# Mysterious Heart Damage Befalling COVID-19 Patients

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April 14, 2020 By Markian Hawryluk

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While the focus of the COVID-19 pandemic has been on respiratory problems and securing enough ventilators, doctors on the front lines are grappling with a new medical mystery.

In addition to lung damage, many COVID-19 patients are also developing heart problems — and dying of cardiac arrest.

As more data comes in from China and Italy, as well as Washington state and New York, more cardiac experts are coming to believe the COVID-19 virus can infect the heart muscle. An initial study found cardiac damage in as many as 1 in 5 patients, leading to heart failure and death even among those who show no signs of respiratory distress.

That could change the way doctors and hospitals need to think about patients, particularly in the early stages of illness. It also could open up a second front in the battle against the COVID-19 pandemic, with a need for new precautions in people with preexisting heart problems, new demands for equipment and, ultimately, new treatment plans for damaged hearts among those who survive.

“It’s extremely important to answer the question: Is their heart being affected by the virus and can we do something about it?” said Ulrich Jorde, MD, the head of heart failure, cardiac transplantation and mechanical circulatory support for the Montefiore Health System in New York City. “This may save many lives in the end.”

## Virus Or Illness?

The question of whether the emerging heart problems are caused by the virus itself or are a byproduct of the body’s reaction to it has become one of the critical unknowns facing doctors as they race to understand the novel illness. Determining how the virus affects the heart is difficult, in part, because severe illness alone can influence heart health.

“Someone who’s dying from a bad pneumonia will ultimately die because the heart stops,” said Robert Bonow, MD, a professor of cardiology at the Northwestern University Feinberg School of Medicine and editor of the medical journal JAMA Cardiology. “You can’t get enough oxygen into

your system and things go haywire."

But Bonow and many other cardiac specialists believe a COVID-19 infection could lead to damage to the heart in four or five ways. Some patients, they say, might be affected by more than one of those pathways at once.

Doctors have long known that any serious medical event, even something as straightforward as hip surgery, can create enough stress to damage the heart. Moreover, a condition like pneumonia can cause widespread inflammation in the body. That, in turn, can lead to plaque in arteries becoming unstable, causing heart attacks. Inflammation can also cause a condition known as myocarditis, which can lead to the weakening of the heart muscle and, ultimately, heart failure.

But Bonow said the damage observed in COVID-19 patients could be from the virus directly infecting the heart muscle. Initial research suggests the coronavirus attaches to certain receptors in the lungs, and those same receptors are found in heart muscle as well.

## Initial Data From China

In March, doctors from China published two studies that gave the first glimpse at how prevalent cardiac problems were among patients with COVID-19 illness. The larger of the two studies looked at 416 hospitalized patients. The researchers found that 19% showed signs of heart damage. And those who did were significantly more likely to die: 51% of those with heart damage died versus 4.5% who did not have it.

Patients who had heart disease before their coronavirus infections were much more likely to show heart damage afterward. But some patients with no previous heart disease also showed signs of cardiac damage. In fact, patients with no preexisting heart conditions who incurred heart damage during their infection were more likely to die than patients with previous heart disease but no COVID-19-induced cardiac damage.

It's unclear why some patients experience more cardiac effects than others. Bonow said that could be due to a genetic predisposition or it could be because they're exposed to higher viral loads.

Those uncertainties underscore the need for closer monitoring of cardiac markers in COVID-19 patients, Jorde said. If doctors in New York, Washington state and other hot spots can start to tease out how the virus is affecting the heart, they may be able to provide a risk score or other guidance to help clinicians manage COVID-19 patients in other parts of the country.

"We have to assume, maybe, that the virus affects the heart directly," Jorde said. "But it's essential to find out."

## Facing Obstacles

Gathering the data to do so amid the crisis, however, can be difficult. Ideally, doctors would take biopsies of the heart to determine whether the heart muscle is infected with the virus.

But COVID-19 patients are often so sick it's difficult for them to undergo invasive procedures. And more testing could expose additional health care workers to the virus. Many hospitals aren't using electrocardiograms on patients in isolation to avoid bringing additional staff into the room and using up limited masks or other protective equipment.

Still, Sahil Parikh, MD, an interventional cardiologist at Columbia University Irving Medical Center in New York City, said hospitals are making a concerted effort to order the tests needed and to enter findings in medical records so they can sort out what's going on with the heart.

"We all recognize that because we're at the leading edge, for better or for worse, we need to try to compile information and use it to help advance the field," he said.

Indeed, despite the surge in patients, doctors continue to gather data, compile trends and publish their findings in near real time. Parikh and several colleagues recently penned a compilation of what's known about cardiac complications of COVID-19, making the article available online immediately and adding new findings before the article comes out in print.

Cardiologists in New York, New Jersey and Connecticut are sharing the latest COVID-19 information through a WhatsApp group that has at least 150 members. And even as New York hospitals are operating under crisis conditions, doctors are testing new drugs and treatments in clinical trials to ensure that what they have learned about the coronavirus can be shared elsewhere with scientific validity.

That work has already resulted in changes in the way hospitals deal with the cardiac implications of COVID-19. Doctors have found that the infection can mimic a heart attack. They have taken patients to the cardiac catheterization lab to clear a suspected blockage, only to find the patient wasn't really experiencing a heart attack but had COVID-19.

For years, hospitals have rushed suspected heart attack patients directly to the catheterization lab, bypassing the emergency room, in an effort to shorten the time from when the patient enters the door to when doctors can clear the blockage with a balloon. Door-to-balloon time had become an important measure of how well hospitals treat heart attacks.

"We're taking a step back from that now and thinking about having patients brought to the emergency department so they can get evaluated briefly, so that we could determine: Is this somebody who's really at high risk for COVID-19?" Parikh said. "And is this manifestation that we're calling a heart attack really a heart attack?"

New protocols now include bringing in a cardiologist and getting an EKG or an ultrasound to confirm a blockage.

"We're doing that in large measure to protect the patient from what would be an otherwise unnecessary procedure," Parikh said, "But also to help us decide which sort of level of personal protective equipment we would employ in the cath lab."

Sorting out how the virus affects the heart should help doctors determine which therapies to pursue to keep patients alive.

Jorde said that after COVID-19 patients recover, they could have long-term effects from such heart damage. But, he said, treatments exist for various forms of heart damage that should be effective once the viral infection has cleared.

Still, that could require another wave of widespread health care demands after the pandemic has calmed.

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