Section: Pulmonary Medicine

Original Research Article

CLINICAL, RADIOLOGICAL AND FUNCTIONAL OUTCOMES IN PATIENTS WITH SARS- COV- 2 PNEUMONIA

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Received : 31/05/2023
Received in revised form : 25/06/2023
Accepted : 06/07/2023

Keywords:
COVID-19, pneumonia, CT score, Ground glass opacity, consolidations, lung function test.

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DOI: 10.47009/jamp.2023.5.4.115

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (4); 571-574

Abstract

Background: Morbidity and death from the severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) infection are quite high, but it is yet unclear how it will effect patients' lung health and quality of life in the long run. The study aimed for clinical and radiological features in patients having pneumonia due to COVID-19. **Materials and Methods:** It was a hospital based record based study done for a period of 2 years from August 2020 to July 2022. A total of 1918 COVID patients were admitted in the year 2020-2022. We gathered the data from the record section of the hospital. 240 consecutive laboratory-confirmed COVID- 19 patients with pathological findings on a chest ultralow dose (uld) CT scan was taken as sample size. Exclusion criteria were age < 18 years, pregnancy and absence of a consent. For all included patients we collected epidemiological, clinical and laboratory data. The study was performed in accordance with relevant guidelines and regulations. SPSS was used for analysis. **Results:** Out of 240 COVID pneumonia patients the mean age was 62.3 but with improved CT image at discharge was 59.2 years. The study was male preponderance (61.5%). Around 35.2% had BMI>25, around 47.7% were active smokers. the most common abnormal findings were ground glass opacity seen in 81% of participants at the time of admission even after discharge it was seen in 72% of patients persisted with GGO and it was statistically significant ($p<0.05$). CT score was calculated, the overall CT score at the time admission was 12.6 and at the time of discharge was 6.8 which was improved and was statistically significant ($p<0.05$). **Conclusion:** Further studies evaluating the long-term impact are warranted to guarantee an appropriate follow-up to patients recovering from SARS-CoV-2 pneumonia.

INTRODUCTION

Morbidity and death from the severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) infection are quite high.[1] On a chest CT scan, 75% of all infected individuals show symptoms of viral interstitial pneumonia.[2] Between three and 24 months after being released from the hospital, patients with severe acute respiratory syndrome-coronavirus (SARS-CoV) were shown to have abnormalities in pulmonary function tests and radiological changes.[3,4] In a recent state-of-the-art study suggested an organized respiratory follow-up of patients with COVID-19 pneumonia because interstitial lung illnesses and pulmonary vascular disorders are expected to be the most significant respiratory sequelae.[5] The survivors of SARS-CoV-2's medium-term functional and radiological outcomes are still unclear. In this study we studied the clinical and radiological features in patients having pneumonia due to COVID-19.

MATERIALS AND METHODS

It was a hospital based record based study done for a period of 2 years from August 2020 to July 2022. A total of 1918 COVID patients were admitted in the year 2020-2022. We gathered the data from the record section of the hospital. 240 consecutive laboratory-confirmed COVID- 19 patients with pathological findings on a chest ultralow dose (uld) CT scan was taken as sample size. Exclusion criteria were age < 18 years, pregnancy and absence of a consent. For all included patients we collected epidemiological, clinical and laboratory data. The study was performed in accordance with relevant guidelines and regulations.

Although all 240 COVID-confirmed patients had chest X-rays (CXR) first, ultra low dose CT has

ISSN (O): 2687-5365; ISSN (P): 2753-6556

shown to be more sensitive for COVID-19 lesions than CXR for confirming pneumonia.[6] International guidelines have also recommended CT for the diagnostic work-up of COVID-19. Experts also emphasized the problem of radiation exposure and promoted the use of low-dose CT scans.[7] According to the most recent research, scan settings for uld CT were adjusted for a patient with a normal body mass index (BMI between 18.5 and 24.9 kg/m2) and an effective dosage ranging from 0.14 to 0.5 mSv. Each of the five lung lobes was visually scored on a scale of 0-5, with 0 indicating no involvement, 1, less than 5% involvement, 2, 5-25% involvement, 3, 26-49% involvement, 4, 50-75% involvement, and 5, more than 75% involvement, to determine the presence of a predominant pattern for ground-glass opacity (GGO), consolidation, fibrosis, or parenchymal bands. The total CT score, which ranged from 0 (no involvement) to 25 (highest engagement), was calculated by adding the individual lobar scores. Pleural effusion, thoracic lymphadenopathy, or underlying lung illness such emphysema or fibrosis were reported but not scored. Thoracic lymphadenopathy is defined as lymph node size of 10 mm in short-axis dimension.

Statistical Analysis

The statistical analysis was performed using SPSS for windows version 22.0 software. The findings were present in number and percentage analyzed by frequency, percent. Chi‑square test was used to find the association among variables. The critical value of P indicating the probability of significant difference was taken as <0.05 for comparison.

RESULTS

Table 1: Clinical characteristics of study participants

Parameters	Normal range	Over all (240)	CT discharge
Age (years, range)	≥18	62.3 (51.4–71)	59.2 (50.2–71)
Sex (female, n and %)		90 (37.5)	77(32)
BMI > 25 kg/m^2 (n and %)		87 (35.2)	61 (25.4)
Active smokers (n and %)		113 (47.7)	92 (38)
Hypertension (n and %)		111 (46.2)	99 (41.2)
Diabetes (n and %)		75 (31.2)	64 (26.7)
Cardiovascular diseases (n and %)		17 (7.9)	5 (2.4)
COPD (n and %)		43 (18)	12 (5.2)
Asthma (n and %)		15 (6.2)	4 (2.1)
Chronic kidney disease (n and %)		13 (5.8)	7 (3.2)
Peak LDH (U/l) (mean ± SD)	<500	643.2 ± 348.1	683.4 ± 364.3
Peak leukocytes (G/l) (mean ± SD)	4.2–10	8.7 ± 4.8	8.5 ± 3.6
D‑ dimer (mg/l) (mean ± SD)	<0.5	1.2 ± 0.8	1.4 ± 0.9
Antibiotics (n and %)		224 (93)	221 (91.8)
Hydroxychloroquine (n and %)		132 (55)	124 (53.2)
Remdesevir (n and %)		42 (17.5)	22 (9)
Tocilizumab (n and %)		4 (2.1)	4 (2.1)

As per table 1 showed out of 240 COVID pneumonia patients the mean age was 62.3 but with improved CT image at discharge was 59.2 years. The study was male preponderance (61.5%). Around 35.2% had BMI>25, around 47.7% were active smokers. Most of the participants are associated with co-morbidity 46.2% had hypertension, 31.2% had diabetes 18% with COPD, 5.8% with CKD. Inflammatory markers are also studied in form of Peak LDH and D-dimer. 93% patients were treated with antibiotics and among them 17.5% were given remdisevir and 4% tocilizumab.

Table 2: Radiological features at admission and at discharge

Features	On admission	On discharge	p-value
Ground glass opacity	194 (80.8)	173 (72.2)	0.01
Fibrous bands	128 (53.3)	127 (53)	0.01
Consolidations	117 (48.7)	111 (44.6)	0.01

As per table 2 the most common abnormal findings were ground glass opacity seen in 81% of participants at the time of admission even after discharge it was seen in 72% of patients persisted with GGO and it was statistically significant (p<0.05). Fibrous bands were the second most common abnormal findings seen in 53.3% and consolidation in 48.7% and all are significant.

Table 3: CT score per lobe on admission and discharge

Variables	on admission	at discharge	p-value
Right upper lobe (mean ± SD)	**2.3 ± 41**	**1.3 ± 1.1**	**.001**
Middle lobe (mean ± SD)	2.1 ±1.2	1.3 ± 1.2	0.02
Right lower lobe (mean ± SD)	2.4 ± 1.2	1.4 ± 1.3	0.01
Left upper lobe (mean ± SD)	2.5 ± 1.3	1.2 ± 1.2	0.01
Left lower lobe (mean ± SD)	2.6 ±1.1	1.4 ± 1.2	0.01

ISSN (O): 2687-5365; ISSN (P): 2753-6556

CT score per lung lobe (mean ± SD)	2.2 ± 1.3	1.5 ± 1.3	0.01
CT score overall (mean ± SD)	12.6 ± 4.4	6.8 ± 5.2	0.01

As per table 3 the CT score was calculated, the overall CT score at the time admission was 12.6 and at the time of discharge was 6.8 which was improved and was statistically significant ($p<0.05$). The CT score as per each lung lobe was improved from admission to discharge which were significant. Though there are persisting abnormalities even after discharge the CT score is improved.

Table 4: Lung Function Test outcomes and Clinical Evaluation

Parameters	Normal range	Overall	CT improving	*P* value
FEV 1 (l) (mean ± SD)		2.5 ± 0.7	3.0 ± 0.7	0.06
FEV 1 (% ± SD)		93.6 ± 16.2	95.1 ± 14.8	0.21
FVC (l) (mean ± SD)		3.4 ± 0.8	3.8 ± 0.9	0.71
Obstruction (n and %)		23 (7.7)	11 (5.2)	0.10
Restriction (n and %)		33 (9.7)	22 (6.5)	0.52
Abnormal DLCO (n and %)		82 (34.4)	28 (11.1)	0.73
DLCO (%, mean ± SD)	> 75	71.3 ± 15.5	70.5 ± 11.5	0.61

As per table 4 LFTs abnormalities (i.e. reduced DLCO and/or restriction) were found in 82 (34.1%) patients, specifically a reduced DLCO (< 75% than predicted) in 11 (5.2%) patients and restriction in 22 (6.5%) patients. Furthermore, an overall homogeneous low effort SpO2 and it was not significant in any parameters.

DISCUSSION

In our cohort of patients recovering from SARS-CoV-2 pneumonia, 72% of patients still have radiological abnormalities, primarily fibrous bands and GGO, and 64.1% of patients still have a radiological abnormality demonstrate LFT impairment at the time of discharge. Mid-term sequelae in SARS-CoV-2 pneumonia patients have lately been documented by other authors, in particular Tabatabae et al. report persistent disease on CT scans. In a cohort of patients who did not require mechanical ventilation persistent fatigue without any impairment in lung function at 6 weeks in 42.3% of patients at 3 months, particularly in the subgroup admitted to an intensive care unit (ICU).[8]
At discharge, consolidations tend to dissolve and GGO consistently decrease, while fibrous lesions essentially remain unaltered, as we found, possibly the manifestation of an earlier lung damage. According to published accounts, GGO and consolidations rise in the first two to three weeks following admission.[9] and the onset of lung fibrosis was discussed. Regardless of the degree of COVID-19, as early as at one week.[10] and at one month.[11] However, our cohort's fibrotic load at baseline was very impressive, reaching a high of 71.8%.
Recent reports of impaired lung function in SARS-CoV-2 survivors.[12,13] notably in convalescent patients with COVID-19 pneumonia. Restriction and reduced DLCO were the anomalies that were most frequently found. Our investigation found that the most prevalent functional reduced DLCO (75% of anticipated), observed in 11 (6.4%) individuals, was an anomaly. The average DLCO value was 71.3% 15.5 of what was anticipated. Moreover, 3 (7.7%) individuals had pulmonary limitation. In the subset of patients who did not have a radiological improvement, the univariate analysis revealed a significant decline in FEV1 volume, with volume reductions of up to 20%.
FEV1 reduction has been identified as a predictor of the onset of chronic obstructive pulmonary disease (COPD) in heavy smokers.[14] however more study on the It is necessary to consider the function that FEV1 reduction has in increasing the risk of lung or airway illnesses. The exploratory analysis failed to identify any CT score-based predictor of CT scan improvement. Numerous variables have demonstrated a hopeful trend toward significance while predicting CT scan advancement.
Our study has few limitations. The study is monocentric, retrospective so the sample is relatively small could be considered not sufficient to fully elucidate the long-term consequences. External validity of the study is limited to critically ill patients.

CONCLUSION

These findings, taking into account the relevant impairment in survivors and the large number of individuals worldwide who are recovering from SARS-CoV-2 pneumonia, lengthier follow-up is necessary to evaluate and clarify the long-term effects of this disorder in the globe.
Conflict of Interest None declared.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556

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ISSN (O): 2687-5365; ISSN (P): 2753-6556