



## OUTCOME BASED ON CLINICAL AND RADIOLOGICAL FINDINGS IN PULMONARY EMBOLISM IN COVID 19: CASE STUDY

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### ABSTRACT

The outbreak of coronavirus has spread rapidly on a global scale.

One of the complications of COVID 19 infection is Pulmonary Embolism which is associated with a high mortality rate and increased ICU admissions. However, only a few studies are present to describe pulmonary embolism in covid 19. We aimed to describe a case series of pulmonary embolism in covid 19 patients. 10 cases who were admitted in our covid 19 hospital in the month of July-August were included. Demographic information, clinical features, and treatment data were extracted from medical records. Among the 10 patients, 7 were males and 3 were females. The patients were aged from 30 years to 80 years. On the basis of ECG Findings, D-dimer levels, CTPA findings, etc. pulmonary embolism was diagnosed and treated in covid 19 patients and the outcome was observed.

This case series examines aspects of Covid-19 emphasizing the increased thrombogenicity and therefore the need for anticoagulation during treatment and in some cases, during recovery cases- particularly those patients with severe illness and pre-existing risk factors.

**KEYWORDS :** COVID 19, pulmonary embolism, anticoagulation, D-dimer, CTPA.

### INTRODUCTION

Since the emergence of coronavirus disease-2019 (COVID-19) as a result of infection with Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), several reports have described significant procoagulant events, including life-threatening pulmonary embolism (PE), in these patients. Abnormalities of various coagulation parameters were frequently reported and have been linked to poor prognosis.<sup>1</sup>

A D-dimer level of  $>1 \mu\text{g mL}^{-1}$  is an established risk factor for poor outcome in SARS-Cov-2 infection, it has been highlighted in recent reports with a high incidence of thrombotic events in the intensive care unit (ICU) patients. The normal level of D-dimer allows safe removal of pulmonary embolism (PE) in inpatients with low or moderate clinical opportunities in PE, but there is no recommendation to use D-dimer as a good sign of thrombosis due to low specificity.<sup>2</sup>

An ECG is a useful, simple yet non-costly tool for diagnostic purposes and therapeutic interventions and in some cases, prognosis.

### On ECG, Acute pulmonary embolism may manifest in the order of prevalence:

1. Sinus tachycardia
2. Prominent S wave in lead
3. Late precordial transition
4. T wave inversion in  $>2$  precordial leads
5. RBBB (incomplete/complete)
6. P Pulmonale
7. RAD (right axis deviation)
8. S1Q3T3
9. Supraventricular arrhythmias

The European Society of Radiology (ESR) and the European Society of Thoracic Imaging (ESTI) recommend contrast-enhanced computed tomography (CT) should be performed to rule out PE and when plain CT chest cannot explain the severity of respiratory distress.<sup>2</sup>

### METHOD

Out of 126 confirmed cases of pulmonary embolism which were admitted to our hospital during July – August months, 10 patients were randomly selected. Their detailed history, covid 19 status, clinical features, laboratory investigations,

radiological findings, ECG findings, treatment, and outcome were studied retrospectively. COVID 19 patients were diagnosed based on criteria of WHO interim guidance. Pulmonary embolism was diagnosed based on clinical features, D-dimer levels, ECG, and radiological findings.

The medical records were obtained for parameters such as ward/ICU admission, days of hospitalization, type of oxygen required (oxygen mask/high flow/mechanical ventilation), and the indication for CTPA.

### Procedure

Medical records of all 10 patients were reviewed. Demographic information, clinical features, and treatment were extracted from medical records. Data were recorded into a computerized database.

### Lab And Radiological Information

Throat swabs were tested for COVID-19 by RTPCR according to the recommended protocol. The laboratory tests include routine blood investigations and blood sugar levels, Inflammatory markers such as D-Dimer levels. CT acquisitions were performed with SIEMENS SOMATOM Definition AS 128 slice multi-detector CT equipment.

### Statistical Analysis

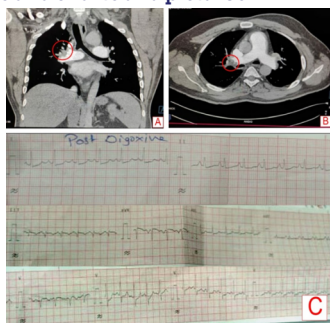
Data were entered into a Microsoft Excel spreadsheet and analyzed. Categorical data was represented in the form of Frequencies and proportions. For Continuous data, the mean and standard deviation was calculated. ANOVA (Analysis of Variance) was the test of significance to identify the mean difference between more than two groups for quantitative data respectively. p-value (Probability that the result is true) of  $<0.05$  was considered as statistically significant after assuming all the rules of statistical tests.

**Table No. 01 Outcome of patients based on D DIMER Levels.**

D DIMER LEVELS	DEATH	DISCHARGE
0-2	1	1
2-4	1	2
6-8	1	0
8-10	1	0
10-12	2	0
12-14	1	0

Total	7	3
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### Observations and charts and pictures



**Image 1: A) Non Enhancing Thrombus In The Upper Branch Of The Right Pulmonary Artery On CTPA - Coronal View B) Non enhancing thrombus in the Right Pulmonary artery at the hilum on CTPA- Transverse view C) ECG demonstrating S1Q3T3, Sinus tachycardia, and P pulmonale**

In our study mortality, high levels of D DIMER are associated with higher mortality rates.

#### Differential Diagnosis

A few differentials during the initial assessment were secondary bacterial infection, atypical pneumonia, pulmonary oedema (cardiac origin), and pulmonary embolism.

#### Treatment

Out of 10 cases, 4 patients were thrombolysed with Streptokinase followed by continued anticoagulation with Inj. LMWH. 1 patient was started on plain Heparin owing to deranged renal function tests. Rest 5 patients were started on Inj. LMWH was continued for 5 days and shifted on to an oral anticoagulant.

#### Outcome

Out of the 10 patients, only 3 patients went discharged and the others succumbed due to other contributing factors like sepsis, ARDS, and cerebrovascular accidents

#### DISCUSSION

Risk factors for thrombosis are numerous but are generally considered to contribute by three key mechanisms (Virchow's Triad); endothelial injury, reduced flow/stasis, and hypercoagulable state. Pulmonary emboli have been reported frequently in COVID-19 and are often noted in patients with COVID-19 without other standard risk factors, suggesting that it is an independent risk factor for VTE.<sup>3</sup>

Among the 10 patients, 8 were males and 2 were females. The patients were aged between 30-80 years.

High levels of D-dimer concentration were associated with poor outcomes and high mortality rates. The presence of comorbidities like cardiovascular disease, diabetes mellitus, and chronic obstructive pulmonary disease have a high risk of mortality in patients with severe COVID 19 infection. Thromboprophylaxis can be given in many forms. However, a study by Tang et al showed promising results with a better outcome of the patients was obtained when LMWH was a part of the treatment plan.

When LMWH was used in prophylactic doses in severe COVID-19 infections with either high D-Dimer levels or when the risk of sepsis-induced coagulopathy was possible, the mortality rates were low as compared to those who were not given any anticoagulation.

Therefore, suitable use of LMWH may have an important role

to play in severe COVID 19 cases.<sup>3</sup>

Guidelines recommend emergency thrombolysis in situations with severe, persistent cardiovascular compromise, evidence illustrating survival benefit and/or better long-term end results.

There is still a controversy about thrombolysis to be carried out in patients without hemodynamic compromise.

Additionally, refractory hypoxia is not considered a typical indication for thrombolysis-with a fear of the worst outcome such as intracranial hemorrhage which was observed in around 1.7% cases.<sup>3</sup>

The American College of Cardiology recommends implementing prolonged thromboprophylaxis in patients with malignancy, reduced mobility, or pre-existing comorbidities like DM/HTN/COPD or cardiac disease with a COVID-19 as they are at a higher risk for developing thromboembolism.

At the time of discharge, if the D Dimer values are greater than two times the upper limit of normal, it is recommended that anticoagulation should be continued for an extended interval.

It is not recommended that PE diagnosis should be based on pulmonary ventilation-perfusion imaging. The incidence of Venous thromboembolism was around 10% in wards as opposed to 48% in ICU. Furthermore, it becomes increasingly difficult to investigate ICU patients owing to critical illness.

#### CONCLUSION:

High mortality rates were observed in a subset of severe covid 19 patients with marked elevation of D-Dimer levels. Contrast-enhanced CT should be preferred in cases where PE is suspected for the extent and confirmatory diagnosis and in some cases, prognosis.

Timely use of the appropriate anticoagulant in a diagnosed case of pulmonary embolism has been associated with improved outcomes.

Long-term prophylaxis should be continued in covid 19 patients with high D dimer levels.

#### Limitation Of The Study:

Small sample size.

#### Funding:

No funding was needed.

#### Authors Contributions

All authors contributed to the study at a different level.

#### Abbreviations:

ARDS - Acute Respiratory Distress Syndrome, ARF- Acute Renal Failure, CTPA- CT Pulmonary Angiogram, COPD - Chronic obstructive Pulmonary Disease, DM- Diabetes Mellitus, ECG- Electrocardiogram, HRCT- High-Resolution Computed Tomography, HTN- Hypertension, IHD- Ischemic Heart Disease, LMWH- Low Molecular Weight Heparin, RBBB- Right Bundle Branch Block, PE- Pulmonary Embolism, RT-PCR- Reverse Transcriptase Polymerase Chain Reaction, SARS - Severe Acute Respiratory Syndrome, STK- Streptokinase, VTE - Venous Thromboembolism, WARF-Warfarin, WHO- World Health Organisation.

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