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Diagnostic Dilemma

# Torsades de Pointes in Coronavirus Disease 2019 Infection

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A 73-YEAR-OLD MAN (weight 69 kg, height 175 cm) was transferred to the authors' critical care unit with respiratory and acute renal failure secondary to coronavirus disease 2019 (COVID-19) infection. His past medical history included hypertension, diabetes, and previous stroke, from which he had made a full recovery. The patient was treated with mechanical ventilation and peritoneal dialysis. He was recruited into the hydroxychloroquine arm of the RECOVERY (Randomised Evaluation of COVID-19 Therapy) trial. Baseline electrocardiogram (ECG) and subsequent ECG monitoring were normal and did not demonstrate any QT prolongation. Three days later, the patient developed a ventricular tachycardia with a circulatory collapse. Immediate cardiopulmonary resuscitation was initiated and defibrillator pads attached; however, the arrhythmia self-terminated within 2 minutes (Fig 1). After resuscitation, another ECG showed a normal QT interval. Arterial blood gas analysis did not show any signs of respiratory insufficiency or an acid-base disturbance. There were no signs of myocardial ischemia. A full panel of blood tests was performed, which did not demonstrate any relevant abnormalities in full blood count, biochemical studies, or coagulation. Hypomagnesemia and hypokalemia were absent. Echocardiography was normal. What is the diagnosis?

Diagnosis: Torsades de pointes ventricular tachycardia presumably resulting from hydroxychloroquine therapy.

Review of the telemetry data demonstrated a polymorphic ventricular tachycardia in the pattern of torsades de pointes, with a spontaneous onset and termination. A cardiac electrophysiology review was requested and confirmed the diagnosis of torsades de pointes. Review of ECGs, blood test results, and medication history allowed the authors to conclude that the arrhythmia had most likely been caused by hydroxychloroquine. Recommendations were made for stringent monitoring of serum electrolytes (to prevent hypomagnesemia and hypokalemia) and daily ECGs. No further antiarrhythmic therapy was recommended at this stage. Hydroxychloroquine was discontinued, and the patient's participation in the RECOVERY trial was terminated. No further arrhythmias were reported during the patent's stay. An adverse drug reaction report was submitted to the UK Medicines and Healthcare products Regulatory Agency (UK MHRA) to register the hydroxychloroquine-related life-threatening arrhythmia.

In early 2020 during the COVID-19 pandemic, a number of studies reported possible therapeutic effects of hydroxychloroquine, and it was therefore included as 1 of the drugs in the platform UK RECOVERY trial.[1] However, preliminary data showed no benefit in hospitalized patients with COVID-19, which led to the UK MHRA instruction to stop recruitment into trials using hydroxychloroquine to treat patients with COVID-19.[2]

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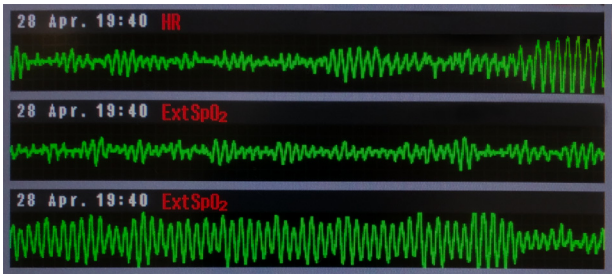


Fig 1. Telemetry data demonstrating onset and resolution of torsades de pointes. Duration of a single electrocardiogram strip is 15 seconds.

Hydroxychloroquine was introduced in 1955 as an antimalarial drug. It has immunomodulatory properties that include inhibition of chemotaxis and phagocytosis, reduction of cytokine synthesis, inhibition of phospholipase A2, and signaling in lymphocytes.[3,4] Hydroxychloroquine has a large spectrum of side effects including cardiomyopathy and arrhythmias associated with the prolongation of the QT interval.[3] Between 1964 and 2020, the UK MHRA registered 916 patients with adverse drug reactions, of whom 679 were classified as serious and 15 as fatal. The most commonly reported adverse drug reactions involved skin (454 cases) and the nervous system, including eye (285) and gastrointestinal tract (165). Cardiac adverse drug reactions were reported in 48 patients and included myocardial and/or pericardial disorders, arrhythmias, and heart failure.[5] Cardiac arrhythmias were reported in 18 patients.

Anesthesiologists should continue to be aware of the importance of a comprehensive drug history and are reminded of potential life-threatening arrhythmias when hydroxychloroquine is used.

## Conflict of Interest

We declare that we have no known competing interests or relationships that could have influenced the work reported in this paper.

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