Streptokinase in a COVID-19-positive patient with STEMI in a PPCI centre: a local experience

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SUMMARY
Primary percutaneous coronary intervention is the recommended modality of treatment for acute ST-elevation myocardial infarction (STEMI). However, different countries now have different consensus about treatment of patients with STEMI during the COVID-19 pandemic. In this report, we describe a case of SARS-CoV-2-positive patient admitted with pneumonia. During hospital stay in COVID-19 designated special care, the patient developed inferoposterior wall myocardial infarction (MI) without haemodynamic instability and was treated successfully with thrombolytics (streptokinase) without any severe complications. To decrease the risk of in-hospital exposure to COVID-19 infection among the staff, in circumstances where there is no negative-pressure catheterisation laboratory and there is shortage in medical staff, thrombolytics can be used as a modality of treatment in low-risk, haemodynamically stable MI during this pandemic, as recommended by different cardiac societies. However, this needs further studies in order to reach local and international consensus.

BACKGROUND
Acute ST-elevation myocardial infarction (STEMI) is a life-threatening condition that needs timely reperfusion, which can be done either by primary percutaneous coronary intervention (PPCI) or by thrombolytics; the former is the gold standard modality of treatment for patients with STEMI.1 2 During the COVID-19 pandemic, different countries have different guidelines and approaches to treatment of COVID-19-positive patients with STEMI. The American College of Cardiology and the Society for Cardiac Angiography and Interventions still recommend PPCI as gold standard, if possible to be done in a timely manner in a percutaneous coronary intervention-capable set-up during the COVID-19 pandemic era.3 In contrast, Chinese dealing with COVID-19-positive patients during this pandemic recommend thrombolytics in those with acute STEMI.4 There are no specific guidelines for in-hospital STEMI in COVID-19-positive patients.

STEMI in COVID-19-positive patients is a challenging situation; different countries have different consensus. In this report, we present a case of a 72-year-old male patient admitted with COVID-19 pneumonia. While he was improving he developed inferoposterior wall myocardial infarction (MI) on the eighth day of admission and was treated with thrombolysis without any severe complications.

CASE PRESENTATION
A 72-year-old man, a resident of Karachi and a known case of diabetes mellitus diagnosed 1 year ago and was on diet control, presented to Aga Khan University Hospital Emergency Department with high-grade fever for the last 3–4 days associated with bouts of dry cough and shortness of breath. He also had diarrhoea in the last 1 day. On examination in the emergency department, his blood pressure was 110/70, with a pulse rate of 104 per minute and respiratory rate of 28 per minute, with Oxygen saturation of 98% on Non-invasive ventilation support. Apart from bilateral crackles on auscultation of the chest, the rest of the systemic examination was unremarkable. The laboratory investigations done in the emergency department are listed in table 1.

The patient’s qualitative PCR for SARS-CoV-2 (COVID-19) was positive, so he was shifted to a COVID-19 designated special care unit and managed accordingly as COVID-19 pneumonia.

While he was doing well, he had severe, typical chest pain associated with nausea and sweating on the eighth day of admission. His ECG showed inferoposterior wall STEMI (figure 1), with positive biomarkers, sent at the time of his chest pain and repeated after 4 hours and at 18 hours (table 2). Along with dual antiplatelet (DAPT) and low molecular weight heparin (LMWH), the patient was given sublingual nitroglycerine, but the pain did not subside. Bedside echocardiogram showed visually estimated Ejection fraction of 45% with segmental wall motion abnormalities, that is, inferior and inferoposterior wall hypokinesia. After discussion with the family (son) and the primary team, and after providing written consent, it was decided to give the patient thrombolitics. A few minutes after starting streptokinase infusion, the patient’s symptoms subsided. An accelerated idioventricular rhythm was seen on cardiac monitor and subsequent ECGs at 60 min and 90 min showed complete resolution of ST segment elevation.

Figure 1 ECG while the patient was having chest pain.
with mortality benefits in PPCI; if the door-to-balloon time could reach 41% and so they tried to contain the infection by adopting precautionary measures which include conservative management of various emergencies, including patients with stable STEMI. COVID-19 was declared a pandemic by WHO on 11 March 2020. In Pakistan, the first case of COVID-19 was diagnosed on 26 February 2020. WHO advised the use of proper personal protective equipment (PPE) while managing COVID-19-positive patients worldwide. COVID-19 carries a high risk of thrombus burden and can cause acute myocardial injury. COVID-19-positive patients who have high cardiovascular disease (CVD) risk factors, such as history of smoking, diabetes, hypertension, dyslipidaemia and prior coronary artery disease, have high incidence of CVD and high mortality as compared with COVID-19-negative patients. Shorter door-to-balloon time is associated with mortality benefits in PPCI; if the door-to-balloon time stretches to more than 1 hour, PPCI loses its mortality benefits in comparison with thrombolytics. Moreover, the Chinese Society of Cardiology recommends thrombolysis in low-risk MI, such as inferior wall MI/lateral wall MI, in haemodynamically stable patients and/or patients with STEMI with severe pneumonia. During the COVID-19 pandemic, it takes too longer than usual to shift COVID-19-positive patients with STEMI to the cath lab for PPCI due to preparations which include proper disinfection of the cath lab; availability of negative-pressure cath lab; donning of proper PPE, which includes gloves, goggles, face shield, gowns, face masks, air-purifying respirators and respirators, both by the cath lab staff and the interventional cardiologist; and shifting the patient following proper protocol to decrease the spread of in-hospital infection. In our case, the patient had COVID-19 pneumonia and low-risk inferior wall MI (confirmed by ECG, positive biomarkers and echocardiographic changes), with haemodynamically stable status, and was in COVID-19 designated special care, which was at a distance from our single working positive-pressure cath lab in the earlier phase of the COVID-19 era. After discussion with the family and the primary team, it was decided to give the patient intravenous streptokinase in the special care unit under a controlled environment. Like the Chinese Cardiac Society, we can administer thrombolitics to low-risk patients to decrease the likelihood of spreading such a deadly infection in hospitals, although this needs further studies.

Outcomes and follow-up

The patient is clinically and haemodynamically stable and is following cardiology outpatient service/tele-clinic.

Discussion

At present we do not have any significant data, both locally and internationally, on the use of streptokinase as thrombolytics in COVID-19-positive patients with STEMI. We also lack data with regard to the rate of nosocomial infection in COVID-19, both among the medical staff (specifically catheterisation laboratory (cath lab) staff and interventional cardiologists/fellows) and in-hospital patients. In China, during the early days of the outbreak, it was predicted that the rate of nosocomial infection could reach 41% and so they tried to contain the infection by a cardiac point of view and was advised coronary angiogram but refused and is following cardiology outpatient service/tele-clinic.

Treatment

The patient was successfully revascularised with thrombolytics.

Case report

| Table 1 | Laboratory investigations in the emergency department |
|---------|------------------------------------------------------|
| Serial number | Investigations | Results | Normal range |
| 1 | Haemoglobin (g/dL) | 12.9 | 11–14.5 |
| 2 | Haematocrit (%) | 39.2 | 34.5–45.4 |
| 3 | White cell count | 5.7 | 4.6–10.8 |
| 4 | Neutrophils (%) | 72.4 | 34.9–76.2 |
| 5 | Lymphocytes (%) | 20.6 | 17.5–45 |
| 6 | Platelets | 152 | 154–433 |
| 7 | C reactive protein (mg/L) | 158.8 | 0–10 |

Table 2 | Serial troponin I values |
|---------|----------------------------|
| 1 | Troponin I, on admission | <0.006 ng/mL | Diagnostic cut-off for Acute coronary syndrome >0.04 ng/mL |
| 2 | Troponin I, at the time of chest pain | 0.011 ng/mL | Diagnostic cut-off for ACS >0.04 ng/mL |
| 3 | Troponin I, 4 hours after chest pain | 133.32 ng/mL | Diagnostic cut-off for ACS >0.04 ng/mL |
| 4 | Troponin I, after 18 hours | 76.28 ng/mL | Diagnostic cut-off for ACS >0.04 ng/mL |

Learning points

- Thrombolytics have been recommended by different cardiac societies, such as the Chinese Society of Cardiology, for use during the COVID-19 pandemic.
- Thrombolytics can be used in low-risk myocardial infarction, such as inferior wall myocardial infarction, with haemodynamic stability and in those with severe COVID-19 pneumonia.
- Thrombolytics can be used in set-ups with no negative-pressure catheterisation laboratories to decrease in-hospital spread of infection.
CONCLUSION
The COVID-19 pandemic has severely affected the healthcare system globally, including shortage in medical personnel due to infection, and has led to increased mortality among the medical staff. Managing a COVID-19-positive patient with STEMI is challenging in terms of timely reperfusion and prevention of in-hospital spread of COVID-19. In this context, thrombolytics can be considered an alternative option to PCI in selected patients.

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