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# ANATOMICAL CHANGES IN LUNG IN CORONAVIRUS INFECTION

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**ABSTRACT**

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. The lungs are affected the most, with patients presenting symptoms related to the respiratory system such as sore throat, fever, malaise, and respiratory distress, and in worst cases may proceed to respiratory failure. Therefore, in this research paper study on anatomical changes in lung of different CT scan reports in case of corona virus infected or suspected patients for better understanding related COVID diagnosis purpose.

**KEYWORD:** COVID, ANATOMICAL CHANGES, CT scan.

## INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

Corona virus disease, which is zoonotic in origin and most commonly spread through respiratory droplets or aerosol transmission, has caused a big threat to mankind.[1] The disease was originated in the seafood market of Wuhan, Hubei, China, in early December 2019with clinical presentations greatly resembling viral pneumonia.[2]

This disease has affected most of the countries in the period of 2 months itself. The outbreak of COVID-19 has been declared a pandemic by World Health Organization (WHO) and presents a great challenge for the healthcare communities across the globe. The presently identified causative agent for COVID-19, severe acute respiratory syndromecoronavirus-2 (SARS-CoV-2), has shared 82%genome sequence similarity to previously identifiedSARS-CoV-1, which also originated in China in 2002.[3-4]

The lungs are affected the most, with patients presenting symptoms related to the respiratory system such as sore throat, fever, malaise, and respiratory distress, and in worst cases may proceed to respiratory failure.[5]

The entry of virus in the host cells induces immune response with wide secretion of inflammatory cytokines and chemokines. Because SARS-CoV-1 and SARS-CoV-2 have the same mechanism of action; both can cause rapid production of multiple cytokines in body fluids following infection, leading to acute respiratory distress and multiple organ failure. This also explains why most patients with COVID-19 have mild symptoms at the onset of the disease, while conditions of a few affected patients are suddenly worsened after being diagnosed in hospital, which may be related to the body producing excessive cytokines after the disease, leading to 'cytokine storm' in the body.[6]

## MATERIALS AND METHODS

### OBJECTIVE

Data of anatomical changes in lung of different CT scan reports in case of corona virus infected or suspected patients.

### Information Sources

The authors performed vast review of the articles. CT scan report collected from the different patients from the different authorized X-Ray house.

### Inclusion and Exclusion Criteria

**Inclusion criteria-** Suspected patients of Corona virus disease.

**Exclusion criteria-** H/o Tuberculosis, Pleural effusion, Cancer of lung and other lung infected disease.

## OBSERVATION AND DISCUSSION

In this review, authors collected different CT scan report, suspected to COVID-19 positive patients. Overall, 15CT scan reports were identified using different data bases full articles to be included in our study. Anatomical changes in lung are summarized according to the CT scan reports.

**Findings in lungs**

**Patient-1**

**Impression**

Diffuse & scattered areas of consolidation with ground glass opacity in both lung fields in peripheral subpleural region.

Possibility of atypical viral pneumonia with organizing pattern appears likely (peak stage of COVID-19 disease with mild severity and severity score of 9/25).

**Patient-2**

**Impression**

Multifocal ground glass opacities with inter & intralobular septal thickening involving bilateral lung fields in peribronchovascular& peripheral subpleural region, predominantly in bilateral lower lobes.

No evident significant lymphadenopathy or pleural effusion.

The above-described findings suggest possibility of infective etiology – atypical viral pneumonia.

CORADS-5: Typical findings of COVID-19 infection are present (suspicion ofCOVID-19 infection is very high).

ADV: Clinical und RT-PCR correlation. CT severity score 19 (Maximum scores 25).

**Patient-3**

**Impression**

**Clinical History**

Bilateral middle lobe medial segment and bilateral lower lobe posterior basal segment parenchymal minimal reticulation with stranding and minimal fuzzy infiltration is seen.

Both lung fields are hyper inflated showing areas of multiple focal air trapping with multiple centriacinar microcystic infiltration, predominantly bilateral basal segments.

Centrilobular tree- in-bud opacities seen in bilateral lung fields with ground glass haziness. There are symmetrically diffusely distributed ground glass opacities in all zones with basal predominance immediate subpleural reticular opacities and irregular linear opacities with minor subpleural reticulation a long with thickening of bronchovascular bundles.

Few bilateral hilar subcentimeterlymphnodes are seen. Trachea is central. Tracheal bifurcation is defined. Mediastinalvascular and tubular structures are normal. Bony thoraciccage and extra thoracic soft tissue are normal.

**Patient 4**

**Impression**

Above CT findings are suggestive of- Multifocal wedgeshaped areas of air space opacifications seen with irregular interlobular septal thickening, few parenchymal bands and few areas of ground glass opacities in both lungs, most marked in both lower lobes, findings are highly suspicious for COVID-19 pneumonia with ongoing reorganization.

Other differential diagnosis would be non-COVID bronchopneumonia (CORADS-4).

If relevant investigationsconfirm COVID-19 infection, CT severity scores: 10/25

**Patient 5**

**Impression**

Atypical infection / viral etiology. CORADS 5 with CT severity index 14 out of 25. (Right upperlobe: 3, Right middle lobe: 2, Right lower lobe: 3, Left upper lobe: 3, Left lower lobe: 3).

**Patient 6**

**Impression**

Atypical infection / viral etiology. CORADS 4 with CT severity index 3 out of 25.

**Patient 7**

**Impression**

Atelectatic bands in posterior basal segment of left lowerlobe and lingular segment of left upper lobe.

No evidence of consolidation, tree in bud or miliary nodules, cavitation or pleural effusion to suggest any active pulmonary infection. No evidence of changes of COVID 19.

**Patient 8**

**Impression**

Patchy ill defined areas of ground glass opacities in bilateral lung fields with peripheral subpleural predominance.

HRCT findings suggest possibility of atypical pneumonitis.

**Patient 9**

**Impression**

Multiple patchy peripheral ground glass haziness with adjacent septal thickening (Crazzy paving pattern) seen involving apical segment of right upper lobe, right middle lobe, posterior segment of right lower lobe, anterior segment of left upper lobe, left lingula & posterior & basal segments of left lower lobe, suggestive of atypical viral pneumonitis.

**Patient 10**
**Impression**
Multiple discrete patchy areas of ground glass opacities with subpleural bands noted within bilateral lung fields, predominantly in peripheral, subpleural region and bilateral lower lobes, likely infective etiology- A typical viral.
CO- RADS: 5(highly suspicious for covid- 19), CT severity score: 3/25.

Clino-pathological correlation suggested.

**Patient 11**
**Impression**
Bilateral lower lobe posterior basal segment parenchymal reticulation with stranding & minimal fuzzy infiltration is seen.

Bilateral hyper inflated lung fields showing areas of multiple focal air trapping with multiple centriacinar microcystic infiltration, predominantly bilateral basal segments & symmetrically diffuse distributed ground glass opacities in all zones with basal predominance immediate subpleural reticular opacities & irregular linear opacities with minor subpleural reticulation along with thickening of bronchovascular bundles.

CT severity score would be 5 to 25% involvement of bilateral lungs.

**Patient 12**
**Impression**
A few patchy areas of ground glass haziness with intervening areas of inter & intra lobular septal thickening along peri-bronchovascularinterstitium& peripheral aspects of the right middle lobe, left upper lobe, left lingula & both lower lobes, suggest infective etiology- viral pneumonia (covid- 19) likely.

(Severity score 6 out of 25 & CORADS:5).

**Patient 13**
**Impression**
Multiple patchy peripheral ground glass haziness with adjacent septal thickening (crazy paving pattern) seen involving posterior segment of right upper lobe, right middle lobe, posterior segment of right lower lobe, anterior segment of left upper lobe, left lingula & posterior and segments of left lower lobe, suggestive of atypical viral pneumonitis.

**Patient 14**
**Impression**
The CT findings are of
Patchy ground glass opacities with mild interstitial thickening in both lung fields as described above.
No significant mediastinal lypmhadenopathy or pleural effusion.

**Patient 15**
**Impression**
Multiple irregular ill defined pulmonary opacities seen at both upper lobe & both lower lobes posteriorly and anterolaterally peripherally subpleurally with associated septal & interstitial thickening with ground glass opacities.
Few small nodes seen at precarinal & pretracheal region.

## CONCLUSION

Information regarding the anatomical findings in COVID-19 is limited, although the virus mainly affects respiratory and immune systems, but other systems like cardiovascular, urinary (kidneys), gastrointestinal tract, reproductive (testes), and nervous system are not spared, especially in elderly patients, more often if comorbidities are also present.

After reviewing 15 CT scan report, we can conclude that ground glass opacities with inter & intralobular septal thickening involving bilateral lung fields& Atelectatic bands in posterior basal segment of left lower lobe and lingular segment of left upper lobe are commonly found which can be also seen in pneumonia so further large study would be require.

This review would definitely help clinicians and researchers to understand the anatomical changes in lung, which can further help in better planning of the disease management and avoiding future health risks.

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