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ORIGINAL ARTICLE

Incidence of Pulmonary Embolism in Covid-19 Patients

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ABSTRACT

Background: Pulmonary embolism (PE) is the blockage of a blood clot in the pulmonary arteries of the lungs. PE is a common phenomenon and requires prompt treatment. Despite advancement in the treatment and diagnosis it has a substantial mortality rate. Recent studies suggest that the novel Covid-19 infection is associated with rising trend of PE. Patients with Covid-19 may be at high risk of complications related to thrombotic condition in the consequences of stasis blood flow and irregular inflammatory response. The main objective of this article is to assess the incidence of PE in covid-19 hospitalized patients.

Material and Method: We reviewed more than 160 medical records of the patients admitted to the Coivd-19 ward during the peak of first wave of Covid-19 pandemic. This study was conducted at Saidu Teaching Hospital Swat from June 2020 to Sep 2020in the time frame of 4 months. The real-time polymerase chain reaction was used to diagnose the Covid-19 in the patients and for the PE computed Tomography pulmonary angiogram(CPTA) was used.

Results: In this study, 160 patients have participated of which 7 developed PE. This represents that the incidence of PE was 3% among individuals.

Conclusion: In the Covid 19 Hospitalized patients Incidence of Pulmonary Embolism is a common phenomenon. For the patients having a high respiratory rate, smoking history, and low level of oxygen preventive measures should be considered.

Keywords: Pulmonary Embolism, Covid-19, Computed tomography angiography, Intensive care unit, Risk factors,Incidence.

INTRODUCTION

The disclosure of corona-virus disease-2019(COVID-$_{19}$) is in the response to Severe Acute Respiratory Coronavirus (SARS-CoV-2) infection (Ma Q). The assorted article represents the significant co-related PE with Covid-19. Patients have been diagnosed with PE, a life-threatening disease (Marshall PS). In the human lungs, PE is the blockage of one of the Pulmonary arteries. (Elliott CG) Transfer of the blood clot from the deep veins of legs or other parts to the lungs causes PE. (CG, et all) Coronavirus (Covid-19) is a virus of various families (Different Strains) that causes respiratory illness in humans. The severity of Covid-19 may vary from mild, severe, organ failure, or death. (Zhang W) Many complications caused by this disease are dangerous and one of them is PE. (Edwards and).The blood clots with the Covid-19 have been observed in the hospitalized patients of Covid (Connors JM). PE is associated with a high mortality rate and it is the major cause of death in Covid-19 patients. (Badr OI) One of the complex consequences of this disease is arterial and venous thrombosis, this disease has poor prognostic outcomes. A high risk of thrombotic complications in Covid-19 patients is due to the Endothelial dysfunction, inactivation of platelets, stasis flow of blood, and excess inflammatory response of the body. (Hajra A)Covid-19 patients have increased the risk of thrombosis (Khan IH). D-dimer test levels can be used for prediction purposes such as an increase in this test level predicting that thrombotic risk is increased in the Covid-19 patients (PM.).Published data is very limited about the incidence of PE, therefore this study aims to analyze the incidence of PE in hospitalized Covid-19 patients.

METHODOLOGY

The review board has approved the study, this study has followed the ethical guidelines. We reviewed more than 160 medical records of the patients admitted to the Coivd-19 ward during the Covid-19 pandemic situation. atSaidu Teaching Hospital, Swat from June 2020 to Sep 2020in the time frame of 4 months. The real-time polymerase chain reaction was used to diagnose the Covid-19 in the patients and for the PE. CPTAwas used for diagnosis of PE.

Patients: Consecutive adult patients (18 years) were the inclusion criteria; for the diagnosis purposes reverse transcription P.C.R was used. Clinically confirmed Covid-19 patients were selected. Chest CT was performed on the patients who had clinical features of this disease. Patients with the unenhanced chest CT were rejected.

Protocol for CT: For the Covid-19 patients, multi-detector pulmonary CT angiography was sued. 64 slice multidetector CT scanner was used for this purpose. At the rate of 4 mL/sec, an intravenous injection of 60 ml was injected into the pulmonary artery. For the CT scan following setting was used: collimation pf 8030.625 nm, 1.20 KVp, average tube current of 300 mA, rotation time of 0.28 sec, the volume of CT dose 4.38 mGy, and the pitch was 0.992.

Imaging Analysis: Two chest radiologists analyzed the presence of PE and chest CT scan patterns of the Covid-19 patients. The clinical and biological status of patients

was not provided to them. For some cases, more than one reading was taken.

Statistical Analysis: Continuous variables comparison was observed by using the student t-test. Pearson test was performed to analyze the comparison between the categorical variables. We consider the CT extent lesions for the determination of clinical factors co-related with the PE. In logistic regression model demographic characteristics, mechanical ventilation was required as the independent variable. The significance difference indicative value was P,0.5. R version 3.4.4 software was used for all analysis.

RESULTS

2012 patients were diagnosed with the Covid-19, 160 were hospitalized during this study period. Among these 160 patients, 153 patients had unenhanced chest CT due to nonsevere clinical features. 7 patients with severe clinical features and Covid-19 infection were included and analyzed by using enhanced material-contrast CT. (Figure 1) The significance difference indicative value was P,0.5 for the t-test.

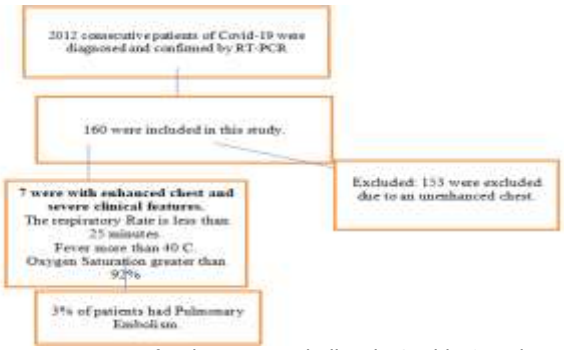

Figure 1: Percentage of Pulmonary Embolism in Covid-19 Patients.

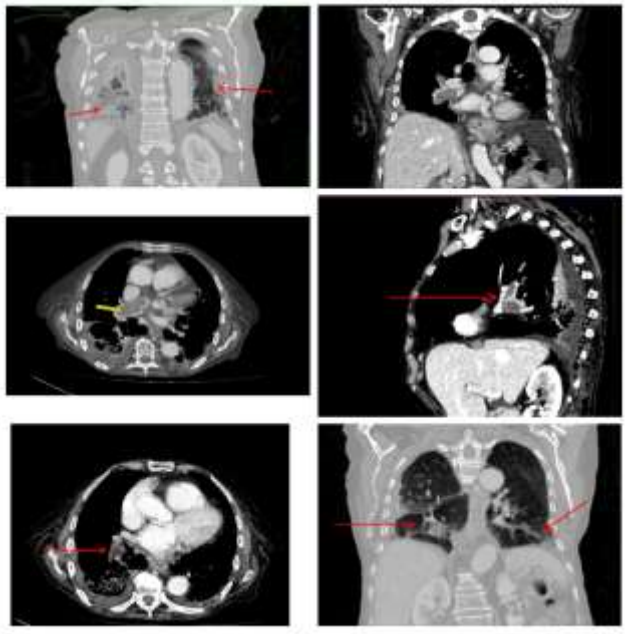

Figure 2: Images by the pulmonary CTPA, showing pulmonary embolism and features of Covid. CT scans were obtained within 10 days of the hospitalized Covid-19 Patients.

Among the 160 patients, 3% had PE. Figure 2 represents the results of imaging. Patients with PE were transferred to the critical care unit. However, it was determined that the inpatients with enhanced chest respiratory rate were less than 25 minutes. Moreover, oxygen saturation was 92%. It was confirmed that 3% of patients with the enhanced chest were suffering from PE.

DISCUSSION

In this study, we analyze the incidence among the hospitalized patients of Covid-19 with PE. We found that 75% of hospitalized patients with Covid-19 who go with CPTA were diagnosed along with PE. This finding is co-related with the previous studies that determine that Covid 19 patients were diagnosed with PE. (Kaminetzky M) Moreover, this incidence is similar to that reported in Riyadh, Saudia Arabia. (GrilletF) Many of the other studies present the higher incidence such as in the study that was conducted in France with the sample size of 106 patients with the Covid-19 it was seen that the incidence of the acute PE was 30%. (Yang J) Another research present that the incidence was 31% for the arterial, and venous thrombosis events in the sample of more than 184 patients present in the intensive care unit (ICU). (Demelo-Rodríguez P)

We did not find significant differences between the PE ICU admission, survival, mechanical ventilation, and hospital stay. Patients that were infected with the Covid-19 had some thrombotic complications due to the platelet's inactivation, Endothelial dysfunction, or the excessive inflammatory response.(Bonaventura)Results in this study demonstrated that there is a high incidence of pulmonary embolism in hospitalized Covid-19 patients. This finding is also supported by numerous research studies. This finding will helpful for the health care providers to diagnose PE in patients, most probably when D-dimer elevation is associated with the clinical signs. (Gervaise A)

As the previous studies show that the increase in the level of D-dimer is because of coagulation. Furthermore, higher D-dimer concentrations lead to infection, trauma, post-surgery complications, inflammation, and other diseases. In addition to this, an increase in the D-dimer levels is highly sensitive to numerous conditions such as it decreases the probability of appearance of the PE and thrombotic diseases. This study does not correlate the PE diagnosis with the D-dimer level. Yet another publication regarding this study will cover the aspect of D-dimer level in prognosis, and diagnosis of the PE with covid-19. (Asero R)

Mostly the patients with the Covid-19 face difficulties in taking a deep breath, and holding it for a while during the PE diagnostics. This is the detection of the peripheral PE. (Espallargas I) Moreover, no studies were approachable in differentiating the range of symptoms that are common in PE, or Non-PE such as chest pain, cough, lower limb edema, dyspnea, and others. Therefore, more research is required to categorize the symptoms in these two variables of PE or Non-PE.

As the Covid-19 has different variants. This study does not report the incidence according to the type of the covid-19 variant. Also, this study does not cover the aspect of risk factors that are related to the previous studies. Other

limitations of these studies are patients that were selected for the study were small in number. In comparison with other studies that cover the hospitals in one city or one country. The population of the study was the target from the same hospital. Lastly, we did not determine if the PE occurs in the hospital or before hospital admission.

CONCLUSION

Our results revealed a high incidence of pulmonary embolism among the infected patients with Covid-19 and correlated with enhanced chest along with severe clinical features. For the patients having a high respiratory rate, smoking history, and low level of oxygen preventive measures should be considered.

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