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EDITORIAL COMMENT

The Known Into the Unknown

Brugada Syndrome and COVID-19*

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The coronavirus disease-2019 (COVID-19) outbreak has been recently declared a pandemic by the World Health Organization (1). The health care organizations of numerous countries around the world are currently stretched to offer the best care to the patients who contract COVID-19, and they are fighting at the same time with the dearth of both resources and knowledge. The amount of scientific data that have been collected from the spread of the infection, particularly in the last month, on the pathophysiology and on possible medical treatments of this frequently lethal viral infection is remarkable, but these data are still insufficient to declare victory against the virus. This is the reason that all major scientific journals, including *JACC: Case Reports*, have quickly opened dedicated sessions to the research and investigations into this very hot topic.

We therefore must thank all the authors who have found the time in this difficult moment to sit in front of a computer and share their experiences on COVID-19, on top of their undoubtedly demanding clinical duties. In line with this, we congratulate Prof. Vidovich (2) for the recently published paper in *JACC: Case Reports* on a case of Brugada syndrome (BS) associated with COVID-19 (2)—the known into the unknown, precisely.

COVID-19 manifests mainly as a respiratory syndrome that includes pneumonia and, in the worst case scenario, acute respiratory distress syndrome (3). We have also learned that, in a not negligible number of cases, the virus can provoke myocardial ischemia and/or inflammation, with or without an associated respiratory syndrome (4). There are already numerous cases of COVID-19 manifesting as ST-segment elevation myocardial infarction that have triggered activation of primary percutaneous coronary intervention protocols. The cause of this ST-segment elevation is unknown: it has been linked to traditional plaque rupture in those patients who have required coronary angioplasty, but it has been suggested that myocarditis or microvascular thrombosis could be the cause when no obvious thrombus or coronary flow interruption is detected. If all this were not sufficient, here comes Brugada type I pattern, interfering with and complicating the lives of interventional cardiologists. Indeed, in the case reported by Vidovich (2), the patient presented with shortness of breath, substernal chest pain, and fever. The electrocardiogram showed a Brugada type I pattern in the right precordial leads with no reciprocal changes; the presence of chest pain, shortness of breath, and reduction of systolic left ventricular function, assessed with a 2-dimensional echocardiogram, led to urgent coronary angiography, which excluded an ongoing acute coronary syndrome. No significant electrolyte imbalance was found. Vidovich's (2) conclusion was that the Brugada type I pattern, completely unknown to the patient until this admission, was unmasked by the COVID-19 viral infection and the ongoing fever. Confirming that when it rains it pours, the patient also experienced an episode of supraventricular tachycardia, which is also another clinical feature of BS and confirmed the final diagnosis.

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A link between fever and a Brugada type I pattern is very well known and has been described extensively (5–7). In fact, the international guidelines on sudden cardiac death recommend lowering body temperature as soon as possible in those patients with an established diagnosis of BS, as well as in carriers of the mutations with a proved inducible Brugada type I pattern (8). The increase in body temperature has indeed been proven to cause a higher degree of inactivation of sodium channels, both mutated and wild ones: in the subjects who are genetically predisposed, this reduced sodium flow can result in a dangerous transmural heterogeneity that is the basis for phase 2 re-entry ventricular arrhythmias and sudden death (9,10). It would also be of interest understand whether the virus itself could interact directly with the myocardial ion channels and provoke the electrocardiographic modification typical of BS.

The take-home message is therefore that patients with BS and concomitant COVID-19 infection should be monitored in the intensive care unit or in the telemetry ward until the fever is resolved, regardless of their respiratory conditions. Further research will be needed to help clinicians to navigate this uncharted sea.

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