



A PATTERN CATEGORIZATION OF CT FINDINGS TO PREDICT OUTCOME OF COVID-19 PNEUMONIA: CASE SERIES

Radiology

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ABSTRACT

The COVID-19 pandemic in India is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). India currently has the largest number of confirmed cases in Asia, after the second wave. Chest CT pattern categorization allied with clinical characteristics and lab parameters within 2 weeks after symptom onset can be used as a tool to predict outcome of COVID-19 pneumonia.

KEYWORDS

CT, COVID 19

INTRODUCTION

In India, after the second wave, Kerala stands second in total number of COVID cases with 1295059 active cases as on 22-04-2021.

Corona virus disease 2019 (COVID-19), caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has spread unabated across the globe after its emergence in Wuhan, China at the end of 2019[1]. It is recognized that CT plays a central role in diagnosis and management of COVID-19 pneumonia. The clinical presentation ranges from asymptomatic, mildly symptomatic cases to severely ill [2,3] Pneumonia is the most serious manifestation of COVID-19 that mainly affects the respiratory system [4]. Chest computed tomography (CT) is recommended as the major screen modality with a higher sensitivity of 97% and faster performance[5,6,7,8]. Computed tomography (CT), especially high- resolution CT (HRCT), is used for the early diagnosis , severity and management of COVID- 19 disease infection [6,9,10,11].

We present three confirmed cases of COVID-19 from Travancore Medicity, Kollam.

Case 1:

A 62 years old female who is a k/c/o bronchial asthma since 15 years admitted in our hospital with complaints of high grade fever, dry cough and exacerbation of breathlessness since 5 days. Her chest CT findings showed consolidation in posterior basal segment of right lower lobe and multifocal areas of ground glass attenuation with intervening septal thickening in all segments of bilateral lung parenchyma in peribronchovascular and subpleural distribution, showing posterior and lower lobe predominance. CT-Severity Score was 16/25.[Fig1]

Lab Parameters

Leukocyte-10000cells/cmm, neutrophil/lymphocyte ratio- 1, LDH-240 units/L, D-dimer-700 ng/ml, CRP-45, Ferritin- 250 mcg/L.

Clinical Outcome

The patient was admitted to ICU due to saturation fall and was on high-flow nasal oxygen for 4 days after which she was shifted to ward with O2 via nasal prongs for 3 days following which she started breathing voluntarily. She got discharged after 5 days when her rapid antigen test became negative.

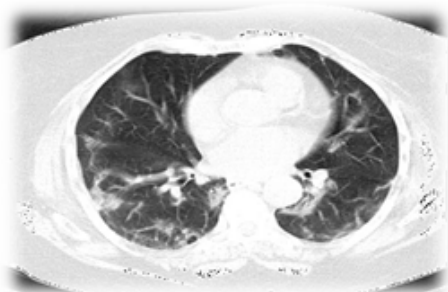


Fig 1

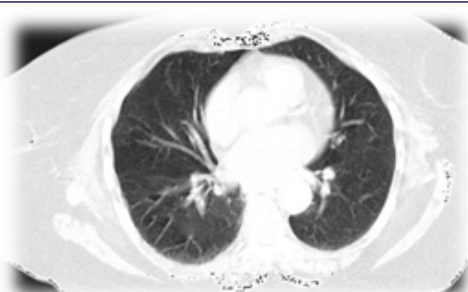


Fig 2

A repeat Ct was taken after 30 days which showed fibrotic band in medial segment of right middle lobe and few ground glass opacities in bilateral lower lobes . Her CT-Severity Score was 3/25.[Fig2]

Case 2:

A 50 years old male with no known co-morbidities admitted in our hospital with complaints of low grade fever, dry cough , throat pain since 5 days. **CT Chest-** Peripheral and subpleural ground glass opacities with small reticular opacities / linear fibrotic bands in left upper and bilateral lower lobes, small pneumatocele in the lateral segment of right middle lobe and sub-segmental atelectasis in the lateral segment of right middle lobe. His CT- Severity Score was 3/25.[Fig3]

Lab Parameters

Leukocyte-7000cells/cmm, neutrophil/lymphocyte ratio-0.9, LDH-250units/L, D-dimer-400 ng/ml, CRP-7, Ferritin-280 mcg/L

Clinical Outcome

The patient was admitted to ward, treated conservatively for one week following which his rapid antigen test became negative and hence discharged.

A repeat Ct was taken after 30 days which showed very few ill-defined ground glass opacities in peripheral zone of bilateral lower lobes. His CT-Severity Score was 2/25.[Fig4]

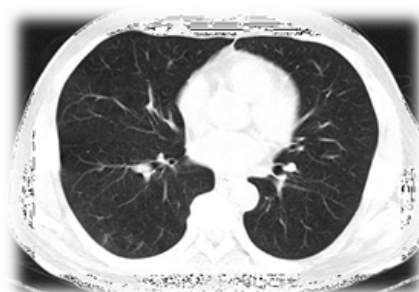


Fig 3

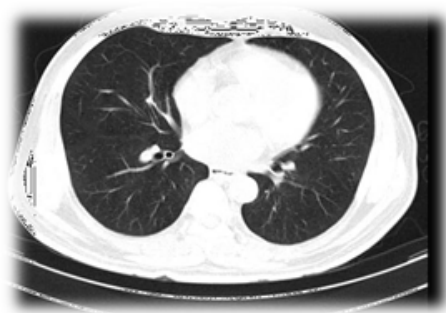


Fig 4

Case 3:

A 70 years old male who is a k/c/o CAD/CKD/HTN/COPD since 10 years admitted in our hospital with complaints of high grade fever, dry cough, acute exacerbation of breathlessness and reduced response since 7 days.

CT Chest- Bilateral, symmetrical, peripheral and subpleural ground glass opacities with crazy paving pattern, patchy small consolidation and traction bronchiectasis in bilateral lungs with mediastinal lymphadenopathy and cardiomegaly.

His CT-SS was 20/25.[Fig 3]

Lab Parameters

Leukocyte-14500cells/cmm, neutrophil/lymphocyte ratio-4, LDH-400 units/L, D-dimer-1200 ng/ml, CRP-65, Ferritin-700 mcg/L

Clinical Outcome

The patient was admitted to ICU due to altered consciousness and low saturation. ABG showed severe decompensated acidosis following which endotracheal intubation was done. Despite of intensive treatment, patient's condition deteriorated, as evident from his profound unresponsiveness and persistent high values of total leucocyte count, D- dimer, ferritin, IL-6, C-reactive protein, LDH and troponin. Mechanical ventilation was discontinued after one week, following which the patient died.

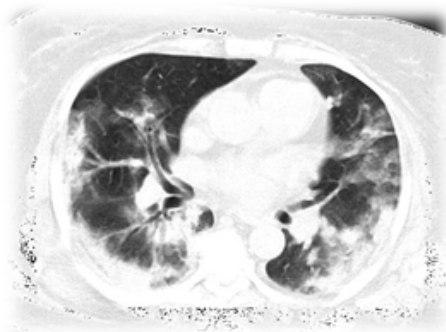


Fig 5

DISCUSSION:

SARS-CoV-2 is a member of the family Coronaviridae and order Nidovirales. Coronaviridae are subdivided into four genera: (a) Alphacoronavirus contains the human coronavirus (HCoV)-229E and HCoV-NL63; (b) Betacoronavirus includes HCoV-OC43, Severe Acute Respiratory Syndrome human coronavirus (SARS- HCoV), HCoV-HKU1, and Middle Eastern respiratory syndrome coronavirus (MERS-CoV); (c) Gammacoronavirus includes viruses of whales and birds and; (d) Deltacoronavirus includes viruses isolated from pigs and birds [12] SARS-CoV-2 belongs to Betacoronavirus together with two highly pathogenic viruses, SARS-CoV and MERS-CoV. SARS-CoV-2 is an enveloped and positive-sense single-stranded RNA (+ssRNA) virus [13].

CLINICAL FEATURES:

Clinical manifestations of Covid-19 pneumonia have similarities with SARS-CoV where the most common symptoms include fever, dry cough, dyspnea, chest pain, fatigue and myalgia. Less common symptoms include headache, dizziness, abdominal pain, diarrhoea,

nausea, and vomiting [14].

CT FINDINGS:

The most common CT features reported in COVID-19 pneumonia are bilateral and sub-pleural areas of ground- glass opacification, consolidation affecting the lower lobes, or both [15]. Each lobe could be awarded a CT score from 0 to 5, depending on the percentage of the involved lobe:

Score 0 - 0% involvement

Score 1 - < 5% involvement

Score 2 - 5% to 25% involvement

Score 3 - 26% to 49% involvement

Score 4 - 50% to 75% involvement

Score 5 - > 75% involvement

The overall CT score was the sum of the points from each lobe and ranges from 0 to 25 points. Scores 7 or less were considered mild, scores 8-17 moderate and scores above 18 were considered as severe COVID pneumonia. [16]

CONCLUSION:

CT pattern categorization along with CT Severity index, clinical symptoms and lab parameters help in predicting the treatment and outcome of patients admitted with COVID 19 pneumonia.

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