Acute coronary syndrome in the time of the COVID-19 pandemic

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This editorial refers to ‘Reduction of hospitalizations for myocardial infarction in Italy in the COVID-19 era\(^1\), by S. De Rosa et al., on page 2083.

Acute ST-segment elevation myocardial infarction (STEMI) is a common reason for hospital admission. In 2009, >683 000 patients were discharged from hospitals in the USA with a diagnosis of acute coronary syndrome (ACS). While the incidence rates for STEMI have declined over the past 10 years, STEMI admissions comprise between 25% and 40% of ACS presentations.\(^2\) The extent to which community outbreaks of infectious diseases such as COVID-19 burden other aspects of the healthcare system remains unknown. Real-time collection of data is challenging in an ongoing pandemic, and clinicians are learning from all sources available while taking care of critically ill patients. Even as supportive data lags, a noticeable trend has emerged with a sudden decrease in ACS (particularly STEMI) presentations to hospitals during the COVID-19 pandemic. We sought to review the current literature and discussion surrounding ACS during the COVID-19 outbreak.

In the current issue of European Heart Journal, Indolfi et al. published a multicentre observational survey from Italy examining consecutive patients admitted with acute myocardial infarction (AMI) during the week of 12–19 March 2020 at the height of the COVID-19 outbreak in Italy, compared with the same time period in 2019.\(^3\) A total of 319 AMIs were recorded during the 1-week period in 2020, compared with 618 in the previous year, corresponding to a 48.4% reduction. There was a 26.5% reduction in STEMI admissions and a 65.4% reduction in NSTEMI admissions. There was a disproportionately greater decrease in STEMI reductions for women, 41.2%, than for men, 25.4%. The STEMI case fatality rate increased to 13.7% from 4.1% in 2019. The rate of major complications (cardiogenic shock, life-threatening arrhythmias, cardiac rupture/ventricular septal defect, and severe functional mitral regurgitation) also increased to 18.8% from 10.4% the previous year. A total of 10.7% of all STEMI patients during this time period were COVID-19 positive, with a significantly higher case fatality rate of 28.6%. The pandemic also caused significant disruptions in workflow, with a 39.2% increase in time from symptom onset to coronary angiography, and the time from first medical contact to coronary revascularization was increased by 31.5%.

The decline in admissions was not just concentrated in the Lombardy epicentre and also did not just pertain to AMIs. The reduction in AMI admissions was seen proportionately across northern, central, and southern Italy. Hospitalizations for heart failure also decreased by 46.8%, along with a 53.4, 63.2, and 29.4% reduction in admissions for atrial fibrillation, pulmonary embolism, and implantable device failure, respectively. Reductions in ACS admissions in Italy were also seen in a separate retrospective analysis examining 15 hospitals in Northern Italy.\(^3\) The group found a statistically significant difference in the rate of ACS admissions per day, with 13.3 admissions during the COVID-19 period (20 February–31 March 2020), compared with 18.9 during the same period in 2019.

A similar reduction in STEMI was observed in a single-centre study from Hong Kong.\(^4\) Seven consecutive patients requiring percutaneous coronary intervention (PCI) for STEMI were compared with two cohorts of patients from the previous year, comprising 108 patients. The seven enrolled patients did not suffer from COVID-19 infection. The study found numerically longer median times in all components examined when compared with historical data from the previous year. There was a significant difference in the time from symptom onset to first medical contact; 318 min during the pandemic period compared with 82.5 and 91.5 min in the previous year’s cohorts. It is also difficult to ascertain the number of patients experiencing ACS who deferred seeking care. There was a notable difference in catheterization lab arrival time to balloon deployment, 33 min compared with 20.5 and 24 min. This could conceivably be a result of the increased time spent on properly donning personal protective equipment.
In another study from Spain, a telematic survey of 81 centres involved within a STEMI network equipped with cardiac catheterization labs showed a dramatic decline in procedural volumes during a 10-day period during the peak of the COVID-19 pandemic. Data obtained from 71 centres over a 7-day period before the start of the pandemic and during the pandemic revealed a 57% decline in diagnostic procedures, a 48% decline in PCI, a 81% decline in structural procedures, and a 40% decline in the use of PCI for STEMI. While it is easy to explain the drop in elective cases such as structural heart procedures and diagnostic catheterizations, it is puzzling to see such a significant drop in STEMI volume. Furthermore, 17 of 339 (5%) professionals tested positive for COVID-19 infection, 10 (3%) required close contact isolation, and 27 (8%) left interventional cardiology to care for patients with COVID-19. This study highlights the significant change in the volume of healthcare activity, notably a 40% reduction in the case of STEMI treated with PCI. Four centres reported increased use of thrombolitics in cases of suspected or confirmed COVID-19.

In the USA, an early analysis from nine high-volume (>100 PCIs per year) was conducted to determine if a decrease in PCI was occurring in the USA during the pandemic, while providing a broad representation of the US population. A mixed model analysing data comparing before COVID-19 time (1 January 2019 to 29 February 2020) with after COVID-19 (1–31 March 2020) displayed a 38% reduction in STEMI activations. There was a mean of 23.6 STEMI activations/month in the before-COVID-19 period and 15.3 activations/month in the after-COVID-19 period. The 38% reduction is like the 40% reduction seen in the early Spanish data. The authors stated that it was conceivable to have expected a rise in STEMI activations because of heightened psychosocial stressors or STEMI induced by viral illness. The decline could again be from patients avoiding medical care because of social distancing or concerns of contracting COVID-19 in healthcare settings, as well as increased use of thrombolytic reperfusion.

Beside the published literature, the decrease in STEMI volume has been one of the major topics that interventional cardiologists have been discussing on different social media platforms, particularly Twitter. This is not a new phenomenon since social media is a popular medium for communication among healthcare clinicians. Many cardiovascular journals and professional societies are increasingly using social media to share health information, clinical questions, scientific papers, and education to a worldwide audience with great efficiency. Since the coronavirus pandemic began, educational conferences and scientific meetings have been cancelled or postponed across the country. The role of social media in dissemination of minute to minute vital information and education of clinicians has taken centre stage.

In the last few weeks, voices within the interventional cardiology community have echoed a decrease in volume of patients presenting with STEMI. We used a Twitter poll to ask what percentage decrease in ACS clinicians have noticed in their institution since the coronavirus pandemic began. To our surprise, we received 549 replies in 2 days, with 47.7% responders reporting a 50% decrease, followed by 35.5% reporting a >50% decrease, and 16.8% reported a 25% decrease (Figure 1).

The reasons for the decline remain unknown; however, there are a multitude of hypothesis-generating ideas. Some suggest that patients are staying at home and are attempting to treat their symptoms themselves until the restrictions are lifted. Others suggest that staying at home and social distancing may be resulting in low levels of exertional activity that would not trigger cardiac symptoms. Indolfi et al. referred to this as a potentially true reduction in acute cardiovascular events secondary to low physical stress and a high prevalence of resting state during the quarantine. There is also the idea of patients not presenting to the hospital at all when they experience chest pain or presenting late due to the fear of catching the virus while staying in hospital. Patients could also possibly not present because of impaired manifestations of cardiac pain, due to to the neurotropic and neuroinvasive effects related to coronaviruses. Following nasal infection, coronaviruses can enter the central nervous system (CNS) via retrograde movement along the olfactory bulb, causing inflammation and demyelination. Moreover, due to the impact of COVID-19 on the economy, many have lost health benefits, which creates another barrier for seeking medical attention. There is also some degree of misinformation and a lack of consensus at the national and international level around the world. Media coverage has also shifted focus from chronic diseases to coronavirus (Figure 2). If any of these theories are true, we should expect to see a surge in the late mechanical and arrhythmic complications of myocardial infarction.

Thus far, we have small studies, surveys, social media polls, and expert opinions that show some consistency and agreement on an emerging pattern noticed worldwide now. Patients with ACS during the COVID-19 pandemic appear to be taking longer to present to the hospital after onset of chest pain, and the overall ACS volume has decreased. There is great curiosity and interest, along with a deluge of ideas theorizing the underlying reasons for the decrease during the pandemic. The Society for Cardiovascular Angiography and Interventions (SCAI) and the Canadian Association of Interventional Cardiology (CAIC) are collaborating to form the North American COVID-19 ST-Segment Elevation Myocardial Infarction (NACMI) Registry. The registry will collect data on COVID-19-positive patients or persons under investigation for COVID-19 with STEMI. Data from this registry will help answer some of these questions. We look
forward to further studies with more data that test some of the suggested hypotheses.

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