COVID-19 and Primary Percutaneous Coronary Intervention (PCI): Delayed Presentations and Outcomes for STEMI care

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Significance:
Primary percutaneous coronary intervention (PCI) is the recommended therapy for acute myocardial infarction. The COVID-19 pandemic has altered the course of STEMI care. In this brief communication, we discuss delayed presentations and outcomes during acute coronary syndrome from Emergency Medical Services (EMS) to stenting.

Abstract

Primary percutaneous coronary intervention (PPCI) is a non-surgical procedure that requires catheterization to improve blood flow to the heart and is the recommended therapy for Acute Myocardial Infarction (AMI). The ongoing COVID-19 pandemic has altered the course of reperfusion therapy for patients with ST-elevation myocardial infarction (STEMI). It is imperative to emphasize the awareness of timely PCI and the effects it has on improving patient outcomes. Based on the consensus statement by the American College of Cardiology (ACC), American College for Emergency Physicians (ACEP), and the Society for Cardiovascular Angiography and Interventions (SCAI), it is critical to inform the public to call the emergency medical system for AMI symptoms and obtain the appropriate level of care. Ultimately, COVID-19 has posed unprecedented challenges to public health. The immediate threat is linked to morbidity and mortality related to the infection, and the masked threat is the waning attention and resources utilized for the care of other diseases. First medical contact is the main time target and reducing treatment delays improving patient outcomes in AMI patients with STEMI should be the next immediate objective in healthcare systems worldwide.

Introduction

Primary percutaneous coronary intervention (PPCI) is a non-surgical procedure that requires catheterization to improve blood flow to the heart and is the recommended therapy for Acute Myocardial Infarction (AMI). The ongoing Coronavirus 2019 (COVID-19) pandemic situation has altered the course of reperfusion therapy for patients with ST-elevation myocardial infarction (STEMI) (1). At this critical time, it is essential to emphasize the awareness of timely PCI, and effects on improving patient outcomes.

Brief Communication

Tam *et al* explore the impact of the outbreak of COVID-19 on STEMI systems of care in Hong Kong, China (2). The target is made on reducing first medical contact as opposed to reducing the door to balloon time and standard quality indicators. While their study is preliminary it has implications for hospitals targeting STEMI care. The single care center in Hong Kong included seven patients with PCI-treated STEMI who were COVID-19 negative. Six of these patients presented during office hours and one presented during non-office hours. STEMI care was compared to patients treated from February 1, 2018, until January 21, 2019, comprising 108 patients before the pandemic (2). Three outcomes were defined that included firstly, patients who reported for chest discomfort from onset to the first medical contact. Secondly, the patients' arrival at the emergency department for wire crossing during PPCI. Third, the arrival and the catheterization laboratory for wire crossing.

For 17 days, they noted the changes in the time component of STEMI management before and after the COVID-19 outbreak. The patient time lag was the largest, over 235 hours, from the onset of symptoms to first medical contact.2 The delay in PCI during the COVID-19 outbreak stems from a reluctance to go to the hospital. Aligned with the findings of the study, patients with STEMI chose not to seek medical care. Public health emergencies can lead to lapses in patient presentations (1,2). Additional precautions that are taken by catheterization laboratories in screening travel history, chest X-ray, symptomatology and wearing protective gear, lead to delays in diagnosis and late transfer to healthcare centers (2). For patients that were treated during the pandemic, the time of arrival at the department to device and catheterization laboratory to device was delayed as compared to patients who were treated before the outbreak. The most relevant findings from the hospital in Hong Kong include the desire to seek help by seven STEMI patients. Delays in arrival and treatment at health facilities lead to negative health outcomes. While the COVID-19 pandemic is a central factor contributing to delays, other causes may relate to cultural and educational, and severity perception of disease (3).

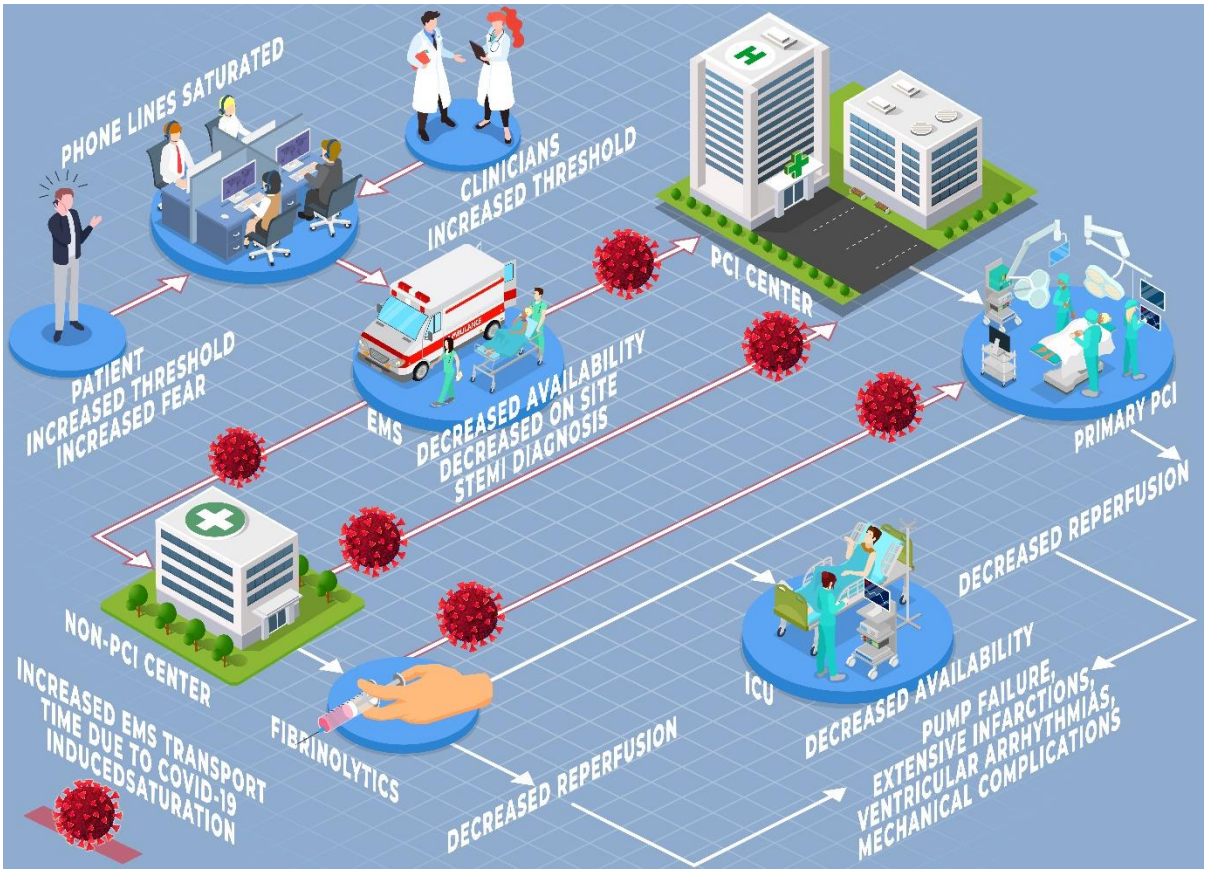

Figure. Primary Percutaneous Coronary Intervention (PCI) and coronavirus disease (2019): Delays in catheterization during acute coronary syndrome from Emergency Medical Services (EMS) to stenting.

PPCI is the current standard of care for patients who present to PCI centers, within the 90 minutes of first medical contact. Jie Zeng, Huang, and Pan reported a balanced protocol from Sichuan Provincial People's Hospital in a letter to *Intensive Care Medicine* (4). To bolster awareness of balancing AMI among patients affected by the epidemic, it is essential that they choose the nearest center that offers PPCI. The report highlights the importance of avoiding public transportation and adopting principles of maximum protection (4). Further, patients with AMI with fever and respiratory symptoms ought to visit the fever outpatient clinic. Once an epidemiological history is obtained, the patient is admitted to the isolation ward for the rapid nucleic acid test. This is a leading cause of delay for times of STEMI emergency reperfusion. A modulation of US intervention care is essential for catheterization laboratory protocols (4,5). Based on Sichuan's experiences, a protocol may be adopted for patients who are at high risk or confirmed cases of COVID-19 to visit the laboratory on a case-by-case basis.

STEMI rates have reduced during the COVID-19 pandemic, partly due to the lack of access to emergency departments or risking hospital exposure (5,6). The hindrances to PCI are tripartite. First, patients presenting to hospitals without PCI-capacity are subjected to delays for PPCI or refusal. Second, patients presenting directly to hospitals with PCI-capacity in ambulances are not receiving benefits of prehospital cardiac catheterization laboratory activation. Third, evaluations by the emergency departments are prolonged due to additional screening for COVID-19 as the presentations may confound with the interpretation of ST-segment elevation. Delays in catheterization curing acute coronary syndrome are noted from Emergency Medical Services (EMS) to the stenting process (Figure).

Based on the consensus statement by the American College of Cardiology (ACC), American College for Emergency Physicians (ACEP), and the Society for Cardiovascular Angiography and Interventions (SCAI), it is critical to inform the public to call the emergency medical system for AMI symptoms and obtain the appropriate level of care (7). The use of PCI in STEMI patients must be continued to avoid reperfusion therapy.

Before transferal to a PCI center, it is essential that the established COVID-19 infection be discussed. The statement notes that fibrinolysis is to be carried within 30 minutes of diagnosis and a transfer to rescue PCI is made when necessary (7). The use of a pharmacoinvasive approach may be considered only if PPCI is not feasible.

Conclusion

COVID-19 has posed unprecedented challenges to public health; the immediate threat is linked to morbidity and mortality related to the infection, and the masked threat is the waning attention and resources utilized for the care of other diseases. Pertaining to STEMI care, first medical contact is essential to ensure quality metrics for delivery of care and targeting clinical decisions, and not merely the in-hospital door to balloon time. While a focus on using prehospital time metrics is essential, a rigorous study of quality measures in-hospital processes is recommended (2,5). The best outcomes are linked to ensuring that the first medical contact and treatment delay is shortened. This may help in improving cases with delayed presentations, positively impacting case-by-case outcomes, and increasing awareness of current therapies in practice. The present work highlights that time is critical in the treatment of STEMI during the COVID-19 outbreak, particularly in high-risk patients as they may have poor outcomes. There are methodologies to expedite this process and ensure timely presentation and positive outcomes. Offering reperfusion therapies and PPCI is required but does not cover for external factors disrupting the patients' admission workflow. First medical contact is the main time target, and reducing treatment delays improving patient outcomes in AMI patients with STEMI should be the next immediate objective in healthcare systems worldwide.

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Human/Animal Rights: No human or animal rights are violated during this study.

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