ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 12 | December - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY OF CT SCAN CHEST FINDINGS IN SEVERE COVID-19 PATIENTS

General Medicine

Dr. C. Yamini Devi M.D., Associate Professor, Dept. of Anatomy, S.V. Medical College, Tirupati.

Dr. Putta Suresh* M.D., Associate Professor, Dept. of General Medicine, S.V. Medical College, Tirupati. *Corresponding Author

Dr. P. Suryavenkatanarayana M.D., Assistant Professor, Dept. of Anatomy, S.V. Medical College, Tirupati.

Dr. Sailesh Reddy T Post graduate Student, Dept. of Anatomy, S.V. Medical College, Tirupati.

Dr. E.B. Swarna Reddy Post graduate Student, Dept. of Anatomy, S.V. Medical College, Tirupati.

ABSTRACT

INTRODUCTION: In December 2019, a case of pneumonia of unknown origin was reported in Hubei Province, China. The causative pathogen identified as severe acute respiratory syndrome corona virus-2 (SARS-CoV-2). The disease was named COVID-19. In March,2020 World Health Organization (WHO) declared it as pandemic. To diagnose COVID-19 the best laboratory test is RTPCR. But this RTPCR test is not 100% sensitive, to support the diagnosis other investigation is needed which is nothing but CT Scan Chest. **AIMS AND OBJECTIVES:** To study CT chest findings in severe COVID-19 patients, who are admitted in the ICU ward in SVRRGG hospital, Tirupati. **MATERIALS AND METHODS:** ***INCLUSION CRITERIA*:** Patients who are positive for COVID-19 by RTPCR test. ***EXCLUSION CRITERIA***: Asymptomatic COVID-19 patients. **RESULTS:** In our study 50 COVID-19 patients were taken. For all these patients CT scan chest was taken. CT scan chest of all patients (50) shows the finding of peripheral ground glass opacities (100%). All these patients CT scan shows bilateral lung involvement. **CONCLUSION:** CT scan of chest of severe COVID-19 patients shows peripheral ground glass opacities and bilateral lung involvement. Any patient who had clinical suspicion of COVID-19 and RTPCR test is negative, it is better to take CT scan chest and if it shows peripheral ground glass opacities, it is better to treat the case as COVID-19 to prevent morbidity and mortality.

KEYWORDS

CT scan chest, COVID-19, corona virus, RTPCR, ground glass opacities, SARS-CoV-2.

INTRODUCTION:

In December 2019, a case of pneumonia of unknown origin was reported in Hubei Province, China.[1] The causative pathogen, isolated from human airway epithelial cells, was found to be a novel enveloped betacoronavirus,[2] now known as Severe acute respiratory syndrome corona virus-2 (SARS-CoV2). The disease was named COVID-19. Though it shares phylogenetic similarity with SARS-CoV, it is the seventh member of the family of coronaviridae to infect humans.[3] Given the rapid spread of COVID-19 and the steep rise in morbidity and mortality it caused, the World Health Organization (WHO) declared it as a pandemic on 11th March, 2020.[4-6]

The most common presenting clinical symptoms are fever and cough in addition to other non-specific symptomatology including dyspnoea, head ache, muscle soreness and fatigue.[7] About 20% cases are severe and mortality is approximately 3%.[8] To understand infection pathogenesis and control disease spread, some early investigations have observed imaging pattern on chest radiology and computed tomography.[9,10] Imaging plays a crucial role in the diagnosis and follow up of novel coronavirus – infected pneumonia (NCIP) patients. CT scan chest is regarded as preferred imaging modality in clinically suspected cases and is valuable to monitor imaging changes during treatment. Therefore, CT scan chest has been considered as an effective diagnostic tool for clinically suspected COVID-19.[11]

AIMS AND OBJECTIVES:

SARS-CoV-2 affects commonly the respiratory system. Many COVID-19 patients present with symptomatology related to lungs. To study the radiological (CT Chest) changes in severely symptomatic COVID-19 patients who are admitted in the ICU ward.

MATERIALS AND METHODS:

***INCLUSION CRITERIA*:**

- All patients who are positive for COVID-19 via laboratory testing with real time reverse transcriptase polymerase chain reaction (RTPCR).
- Severely symptomatic COVID-19 patients.

***EXCLUSION CRITERIA*:**

- Age less than 18 years.
- Asymptomatic COVID-19 patients.
- Mildly symptomatic COVID-19 patients.
- Patients with history of COPD.

This study included adult patients (age more than 18 years), who are admitted in SVRRGG hospital, a tertiary care centre in Tirupati, designated for the management of COVID-19 patients. This study included 50 adult patients, who were diagnosed as COVID-19, by RTPCR test. All these 50 patients were severely ill. Severely ill patients means patients who require oxygen supplementation and who were admitted in COVID-19 ICU ward. CT scan chest was taken for all these patients. For all these patients other investigations like complete blood count, blood sugar, renal function tests, liver function tests, chest X-ray PA view, c-reactive protein, LDH, d-Dimer and serum ferritin were done.

RESULTS:

In our study we took 50 COVID-19 patients, who were admitted in SVRRGG hospital, Tirupati, which is a State COVID Management hospital. All these patients were severely ill. All these patients were in need of oxygen supplementation and admitted in COVID-19 ICU ward. All were tested positive for SARS-CoV-2 by RTPCR test. These patients age was between 50-70 years. Among all these 50 patients, 11 patients were females and 39 patients were males. Most of the male patients had severe disease.

Table 1: CT Scan chest findings

S.No.	CT chest findings	No. of patients	Percentage
1	Ground glass opacities (GGO)	50	100%
2	Sub pleural region (Peripheral)	50	100%
3	Bilateral lung involvement	48	96%
4	Pleural effusion	1	2%

Table 2: CT Scan chest severity score (CSS) [0-25]

S. No.	Severity	CSS	No. of patients	Percentage
1	Mild	1-8	8	16%
2	Moderate	9-15	28	56%
3	Severe	16-25	14	28%

Fig 1: CT Scan chest showing peripheral ground glass opacities

Fig 2: CT scan chest showing subpleural ground glass opacities

For all these 50 patients CT scan chest was taken at the time of admission. All the patients were symptomatic at the time of admission. CT scan chest of all patients (50) shows the findings of ground glass opacities (100%). These ground glass opacities were present in the peripheral regions of lung fields in all 50 patients (100%). In 48 patients, there is bilateral lung involvement(96%). In all patients bilateral upper, mid and lower zones were involved. But in one patient CT scan chest shows left minimal pleural effusion (2%).

CT scan chest severity grading was done depending upon the number of lobes involved. The CT Scan Chest Severity Score (CSS) is categorised as mild (1-8), moderate (9-15) and severe (16-25). In our study mild CSS changes were seen in 8 patients (16%), moderate in 28 patients (56%) and severe in 14 patients (28%).

DISCUSSION:

In this study 50 severely ill COVID-19 patients were taken. CT scan chest was taken for all these patients. Our study shows commonest finding of CT scan chest as bilateral peripheral ground glass opacities, which was seen in all 50 patients (100%). This study is comparable with the other following studies, where bilateral peripheral ground glass opacities was common finding. Chung M et.al. investigators examined chest CTs in 21 infected patients and found high rates of ground glass opacities and consolidation, sometimes with a rounded morphology and peripheral lung distribution[12]. Melina et.al study confirmed abnormal findings in COVID-19 in 86 % of patients, with a majority having bilateral involvement. Multifocal ground glass opacities and consolidation was reported in 57 % and 29% respectively with a peripheral lung predilection[13].

Ng M.Y., Lee E.Y., et al study reported COVID-19 pneumonia presents with bilateral peripheral ground glass opacities with or without consolidation[14]. For instance, for initial prospective analysis in Wuhan revealed bilateral lung opacities 40 of 41 patients (98%) chest CTs in infected patients and described lobular and subsegmental areas of consolidation as the most typical findings[15]. CT scan chest can spot people with negative RTPCR, but yet highly suspicion of COVID-19 regarding clinical conditions[16,17]. CT scan findings may also provide information about the disease severity[18-21].

CONCLUSION:

Diagnosis of COVID-19 by RTPCR has 60-70% sensitivity with nasopharyngeal swab. If any patient clinically suspected as COVID-19 patient and if RTPCR test is negative, the next reliable investigation is CT chest. In this study typical CT scan chest findings of COVID-19 patients were bilateral peripheral ground glass opacities. So any patient who has clinical suspicion of COVID-19 and CT scan chest shows the typical findings, it is better to treat those patients as COVID-19 patients with effective treatment to prevent morbidity and mortality, even though RTPCR test is negative.

REFERENCES:

1. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020; 395: 497-506.
2. Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. Lancet 2020; 395:565-574.
3. Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020; 382:727-733.
4. World Health Organization. Coronavirus disease (COVID-19) outbreak (https://www.who.int.)
5. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 2020;395:507-513.
6. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus – infected pneumonia in Wuhan, China. JAMA 2020 February 7 (Epub ahead of print).
7. Wang W, Tang J, Wei F. Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China. J Med Virol 2020;92(4):441–447.
8. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet 2020;395(10223):470– 473.
9. Nishiura H, Jung SM, Linton NM, et al. The extent of transmis- sion of novel coronavirus in Wuhan, China, 2020. J Clin Med 2020;9(2):E330.
10. Pan F, Ye T, Sun P, et al. Time course of lung changes on chest CT during recovery from 2019 novel coronavirus (COVID-19) pneumonia. Radiology 2020 Feb 13:200370 [Epub ahead of print].
11. Zhao W, Zhong Z, Xie X, Yu Q, Liu J (2020) Relation between chest CT findings and clinical conditions of coronavirus disease (COVID-19) pneumonia: a multicenter study. AJR Am J Roentgenol 214:1072–1077
12. Chung M, Bernheim A, Mei X, et.al. CT imaging features of 2019 novel coronavirus (2019-nCov). Radiology 2020 Feb 4; Vol.295. No.1. https:// pubs. rsna. org/doi/ 10. 1148/radiol/2020200230.
13. Melina Hosseiny, Soheil Kooraki, et.al. Radiology Perspective of Coronavirus Disease 2019 (COVID-19): lessons from severe acute respiratory syndrome and middle east syndrome. American Journal of Roentgenology 2020.214:1078-1082.
14. Ng M.-Y., Lee E.Y., Yang J., Yang F., Li X., Wang H., Lui M.M.-s., Lo C.S.-Y., Leung B., Khong P.-L., Hui C.K.-M., Yuen K.-y., Kuo M.D. Imaging profile of the COVID-19 infection: radiologic findings and literature review. Radiology. 2020;2(1)
15. Huang C, Wang Y, Li X, et al. Clinical features of patients in- fected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395(10223):497–506.
16. Xie X, Zhong Z, Zhao W, Zheng C, Wang F, Liu J (2020) Chest CT for typical 2019-nCoV pneumonia: relationship to negative RT-PCR testing. Radiology 200343
17. Wu J, Wu X, Zeng W, Guo D, Fang Z, Chen L et al (2020) Chest CT findings in patients with coronavirus disease 2019 and its relationship with clinical features. Investig Radiol 55:257–261
18. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y et al (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 395: 497–506
19. Kanne JP, Little BP, Chung JH, Elicker BM, Ketai LH (2020) Essentials for radiologists on COVID-19: an update—radiology scientific expert panel. Radiology 200527
20. Fang Y, Zhang H, Xu Y, Xie J, Pang P, Ji W (2020) CT manifestations of two cases of 2019 novel coronavirus (2019-nCoV) pneumonia. Radiology 295: 208–209
21. Song F, Shi N, Shan F, Zhang Z, Shen J, Lu H et al (2020) Emerging 2019 novel coronavirus (2019-nCoV) pneumonia. Radiology 295:210–217