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COVID -19 AND ATYPICAL FINDINGS.

Radio-Diagnosis

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ABSTRACT

Aim of our study is to retrospectively describe the atypical findings in patient with Covid-19 disease.This is a retrospective original research of 853 patients between 1st January 2021 to 30th March 2021 for Covid-19.Patients HRCT Thorax findings and Demographic variables were recorded. The atypical findings were described and noted. Atypical findings were Medistinal lymphadenopathy,Pleural effusion Pericardial Effusion,Pneumothorax,Pneumomediastinum,Pulmonary Thromboembolism,Inter lobar cyst.Medistinal lymphadenopathy (80,9.3 %) was the most common atypical finding followed by pleural effusion(65,7.6%).Pneumomedistinum and pneumothorax constituted 16 (1.8%) cases together.1 case of atypical cyst was noted.

INTRODUCTION-
In December 2019, in Wuhan, China, A series of cases of pneumonia (1) of unknown causation emerged. Deep sequencing analysis was used to identify the novel bat-origin coronavirus 2019 (COVID-19). On December 30, 2019, The incident was declared a public health emergency of international concern (PHEIC) by the WHO. The WHO classified the disease a pandemic on March 22, 2020. The mode of transmission(2) of the disease is via human-to-human contact, droplets; airborne transmission is also possible in certain conditions.

The COVID-19 pandemic has been connected to the coronaviruses responsible for the severe acute respiratory syndrome (SARS-CoV) and the Middle East respiratory syndrome (MERS-CoV). SARS-CoV-2 is an enveloped single-stranded RNA virus that causes severe acute respiratory syndrome. The gold standard for COVID-19 diagnosis is the real-time reverse transcriptase polymerase chain reaction (RT-PCR) assay of nasal and pharyngeal swab specimens. The clinical presentation is varied, including asymptomatic cases, slightly symptomatic cases, fever, cough, anosmia, dyspnea, and severe respiratory distress. Based on the literature, patients with a history of hypertension, diabetes, and immune-compromised individuals are at an increased risk of acquiring severe disease (3). As of August 2021, the world has witnessed more than 4.3 million deaths among more than 205 million total cases due to the COVID-19 pandemic.

COVID-19 chest imaging findings were initially reported in January 2020, and the majority of hospitalized patients had bilateral lung involvement and ground glass opacities (GGO) (4). Imaging plays an important role in the diagnosis of COVID-19 pneumonia. CT is considered the first-line imaging modality in highly suspected cases and is helpful for monitoring imaging changes during treatment and for the follow-up. Therefore, CT has been identified as an efficient clinical diagnostic tool for people with suspected COVID-19 (5).

Chest CT scanning may have a potential role as a problem-solving diagnostic technique in patients with persistent clinical suspicion despite negative RT-PCR results. CT scans that are performed as part of standard clinical care, for reasons other than COVID-19 evaluation (eg, oncologic follow-up CT scans), may reveal lung abnormalities that can suggest the diagnosis of COVID-19, even in asymptomatic individuals (6-9). The Fleischner Society recently published an expert opinion statement on the use of chest imaging (including radiography and CT scanning) in patient treatment during the COVID-19 pandemic, with the intent to offer guidance to physicians on the use of thoracic imaging across a breadth of health care environments.

However, The Fleischner Society however stated that the evidence based data, supporting the use of imaging across the scenarios provided was limited, and that their recommendations may be refined through thorough scientific investigation (10-11).

The aim of this study was to review various atypical chest CT imaging manifestations of SARS-CoV-2 infection in a cohort of RT-PCR positive patients who underwent CT at our institute in order to confirm and add to the emerging literature about this novel virus that took the world by storm, as well as to guide clinicians in triaging and managing patients based on CT findings.

METHODS-
Study Design And Participants
Patients were enrolled randomly from all Inpatient and Outpatient departments in Dr.Vikhe Patil Medical College and Hospital from 1st January 2021 to 30th March 2021 for Covid-19. All patients were diagnosed with COVID-19 based on positive severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) quantitative RT-PCR using throat swab samples.

Data Collection
Demographic, HRCT Thorax findings were collected from electronic data record and evaluated by two researchers. HRCT scan was done on 16 slice GE Light speed CT machine. HRCT thorax scans were done at 140 kV and 15 mAs. Scan were evaluated at WL: 450, WW:1500.

RESULTS-
1) Demographic Characteristics
Total of 853 patients were enrolled in our study. Of these, 603 were male and 250 were female. Demographic characteristics of the patient are summarized in the table 1.

Table 1: Demographic Characteristics Of Patients

		All Patients (n=853)
Age	Mean (range)	41 (16-83)
	Age (SD)	12.383
Sex	Male –	603 (70.69)
	Female -	250 (29.3)

The mean age was 43 ± 14.3 years; with a range of 16-83 year. 135 (54.66%) of participants were ≤ 45 years and 112(45.16 %) were > 46 years of age. Male participants were 603 (70.69 %) and 250 (29.3%) were female.

2) HRCT Thorax scan results
HRCT Thorax scans were evaluated by 2 experienced radiologists. CT Severity score was calculated for each patient. (Range= 0 -25).

Pleural Effusion was seen in 65 (7.6%) patients. Unilateral pleural

effusion was seen in 43 (5.04%) patients and 22 (2.5%) had bilateral pleural effusion.(Fig 1)

Figure 1: Axial CT scan images in lung window.
Showing B/l Pleural effusion (Red arrows)

- Mediastinal Nodes were present in 80 (9.3 %) patients.
- Pericardial Effusion was seen in 6 (0.7%) patients. Pneumothorax was seen in 26(3.0%) patients.Pneumomediastinum was present in 6 (0.7%).Pulmonary Thromboembolism was present in 2 (0.02%).Pneumothorax was seen in 26 (3.0%) patients.
- A single case atypical cyst with fluid collection was seen at the left major fissure.(Fig 2)

Figure 21: Axial CT scan images in lung window.
Cyst with air fluid level noted at the left major fissure(Arrowhead)

Table 1: Atypical Covid-19 findings.

	Atypical finding	No. of patients
1	Pleural Effusion	65 (7.6%)
	Unilateral	43 (5.04%)
	Bilateral	22 (2.5%)
2	Mediastinal Nodes	80 (9.3 %)
3	Pericardial Effusion	6 (0.7%)
4	Pneumothorax	10(1.1%)
5	Pneumomediastinum	6 (0.7%)
6	Pulmonary Thromboembolism	2 (0.02%)
7	Inter lobar cyst	1 (0.01 %)

DISCUSSIONS-

COVID-19 causes the most pathogenic alterations in the lungs and the immune system (12). Serous, fibrin exudate and clear membrane form in the alveolar cavity and, congestion and edema appear in the lungs (13). HRCT lung imaging can be utilised to identify the distinctive imaging of lung changes: multiple small patch shadows and stromal changes can be observed in early stages, and the lung exudate is obvious (14), which eventually develops into multiple ground-glass shadows and infiltrating shadows in both lungs(15).

Emerging recent data suggests that uncommon atypical pulmonary and extrapulmonary findings, like centrilobular nodules, cavitation, pleural/pericardial effusion, lymphadenopathy, pneumothorax/ pneumomediastinum and pulmonary thromboembolism can be present and have been associated more in critically ill patients (16,17).

In our study, 80 (9.3%) of the patients had mediastinal lymph nodes, 65 (7.6%) had pleural effusion, and 6 (0.7%) had pericardial effusion. According to Salehi et al. (16,17) and Li et al. (16,17) in their study. These features are rarely seen on chest CT in the early stages of COVID-19, although they may be seen as the disease progresses. Furthermore, compared to uncomplicated patients, severe and critical patients had a higher incidence of lymph node enlargement, pericardial effusion, and pleural effusion.

In viral pneumonia, spontaneous pneumomediastinum can also occur. It has been hypothesised that damaged alveoli with severe COVID-19 pneumonia are prone to rupturing, particularly in patients with pronounced cough. There have been few reports on spontaneous pneumomediastinum from COVID-19 in the non-mechanical ventilation settings. (18) Pneumomediastinum was found in 6 (0.7%) of the cases in the study we conducted.

Previously, pulmonary thromboembolism was considered to be a rare complication of viral pneumonia. One patient in our study developed pulmonary thromboembolism. Bompard et al. (19)observed acute pulmonary thromboembolism in almost a quarter of the COVID-19 pneumonia patients evaluated after contrast administration on CT and concluded that contrast-enhanced CT should be more widely used, particularly in those with marked elevation of D-dimer.

In conclusion, Atypical pulmonary and extrapulmonary features were observed in patients with high CT severity scores in our study, which could be either due to a heightened inflammatory response or secondary bacterial infection. However, the fact is, less common but atypical findings are seen in complicated patients. A radiologist must be experienced with typical and atypical CT Chest Imaging findings in order to provide better patient care.

The main limitation of our study was that we couldn't assess the true incidence rate because most of the patients in our cohort who underwent HRCT had moderate to severe disease. Second, because many patients were lost to follow-up, the long-term effects of COVID-19 pneumonia could not be examined in our study.

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