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Case Report

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Systemic thrombolysis with tenecteplase for STEMI complicating a SARS-COV2 pneumonia

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Abstract

Corona virus disease of 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-COV2), has been known to cause many complications: respiratory illnesses, acute kidney injury, coagulopathy which can lead to multi organ dysfunction. The cardio-vascular system is also affected with complications including: myocardial injuries, myocarditis, heart failure, dysrahythmias, venous thrombo-embolic events and acute myocardial infarction.

We report a case of a patient admitted to the intensive care unit (ICU) for SARS-COV2 pneumonia complicated by a ST segment elevation myocardial infarction (STEMI) treated with systemic thrombolysis using tenecteplase (TNKase) with a favorable outcome. The authors discuss the therapeutic strategy for STEMI in COVID-19 patient and the different challenges including the choice of reperfusion therapy and the drug for thrombolysis.

Keywords: COVID-19; STEMI; tenecteplase; thromboembolism; thrombolysis.

Introduction

World health organisation (WHO) declared the COVID-19 as a global pandemic with more than 2.700.000 deaths until the end of March 2021. While Systemic inflammation and pulmonary complications can result in significant morbidity and mortality, Cardio-vascular complications may also occur. These complications include: acute coronary syndrome (ACS), acute myocarditis, acute pericarditis, dysautonomia

The diagnosis of ACS in-patient with SARS-COV2 infection is based on electrocardiogram (ECG) as in other etiologies. The therapeutic strategy depends on the diagnosis delay and the availability of primary percutaneous coronary intervention (PCI) [1].

We report the case of a patient hospitalized in the ICU for the management of SARS-Cov2 pneumonia, complicated by STEMI, who underwent successful thrombolysis using TNKase.

Case report

A 62 years old male, with a medical history of arterial hypertension treated with Angiotensin-Converting Enzyme Inhibitors and active chronic smoking, presented to the emergency room with an 11 days history of dry cough, fever and dyspnea. On admission, patient was tachypneic with a respiratory rate of 30 cycles per minute, oxygen saturation of 85% while breathing ambient air, improved to 92% on 15 l/min of oxygen via a non-rebreather mask, he was afebrile, heart rate was 100 beats per minute and blood pressure 134/85 mmHg, capillary blood glucose was 330 mg/dl. His weight was 72 kg. Computed Tomograp hy (CT) thorax showed multifocal bilateral ground glass opacities affecting 50% of the lung parenchyma (Figure 1).

Reverse Transcriptas e- PCR (RT-PCR) was positive for SARS-COV-2 3 days before his hospitalization. Patient was started on hydroxychloroquine 200 mg three times a day (ECG showed no abnormalities), azithromycin 500 mg the first day then 250 mg/day for 5 days, methylprednisolone 80 mg intravenously per

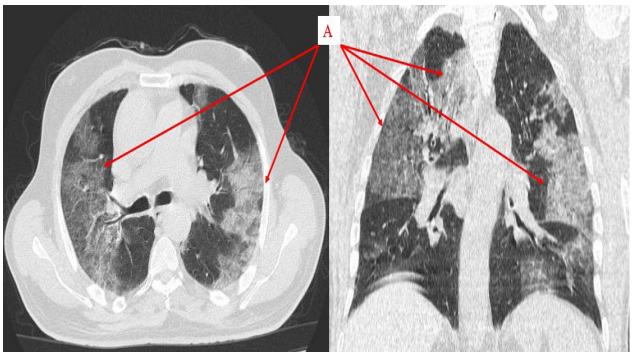

Figure 1: Computed tomography: Multifocal bilateral rounded ground-glass opacities.

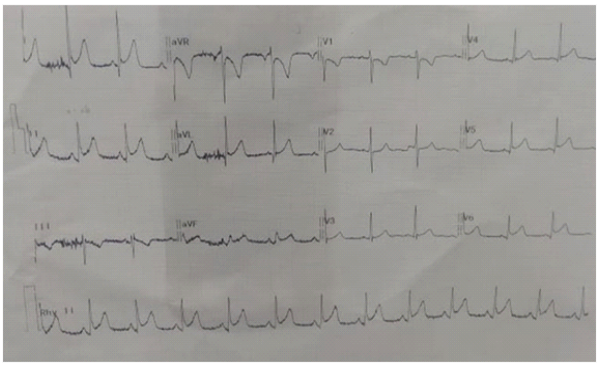

Figure 2: ST-segment elevation on lateral area.

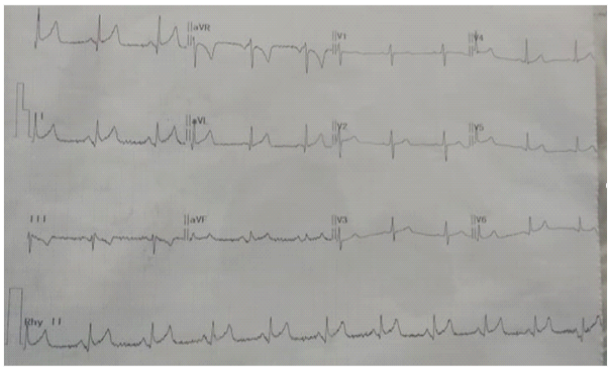

Figure 3: ECG 6h after thrombolysis showing a regression of ST-segment elevation.

day, vitamin C, vitamin D and Zinc. Therapeutic anticoagulation was started using enoxaparin 1 mg/kg twice daily. The patient was also put in the prone position for 10 to 18 hours. Hyperglycemia was managed using variable intravenous insulin infusion. The laboratory results revealed leukocytosis at 14440/mm^3, lymphopenia at 1011/mm^3, an elevated C-reactive protein level to 101 mg/l, lactate dehydrogenase was 768 UI/l, ferritin level was 1075.96 ng/ml, The remainder of his blood test results were within normal range, including renal function, hepatic function tests, and platelet count. Coagulation tests, including D-dimer, fibrinogen, and ATIII were not available.

The patient symptoms improved: his respiratory rate was at 16-20 cycles/min, his oxygen saturation of 96% on 8 l/min of oxygen. However, 4 days later, the patient presented with chest pain, the ECG showed ST-segment elevations on lateral area (DI, DII, AVL, V5, V6) (Figure 2). Patient received in addition to curative anti-coagulation, analgesia with morphine, dual antiplatelet therapy including aspirin 100 mg and clopidogrel 300 mg 30 min after the pain onset. PCI was not available in the hospital for revascularization, the ICU and cardiology team decided to use systemic thrombolysis using IV 40 mg TNKase.

The outcome was favorable with regression of chest pain and ST-segment elevation (Figure 3: ECG 6 h after thrombolysis) without any hemorrhagic incident. The patient was discharged to the medical department 3 days later.

Discussion

The treatment of ACS requires emergency reperfusion of the affected coronary artery using either coronary angiography and percutaneous coronary intervention or systemic thrombolysis. The choice depends mainly on the availability of coronary angiography.

Angioplasty is the gold standard of reperfusion treatment as recommended by the Cardiovascular societies (European Society of Cardiology and American Heart Association guidelines) [2,3]. During COVID-19 pandemic period, myocardial reperfusion had several challenges requiring logistic and practices changes. Firstly, the lack of human ressources especially in our institution where the cardiology team was deployed in other units to manage COVID-19 patients, the high risk of contagion for the health care team, the reduced capacity of the non COVID-19 units and finally the delays to admission from the emergency room compared to the pre-Covid-19 era which extended the door-to-balloon time [4]. Furthermore, Moving patients with SARS-COV2 pneumonia under oxygen therapy to the the cath-lab is very challenging. For all these reasons, and based on fibrinolysis efficiency and safety, some authors recommanded systemic thrombolysis as a reasonable alternative for treatment of STEMI in the setting of the COVID-19 pandemic [5].

In addition, during COVID-19 infection, the severe inflammatory reaction causes thrombo-embolic abnormalities by activating coagulation which was responsible on stent thrombosis. In a case series of 19 patients with active stent, Hamadeh et al reports an incidence of stent thrombosis of 21% [6].

However, systemic thrombolysis presents a failure rate of 15% according to some authors [7], requiring a secondary rescue angioplasty. Moreover, this therapy has many contre-indications: history of a stroke in the preceding 6 months, cerebrovascular malformation, active bleeding, history of recent surgery or hepatocellular or renal insufficiency [1,5].

Thrombolysis can also be associated with a significantly higher mortality and length of hospital stay compared to angioplasty [8].

In our case, systemic thrombolysis was chosen based on some reasons but mainly for the absence of a cath-lab in the hospital (the closest one being at 300 Km) which is consistent with the recommendations of the American college of Cardiology in the management of STEMI during COVID-19 pandemic [9], and the outcome was good without any hemorrhagic complications. However, Leng et al. compared systemic thrombolysis, using atelplase, as a first line-therapy on STEMI during COVID-19 pandemic and concluded that this approach was as-

sociated with a lower rate of timely coronary reperfusion and an increased rate of recurrent ischaemia, cardiogenic shock, and ex-acerbated heart failure [10].

The choice of TNKase in our case, was based on the short onset of action, the longer half-life, the use of a single intravenous dose, the drugs safety [11] and it is the only drug available in our institution.

Conclusion

The choice of reperfusion strategies for ACS during COVID-19 pandemic presents many challenges. Systemic thrombolysis is a good alternative, even within the timeframe of PCI, especially in the absence of a cath-lab. More studies are needed to evaluate the efficiency of systemic thrombolysis in COVID-19 patients and its long-term outcome.

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