



# Autoimmune thrombotic thrombocytopenic purpura (TTP) associated with COVID-19

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Dear Editor:

A 57-year-old woman with a history of hypertension and breast cancer in complete remission was seen in late-March 2020 at the emergency ward in a private clinic with dry cough, anosmia, and dysgeusia. Physical examination found a low grade fever (37.8 °C) but was otherwise normal. A thoracic computerized tomography was normal, and a single nasopharyngeal swab (NPS) was reported as negative for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by a polymerase chain reaction (PCR)-based test. A complete blood work-up was normal except for mild lymphopenia (Day 1 on Table 1).

Because of the pandemic state of SARS-CoV-2 and associated symptoms [1], the treating physicians considered the patient to have coronavirus disease 2019 (COVID-19) but with a false-negative result of the PCR NPS test. The patient was treated with lopinavir/ritonavir, hydroxychloroquine, and azithromycin. On the fifth day of treatment (Day 6 on Table 1) routine blood tests showed severe thrombocytopenia, moderate anemia with a normal reticulocyte count, and high serum lactate dehydrogenase (LDH) and bilirubin (Table 1). Treatment with methylprednisolone 1 mg/kg/24 h and intravenous immunoglobulin was added, but after no improvement in laboratory findings (Day 8 on Table 1), the patient was transferred to our institution for further management.

After initial clinical and laboratory work-up at our institution (Day 9 on Table 1), a diagnosis of autoimmune thrombotic thrombocytopenic purpura (TTP) was rapidly established, based on the presence of microangiopathic hemolytic anemia, severe thrombocytopenia, and very low activity (2%) of ADAMTS-13 (a disintegrin and metalloproteinase

with a thrombospondin type 1 motif, member 13) in combination with the presence of an ADAMTS-13 inhibitor, which is an autoantibody to ADAMTS-13 [2, 3].

A NPS sample was retested in our center on admission and was negative for SARS-CoV-2, but serological tests were positive for SARS-CoV-2 IgG, thus confirming the past COVID-19 [4].

Treatment with plasma infusion on admission led to a rapid rise in the patient's platelet count (Day 10 on Table 1). After placement of a central venous catheter, therapeutic plasma exchange was begun, with a favorable clinical and laboratory course over the next week (Day 17 on Table 1).

We present a case of acquired autoimmune TTP whose onset occurred immediately after COVID-19, since the patient was admitted for this latter infection with normal laboratory values.

Of course, this could be a mere coincidence rather than a causal relationship, owing to the very high incidence of SARS-CoV-2 infection [5].

As with other hematological disorders, the COVID-19 pandemic may change the way in which the approach to and management of patients may vary from the standard of care, as highlighted by the American Society of Hematology COVID-19 Resources Center (specific information on TTP can be found at <https://www.hematology.org/covid-19/covid-19-and-ttp>).

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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**Table 1** Evolution of laboratory findings from the day of onset until end of plasma exchange therapy

Laboratory test	Day 1	Day 6	Day 8	Day 9 (before plasma infusion)	Day 10 (after plasma infusion)	Day 17 (after 7 days of plasma exchange)
Hb (g/L) (NV 120–150)	130	99	83	69	64	97
Platelets ( $\times 10^9/L$ ) (NV 140–350)	191	22	23	13	86	220
Leukocyte count ( $\times 10^9/L$ ) (NV 3.80–11.00)	4.78	5.31	17.40	20.33	12.35	9.03
Lymphocyte count ( $\times 10^9/L$ (%)) (NV 1.00–4.00)	0.57 (12)	1.61 (30.3)	1.04 (6)	3.05 (15)	2.45 (19.8)	2.17 (24)
Reticulocyte count ( $\times 10^9/L$ (%)) (NV 20–100 (0.5–2))	-	-	69 (-)	69.8 (3.05)	155.4 (7.73)	130.9 (4.35)
Schistocyte count (%) (NV < 0.5)	-	-	-	6	10	-
Creatinine (mg/L) (NV 0.6–1.2)	0.80	0.80	0.68	0.72	0.68	0.61
LDH (U/L) (NV 125–243)	267	1451	2315	1594	950	218
Indirect bilirubin (mg/dL) (NV 0.3–1.0)	-	1.95	1.46	0.86	-	-
CRP (mg/L) (NV < 5.0)	43	39.80	11.60	5.8	6.6	< 1.0
ADAMTS-13 (%) (NV > 70%)	-	-	-	2	1.91	89
ADAMTS-13 inhibitor (NV negative or < 0.4 Bethesda units)	-	-	-	Positive (5.2 Bethesda units)	-	Positive (2.5 Bethesda units)

- refers to non-available tests

NV normal values, CRP C-reactive protein

**Consent for publication** Consent for publication was obtained from all of the authors.

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