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Original Research Paper

Radiodiagnosis

IMAGE ANALYSIS AND ROLE OF PORTABLE CHEST X RAY OF PATIENT WITH COVID-19 AT TERTIARY CARE DISTRICT HOSPITAL OF WEST GUJARAT (INDIA).

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ABSTRACT/ INTRODUCTION

In recent pandemic of corona virus disease (COVID -19) all over world medical field as shown interest in study of COVID 19 patient for diagnosis and management. In a COVID -19 a most common presentation is chest infection & HRCT is preferable modality. But due to high risk of spreading cross infection among others and prevailing guidelines for isolation , transportation of patient to CT Unit , equipment decontamination issue after each use ,cost factor and lake of availability of dedicated CT Scan at many hospital CXR may be considered as choice of investigation for identification & follow up of lung abnormalities at any tertiary district hospital. Also dedicated portable x ray machine may be feasible at any place of isolated COVID-19 ward. [2]

Also in case of highly suspicious COVID-19 patient, a positive x ray chest may be enough and no need for further CT scan. Additionally, portable CXR may be used for early detection as well screening of patient where limited supply of RT PCR Test kit as well rural area with lack of electricity.

The purpose of this article is use of portable CXR to - (1) identify pattern of lung abnormalities on presentation. (2) Course of appearance on follow up study and (3) to compare portable CXR with CT scan findings in critically ill patient in order to guide further line of treatment & management of COVID-19 pandemic by global medical community & thus control over growing number of patient in COVID 19 pandemic.

Etiology & Clinico -pathology:

COVID-19 is a viral disease also known as SARS-CoV-2 or severe acute respiratory syndrome coronavirus 2. Incubation period of average 5-6 days during this period patient may not show any sign or symptom. COVID-19 infection mainly affect respiratory system usually present with cough, high grade fever and shortness of breath. Also present with headache, hemoptysis, and diarrhoea. Disease may have symptoms of conjunctivitis, and patient may have positive viral PCR in their conjunctiva fluid ([1])

It divided grade like early asymptomatic, mild- moderate and severe or critically ill .Period of onset of symptom range from 6-41 days with median of 14 days. However it depend on patient age and immunity of patient.

MATERIAL METHOD

Retrospective study during this pandemic, we have included all patient with positive RT PCR and admitted with mild to moderate symptoms in tertiary care corona dedicated hospital during pandemic Feb2020 to june2020 We had taken Portable / Digital x ray chest PA or AP view on admission as well follow up after treatment at regular interval by dedicated portable x ray machine in corona ward with local protocol. (Total number of positive patient 36, total x ray chest 180).

Few critically ill patient also studied and evaluated by HRCT without contrast and correlated finding with portable x ray chest. (Total HRCT 9)

All patient with negative RT PCR or suspected patients are excluded from study.

Analyzed patient for age sex predominance, clinical symptoms correlation and each potable X ray chest for presence and localization of consolidation, ground glass opacities and other associated abnormalities like lymph node, pleural effusion and pneumothorax. Severity score noted for each lung and total summed for each patient. CT scoring also done in critically ill patient.

Radiological Imaging Findings: ([2,4,6])

Now a days COVID-19 pandemic is continues to involve globally So, it is necessary for radiologist to know abnormality related to this rapidly spreading deadly virus.

It includes lobular distribution, sub pleural distribution, diffuse distribution, and mixed type. Virus invades bronchioles causes bronchiolitis and peripheral inflammation, and then spreads and invades the lung tissue.([2])

Most common x ray findings are as below (figure 1).
(1) Ground glass opacities or ill define haziness usually affect peripheral areas of unilateral or bilateral lung field.

(2)Consolidation- more frequently bilateral and usually involving lower lung field.

(3) Patchy or diffuse air space opacities – peripheral, multifocal involvement is unique and important feature of COVID-19. Can be easily identified on plain X ray chest.

Other uncommon finding include Pleural effusion, pneumothorax, and diffuse emphysematous changes with or without pneumothorax due to rupture of damaged interstitial alveoli. ([2])

X Ray Reporting System. ([4,6])

On bases of findings of parenchymal abnormality X ray film reporting scoring is an essential tool to understand severity of case and follow up evaluation of COVID-19 patient.

For this Whole lung is divided in to three zone (upper, mid and lower zone) in AP /PA view.

Each zone further assessed according to parenchymal abnormality
Score 0 No lung abnormalities

Score 1 Interstitial infiltrates /Ground glass haziness
Score 2 Focal Consolidation /interstitial infiltrates
Score 3 Diffuse air space opacities / consolidation

Each zone score is added to obtain over all CXR SCORE (0 to 18 Max) to be mentioned on report of COVID-19 patient.

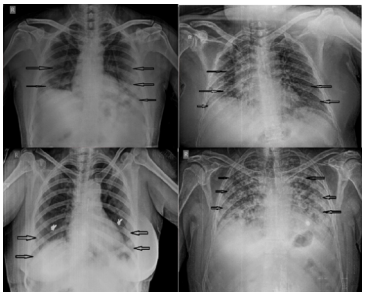

Figure 1 Shows Image Of Different Patient With Various Grade Of COVID 19 Patients Shows Bilateral ,peripheral And Predominantly Lower Zone Involvement

CT Scan Findings: (Figure2)
The primary findings on CT in adults have been reported as below ([3,5])

- Ground-glass opacities (GGO): bilateral, sub pleural, peripheral
- Crazy paving appearance (GGOs and inter-/intra-lobular septal thickening)
- Air space shadowing /consolidation
- Broncho vascular thickening in the lesion
- Traction bronchiectasis

The ground-glass and/or consolidative opacities are usually bilateral, peripheral, and basal in distribution

Atypical CT findings: seen in a minority of patients may raise concern to rule out other infective etiology. Mediastina lymphadenopathy.
Pleural Effusions: may occur as a complication of COVID-19, Multiple tiny pulmonary nodules (unlike many other types of viral pneumonia) - tree-in-bud, Pneumothorax & cavitation.

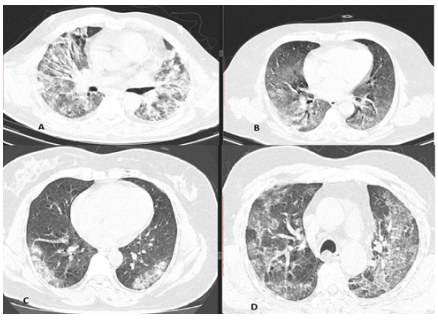

Figure 2 HRCT Thorax Of Different Patients Shows Primary CT Findings In COVID-19.

RESULT:

A retrospective study of 36 patients we found COVID 19 predominantly affecting male patients in third-fourth decade. (Figure 3)

Age group	Male	Female
0-20	0	2
21-40	9	3
41-60	10	7
60+	3	2

Figure 3 - Age Group Distribution Of COVID-19

A significant number of patient with positive RT PCR we have seen 33 % of asymptomatic patients had clear x ray chest and discharge after quarantine period. 67 % are symptomatic and shows radiological abnormalities Highest X ray severity score was among 38 % patient while bilateral ground glass opacification (GGO) was predominant finding in x ray chest, followed by alveolar and interstitial shadowing. (Figure 4,5).

Critically ill 9 patient underwent HRCT, shows pneumonic changes on HRCT. CT score was maximum in 24% of patient. (figure 5).

Death occur in 7 patient was 33 % of total patient was showing high mortality of COVID 19.However we feel that as sample group was small & restricted to local area it may not reflect actual generalized mortality for pandemic.

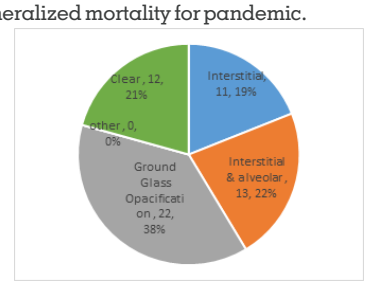

Figure 4 Distribution Of X ray Findings Of COVID-19

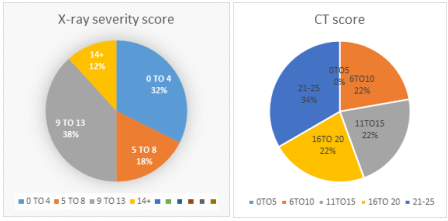

Figure-5 Showing x ray And CT Score For COVID-19.

CONCLUSION -DISCUSSION:

In our retrospective study of 36 COVID-19 patient we found one third of patient with positive RT PCR are asymptomatic and do not show any abnormality on plain x ray chest , were discharge without medication after quarantine period. Hence we feel that x ray is not specific or diagnostic tool for COVID-19 and may over look corona virus over RT PCR. [7]But radiologist and physician should be familiar with radiological findings as it is essential tool to correlate and guide treating physician to assess the severity of COVID-19 progress. Bilateral ground glass opacification /pneumonic changes were commonly present among all symptomatic patients. Other pulmonary abnormalities like- pleural effusion, lymph node enlargement were not common. In rural or distant areas where limited of availability of RT PCR, X ray chest may be used for screening of symptomatic patient with travel history to further send for RT PCR or quarantine.

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