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Case Series

Rapid Screening: Post Computerized Tomography incidence of Severe Acute Respiratory Syndrome Coronavirus 2 features in the asymptomatic patients.

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Abstract

Background: It is to document the frequency of incidental Corona Virus Disease-2019 (COVID-19) specific findings in patients imaged after the initial ten days of lockdown relief and the sensitivity of computed tomography (CT) in picking unknown ongoing disease processes.

Case Presentation: In this study, we presented seven cases; three cases in plain CT pyelogram and four cases of post-contrast scans. Post-contrast scans of chest findings in case 1 showed few pre-vascular, pre-tracheal, and sub-carinal lymph nodes with calcified granuloma in the left lower zone accompanied by extensive bilateral peripheral ground glass haze with alveolar opacification. In Case 2, multiple non-homogeneous areas of ground-glass haze diffusely involving both lung fields were seen. Case 3 showed a few sub-centimeters mediastinal lymph nodes with diffuse mosaic attenuation patterns in both lung fields and multiple soft tissue density nodules in both lungs. While in Case 4, Patchy areas of alveolar opacification with surrounding ground-glass haze were noted in the lower lobes.

Management & Results: A total of 64 CT C/A/P (chest/abdomen/pelvis) with contrast scans and 120 plain pyelograms were done within ten days after lockdown relief, and it was observed that during the stricken lockdown, no incidental case of positive CT finding was observed. However, afterward, within this time, 44 cases (23.9%) were recorded in asymptomatic patients with COVID-19.

Conclusion: CT chest is highly sensitive in detecting COVID-19 with high accuracy of featuring progress in the disease and associated findings even in the initial stages.

Keywords

COVID-19, CT scan, Asymptomatic Patients, Pyelogram.

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Introduction

The chief medical emergency of COVID-19 running globally is highly contagious and caused a rapid increase in the death rate worldwide[1,2]. Now, many countries are reporting multiple cases of this highly contagious and lethal disease. The coronavirus mostly affects the lungs due to the abundance of Angiotensin-Converting Enzyme type 2 (ACE2) in alveolar cells of lungs; progressing alveolar lung disease causes respiratory distress, which (in some cases) leads to death. The WHO has set a diagnostic protocol for COVID-19 testing. The predominant testing modes are reverse transcription-polymerase chain reaction (RT-PCR), chest X-ray radiography, chest ultrasound, and chest CT[3-6]. The CT is a 3D imaging modality in which a series of images obtained from a different angle by using X-radiations is combined. Studies were performed both ways, with and without contrast media depending on suspected pathology. The plain imaging of kidneys, ureters, and bladder called CT-K.U.B. or Pyelography is used to detect various urinary tract pathologies. The study protocol mentioned in various series is adding 5mm thick cuts above the diaphragm (lung bases) to the below pubic symphysis.

However, the CT chest is highly sensitive for COVID-19 testing[7], but the CT chest is stated to be significant in reporting the progression of complications and not as a primary diagnostic tool[8]. Due to a high radiation dose, the CT scan is not recommended for routine screening by WHO. The baseline radiographic imaging, X-ray Chest, although is less sensitive but used for suspected patients, appears mostly normal in the early and mild stages. Extensive findings are seen after 10-12 days of symptoms[9]. Clinical signs and symptoms of novel coronavirus present manifestations of the respiratory tract but some cases recorded with positive PCR and CT findings are asymptomatic; these individuals can act as carriers. This retrospective study was carried out to determine the percentage (%) of incidence in a particular time period. No comparative study was performed. It is to document the frequency of incidental COVID-19 specific findings in patients imaged after the initial ten days of lockdown relief and the sensitivity of CT in picking unknown ongoing disease processes.

Case Presentation

A total of seven cases are presented in this study.

Plain Studies

Three cases in plain CT pyelogram are described below:

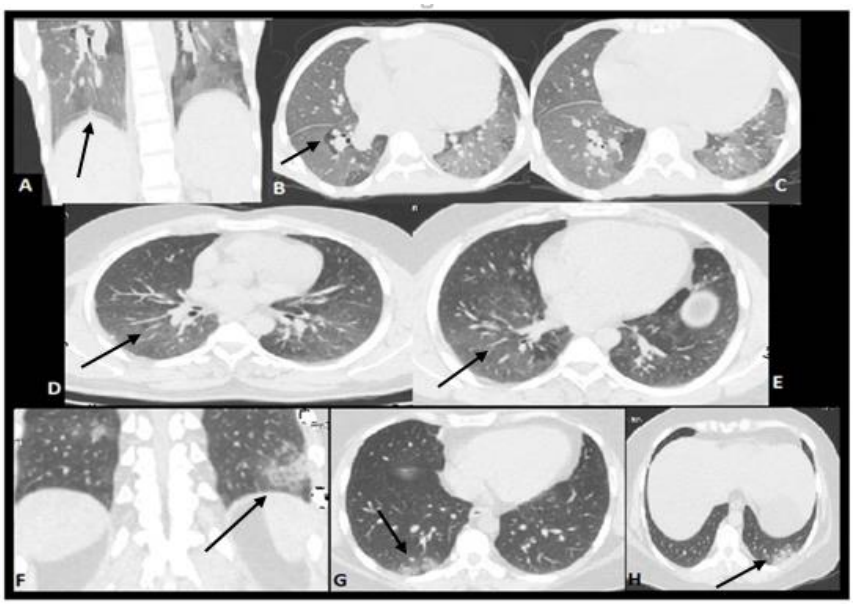

Figure 1: Plain study outcomes.

Case 1 (A to C) A 31 years old female came for a CT pyelogram. Visualized lungs radiography showed bilateral diffuse ground-glass alveolar opacification, shown by arrows in images B and E with a small patch of consolidation, shown in images A and F with arrows in the lower lobe. Case 2 (D & E) Lower lobe of the lungs shows patchy alveolar consolidation and a ground-glass appearance. Case 3 (F to H) Patchy areas of consolidation in both lower lobes are peripherally shown by arrows (Figure 1).

Post-Contrast Studies

Four cases of post-contrast scans are presented below:

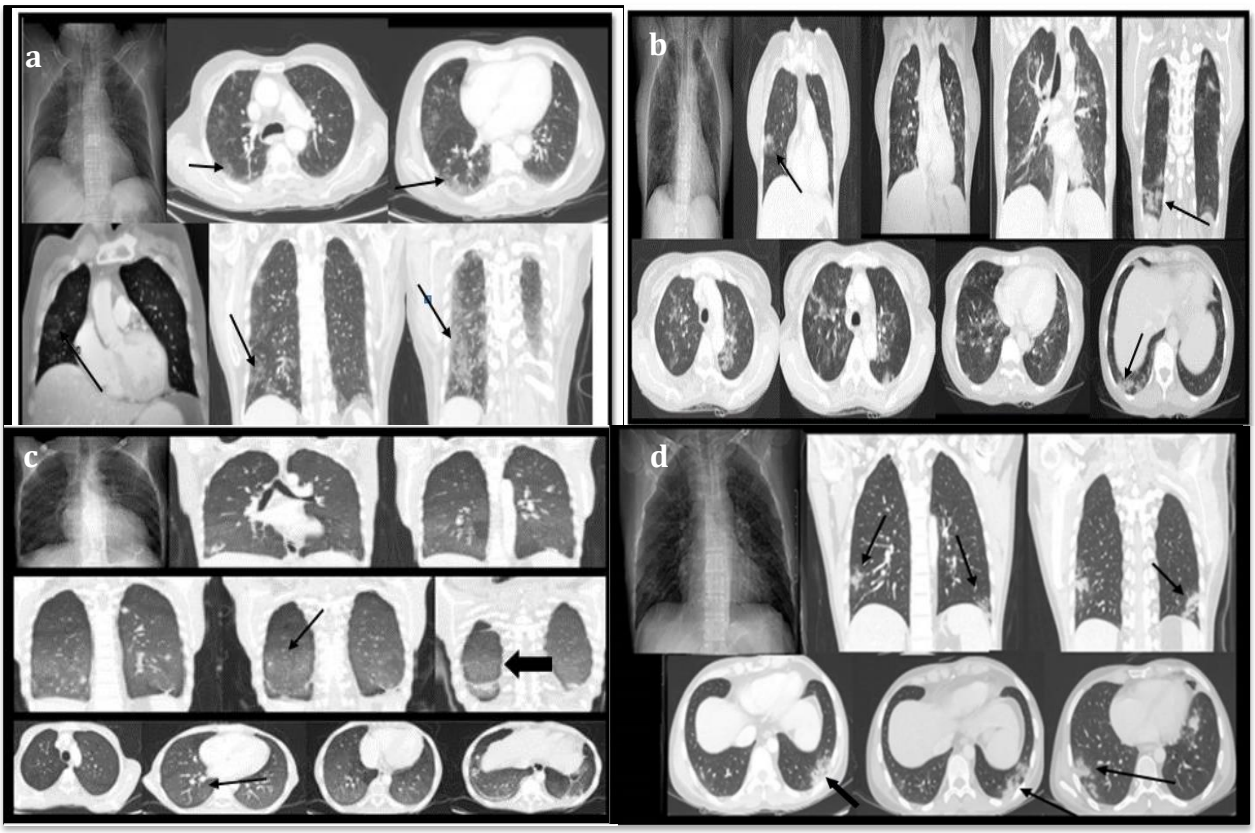

Figure 2 (a-d): Contrast study outcomes.

Case 1: A 24 years male with a known case of adenocarcinoma prostate with bony metastasis came for CT C/A/P, Followed by PVP protocol. Chest findings showed few pre-vascular, pre-tracheal, and sub-carinal lymph nodes with calcified granuloma in the left lower zone accompanied by extensive bilateral peripheral ground-glass haze with alveolar opacification (shown by arrows) seen predominantly involving upper and lower lobes. Case 2: A 60 years old female with a cough came for CT chest findings showed multiple non-homogeneous areas of Ground Glass Haze diffusely (shown by arrow) involving both lung fields. These were peripheral as well as central with mediastinal lymphadenopathy. Case 3: 24-year-old male status post renal transplant came for surveillance scan. Chest findings showed a few sub-centimeters mediastinal lymph nodes with diffuse mosaic attenuation patterns in both lung fields (shown by arrows) along with multiple soft tissues density nodules in both lungs, a few of them with central cavitation (shown by bold arrow). Fibrotic bands were also seen—case 4: A 40 years male status post renal transplant surveillance scan. Patchy areas of alveolar opacification with surrounding ground-glass haze were noted in lower lobes, predominantly in the peripheral zone, shown by arrows (Figure 2).

National and hospital internal guidelines recommend HRCT (high resolution computed tomography) imaging for disease progression as it uses thin cuts that delineate fine detail of the disease effect. In our series, we recorded incidentally found positive cases. The patients came primarily for different causes; therefore, we performed routine thick-cut imaging, which shows the high sensitivity of CT in the detection of COVID-19 even in thick slices (5 mm).

Management & Results

The outpatients that were appointed after religious occasions were highly suspicious due to lockdown relief. Soon after an increase in the rate of incidentally positive patients, the department decided to perform every CT scan after PCR testing to avoid unnecessary contamination. A total of 184 scans with 98 males and 86 females were carried out, of which 44 were positive. All the results are shown with the coronal and axial/transverse plane of CT scan images in a plain and contrast study. The specific management and treatment are based on the patient's primary condition as patients with end stage renal disease have different protocol for chest pathology management as compared to those with metastasized cancer. It was noticed that the patients with previous lung disease or any other immunosuppressing factor, for example, age, post-renal transplant, etc. showed more chronicity of the disease. The healthy population showed very mild signs and symptoms that don't require any proper treatment.

Discussion

At the time of the pandemic, patients that came with their immunity already suppressed either due to any other ongoing disease process or due to their age factor showed chronic COVID-19 findings requiring proper protocol of treatment, including oxygen saturation medication, and follow-up scan. However, others showed only mild symptoms, not requiring any special treatment.

Early detection of COVID-19 is significant to providing effective treatment, as management in the late stages is challenging. Many series mentioned that CT imaging is well-grounded compared with the efficacy of RT-PCR. Fang et al. mentioned the CT sensitivity against COVID-19 detection as 98% and RT-PCR sensitivity as 71% in their work10. ACE2 is a primer involved in acute lung failure by the involvement of which the COVID-19 infection induces diffuse alveolar damage[11,12]. Therefore, lung imaging diagnosis and detection of progression are crucial. The lung imaging with CT requires breath-hold to reduce motion artifact interfering finding. However, the COVID-19 positive patient cannot breathe; therefore, radiologists should be focused on not confusing the motion artifact from GGO or consolidation[13]. Ground Glass opacity increases hazy attenuation in various alveolar areas and interstitial processes with vascular bronchial marginal preservation[14]. Whereas the consolidation obscures airway walls and vascular margins[15]. The breathing artifact causes an overlap of structures, e.g., pulmonary vessels[16]. Caruso et al. mentioned enlarged subsegmental pulmonary vessels in 89% population of their study[17,18].

Immunocompromised individuals were found as potential carriers. The distribution of COVID-19 infection is not restricted to the specific region of the lungs. Lower lobes are often involved in evident patients who underwent a plain pyelogram that even a small part of the lung is sufficient to identify COVID-19 positive patients.

In limited time period incidental cases were observed in our study. It highlighted the main features that appear on CT scans in the early stages of COVID-19 as the indulged population was asymptomatic. Healthcare workers must pay proper attention to personal safety to remain safe from asymptomatic carriers. This data also concluded strict preventive measures needed to be implemented and practiced in radiological imaging facilities, even considering every patient a suspected carrier.

Conclusion

Coronavirus disease is described as a systemic inflammatory reaction that influences the lungs, blood, and circulatory systems. HRCT chest, having

huge specificity and fantastic susceptibility for COVID-19 pneumonic infection, is a great methodology. It can play a positive part in the early recognition, evaluation, and management of pneumonic COVID infection during a pandemic. If available, it can be utilized with certainty for a re-assessment of PCR-negative suspects for decision-making about treatment and foreseeing the danger of respiratory decline. As HRCT examination can precisely evaluate the seriousness of COVID-19, therefore, it also helps screen for infection transformation during follow-up among various clinical conditions.

Conflicts of Interest

The authors have declared that no competing interests exist.

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