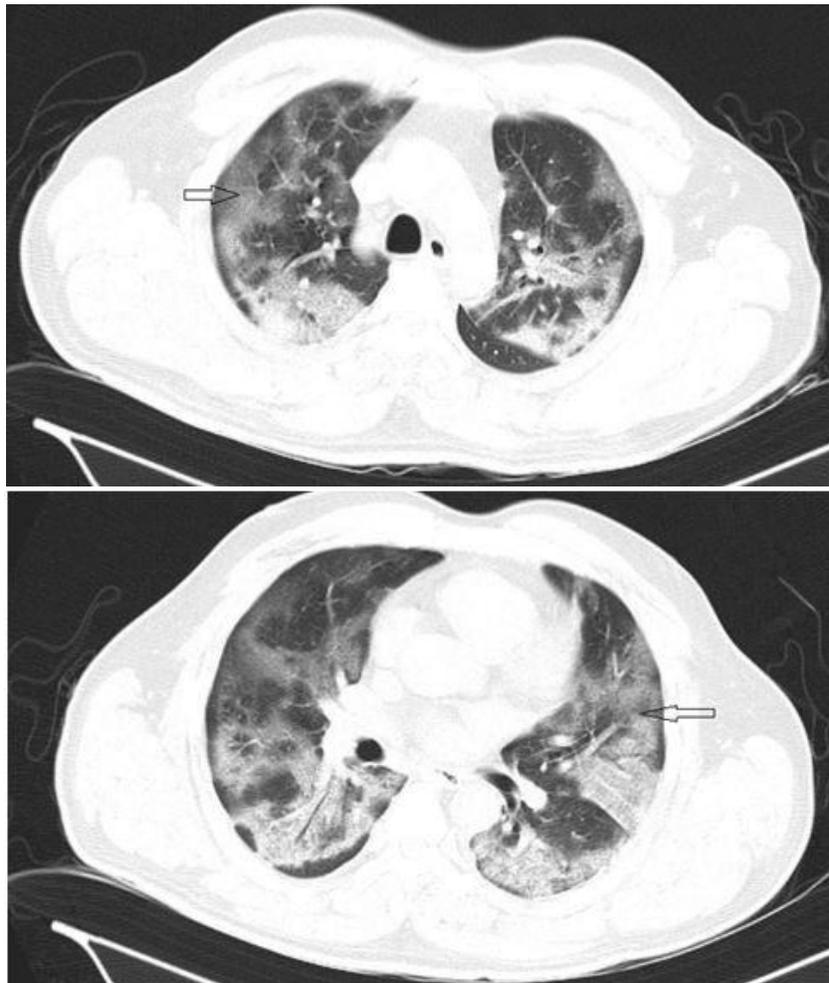

Figure 1 & 2 diffuse, irregular areas of ground glass appearance sparing the sub pleural region (Black arrows)

On the basis of the Ct report, the patient underwent a repeat RT-PCR test after 72 hours which revealed a positive result. The patient's condition further deteriorated even after administration of antipyretics and oxygen support. Hence a repeat HRCT was performed after a gap of 1 week. It revealed further increased areas of ground glass opacities and newly added areas of consolidation which were absent on the initial scan and was then classified as CO-RADS grade 6 (Figure 3 & 4).

The patient is currently undergoing treatment with supplementary oxygen, conservative fluid management and empirical antimicrobials.

3. DISCUSSION

No known age and gender predilection have been reported for Covid-19. The clinical spectrum of COVID-19 varies from asymptomatic to clinical conditions characterized by respiratory failure to the most critical stage involving multi organ failure. However few patients have presented with only fever oral; breathlessness (Zhuang et al., 2020). However oxygen saturation is generally low in these patients as seen in our case.
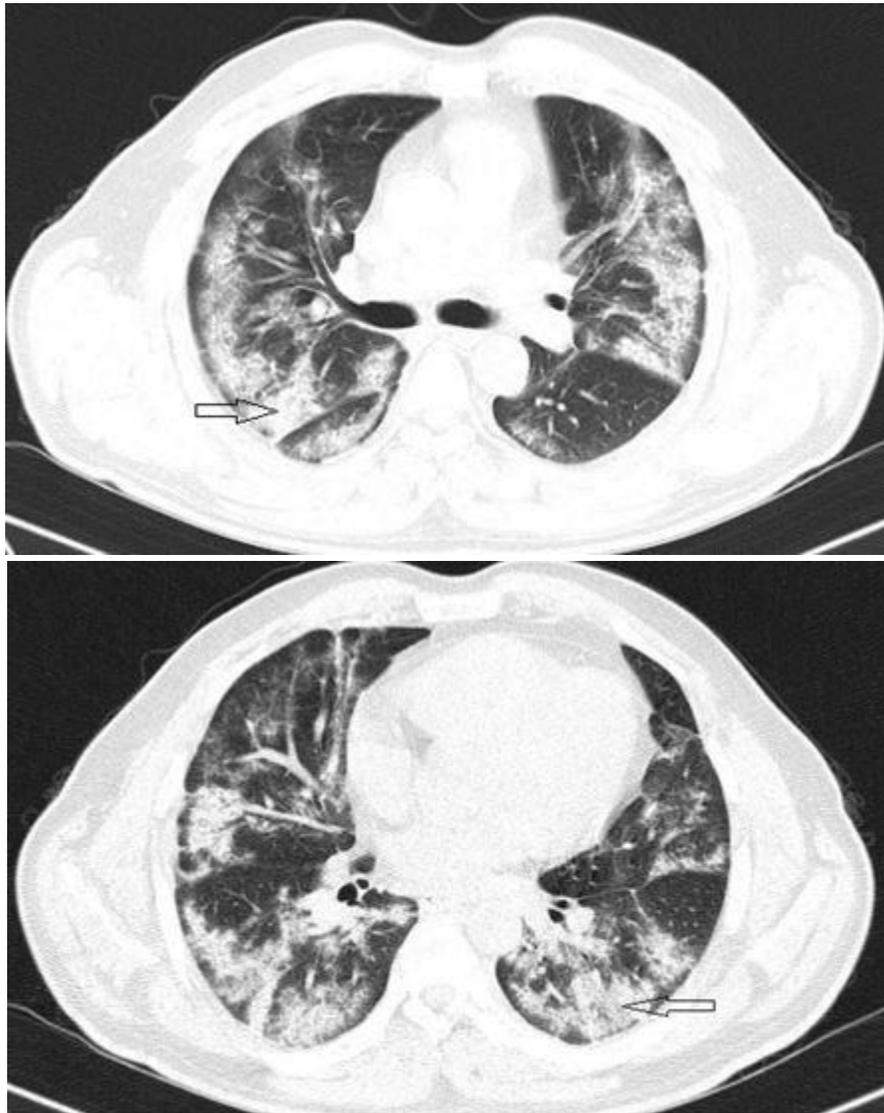
Figure 3 & 4 follow up scan shows areas of increased radio opacity suggestive of consolidation (black arrows).

Chest X-ray is the first mode of investigation in patients with fever and breathlessness buth as a low sensitivity in identifying early lung changes in the initial stages of the disease. At this stage, it can be completely normal. As the disease process advances, the chances of getting significant findings increases (Cascella et al., 2020). Hence a normal chest x ray does not rule out the COVID19 infection However in our case no significant findings were noted in chest radiograph. Given the limited number of (RT-PCR) kits worldwide and the possibility of false-negative real-time RT-PCR results, the National Health Commission of the People's Republic of China has encouraged diagnosis based on clinical and chest CT findings alone (Bernheim et al. 2020). A Study in China has shown a low sensivity (59-88%) of RTPCR test at initial presentation and 97%. Of HRCT (Ai et al., n.d.). The same study revealed that 93% of the patients who were negative for RTPCR but had suspicious CT findings came to be positive after a mean gap of 5 days.

RT-PCR testing accuracy may be affected by a number of factors including viral load in the respiratory tract, sampling procedures and timing, specimen's source and inherent performance of the testing kits. According to Jian-Long He et al. it is wiser to club RTPCR test with HRCT thorax study for screening of patients who are symptomatic but negative for COVID 19 on initial presentation (He et al., 2020). HRCT is a fast and accurate mode of detecting changes at the secondary pulmonary lobule and can help stage the progression of the disease. According to various literature, the classical features seen in COVID positive patients on HRCT are patchy, ground glass opacities in the periphery in early stage of the disease followed by increased number of GGO, areas of consolidation, crazy paving pattern and interstitial and pleural thickening in later stage of the disease (Xie et al., n.d.) (Bernheim et al., 2020; Wu et al., 2020). The respective incidence rate of GGOs and consolidation are about 86% and 29% respectively bilateral lung involvement is

seen in 75% of the patients (Majidi and Niksolat 2020). Similar findings were noted in our patient. RTPCR positive patients also known to present with atypical HRCT findings, such as- isolated lobar or segmental consolidation, tree-in-bud nodules without any peripheral ground glass opacities with Pleural effusion and mediastinal lymphadenopathy (Simpson et al., 2020). However such atypical findings were not seen in our patient.

The two widely used CT criteria's to report COVID 19 are the RSNA chest CT classification system and coronavirus disease 2019 (COVID-19) Reporting and Data System (CO-RADS). The RSNA classification system classifies the scan as (de Jaegere et al., 2020)(Table 1).

Table 1 The RSNA Classification System

Typical appearance	Bilateral peripheral Ground glass opacity, with or without consolidation Crazy paving pattern.
Intermediate appearance	Not having typical features. Having multiple, diffuse, peripheral or unilateral Ground glass opacity .
Atypical appearance	Absence of typical and atypical features. Having isolated lobar or segmental consolidation. Cavitation. Discrete small nodules
Negative for pneumonia	-

Whereas the CO-RADS system provides a level of suspicion for pulmonary involvement of COVID-19. The level of suspicion increases from very low (CO-RADS category 1) to very high (CO-RADS category 5) and CO-RADS category 6 is defined as RT-PCR positive patient at the time of examination. The classification was used in our case as the RTPCRtest was negative on admission. The classification details are as given bellow (Prokop et al., 2020) (Table 2).

Table 2 Corona Virus Disease 2019 (Covid-19) Reporting and Data System (CO-RADS)

CO-RADS grade	Level of suspicion	Findings
0	None	Scan being incomplete or inadequate quality
1	Very less	No findings of pneumonia
2	Less	Tree-in-bud sign, a centrilobular nodular pattern. Lobar or segmental consolidation Lung cavitation
3	Equivocal	Perihilar ground-glass opacity, homogenous extensive ground-glass opacity with or without sparing of some secondary pulmonary lobule
4	High	Bilateral, peripheral ground-glass opacities with or without consolidations in lung regions close to visceral pleural surfaces. A multifocal bilateral distribution but sparing the immediate sub pleural region
5	Very high	Similar to corads-4 with

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		involvement of sub pleural region Appearance resembles organizing pneumonia
6	Known positive patient	Rtpcr- confirmed

HRCT thorax also aids in monitoring disease progression as early disease demonstrates preponderance of ground-glass abnormality followed by development of crazy paving and, Finally, increasing consolidation later in the disease course which was noted in our case (Pan et al. 2020).

4. CONCLUSION

In our opinion a symptomatic, RTPR negative patient needs an HRCT examination as it is an important modality to show early changes in symptomatic patients. Results of HRCT also help the clinicians to repeat the RTPCR test which is usually positive after 5th day of presentation.

Conflict of Interest

The authors declare that there are no conflicts of interests.

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

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Data and materials Availability

All data associated with this study are present in the paper.

Peer-review

External peer-review was done through double-blind method.

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