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Review Article

Radiology Section

Computed Tomography of Chest in COVID-19 Infection: A Narrative Review

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ABSTRACT

Coronavirus Disease 2019 (COVID-19) is caused by a novel coronavirus that is very contagious. Asymptomatic infection to severe and deadly sickness is all possibilities. The gold standard investigation for diagnosing coronavirus infection is Reverse Transcription-Polymerase Chain Reaction (RT-PCR). Computed Tomography (CT) is an important imaging modality for the management of COVID-19 patients. A CT scan of the chest can also be used to check for disease sequelae. During the pandemic, several classifications and CT Scoring Systems (CT-SS) were devised to aid in triage and diagnosis. Literature search was performed in Google Scholar and PubMed databases, using these keywords and their combinations: COVID-19, CT, Ground-Glass Opacity (GGO), RT-PCR. The present review paper aims to summarise, discuss and illustrate the radiological findings of the COVID-19 as well as the current status of the CT chest in the management of the disease. CT is the best imaging method for detecting the involvement of the lungs, as well as the quickest way for determining the nature of abnormalities. CT has a vital role in the diagnosis, management, and prognostication of COVID-19 in the fight against the pandemic, as evidenced by extensive research. Understanding of the imaging characteristics of COVID-19 pneumonia, can help with early control of the disease spread, and CT severity score could be useful for clinical triage, prognosis evaluation, and follow-up.

Keywords: Coronavirus disease 2019, Computed tomography scoring systems, Ground-glass opacity, Reverse transcription-polymerase chain reaction

INTRODUCTION

Coronavirus Disease 2019 (COVID-19), which is caused by a highly contagious new coronavirus that has spread to practically every country in the world. COVID-19 was first detected in Wuhan in December 2019, and the World Health Organisation (WHO) declared it a pandemic on March 11, 2020. Fever, cough, dyspnoea, and chest tightness are the main clinical symptoms of COVID-19, but a large percentage of patients may be asymptomatic. Infection can spread through respiratory air droplets or through direct contact with contaminated surfaces [1-4]. Because asymptomatic patients must be isolated, tests must be highly accurate and quick [5].

Despite the fact that pharyngeal swabs for Reverse Transcription-Polymerase Chain Reaction (RT-PCR) assay is the gold standard for diagnosis, the test can nevertheless result in false negative results for a variety of reasons. This could explain why some RT-PCR assays are negative even when clinical illness is present. Because RT-PCR has limited sensitivity, time commitment, high cost, and limited availability in some countries, Chest CT has been used to diagnose COVID-19 in highly suspected symptomatic RT-PCR negative individuals who had direct contact with confirmed COVID-19 patients and ended up in the hospital for treatment. The utility of a chest CT scan in COVID-19 patients with false negative RT-PCR findings has been proven in a number of studies, with estimated sensitivity of around 98% [6-8].

With a comprehensive review of published studies, authors intend to present a pictorial overview of the typical and atypical CT manifestations of COVID-19, as well as discuss the current status of the CT chest in the management of the disease.

INDICATIONS FOR CT IMAGING IN COVID-19

The American College of Radiology (ACR), the Society of Thoracic Radiology (STR), and the American Society of Emergency Radiology have all warned against using routine imaging, especially CT chest, as a primary diagnostic test [9,10].

In mid year of 2020, the Fleischner Society released an international consensus statement to provide doctors with recommendations on the use of thoracic imaging in a variety of healthcare settings and circumstances. Mild disease was defined when there was no evidence of respiratory damage or dysfunction. Moderate to severe respiratory illness was defined when there was significant pulmonary dysfunction or damage [11]. The society made the following recommendations:

- There is no rationale to use regular imaging as a screening test in those who are asymptomatic COVID-19 positive.
- Imaging is not indicated for patients with mild illnesses unless they are at danger of worsening their condition.
- Indicated in patients with moderate to severe COVID-19 symptoms, regardless of COVID-19 RT-PCR results.
- All patients with deteriorating respiratory illness should undergo imaging.
- An x-ray can be performed initially, but a CT scan is required if symptoms worsen.

They also suggested CT after infection recovery in patients with functional impairment or hypoxaemia. Daily Imaging is not recommended in intubated patients. In addition, on incidental COVID-19 findings on CT, COVID-19 testing of the subject is recommended.

In the initial phase of the disease, the role of CT chest is limited. The diagnosis is primarily based on RT-PCR. However, due to a lack of RT-PCR testing kits for COVID-19, studies have recommended that thoracic CT scans could be used as a primary screening or diagnostic test in areas with a high prevalence of COVID-19 cases [3]. Despite this clinical setting, CT chest indications have increasingly evolved. While some countries, particularly developing countries, have used routine imaging to identify probable COVID-19, others, primarily in the western countries, have argued for a more circumspect approach.

CT CHEST IMAGING FINDINGS

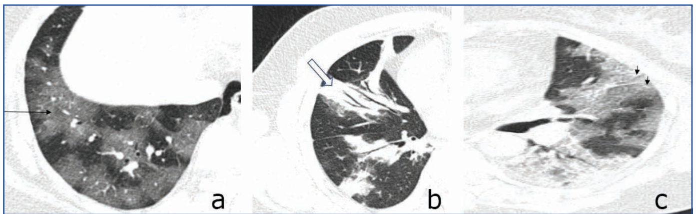
The angiotensin converting enzyme-2 receptors are targeted by the Corona virus in humans, causing damage to the lung interstitium and parenchyma [12]. The CT findings of COVID-19 pneumonia are consistent with typical viral pneumonia lung damage. CT imaging is preferred over radiography because it is more sensitive to detecting early disease, determining the nature and extent of lesions, and detecting subtle changes that aren't always obvious on chest radiography. Depending on the time course and severity of the disease, COVID-19 patient's chest CT pictures may show various imaging characteristics or patterns.

As in other Institutes, the usual protocol for COVID-19 lung infection assessment in the institute was a supine non contrast CT chest with breath-hold [13]. All images were reconstructed using a sharp reconstruction kernel and a 1.0 mm slice thickness with a 1 mm increment. In patients with suspected Pulmonary Embolism (PE) with very high D-dimer values or lower limb deep vein thrombosis, intravenous iodinated contrast is recommended. In COVID-19, Minimum Intensity Projection (MinIP) CT chest reconstructions [Table/Fig-1] can improve diagnostic accuracy for pulmonary Ground-Glass Opacity (GGO). Additionally, it improves diagnostic confidence and subjective time efficiency [14].

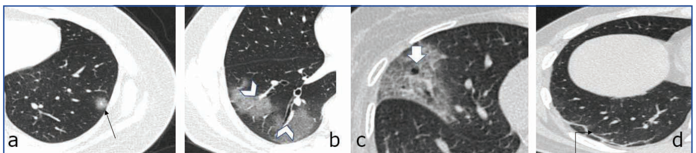
According to "Expert Recommendations from the Chinese Medical Association Radiology Branch" clinical guidelines, COVID-19 was divided into three stages based on the period of commencement and the body's response to the virus, with an additional dissipation stage [15]. Based on extent of lung involvement, COVID-19 CT findings can be categorised into early, advanced, severe, and dissipative stages:

Early Stage (0-4 Days)

Single or multifocal scattered patchy or conglomerate ground glass opacities can be seen on chest CT, primarily in the middle and lower lobes, along the bronchovascular bundles. Ground glass lesions are most commonly found in the lung's peripheral and sub-pleural sections [15]. The findings of intra and interlobular septal thickening in areas of ground glass opacity can lead to a crazy paving pattern [15-18]. Lung opacification that does not obscure the bronchovascular markings is known as GGO [Table/Fig-1-3]. GGOs are more common in children and young people, while lung involvement, sub-pleural line thickening, fibrosis, and consolidation are more common in older patients (>60 years).

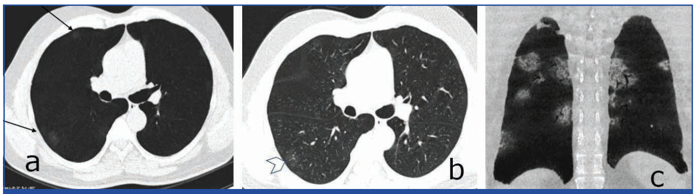


[Table/Fig-1]: a) Axial thin sections of chest High-Resolution Computed Tomography (HRCT) of patients with COVID-19 pneumonia in first and the second week of symptoms. Initial high-resolution Computed Tomography (CT) chest shows subtle Ground-Glass Opacities (GGOs) in both lower lobes (arrows); b): Coned down axial HRCT chest image shows patchy perilobular consolidation with a traversing patent bronchus-air bronchogram (open arrow) in the left lower lobe of a 26-year-old female presenting with high-grade fever; c): A 55-year-old man with Ground-Glass Opacities (GGOs) and interlobular septal thickening giving a crazy paving appearance in the superior segment of the right lower lobe (arrowheads).



[Table/Fig-2]: a) Coned down axial HRCT chest image shows patchy consolidation with a traversing patent bronchus-air bronchogram (Arrow) in the left lower lobe of a 26-year-old female presenting with high-grade fever. The surrounding GGO gives the appearance of a halo (halo sign); b) Axial coned down CT chest image in a 52-year-old patient shows vascular thickening (open arrowhead), in a background of GGOs; c) Rounded lucencies within an area of GGO in patients of COVID-19 pneumonia-air bubble sign (open arrow). These lucencies have an imperceptible wall, which differentiates them from a normal bronchus; (d) Axial coned down CT chest image in a 42-year-old female shows curvilinear opacities parallel to the chest wall (curved arrows) with adjacent reticulations.

Microvascular thrombosis, which is produced by endothelial injury, dilates the traversing pulmonary vessel within or close to the GGOs, causing vascular expansion [Table/Fig-2,3]. Pathologically, this stage is characterised by the dilation and congestion of the alveolar

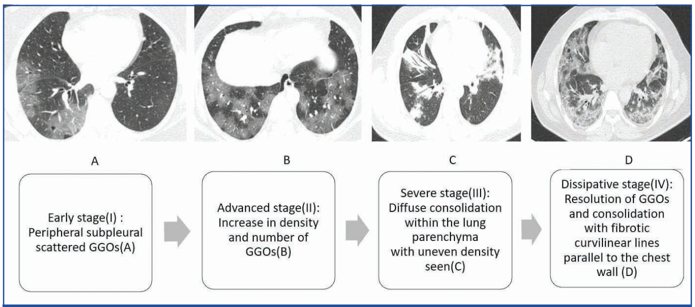


[Table/Fig-3]: A 48-year-old man, who presented to the emergency department with cough and fever. An immediate CT scan was performed due to suspected COVID-19 manifestation. a) The axial MinIP reconstruction shows focal subtle GGO in the right upper lung lobe (arrow) suspicious for early stage pulmonary COVID-19, which was missed and other one is faintly visible (open arrowhead) on axial multiplanar reformat (MPR) series. b) Real-time RT-PCR confirmed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. c) CT scan of a 52-year-old man with fever, cough, shortness of breath and real-time RT-PCR confirmed SARS-CoV-2 infection. The Coronal MinIP reconstruction enables improved contrast between diffuse focal Ground-Glass Opacities and unaffected normal lung parenchyma.

septal capillaries, fluid exudation into the alveoli, and interlobular interstitial oedema [19].

Advanced Stage (5-8 Days)

New lesions with increased opacification of prior GGOs merge to produce consolidations with/without air bronchograms in this stage [Table/Fig-4].



[Table/Fig-4]: Different stage of COVID-19 lung infection.

Consolidation: Opacification of the parenchyma, which obscures the bronchovascular markings [Table/Fig-1b]. After GGOs, the second most prevalent manifestation is multifocal bilateral patchy consolidations with a peripheral and sub-pleural predominance. On CT, larger and more numerous GGOs, consolidation, and increased fibrous streaks indicate disease progression.

Crazy paving: Thickening of the interlobular septa on the background of GGOs creates a crazy paving pattern [Table/Fig-1c]. The formation of crazy paving, as well as consolidations, indicate that the disease has progressed to a more advanced level [20].

Organising Pneumonia (OP): OP is characterised by halo and reverse halo signs. The halo sign is a GGO-encircled area of consolidation [20,21]. A focal rounded GGO or normal parenchyma is encircled by a rim of consolidation in the reverse halo sign [Table/Fig-2a].

Pleural involvement: Pleural alterations are more prevalent, with pleural thickening being the most prevalent [Table/Fig-2d,4c,4d]. Pleural effusion, on the other hand, is uncommon, and its occurrence in COVID-19 may indicate a bad prognosis [22].

Airway changes: Bronchiectasis and bronchial wall thickening are the outcome of inflammatory injury to the airways, which can develop to fibrosis [Table/Fig-2b,5d] [18,23]. Central lucencies can be caused by a focal small area of bronchiectasis or partial resorption of consolidation [Table/Fig-2c] [22].

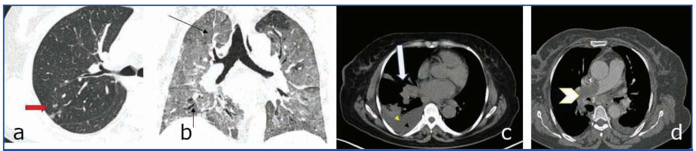
This stage is distinguished by the deposition of exudates in the alveolar cavity, interstitium and vascular enlargement. To form a fusion state, fibrous exudation connects each alveolus through the interalveolar space [19].

Severe Stage (9-13 Days)

This stage is marked by extensive consolidation with different densities [Table/Fig-5a-c]. Air bronchograms and bronchial dilatation are noted due to fibrous exudate into the alveolar cavity. Patchy GGO appears in non consolidated lung regions. When the majority of the lungs are affected, the lungs take on the appearance of a "white out lung". There is a minor amount of pleural effusion and the pleura are thickened. Advanced or severe stages of fibrosis can move to dissipation stages with residual fibrosis in some cases [24].

Dissipation Stage (≥14 Days)

This stage is distinguished by the gradual resolution of GGOs and consolidations, as well as the emergence of residual fibrosis and curvilinear lines [Table/Fig-5d].



[Table/Fig-5]: Atypical Computed Tomography (CT) chest findings in COVID-19 pneumonia. (a) Axial chest CT images in patients with COVID-19 pneumonia show small subsolid nodules with subtle tree-in–bud appearance (red open arrows). b) Coronal high-resolution CT chest image in the COVID-19 PCR positive patient shows interlobular septal thickening with traction bronchiectasis (arrow) and Ground Glass Opacities (GGO) (small arrow) suggestive of progression to interstitial lung disease. (c) Axial chest CT image in a 32-year-old man in shows an enlarged right higher lymph node (open arrow) and right pleural effusion (arrowhead). (d) A 45-year-old man with COVID-19 pneumonia presenting with sudden onset breathlessness. (d) Computed Tomography (CT) pulmonary angiogram image shows thrombus in the right main pulmonary artery (open arrowhead) and left-sided mild pleural effusion.

Fibrosis and sub-pleural curvilinear lines: Fine curvilinear opacities/lines paralleling the pleural surfaces, which are related to fibrosis [Table/Fig-2d,5d]. Extreme lung fibrotic states can move to dissolution stages with remnant fibrosis in some cases [24]. It can, however, proceed to interstitial lung disease in some circumstances.

Association with pulmonary thromboembolism: Deep venous thrombosis, PE, acute myocardial infarction, and ischemic stroke related to COVID-19 infection results in significant morbidity and mortality. These symptoms are caused by endothelial injury, inflammation, and microvascular thrombosis. In a study on critically ill patient admitted in ICU, about 31% patients had vascular thrombosis (venous=31%, arterial=3.7%) [25]. Also, in a study, it was found that non survivors' d-dimer levels were consistently higher than survivors' throughout the clinical course, and that this difference increased as the illness worsened [5].

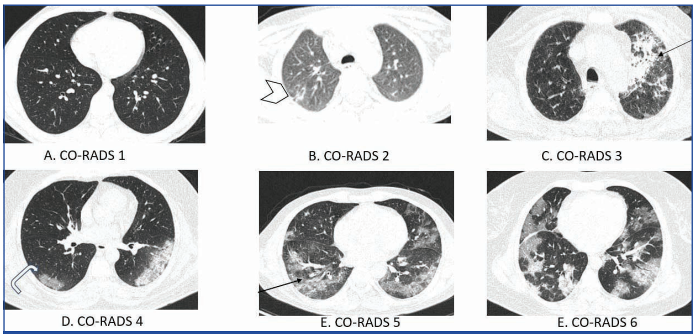
Atypical imaging features: Atypical COVID-19 presentations include pulmonary nodules, intralobular septal thickening, mediastinal lymphadenopathy, and pleural/pericardial effusions [Table/Fig-5]. Pleural effusions and upper-lobe involvement were more common in Middle East Respiratory Syndrome Coronavirus (MERS) pneumonia [26]. In contrast to COVID-19, Severe Airway Respiratory Syndrome (SARS) had a higher frequency of focused unilateral lung involvement in the early stages [26].

SEVERITY ASSESSMENT OF COVID-19 BY CT CHEST

In COVID-19, CT chest assessment of disease allows for reliable quantitative severity score, which is useful in diagnosing mild disease, defining temporal change, and aiding clinical decisions. With the aim to improve communication with physicians and multicentre collection of CT diagnostic accuracy data, the use of standardised reporting systems for lung involvement in COVID-19 has been promoted.

Several reporting systems for chest CT scans of patients with COVID-19 have been proposed. These methods use standardised language and diagnostic categories to provide a more comprehensive picture of the COVID-19 infection-related lung parenchymal abnormalities.

The RSNA Expert Consensus Statement, Coronavirus Disease 2019 Reporting and Data System (CO-RADS) by the Dutch Radiologic Society [Table/Fig-6,7], British Society of Thoracic Imaging, COVID-RADS are different reporting systems [27-31]. When typical findings are present or absent, each classification system is likely to be helpful



[Table/Fig-6]: Representative axial High-Resolution Computed Tomography (HRCT) chest images depicting CO-RADS. (a) Normal HRCT chest: CO-RADS 1; (b) Centrilobular nodules in the right lung (open arrowheads)- bronchiolitis, later diagnosed as active pulmonary tuberculosis. CO-RADS 2; (c) Dense consolidation with air bronchogram (arrow) and surrounding reticular interstitium in a patient with bacterial pneumonia: CO-RADS 3; (d) Peribronchovascular GGOs in the left lung (curved arrows): CO-RADS 4. Nasopharyngeal swab was positive for SARS-CoV-2; (e) Peripheral and sub-pleural predominant multifocal GGOs with interlobular septal thickening- crazy paving appearance (arrow) in both lungs: CO-RADS 5. This was later proven to be COVID-19 pneumonia; (f) Extensive, peripheral confluent bilateral GGOs with septal thickening in a patient with SARS-CoV-2 secondary to COVID-19 pneumonia.

CO-RADS	Description
6-Proven	RT-PCR positive for Coronavirus
5-Very high suspicion: Typical for COVID-19	GGO, with or without consolidations, in lung regions close to visceral pleural surfaces, including the fissures (sub-pleural sparing is allowed) and multifocal bilateral distribution AND at least one of the following:
	- Ground-glass areas
	- Unsharp demarcation, rounded shape
	- Sharp demarcation, outlining the shape of multiple adjacent secondary pulmonary lobules
	- Crazy paving
	- Patterns compatible with organising pneumonia
	- Thickened vessels within parenchymal abnormalities found in all confirmatory patterns
4-High suspicion: Suspicious for COVID-19	Findings are similar to those for CO-RADS 5 category but:
	Not in contact with the visceral pleura
	Not located strictly unilaterally in a predominant peribronchovascular distribution
	Superimposed on severe diffuse pre-existing pulmonary abnormalities
3-Equivocal/unsure-Features compatible with COVID-19 but also other diseases	Perihilar GGO
	Homogenous extensive GGO with or without sparing of some secondary pulmonary lobules
	GGO together with smooth interlobular septal thickening with or without pleural effusion in the absence of other typical CT findings.
	Small GGOs that are not centrilobular or not located close to the visceral pleura.
	Patterns of consolidation compatible with organising pneumonia without other typical findings of COVID-19
2-Low suspicion-Typical for other infection but not COVID-19	CT lung findings typical of infectious origin that are considered not compatible with COVID-19. Examples:
	- Infectious bronchiolitis
	- Bronchitis
	- Bronchopneumonia
	- Lobar pneumonia
	- Pulmonary abscess.
	Features including:
	- Tree-in-bud sign
	- Centrilobular nodular pattern
	- Lobar or segmental consolidation
	- Lung cavitation
1-Very low suspicion	Normal or non infectious
0-Not interpretable	Scan technically insufficient for assigning a score

[Table/Fig-7]: Summary and important features of CO-RADS [28].

in indicating the presence or absence of COVID-19, respectively. The CO-RADS classification was created for a moderate to high prevalence setting and is a standard reporting system for patients with probable COVID-19 infection. With 61% sensitivity and % percent specificity, CO-RADS score >4 were shown to be the best threshold. The CO-RADS 1 and CO-RADS 5 categories had moderate agreement [32].

On a CT chest scan, a variety of approaches can be employed to detect the extent of lung involvement. Parenchymal anomalies are classified as mild, moderate, or severe using qualitative approaches. By using semi-quantitative methods, quartiles can be used to estimate lobar or zonal involvement [33,34]. Quantitative methods based on artificial intelligence that were utilised to determine Total Lung Involvement (TLI), percentage of consolidation, and GGOs showed to be more accurate [35-37]. The degree of lung parenchymal involvement and the disease severity of COVID-19 are specifically related [38].

The CT severity scoring system allows for more accurate identification, allowing for improved control of coronavirus propagation through medical therapy and the reduction of public health surveillance systems. Various CT visual quantitative grading systems exist [Table/Fig-8] [18,33,43]. The CT severity assessment system has the potential to improve clinical triage and predict clinical outcomes [35,39].

The CT severity score for severe COVID-19 was 19.5 points, with a sensitivity of 83.3 percent and a specificity of 94% [40]. CT severity scores of 18 on a scale of 0 to 25 were linked to a higher probability of death [41]. Another score, the Total Severity Score (TSS), revealed a substantial difference between mild and severe-critical patients, with a cut-off value of 7.5 with good sensitivity and specificity [Table/Fig-9] [33]. Similar sensitivity and specificity have been found in other CT-SS [18,42,43].

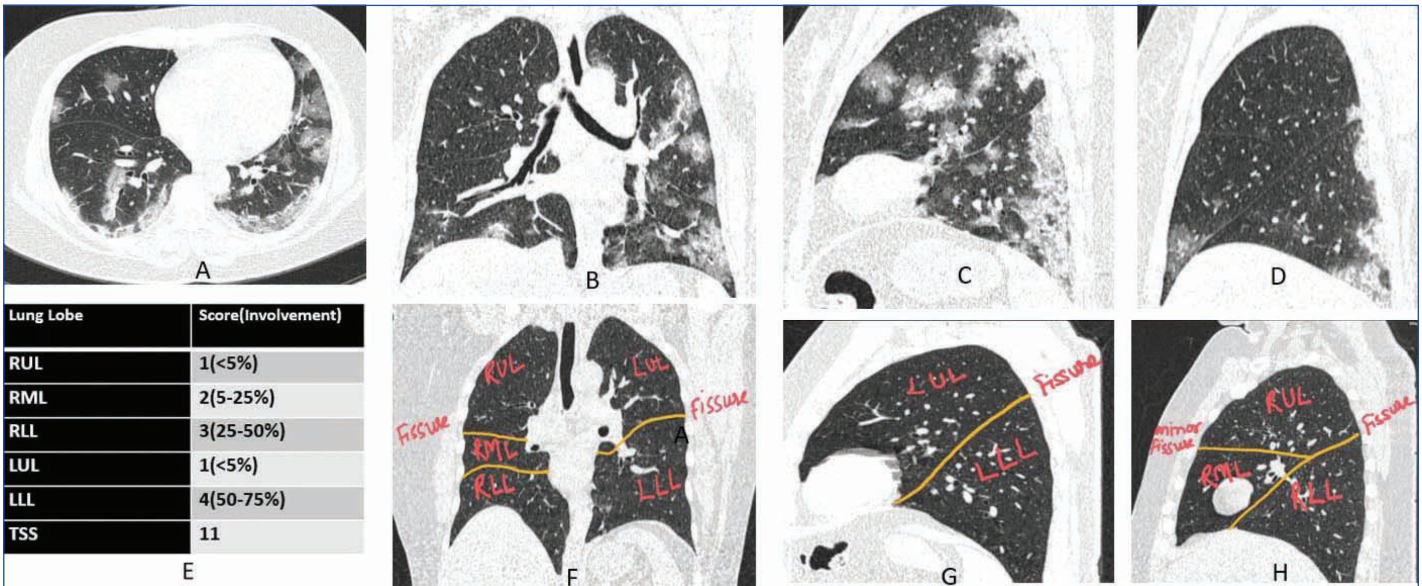
The positive predictive value of each of these systems varies according to the prevalence of COVID-19. More study is needed to assess the diagnostic effectiveness of CT chest in persons who have highly suggestive CT readings but aren't clinically suspected of having COVID-19 [44].

The CT severity ratings along with other several clinical and laboratory variables linked to a patient's prognosis [45]. CT severity scores were found to have significant relationships with serum markers of disease severity [46-50]. The CT severity score and inflammatory marker levels have been found to have a significant positive relationship [38,39,41,46]. In a multivariate model that included age and inflammatory serum biomarkers, higher CT severity scores were linked to an increased mortality rates in COVID-19 hospitalised patients. Patients with a CT severity score of 15 or higher were more likely to die, and the CT severity score was the only independent risk factor for mortality [41].

Although preliminary data from clinical research suggests that CT severity rating is effective in the management of COVID-19 patients. Finding a standard scoring methodology requires inter-observer consistency. Furthermore, a significant proportion of asymptomatic patients may have parenchymal involvement on CT that is comparable in severity to that of symptomatic patients, and CT severity scores of clinically severe cases of COVID-19 pneumonia may be comparable to those of moderate clinical severity, highlighting the limitations of relying solely on CT severity to draw clinical conclusions [51].

Studies	Lung regions to consider	Score interval and % of involvement	Character of bnormalities	Total score
TSS by Li K et al., [33]	5 lobes	Score-5 (0-4) 0 (0%), 1 (1-25%), 2 (26-50%), 3 (51-75%), or 4 (76-100%)	No	20
Chest CT score by Li K et al., [18]	5 lobes	Score-6 (0-5) 0 (0%), 1 (<5%), 2 (5-25%), 3 (26-49%), 4 (50-75%), 5 (>75%)	No	25
CT score by Yuan M et al., [43]	6 regions	Score-5 (0-4) 0 (0%), 1 (1-25%), 2 (26-50%), 3 (51-75%), or 4 (76-100%)	25 Yes (1-3) 1-normal attenuation, 2-ground glass opacification 3-consolidation	72

[Table/Fig-8]: Tabulation of all the CT Scoring Systems (CT-SS) and comparison of their important features [18,33,43].
CT-SS: CT severity score; TSS: Total severity score



[Table/Fig-9]: Total Severity Score (TSS) calculation in COVID-19 pneumonia using High-Resolution Computed Tomography (HRCT) chest. a) Axial and b) Coronal chest Computed Tomography (CT) images in a 55-year-old man with clinically moderate COVID-19 pneumonia shows multifocal peripheral Ground-Glass Opacities (GGO) and consolidations in both lungs(L>R). Sagittal reformatted images of the left lung; c) and right lung; d) Show less than 5% involvement of right upper lobe (score 1); right middle and right lower lobes have a score of 2 and 3 each, and left upper and lower lobe has a score of 1 and 4 respectively. The TSS in this patient was 12, correlating with the clinical severity; e): Tabulation of Total Severity Score (TSS); f, g, h): Shows normal anatomical division of lung lobes and fissures.
RUL: Right upper lobe; RML: Right middle lobe; RLL: Right lower lobe; LUL: Left upper lobe and LLL: Left lower lobe

CT DETECTION VERSUS RT-PCR DETECTION OF COVID-19

The RT-PCR technique is used to identify genetic material in samples in order to diagnose COVID-19 infection [6,52]. However, because RT-PCR was not widely available, particularly in poorer countries, CT chest was employed for early triage and therapy of COVID-19. Multiple factors can influence RT-PCR diagnostic performance, such as incorrect nucleic acid extraction from biological materials, insufficient sampling, variations in the accuracies of different assays, or low viral load in the early or late stages, resulting in false-negative results [53,54]. In 3-56% of RT-PCR positive individuals, false negative CT scans have also been recorded. [17,55-57]

COVID-19 lung manifestations on CT chest suggestive with COVID-19 severity usually appear later in the disease course, usually 6-11 days after infection [58]. Few studies in symptomatic participants found that CT had a higher sensitivity than RT-PCR. Such findings could be attributed to a number of reasons, including the inclusion of only patients with moderate to severe symptoms [53,55,59]. The pooled sensitivity for CT chest was 94% in a meta-analysis, and 89% for RT-PCR [3]. Lower CT sensitivity was reported as a consequence of symptoms and disease severity in another investigation, but these parameters had no effect on RT-PCR performance [60]. CT's specificity is insufficient to support its use in the diagnosis of COVID-19. The sensitivity of RT-PCR was 65% when chest CT was used as a reference of diagnosis standard for COVID-19, according to a study [61]. In the detection of COVID-19, the RT-PCR assay has a high specificity but a poor sensitivity, whereas the CT assay has a greater sensitivity but a lower specificity. The incidence of COVID-19 and other comparable viral pneumonias, as well as other clinico-radiological mimickers, affects the accuracy of imaging tests in detecting COVID-19 [60]. Despite a negative RT-PCR test, patients with clinical symptoms or a history of exposure, CT characteristics of viral pneumonia should be considered highly suspicious for COVID-19 pneumonia in the present pandemic.

COVID-19 AND PAEDIATRIC PATIENTS [62,63]

The most common symptoms in children with COVID-19, were fever and cough. In certain cases, gastrointestinal problems may be the first symptom to appear. Symptoms of the gastrointestinal tract were more common in younger children. The majority of infected youngsters show just minor clinical symptoms, and their prognosis is good. The majority of paediatric patients recovered within 1-2 weeks after the commencement of the illness. In adults, lymphocytopenia is common after the onset of COVID-19, while in children, it is uncommon. Although abnormal chest CT symptoms in certain children were common, they must be distinguished from other types of viral pneumonitis.

COMPUTED TOMOGRAPHY (CT) AND RADIATION CONCERN

In a retrospective single-center investigation, it was observed that 75.4% of COVID-19 patients were exposed to doses greater than 5 mSv {International Commission on Radiological Protection's (ICRP) upper limit of permissible, effective dose for community members}. COVID-19 patient treatment should include a more reasonable utilisation of chest CT imaging [64]. Several radiological associations have developed recommendations on the role of chest CT in the diagnosis and follow-up of COVID-19, as discussed, to prevent unrestricted use and associated unnecessary radiation exposure. Several studies have now demonstrated the use of low-dose CT, with image quality comparable to full-dose chest CT. This method was effective in lowering radiation exposure [65,66].

CONCLUSION(S)

Due to its high infectivity, COVID-19 cases have been reported in every country around the world. The best imaging method for detecting the involvement of the lungs, as well as the quickest way for determining the nature of abnormalities, is CT. The CT has a vital role in the diagnosis, management, and prognostication of COVID-19 in the fight against the pandemic, as evidenced by extensive research. In the diagnosis of COVID-19 pneumonia, chest CT shows a high sensitivity but a low specificity. Early containment can be aided by understanding the imaging characteristics of COVID-19 pneumonia, and a CT severity score could be beneficial for clinical triage and prognosis evaluation.

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