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ORIGINAL ARTICLE

Role of Chest Ultrasound in Follow up of Corona Virus Disease-19 Patients

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ABSTRACT

Background: Computed tomography (CT) could be considered the gold standard for diagnosis of Corona Virus Disease-19 (COVID-19) but has some drawbacks such as resource allocation, radiation exposure, and the need for specialized facilities. This work aimed to confirm the role of Chest ultrasound as bed-side accessible tool in the follow up of COVID-19 patients during their hospital stay for better management and to improve the outcome.

Methods: This prospective cohort study included 60 patients who got admitted to Zagazig Chest Hospital with confirmed PCR tests for COVID-19. Routine laboratory investigations, CT imaging and Chest Ultrasound (CUS) were done to all patients at time of admission and periodically during follow up period during hospitalization. Patients were categorized according to Chest Ultrasound Severity index (USI) and CT Severity Score (CTSS).

Results: Ultrasound findings showed a progressive decrease in consolidation with airbronchogram and B-lines from Day 1 to Day 21, while fluid bronchograms increased on Day 14 and slightly decreased by Day 21. Fragmented pleural lines increased on Day 14 and decreased by Day 21. The ultrasound severity index (USI) indicated predominantly severe lung involvement on Days 1 and 14, with a shift toward moderate findings by Day 21 as some patients recovered. Comparing USI with CT severity score (CTSS), severe USI (CTSS 16–20) showed high sensitivity (90%) and specificity (85%) with (89%) accuracy on Day 1, while moderate and mild USI were associated with lower CTSS and a gradual reduction in severity scores by Day 21. Patients classified with severe USI had a higher mortality rate (35%) while those with moderate USI had a significantly lower mortality rate (6.7%).

Conclusion: High accuracy of Chest Ultrasound indicates the effectiveness of U/S in monitoring COVID-19 progression. Also, Prognostic utility of Chest ultrasound, where higher severity is associated with worse outcomes.

Keywords: CT-severity score; Chest Ultrasound; Follow up; Corona Virus Disease-19.

INTRODUCTION

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has fundamentally transformed healthcare systems worldwide, necessitating rapid adaptations in diagnostic and treatment approaches. As the disease

spread rapidly, traditional diagnostic methods, such as CT scans and chest X-rays, faced significant constraints, including resource allocation, radiation exposure, and the need for specialized facilities. This context prompted a re-evaluation of existing imaging techniques, leading to the increased utilization of ultrasound (U/S) as a valuable tool in the assessment and management of COVID-19 [1].

Ultrasound is a non-invasive, bedside imaging modality that provides real-time visualization of the lungs, making it particularly useful in critical care settings [2]. Its advantages include portability, lack of ionizing radiation, and the ability to perform examinations in isolation or at the bedside of critically ill patients. As healthcare systems grappled with unprecedented patient loads and the need for quick diagnostic methods, ultrasound emerged as a practical solution [3].

The aspects of CUS, including as its effectiveness in detecting and monitoring the evolution of lung diseases, such as viral pneumonia, need to be better understood in this context. So, this work was designed to confirm the role of Chest ultrasound as bed-side accessible tool in the follow-up of COVID-19 patients during their hospital stay for better management and to improve the outcome.

METHODS

From March 2022 till February 2023, this prospective cohort study was performed on 60 moderate , severe and critically ill patients [4] who got admitted to Zagazig Chest Hospital, ICU department with confirmed PCR tests for COVID-19. Following clearance by the Zagazig University Institutional Review Board (ZU-IRB) under code IRB (#9362/22-3-2022). Written informed consent was taken from all patients or their 1st degree relatives.

Sample size: Assuming that all cases met the inclusion and exclusions criteria using Open Epi during the study period (1 year) ,5 cases/ month,60 cases have been included as a comprehensive sample.

Inclusion criteria: Patients > 18 years old from both sexes with suspicion of having COVID-19 with symptoms (fever, cough, fatigue, loss of smell or taste, drowsiness, body ache, Breathlessness), patients with laboratory finding that correlated with COVID-19 [ABG denoting respiratory failure, CBC revealing lymphopenia as the most common finding, (Elevated CRP, Interleukin- 6, serum Ferritin and LDH)[4], interrupted Liver and Kidney function tests, and positive PCR tests for COVID-19], patients with radiological findings correlating with the disease (CORADS4/5)[5] .

All patients were subjected to entire history taking, including demographic data, associated comorbidities, full general and local chest examination, and laboratory investigations on admission: CBC, CRP, Kidney and liver function tests, D-dimer, serum Ferritin, LDH, Interleukin-6, arterial blood gases, nasopharyngeal swabs for PCR for COVID-19 using kits provided by Ministry of health and population. Most blood tests were performed at Zagazig Chest Hospital laboratory, some tests were performed at Sharqia Joint Laboratory.

Radiological examination:

High Resolution Chest CT scan was done to confirm diagnosis on Day one and follow up on Day Twenty-one. Radiological findings were noted such as bilateral and peripheral basal ground-glass and consolidative pulmonary opacities, linear opacities, "crazy-paving" pattern and the "reverse halo" sign and pleural effusion [6].

CT Severity Score Calculation (CTSS) [7]

The lung was divided into six zones for assessment: upper, middle, and lower zones of both the right and left lungs. Each zone was evaluated based on the percentage of the area affected by abnormalities such as ground-glass opacities (GGO), consolidation, reticulation, and air bronchograms. A scoring system was applied to each zone: 0 for no abnormalities, 1 for ≤25% involvement, 2 for 26–50%, 3 for 51–75%, and 4 for >75% involvement. The scores from all six zones were summed to calculate the total CT Severity Score (CTSS), which represented the extent of lung involvement: CTSS of 0 indicated no involvement, 1–7 indicated mild involvement, 8–14 indicated

moderate involvement, and 15–25 indicated severe lung involvement.

The lung ultrasound (LUS) examinations [8]

Lung Ultrasound was conducted using Mindray DP-15 and Alpion Cube i7 portable ultrasound machines. A 3–5 MHz convex transducer was used to visualize deeper lung features, while a high-frequency linear array probe (5–12 MHz) provided detailed imaging of the peripheral lung parenchyma, pleura, and chest wall. Probes were positioned longitudinally, transversely, and obliquely along parasternal, clavicular, axillary, and paravertebral lines to thoroughly evaluate the chest in a ventral-to-dorsal direction. Patients were scanned in both supine and seated positions, with low-frequency curved array probes (5 MHz) used for deeper structures. This comprehensive ultrasound protocol was performed on Days 1, 14, and 21 following admissions [9].

Ultrasound Findings interpretation:

The pleural line appeared as a thin echogenic line between the chest wall and the lung. Fragmented pleural line appeared irregular, broken, or thickened which indicated lung pathology: A- lines were horizontal echogenic lines that appear parallel to the pleural line, indicating the presence of normal lung aeration. B-lines appeared as vertical hyperechoic artifacts that originated from the pleural line and extended to the bottom of the ultrasound field. The presence of 3 or more B lines per intercostal space was commonly associated with conditions such as pulmonary edema or interstitial lung disease. Air bronchograms appeared as echogenic bright tubes indicating the presence of air with hypoechoic surrounding tissue indicating the fluid buildup around the bronchial structures. Consolidations appeared as hypoechoic areas indicating lung affection. Fluid bronchogram appeared as anechoic or hypoechoic tubular structures within consolidated lung tissue, indicating fluid-filled bronchi in conditions like pneumonia or pulmonary edema. Focal interstitial patterns were identified by several key features including B-lines, irregular pleural lines and consolidation. Pleural effusion showed up as anechoic or hypoechoic areas on the ultrasound.

The Chest Ultrasound Severity Index (CUSI) [10] is a way to measure lung problems using ultrasound. It looks at 12 zones on both sides of the chest, each lung was divided into (Anterior superior, Anterior Inferior, Lateral Superior, Lateral Inferior, Posterior Superior and Posterior inferior). Each zone is scored based on the worst finding: 0 points for normal lung or a few B-lines, 1 point for moderate loss of lung aeration with more B-lines, 2 points for severe loss of aeration, and 3 points for consolidation or unclear areas. Pleural effusion can be scored separately, with 1 point for mild, 2 for moderate, and 3 for massive effusions. The total score is the sum of all zones, with a maximum of 36 points. The severity is then classified as mild (0-10 points), moderate (11-20 points), or severe (more than 20 points).

Outcome

Primary Outcome: The survival rate for COVID-19 patients.

Secondary Outcome: Complications during hospitalization of COVID-19 patients.

Statistical analysis:

Data analysis was performed using the software SPSS (Statistical Package for the Social Sciences) version 26. Categorical variables were described using their absolute frequencies. To compare ordinal data between two groups, chi square for trend test was used. Kolmogorov–Smirnov test was used to verify assumptions for use in parametric tests. Quantitative variables were described using their means and standard deviations or median and interquartile range according to type of data. All tests were two-sided, $p<0.05$ was considered statistically significant<0.001 was considered highly statistically significant and $p>0.05$ was considered not statistically significant. Crosstabulation was used to calculate sensitivity, specificity, positive, negative predictive value and overall accuracy of screening test.

RESULTS

Table 1 showed 60 patients aged from 24 to 86 years with mean 57.32 years. 26.7% of them were smokers. Female represented 51.7% of patients. About 28% patients had no associated comorbidities, 36.7% had cardiovascular diseases, 33.3% were diabetics. 9 patients (15%) had chest diseases including COPD, Asthma and Bronchiectasis.

In Table 2, CT findings on Day 1 revealed bilateral lung involvement in 48 (80%) of patients and unilateral lung involvement in 12 (20%) patients, with 24 (40%) patients showing consolidation with airbronchogram, 35 (58.3%) presenting ground-glass opacities, 8 patients (13.3%) with effusion, 1 patient (1.7%) with a reverse halo sign, and 2 patients (3.4%) with a crazy paving pattern. By Day 21, improvements were noted: 18 (30%) patients had unilateral involvement, 30 (50%) patients had bilateral involvement and 12 (20%) patients had no detectable lesions. 21 (35%) patients showed consolidation with air bronchogram, 27(45%) patients exhibited ground-glass opacities.

In Figure (1) Ultrasound findings on Day 1,14 and 21 showed that B-lines (3 or more B-lines per field) were found in 58 patients (96.7%) on Day 1, then decreased to 48 (80%) patients on Day 14 then 42 (70%) patients on day 21. Air bronchogram and consolidations were found in 50 patients (83.3%) on Day 1, then 40 patients (66.7%) on day 14 and on day 21 the number was down to 35 patients (58.3%). Fluid bronchograms was detected in 6 patients(10%) on day 1,then increased to be found in 11 patients (18.3%) on day 14 then the number decreased to 8 patients (13.3%) on day 21.The number of patients with fragmented pleural lines on Day 1 was 24 patients (40%) and on Day 14 the number increased to 27 patients (45%) , then decreased by Day 21 to 12 patients (20%).The overall cases of pleural effusion decreased from 8 patients on Day 1 to 3 cases on Day 14 and no cases of effusion on Day 21.

In Table 3, Ultrasound severity index showed that On Day 1 and Day 14, lung involvement is predominantly severe for most patients. On Day 1, 40 patients (66.7%) were categorized as Severe by Ultrasound severity index, and 20 (33.3%) patients were categorized as Moderate severity. By Day 21, some patients recovered, leading to more moderate findings as the number of patients categorized as severe using Ultrasound severity index was down to 20 patients (33.3%), 30 (50%) patients were categorized as moderate, and 10 patients (16.7%) were categorized as mild .The association between Ultrasound Severity index and CT severity score (CTSS) showed that on Day 1 Patients categorized as Severe using USI (USI Severity: Severe) corresponded to CTSS ranging from 16 to 20, with a high sensitivity (90%) and specificity (85%) for detecting severe cases with accuracy of (89%). Moderate USI severity correlated with CTSS of 8 to 13, showing sensitivity of 85% and specificity of 88% and accuracy of 87%. on Day 21 A shift toward lower severity scores (Mild and Moderate) was observed, suggesting improvement over time. Patients with mild USI severity had CTSS ranging from 0 to 7, with lower sensitivity (75%) but higher specificity (92%).

Figure 2 showed that the scores for USI and CTSS closely followed each other reflecting the relationship between these two metrics.

In table (4), Death rate was 41.7% among the patients studied and 35(58.3%) patients improved. Complications occurred in 31(51.7%) patients. Among the complications that affected the patients during hospitalization, ARDS was the most prevalent complication, affecting 21 patients (35%). 12 (20%) patients developed secondary bacterial infection other complications such as cardiac, neurological and psychological complications were noted in 7 (11.7%),6 (10%) and 11(18.3%) patients respectively. Out of improved patients, 4 (6.7%) patients suffered from psychological complications and 2 (3.3%) patients suffered

from secondary bacterial infection.

In Table 5, It was found that there was a relation between high USI scores at admission and mortality rate as patients classified with severe USI had a higher mortality rate (35%) while those with moderate USI had a significantly lower mortality rate (6.7%).

Table (1): Baseline Demographic characteristics and comorbidities of studied patients:

	Number of patients (N=60)	Percentage (%)
Sex: Female Male	 31 29	 51.7% 48.3%
Age (year)	57.32 ± 16.49	24 – 86
Smokers	16	26.7%
Occupation: Not working Working Physicians/Paramedical personnels	 34 14 12	 56.7% 23.3% 20%
Comorbidities: Chronic Chest diseases Cardiovascular Disease Chronic Kidney Disease Diabetes Mellitus Liver cirrhosis SLE (Collagen) Neurological Disease None	 9 22 1 20 2 1 2 17	 15% 36.7% 1.7% 33.3% 21.6% 1.7% 3.3% 28.3%

Table (2): Distribution of CT findings at Day 1 and 21:

Patients / Lesion	Number of patients (N=60)	%
Day 1		
Site Unilateral Bilateral	 12 48	 20% 80%
Consolidation with airbronchogram	24	40%
Ground Glass opacities	35	58.3%
Reverse Halo sign	1	1.7%
Crazy Paving	2	3.4%
Effusion Minimal Mild Moderate	8 5 2 1	13.3% 8.3% 3.3% 1.7%

Patients / Lesion	Number of patients (N=60)	%
Day 21		
Site of Lesion: Unilateral Bilateral	 18 30	 30% 50%
No findings	12	20%
Consolidation with airbronchogram Ground glass opacities	21 27	35% 45%

Table (3): Relation between USI and CTSS:

Day	CTSS [Range (mean)]	USI	No Of Patients (%) By USI	Sensitivity	Specificity	PPV	NPV	Accuracy
Day 1	Severe [16–20 (18 ± 2)]	Severe (>20)	40 (66.7%)	90%	85%	88%	87%	89%
	Moderate [8–13 (11 ± 1.5)]	Moderate (11-20)	20 (33.3%)	85%	88%	87%	86%	87%
Day 14		Severe (>20)	35(58.3%)					
		Moderate (11-20)	25(41.7%)					
Day 21	Severe [15–25(16 ± 2)]	Severe (>20)	20(33.3%)	84%	90%	88%	86%	87%
	Moderate [8–14 (11 ± 1.5)]	Moderate (11-20)	30(50%)	80%	85%	84%	82%	83%
	Mild [0–7 (5 ± 1.2)]	Mild (0-10)	10(16.7%)	75%	92%	90%	85%	87%

(PPV): Positive Predictive Value
(NPV): Negative Predictive Value
(USI): Ultrasound Severity Index
(CTSS): CT Severity Score

Table (4) : Outcome of the patients:

Mortality	Number of patients
Patients survived (Improved)	35(58.3%)
Patients Died	25(41.7%)
Complications	31 (51.6%)
Acute Respiratory Distress Syndrome	21(35%)
Secondary Infection (Bacterial)	12(20%)
Cardiac Complications	7(11.7%)
Neurological Complications	6(10%)
Psychological Complications	11(18.3%)

Table (5): Relation between USI at admission and Mortality:

USI Severity	No of Patients	Mortality rate Patients (%)
Severe	40	21 (35%)
Moderate	20	4(6.7%)
Total	60	25(41.7%)

USI:Ultrasound Severity Index

A Chi-Square test (χ^2 = 8.017, p-value = 0.0046) was used to evaluate the association between USI severity and mortality. The significant p-value (<0.05) indicates a statistically significant relationship

- Chi-Square Value (χ^2): 8.017
- p-value: 0.0046
- Degrees of Freedom (dof): 1

The p-value (0.0046) is less than the significance level (e.g., 0.05), indicating a statistically significant association between USI severity and mortality

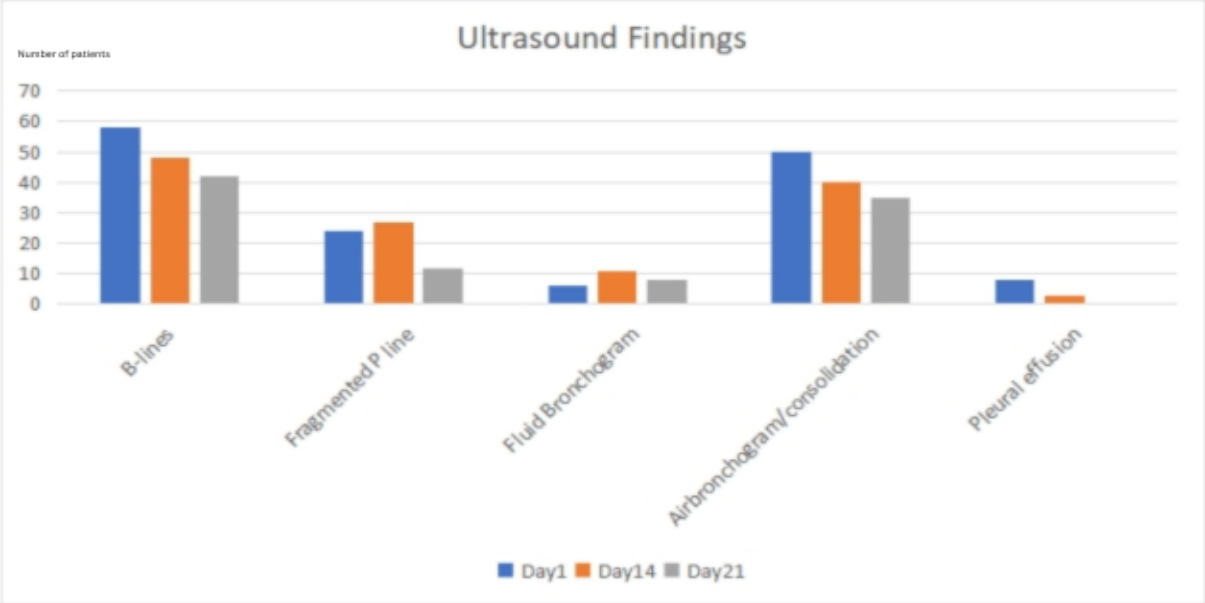

Figure 1: Ultrasound findings at Day 1,14 and 21.

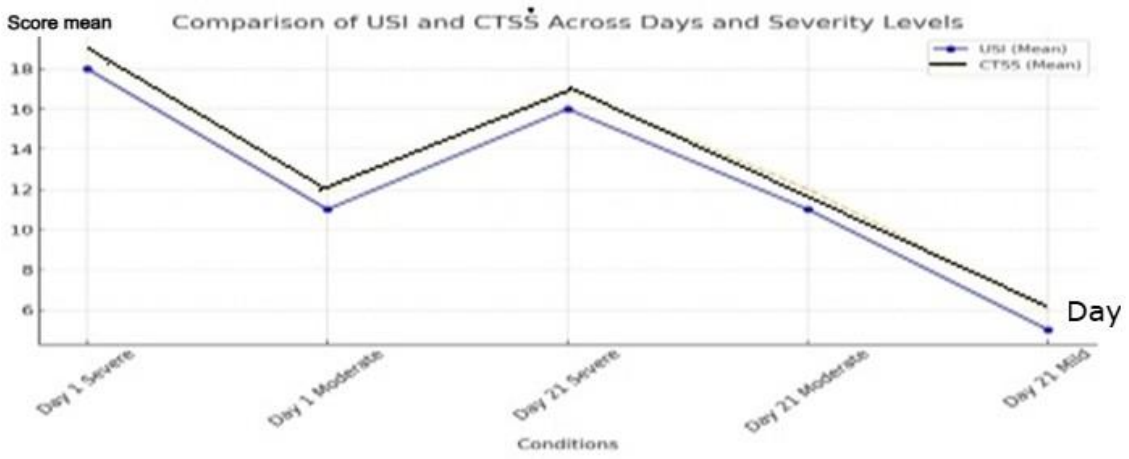

Figure 2: Comparison between USI and CTS scores

DISCUSSION

In this study, Table 1 Showed 60 patients aged from 24 to 86 years with mean 57.32 years., 26.7% of them were smokers. Female represented 51.7% of patients. 34 patients (56.7%) were non workers due to old age and being females and housewives. About 28% patients had no associated comorbidities, 36.7% had cardiovascular diseases, 33.3% were diabetics. 9 patients (15%) had chest diseases including COPD, Asthma and Bronchiectasis. These results agree with the information culled from the Infectious Disease Information System in China that reported among 44,672 confirmed cases of COVID-19, men made up 51.4% of the patient population [11]. Another study by Prats et al. [12] similarly had 402,978 participants in total. Of the total population, 140,090 (34.8%) were current smokers, and 39,974 (9.9%) were ex-smokers. In a similar study done by Wang et al. [13] in which they studied 344 COVID-19 patients, 141 patients have hypertension (40.9%), Diabetes patients reaching 64 (18.6%). Patients with cardiovascular diseases 40 (11.6 %). Patients with COPD 16 (4.7%).

CT findings showed improvement from Day 1 to Day 21 (Table 2) . Day 1 CT findings revealed bilateral lung involvement in 48 (80%) of patients and unilateral lung involvement in 12 (20%) patients, with 24 (40%) patients showing consolidation with air bronchogram, 35 (58.3%) presenting ground-glass opacities, 8 patients (13.3%) with effusion, 1 patient (1.7%) with a reverse halo sign, and 2 patients (3.4%) with a crazy paving pattern. By Day 21, improvements were noted: 18 (30%) patients had unilateral involvement, 30 (50%) patients had bilateral involvement and 12 (20%) patients had no detectable lesions, 21 (35%) patients showed consolidation with air bronchogram, 27(45%) patients exhibited ground-glass opacities. Bao et al. [14] also mentioned that the most common CT features in patients affected by COVID-19 included ground glass opacities and consolidation involving the bilateral lungs in a peripheral distribution which agrees with this study. The gradual decline in bilateral findings over the days suggests a potential response to therapeutic interventions and also noted that timely management can lead to improvements in radiological findings.

In Figure (1) ultrasound findings revealed a progressive improvement in lung conditions over 21 days. B-lines were the most common findings in ultrasound examinations, B-lines (3 or more B-lines per field) were found in 58 patients (96.7%) on Day 1, then decreased to 48 (80%) patients on Day 14 then 42 (70%) patients on day 21. This agrees with the findings of Xing et al. [15] who mentioned that separate B-lines were found more than half of the examinations after the 2nd week in a study they conducted on 20 patients with COVID-19. Most examinations during the 2nd and 3rd weeks showed confluent B-lines. Also, Wang et al. [16] conducted a study on Twenty-seven patients confirmed as affected by COVID-19 virus who were hospitalized from March 2 to March 30, 2020, and reported an increased number of B-lines is

observed with the increase in disease severity degree. Air Bronchograms and Consolidations were found in 50 patients (83.3%) on Day 1, then 40 patients (66.7%) on day 14 and on day 21 the number decreased to 35 patients (58.3%). These findings were indicative of lung parenchymal disease and have been associated with unfavorable prognosis in COVID-19 patients. This agreed with Zhou et al. [17] who noted that the presence of air bronchograms in chest images is a common finding in severe cases, correlating with the extent of lung injury. The number of cases with fragmented pleural lines increased from 24 patients (40%) on Day 1 to 27 patients (45%) on day 14 then decreased by Day 21 to 12 patients (20%). Fragmented pleural lines are often associated with pleural inflammation or effusion or pneumonia, indicating a need for careful monitoring. A study by Fang et al. [18] reported similar findings, suggesting that the persistence of fragmented pleural lines indicates pathology.

The findings on fluid bronchograms in this study showed an increase from 6 patients (10%) on day 1 to 11 patients (18.3%) on day 14 then the number decreased to 8 patients (13.3%) on day 21. This can be explained by the complications that affected the patients during ICU stay such as ARDS and heart failure which led to the increase of Fluid bronchogram on Day 14. Similar trends were reported by Zhou et al. [17] who highlighted fluid bronchograms as indicators of severe lung involvement, correlating with Respiratory complication like ARDS. Fang et al. [18] noted that rising fluid bronchograms could signal secondary infections, emphasizing the need for careful monitoring. Additionally, he pointed out that timely recognition of these findings is crucial for guiding treatment strategies, such as diuretics and corticosteroids, which can help alleviate pulmonary edema. The presence of pleural effusion decreased from 8(13.3%) patients on Day 1 to 3(5%) patients by Day 14 and no cases of effusion on day 21. Zhang et al. [19] highlighted that pleural effusion is not uncommon in COVID-19, but its management remains critical, as it can complicate the clinical picture and affect treatment outcomes.

Table 3 highlights the dynamic tracking of lung involvement using the Ultrasound Severity Index. On Day 1, 40 (66.7%) patients had severe lung involvement, with 20 patients (33.3%) showing moderate severity. By Day 21, lung recovery was evident, with severe cases decreasing to 20(33.3%) patients, moderate cases rising to 30(50%) patients, and 10(16.7%) patients categorized as mild. This demonstrates the effectiveness of lung ultrasound in monitoring disease progression and resolution over time. Studies by Soldati et al. [20] have similarly documented high sensitivity for detecting interstitial involvement in COVID-19, particularly in ICU settings.

Also, between March 2020 and May 2020, Lichter et al. [21] conducted a study on 120 consecutive COVID-19 patients who underwent complete LUS within 24 hours of admission. The median baseline total LUS score was 15, severe cases were associated with high LUS scores and clinically improved cases had lower LUS scores, meaning that Lung Ultrasound score can be indicative of the state of lung pathology and clinical condition in COVID-19 patients which agrees with the current study findings. The association between Ultrasound Severity Index (USI) and CT Severity Score (CTSS) findings demonstrated high accuracy in monitoring disease progression. On Day 1, severe USI findings associated with CTSS values of 16–20, showing high sensitivity (90%) and specificity (85%) with (89%) Accuracy. Moderate USI severity aligned with CTSS values of 8–13, with sensitivity of 85% and specificity of 88% with accuracy of 87%. By Day 21, a shift toward lower severity scores indicated recovery, with mild USI severity corresponding to CTSS values of 0–7, showing reduced sensitivity (75%) but increased specificity (92%). These findings highlight USI's reliability in dynamically tracking disease severity and improvement over time. In a study by Zieleskiewicz et al. [22] One hundred patients were included. LUS score was significantly associated with pneumonia severity assessed by chest CT score and clinical features. Which reflects a close relation between CTSS and USI in Patients with COVID-19 as demonstrated on Figure 2, which represents the findings of CTSS scores in the studied patients and USI findings in the same group.

Death rate among patients studied which was 41.7% and 35 (58.3%) patients improved. 31(51.6%0 patients developed complications during hospitalization with some patients showing more than one complication simultaneously. Among the complications that affected the patients during hospitalization, ARDS was the most prevalent affecting 21(35%) patients, followed by secondary bacterial infections in 12(20%) patients, cardiac complications in 7(11.7%), neurological complications in 6(10%), and psychological complications in 11(18.3%) patients (Table 4) . Out

of improved patients, 4 (6.7%) patients suffered from psychological complications and 2 (3.3%) patients suffered from secondary bacterial infection. Tzotzos et al. [23] mentioned that life threatening form of respiratory failure, acute respiratory distress syndrome (ARDS) is a frequent complication in COVID-19.

Similarly, Zhou et al. [24] observed that ARDS was prevalent among patients requiring intensive care, emphasizing the need for aggressive management strategies. The study found secondary bacterial infections in 12 patients (20%). This finding is consistent with Zhang et al. [25] who noted that critically ill patients are at heightened risk for hospital-acquired infections due to prolonged ventilation and the use of invasive devices. These infections complicate management and can lead to worse outcomes. Garcia-Vidal et al. [26] also mentioned similar findings in their studies. Concerning outcome 25 patients died, survival rate was 58.3%.

Table 5 highlights the prognostic value of the Ultrasound Severity Index (USI) in predicting outcomes, showing a higher mortality rate (35%) among patients with severe USI scores compared to 6.7% in those with moderate scores. This could help guide early intervention strategies for patients at higher risk. Ji et al [27] mentioned similar results in their study among 280 patients, patients with higher severity index have higher mortality rate.

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CONCLUSION

High accuracy of Chest Ultrasound indicates the effectiveness of U/S in monitoring COVID-19 progression. Also, Prognostic utility of Chest ultrasound, where higher severity is associated with worse outcomes.

Conflict of interest**:** None.

Financial Disclosures**:** None.

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