ORIGINAL ARTICLE

COMPARISON OF CLINICAL FEATURES AND CT MANIFESTATIONS OF COVID 19 AND NON COVID 19 PNEUMONIAS IN DIFFERENT PATIENTS PRESENTING IN ALLIED HOSPITAL RADIOLOGY DEPARTMENT

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ABSTRACT

OBJECTIVES: To compare clinical features and CT manifestations of COVID 19 and non COVID 19 pneumonias and to find out if there are any discriminatory factors between the two. **STUDY DESIGN:** Descriptive cross-sectional study. **SETTING:** Radiology Department Allied Hospital Faisalabad CT scan section. **DURATION:** 1 month i.e. 1st May to 1st June, 2020. **METHODOLOGY:** 60 patients were taken for the study including both genders. Baseline characteristics and labs were asked from the patient and from their chart. HRCT chest findings interpreted and statistical analysis applied. **RESULTS:** Age range was from 30y to 60y for COVID and 36 to 62 for non COVID patients. No statistical difference in baseline characteristics was found except in leukocyte and platelet count that was found to be lower in COVID 19 patients as compared to non COVID 19 patients. Predominant pattern for COVID 19 is GGO (100% versus 83%) and peripheral distribution (100% versus 16.6%). **CONCLUSION:** Most common manifestation of COVID 19 pneumonia was peripheral distribution of ground glass haze, with more lobes and segmental involvement as compared to non COVID pneumonia.
Key words: HRCT chest,COVID 19 pneumonia, Ground glass haze.

Introduction

Pandemic when occurs take a great toll and unprecedented amount of effort to be dealt with in terms of recognizing its spread, age groups and gender more vulnerable, coming up with vaccines or other preventive and curative treatments to deal with it on international and national levels.[1] Covid 19 pandemic commonly known disease nowadays was not known to us till the end of year 2019 when many people presented with pneumonia like symptoms of unknown origin in Wuhan City, Hubei Province, China.[2] The disease later spread throughout China and then to a lot many other countries by March 2020. The pathogen causing the symptoms was found to be novel enveloped RNA beta coronavirus that has currently been named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which has a phylogenetic similarity to SARS-CoV.[3] The virus as we know today spreads from one human-to another by multiple means, such as droplets, aerosols, and fomites The World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) postulate that aerosols or droplet nuclei have less

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than five micrometer size and droplets as having more than five micrometer size.

Why early diagnosis? So as to limit the spread of infection by quarantineand also for early treatment preventing major morbidity and mortality. Thus early diagnosis is crucial.[5]

Corona virus spreads very insidiously and studies show that more than 2 people can be infected by one patient if preventive measures are not adopted according to the study done byWu et al, the basic reproductive number was predicted to be approximately 2.68% for COVID-19.[6]

COVID 19 is diagnosed by PCR analysis of sputum, nasopharyngeal and lower respiratory tract samples, but they have their limitation as of inadequate sampling, limited testing kits and uncomfortable procedures. Here comes the vital role of radiological imaging. Chest x ray and HRCT are two modalities that can be used. Chest X rays despite being less sensitive (69%) are done initially to rule out the disease9but HRCT gives better picture by detecting smaller patches of disease that are not detected by chest x ray Chest high-resolution computed tomography (HRCT) is an important methodfor detecting lung abnormalities. It has diagnostic as well as prognostic role in COVID 19 and many other lung pathologies.

Our aim behind the study was to highlight the clinical features and CT imaging features of COVID 19 pneumonia and compare them with those of non COVID 19 pneumonia patients in an attempt to find any peculiar feature specific to either.

Objectives

To compare clinical features and CT manifestations of COVID 19 and non COVID 19 pneumonias and to find out if there are any discriminatory factors between the two.

Methodology

It was a descriptive cross sectional study conducted at Radiology department Allied hospital Faisalabad CT scan section from 1st May, 2020 to 1st June 2020. Approval for the study was taken from ethical review committee, Faisalabad Medical University, Faisalabad.

Patients of all ages and both gender who were referred from emergency, OPD departments of Allied Hospital during this period for need of HRCT chest were included for the study via non probability consecutive sampling. We had to exclude around 15 patients whose history and clinical findings we could not trace so we were left with 60 patients. Baseline data including age, gender, symptoms, contact history, travel history and duration from symptoms were asked from the patients and labs viewed from their charts. We declared those patients as COVID 19 pneumonia that were PCR positive and had positive history of contact with COVID 19 patient and those with negative PCR and no history of contact or international travel as non COVID. All patients underwent high resolution CT chest. The CT findings were interpreted by two of the expert radiologists of the department. Analysis was done using statistical package for the social sciences version 20 (SPSS). Descriptive and inferential statistics were used.

Results

Mean age of COVID pneumonia patients is 45 years ranging from 30 years to 60 years, while 75% being male in COVID group. While in non COVID group age range was from 36 to 62 with equal gender distribution. No statistical difference found in baseline characteristics between two groups. Statistical difference was found in platelet and leukocyte count of two groups being lower in COVID 19 patients.

Figure 1: Peripherally placed patchy ground glass opacities / evolving consolidations typical of COVID-19 infection.

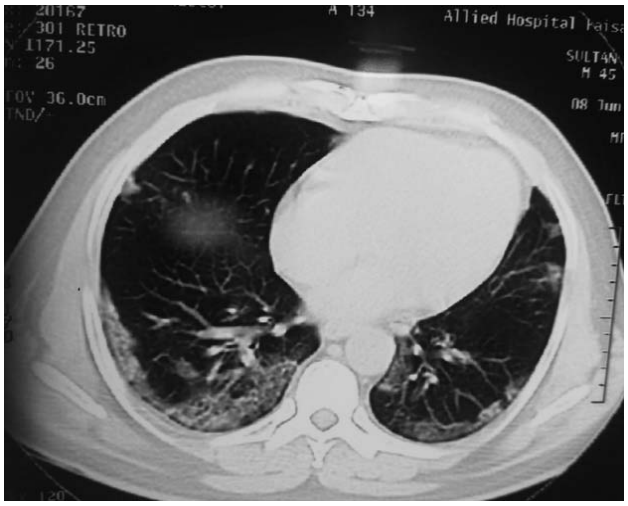

Figure 2: Peripherally placed curvilinear ground glass opacities typical of COVID-19 infection.

Characteristic	Patients with COVID-19 (n=24)	Patients with Non-COVID-19 Pneumonia(n=36)	P
Age(y) mean=SD	45±15	49±13	0.13
Male sex	18 (75)	18 (50)	0.15
Symptom			
Fever	20 (83)	17 (47)	0.06
Cough	19 (79)	25 (69)	0.74
Sputum	8 (33)	10 (27)	0.80
Shortness of breath	9 (37)	9 (25)	0.64
Muscle ache	14 (58)	11 (30)	0.07
Diarrhea	3 (12)	4 (11)	>.99
Interval from symptom onset to admission	4.4±2	5.5±4	0.41
Peak body temperature	37.9±0.6	38.2±1.0	0.65

Table 1: Comparison between COVID-19 and non-COVID-19 pnemonia patients on the basis of age, gender and pulmonary and extrapulmonary manifestations

Laboratory Finding	Patients with COVID-19 (n=24)	Patients with Non-COVID-19 Pneumonia(n=36)	P
Leukocyte count (× 10^9 cells/L)	4.00 (3.2-5.01)	5.0 (4.28-7.61)	0.02[a]
Neutrophil count (×10^9 cells/L)	3.0 (2.02-3.67)	3.3 (2.5-5.7)	0.15
Lymphocyte count (×10^9 cells/L)	1.1 (1.03-1.33)	1.18 (0.98-1.65)	0.41
Platelet count (×10^9 cells/L)	140 ± 33.1	210 ± 48	0.00[a]
C-reactive protein level(mg/L)	14.0 (9.0-27)	12.0 (2.53-85.00)	0.70

Note: except where otherwise indicated, data are median (interquartile range). A Statistically significant difference.

Table 2: Comparison of laboratory findings between patients with coronavirus disease 2019 (COVID-19) and patients with non-COVID-19 pneumonia

In regards to imaging features between two group ground glass haze is found in 100 of the COVID 19 patients and in comparison to 83 % of non COVID 19 patients. Mixed ground glass haze and consolidation were seen more in NON COVID patients (64%) and (61%) versus (41%) and (45%) in COVID group respectively. Centrilobular nodules are in 77% in non COVID versus 25% in COVID group. Air bronchogram and tree in bud appearance were non-significant and also seen in very less percentage in both groups. Number of affected lobes and segments were more in COVID group. Also COVID pneumonia has peripheral distribution of opacities (100% versus 16.6%) as compared to random or diffuse pattern in non COVID group (83% versus 0%). Lymphadenopathy and pleural effusion were both non-significant and non-specific.

Imaging Feature	Patients with COVID-19 (n=24)	Patients with Non-COVID-19 Pneumonia(n=36)	P
Pattern of opacities			
GGO	24 (100)	30 (83)	0.72
Mixed GGO	10 (41)	24 (64)	0.08
Consolidation	11 (45)	22 (61)	0.08
Air bronchogram	8 (33)	11(30)	0.85
Centrilobular nodules	6 (25)	28 (77)	0.02[a]
Tree-in-bud sign	2 (08)	6 (16)	0.70
Reticular pattern	19 (79)	9 (25)	0.02[a]
No. of affected lobes, median (IQR)	4-5	1-3	0.00[a]
No. of affected segments, median(IQR)	11-17	2-11	0.00[a]
Primary distribution of opacities			
Random	0	30 (83)	
Peripheral	24 (100)	6 (16.6)	0.00[a]
Lymphadenopathy	2 (08)	5 (13)	>0.99
Pleural effusion	1 (04)	5 (13)	>0.99

Note: Except where otherwise indicated, data are number (%) of patients. GGO = ground-glass opacity, IQR = interquartile range. A Statistically significant difference.

Table 3: Comparison of imaging features on chest CT images of patients with coronavirus disease 2019 (COVID-19) and patients with non-COVID-19 pneumonia.

Discussion

International outbreak of COVID 19 pneumonia has urged efforts on local and global levels to control the dissemination of disease and confine the spread as effectively as possible.[7]

To the date of writing the article approximately 14.4 million people are affected worldwide with 0.6 million losing their precious lives in the due course.[8]

Disease has variable presentation in different patients ranging from asymptomatic to mild illness, to need for intensive care and may lead to death of patients due to multiple factors some of which are known like age, co-morbid illnesses. There are still factors we are trying to find those are responsible for this diversity in outcome of disease.[15] The most common presentation of COVID 19 pneumonia in our study was fever, cough and body aches, although there was no statistical difference between COVID 19 and non COVID 19 pneumonia. It is consistent with the study of ZenghuiChengi who also had fever and cough as most common symptoms with no statistical difference in clinical parameters in COVID and non COVID groups.[9]

Health crisis is one aspect of COVID 19 pandemic, economic crisis due to loss of jobs and international market loss is another.[10] Still men have to go out for bread and butter of the family that could be the reason of more COVID 19 cases in male gender as was seen in our study. Another study states that more male predominance in COVID 19 as compared to non COVID pneumonia may be due to sex linked protection in terms of immunity.[9]

COVID-19 is a highly contagious disease so timely management can control the spread as well as mortality and morbidity. Chest X rays and CT are main stray radiological methods to aid in diagnosis. CT findings in our study that were significant were predominantly ground glass haze in peripheral location in 100% of patients, and mixed GGO (64%) and consolidaton (61%) in more seen in non COVID patients. This result is consistent with Stephan Altmayer and Matheus Zanon systemic review and meta analysis,[7] and also with results of Zenghui Cheng[9] who also had 100% GGOs in COVID group followed by mixed GGOs (63%). While in non COVID group mixed GGOs and consolidation were predominant 72% and 77% respectively.

COVID group has disease distribution peripherally 100% versus 16% of non COVID group, as non COVID group has more random or diffuse distribution 83%. Hui Juan Chen[11] also stated in his study results that multifocal, bilateral ground-glass opacities, with a peripheral subpleural distribution was the pattern seen in COVID 19 patients Wei Wei[12] in his study also stated that COVID 19 patients had GGO, GGOs with consoliadation with peripheral distribution on imaging and that disease severity is associated with involvement of more lobes and segments which is also seen in our study that COVID group involves more segments and lobes as compared to non COVID group.

Chinese National Health Commission has designated HRCT chest as one of the three main diagnostic criterias for diagnosis of COVID pneumonia and in Hubei Province imaging and clinical features are only used in diagnosis.[13]

CT scans have a higher sensitivity (91%) and improved false negative rates compared to RT-PCR. The main caveat of using CT for COVID-19 is that the specificity is low (25%) because the imaging features overlap with other viral pneumonia.[14] It was a consideration to use CT as initial screening tool in COVID 19 patients but certain factors are hindering, one mentioned above as very low specificity, excessive radiation use and economic burden of avoidable CT in stable patients, delay in other CTs due to meticulous sanitation after every COVID scan. A study states that upto 25% of GGOs can be seen in chest CT of a normal patient that can be misleading too if we take CT as initial screening tool.

Conclusion

CT chest is very sensitive modality for COVID 19 pneumonia but can't be taken as initial screening tool. It can differentiate COVID 19 from non COVID 19 patients to a certain degree as bilateral predominantly peripheral ground glass haze with involvement of predominantly lower lobes is more of a features of COVID 19 rather than non COVID 19 pneumonias but still there are some overlapping features, so RT-PCR is still gold standard and used as first screening tool in most of the countries.

Conflict of Interest: None

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