An Interview With an Italian Intensivist on the COVID Experience in Italy

Apr 07, 2020 | George W. Vetrovec, MD, MACC ; Federico Pappalardo, MD

Expert Analysis

Editor's Note: *The current COVID-19 crisis has a huge human impact. Clearly cardiovascular issues have a central role in management and, unfortunately, in adverse outcomes. We are continually struggling to understand risks and management strategies. One area that has had little discussion is that of hemodynamic support in the setting of cardiovascular collapse in association with this novel coronavirus infection. I had the unique opportunity to interview Dr. Federico Pappalardo, who is currently Associate Professor at Università Vita-Salute San Raffaele in Milan. I am grateful to Professor Pappalardo for his time.*

Dr. Vetrovec: I know the coronavirus pandemic has presented an incredible task for you and all the Italian physicians. A number of publications[1,2] have come out, but we are still in a fact-finding time and continually re-analyzing as new data appear. First-hand observations remain very helpful, so I really appreciate you taking time to briefly give your perspective on the cardiac aspects of the COVID-19 illness. First, how frequently have patients demonstrated cardiac symptoms, and what are the symptoms like? I have heard that primary respiratory failure is the predominant finding with associated fever, cough, and other "flu-like" symptoms.[3] Is this true? Or do you have a different perspective?

Dr. Pappalardo: There is accumulating evidence about cardiovascular involvement during COVID-19, though respiratory symptoms are the most common phenotype of this population. We have to acknowledge, however, that as clinicians and

researchers, we are changing our approach. We lack consistent data on COVID-19 and its clinical spectrum and necessarily rely on case series, anecdotes, and social media communication. This is enormously valuable because the virus is moving fast, and we have to move fast with our knowledge, but we are very much looking forward validated prospective data. To come back to your question, it seems that cardiac involvement has a wide spectrum of presentation mostly later in the course of the disease.

Dr. Vetrovec: I have also heard that there have been very few recognized heart attacks associated with the disease,[4] both in other countries and in the United States. Is this true? Does this represent a peculiarly low event rate, or does it reflect patient concerns about coming to the hospital and being exposed to the virus? I know Hong Kong has reported a significant delay in symptom onset to hospital arrival time. Any observations from your experience in Italy?

Dr. Pappalardo: There is a widespread fear to access the hospital, and that can probably explain the delayed presentation. On top of that, the emergency medical service ambulances are suffering significant delays in their operations because their call centers are overwhelmed by the population seeking advice. The ambulance personnel are also handling secondary transportation because patients need to be allocated where a bed is available. Having said that, I am worried that door-to-balloon time is significantly delayed due to the pandemic and might account for a higher rate of morbidity and mortality in ST-segment elevation myocardial infarction.

Dr. Vetrovec: The biomarker troponin can be elevated—commonly, in some reports—but without evidence of specific heart attack or even a documented cardiomyopathy. Conversely, a very high level of troponin correlates with high mortality risk and significant elevations in other biomarkers such as C-reactive protein. What are your observations in Italy?

Dr. Pappalardo: The important thing is to identify cardiac damage because this is not common practice in the general intensive care unit and in infectious disease units to have this sensitivity. Hopefully, cardiovascular specialists will be actively involved in the care of patients with COVID-19. The most common signal for

myocardial damage is the release of cardiac troponins, which can be multifactorial, of course. However, I would suggest making clinicians aware of the potential for plaque rupture, myocarditis, and deterioration of preexisting heart disease as phenomena that can be triggered by COVID-19 and deserve specific treatment. Monitoring cardiac side effects of current pharmacological therapies is also paramount.

Dr. Vetrovec: Have you seen patients with a viral cardiomyopathy likely secondary to the coronavirus? If so, how did it present, and how was the diagnosis made? Are support devices such as intra-aortic balloon pump, extracorporeal membrane oxygenation (ECMO), or Impella (Abiomed; Danvers, MA) being used? Are there barriers to use?

Dr. Pappalardo: The allocation of resources is a critical issue in the setting of pandemic. However, we are facing a significant number of patients in their 30s, 40s, and 50s, which poses an ethical challenge on rationing of resources. Mechanical circulatory support (MCS) can provide a bridge to heart recovery because these therapies are usually reversible and therefore have the potential to save a lot of lives. I would consider the pathophysiological and hemodynamic picture that is driving acute heart failure and cardiogenic shock in order to tailor the strategy to each patient's need. Moreover, I would be proactive in implantation because, due the infectious risk containment, the procedure would be very complex in an *in extremis* scenario.

The key factor is to assess the need for an artificial lung on top of circulatory support; in this case, it is imperative to be aware of the risks associated with venoarterial ECMO and pulmonary edema and the need to consider either an ECpella strategy or a veno-venoarterial ECMO configuration. The latter, however, is more resource demanding because it requires continuous attendance by a perfusionist to check for adequate flows through the two reinfusion ports of the extracorporeal circuit.[5]

If myocarditis is diagnosed, left ventricular support with Impella adds to the benefit of the increase of systemic perfusion, the unloading of the left ventricle, which can interrupt the mechanotransduction signals, maintaining inflammation at

the myocardial level. In 2015, we published our experience with fluoroless bedside Impella implantation with echocardiographic monitoring,[6] which would be very attractive in this pandemic phase to reduce the burden on hospital resources and guarantee timely access to MCS.

Dr. Vetrovec: To follow up, I recognize there is limited experience, but can you expand with your specific thoughts on optimal patient and device selection? Given significant pulmonary and cardiac complications in some patients, what are the interactions between pulmonary issues and left heart failure?

Dr. Pappalardo: Combined use of devices is necessary if there is need for artificial gas exchange. I would like to point out again the potential to combine veno-venous ECMO and left-sided Impella; this has been reported in a COVID-19 patient with decompensated chronic cardiomyopathy and acute interstitial pneumonia.

Lastly, I recognize that standard monitoring with the pulmonary artery catheter cannot be routinely implemented in this scenario, and a high level of suspicion should prompt echocardiography. These patients are usually on some norepinephrine as a result of sedation, systemic inflammatory response syndrome, and pronation, and any deterioration of left ventricular ejection fraction <35% with hypotension should warrant consideration for MCS.

Dr. Vetrovec: Finally, what are your overall insights? What other observations have you and your Italian colleagues made? Perhaps a comment on self-protection, which has been discussed in the literature and among medical professionals.[7] What else should we know?

Dr. Pappalardo: I think we have a lot to learn from this unprecedented experience and push for resources for healthcare that might allow for working in a safer environment and living in a healthier world for everyone.

Dr. Vetrovec: Thanks so much. I really appreciate your time and insights. Please know we are all in this together and that we respect all you and your colleagues have done and continue to do.

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Clinical Topics: **Heart Failure and Cardiomyopathies, Invasive Cardiovascular Angiography and Intervention, Noninvasive Imaging, Acute Heart Failure, Heart Failure and Cardiac Biomarkers, Interventions and Imaging, Angiography, Nuclear Imaging**

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