

HRCT Pattern in COVID-19 Patients

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ABSTRACT

Background: In December 2019, a group of cases of pneumonia of unknown cause was found in Wuhan, China, now known as coronavirus disease 2019, and the coronavirus was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). High-resolution computed tomography (HRCT) is currently regarded as a significant imaging technique for aiding in the diagnosis & management of COVID-19 patients.

Objective: To find the different patterns of manifestation in HRCT chest in COVID-19 patients.

Study Design: Descriptive Cross-Sectional

Setting: University of Lahore Teaching Hospital, Lahore

Methodology: A descriptive, cross-sectional study was conducted in Radiology Department in University of teaching hospital, Lahore. 240 participants' medical histories were thoroughly reviewed, both directly from them and on case sheets. All patients with confirmed cases of COVID-19 pneumonia were admitted to the hospital and received a chest HRCT. Three follow-up HRCT chest scans were performed on one patient. The distribution and patterns of lung involvement were studied. Each of the five lung lobes was evaluated visually for degree of involvement and categorized as mild (26-50 percent), moderate (51-75 percent), or severe (75 percent) (76-100 percent). Data was analyzing in SPSS. Age was presented as mean + SD. Gender and other HRCT patterns were presented as frequency & percentage.

Result: Total 240 COVID-19 patients included. There were 142(59.4%) male and 97(40.6%) female. The mean age was 54.0+15.71 with age range of 4 to 84 years. Large number of patients 114(47.7%) were in the age group 45-64 years. Ground glass opacity was the most common CT abnormality, with 236(99.2%) cases. Among them 49(20.5%) cases had GGO plus consolidations. Crazy paving pattern was seen in 136(56.9%) cases. Only 10(4.2%) patients with GGO pulmonary nodules and pleural effusion were involved. The majority of the patients had a fever 114(47.5%), while the least frequent symptom was a runny nose (7(2.9%).

Conclusion: Pure GGO pneumonia is the most prevalent pattern of COVID-19 pneumonia seen on HRCT scans, GGO consolidation, with crazy paving with prominent distribution in the lung posterior & peripheral area.

Keywords: COVID-19, HRCT, GGO, Pneumonia.

INTRODUCTION

In December 2019, a group of cases of pneumonia of unknown cause was found in Wuhan, China, now known as coronavirus disease 2019, and the coronavirus was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)¹⁻³. According to epidemiological research, the majority of the first patients worked at or resided near a local fish market in Wuhan and was exposed and transfers from one person to another⁴.

When an infected individual coughs or sneezes, respiratory droplets are produced, which disseminate the virus from one person to another⁵. Fever, cough & breathing problem are some of the symptoms of infection⁴.

COVID-19 pneumonia is now diagnosed using clinical symptoms, contact history from the epidemic region, radiological diagnosis & nucleotide detection⁶. RT-PCR is thought to be highly specific, however sensitivity has ranged from 60.0 to 70.0% to 95.0 to 97.0%. As a result, false negatives are a serious clinical issue⁷.

High-resolution computed tomography (HRCT) is currently regarded as a significant imaging technique for aiding in the diagnosis & management of COVID-19 patients⁸. HRCT provides a great sensitivity for diagnosing COVID-19 in epidemic areas, according to a large sample study⁹. Though, the prognostic usefulness of radiological abnormalities in severe COVID-19 patients has not been reported, and prior investigations have not shown^{10,11}.

HRCT (high-resolution computed tomography) of the chest is becoming more widely accepted as reliable evidence for early diagnosis, for changes in chest imaging might occur before clinical symptoms, HRCT scans can serve as an early warning system in the diagnosis of COVID-19¹². HRCT has a high sensitivity of 97.0 percent in identifying COVID-19, according to recent research, and can play a key role in early detection & exact diagnosis of pneumonia. The rationale of the study to find the

different patterns of manifestation in HRCT chest in COVID-19 patients.

MATERIAL AND METHODS

A descriptive, cross-sectional study was conducted in Radiology Department in University of teaching hospital, Lahore. 240 sample size was calculated with 80% power of test and 5% level of significance by taking expecting COVID-19 patients

All research participants' medical histories were thoroughly reviewed, both directly from them and on case sheets. All patients with confirmed cases of COVID-19 pneumonia were admitted to the hospital and received a chest HRCT. Three follow-up HRCT chest scans were performed on one patient. The distribution and patterns of lung involvement were studied. Each of the five lung lobes was evaluated visually for degree of involvement and categorized as mild (26-50 percent), moderate (51-75 percent), or severe (75 percent) (76-100 percent).

Data was analyzing in SPSS. Age was presented as mean + SD. Gender and other HRCT patterns were presented as frequency & percentage.

RESULTS

Total 240 COVID-19 patients included. There were 142(59.4%) male and 97(40.6%) female. The mean age was 54.0+15.71 with age range of 4 to 84 years. Large number of patients 114(47.7%) were in the age group 45-64 years and only 9(3.8%) patient was found below 24 years. 51(21.3%) patients were between 25 to 44 years of age group and 65(27.2%) patients were above 65 years of age group. Table:1

The majority of the patients had a fever 114(47.5%), while the least frequent symptom was a runny nose (7(2.9%). In addition, the patient had a dry cough 32(13.3%), headache 28(11.6%), fatigue 33(13.7%), shortness of breath 26(10.8%).

Table 1: Distribution of gender & Age

		Frequency (%)
Gender	Male	142(59.4%)
	Female	97(40.6%)
Age (Years)	Mean+ SD	54.0+15.71
	<24	9(3.8%)
	25-44	51(21.3%)
	45-64	114(47.7%)
	Above 65	65(27.2%)

Ground glass opacity was the most common CT abnormality, with 236(99.2%) cases. Among them 49(20.5%) cases had GGO plus consolidations. Crazy paving pattern was seen in 136(56.9%) cases. Only 10(4.2%) patients with GGO pulmonary nodules and pleural effusion were involved. The majority of the lesions were numerous, with 78 (32.6%) cases of intrathoracic lymph node enlargement. HRCT findings consistent with evolving 31(13%) fibrosis are often present, like 28(11.7%) traction bronchiectasis. Most commonly involved lobe was 29(12.1%) right lung followed by left lung 17(7.1%) predominant. Only 11(4.6%) upper lung and 189(79.1%) lower lung predominant involved. Table: 2.

Mostly patients 199 were involved in total severity score. Distribution of pattern was symmetrical (18%) and asymmetrical (82%). Among them 77(32.2%) patients had mild problem, 69(28.9%) had moderate problem and 52(21.8%) had severe problem. Table: 3.

Table 2: HRCT Pattern

	Positive	Negative
GGO	236(99.2%)	2(0.8%)
GGO plus	49(20.5%)	190(79.5%)
Crazy Paving Pattern	136(56.9%)	(95.8%)
GGO with Pulmonary Nodules	10(4.2%)	229(95.8%)
Intrathoracic Lymph Node Enlargement	78(32.6%)	161(67.4%)
Fibrosis	31(13%)	208(87%)
Traction Bronchiectasis	28(11.7%)	211(88.3%)
Right Lung Predominant	29(12.1%)	210(87.9%)
Left Lung Predominant	17(7.1%)	222(92.9%)
Upper Lung Predominant	11(4.6%)	228(95.4%)
Lower Lung Predominant	189(79.1%)	50(20.9%)

Table 3: Severity Score

Severity	Frequency (%)
Mild Problem	77(32.2%)
Moderate Problem	69(28.9%)
Severe Problem	52(21.8%)

DISCUSSION

The use of computed tomography (CT) of the chest in the diagnosis and therapy of coronavirus disease 2019 (COVID-19) is significant, but it should not be utilized without care². Based on current scientific facts and our personal observations, this study gives a pattern of HRCT chest in COVID-19 suspected, positive patients. Due to its low sensitivity and specificity, CT chest is not recommended as a routine screening test¹³.

COVID-19 is a worldwide pandemic caused by a coronavirus that causes severe acute respiratory sickness. It has now spread rapidly to other regions of the globe, causing a deal of the economy, society, history, and science¹⁴. On January 30th, 2020, the WHO declared the outbreak a global public health, emergency.

COVID-19 has a wide range of clinical signs, from asymptomatic to moderate illness (body pain, fever, dry cough & nasal congestion). Hypoxemia, sepsis, coagulopathy, metabolic problems, and mortality are among symptoms of the severe form of the condition². In the early stages of disease, altered senses of smell and taste have been reported.

The presence of viral nucleic acid in pharyngeal swabs, mucus, or blood is used to diagnose COVID-19 pneumonia. According to studies, radiological results are noted before

symptoms, making imaging critical for early identification and early isolation¹⁵.

The male patient 142 (59.4%) was found to be comparable with female patient 97 (40.6%), which was similar to a prior research by Chen N et al and SZALAM et al¹⁶. According to a research by Wen A et al, GGO is found in the peripheral (123(96.09%) & posterior distributions 103(80.4%). Pure GGO was found to be 42.81 percent of the time in the study group, whereas GGO with consolidation was found to be 81.28 percent of the time¹⁷. As compare to our study, Ground glass opacity was the most prevalent suggestive result in 99.2% of cases, followed by GGO + consolidations in 20.5%. Distribution of pattern was symmetrical (18%) and asymmetrical (82%)¹⁸, as compare to our study the distribution pattern was symmetrical 14% and asymmetrical 84%.

In one study, the GGO in 84%, GGO plus consolidation was 41%¹⁷. As compare to our result, the most of infected individuals had a similar pattern of Ground Glass Opacities 236(99.2%).

CONCLUSION

In conclusion, Pure GGO pneumonia is the most prevalent pattern of COVID-19 pneumonia seen on HRCT scans, GGO consolidation, with crazy paving with prominent distribution in the lung posterior & peripheral area.

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