Venerable but Vulnerable: When Centenarians Encounter Coronavirus Disease 2019

To the Editor—The current pandemic of coronavirus disease 2019 (COVID-19) has reminded us of the extent of human exposure to infectious disease. Older age is one of the main causes of death in patients with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1, 2]. Centenarians, who overcame the 1918 flu pandemic, world wars, and communicable diseases such as polio or smallpox during the 20th century, are now facing a new health challenge. Although they are generally vulnerable, some centenarians seem to have a better prognosis than younger people against COVID-19.

In this study, we report the baseline characteristics and outcomes of COVID-19 centenarians included in the NOSO-COR Project (0.4% of 1380 patients) [3] or in the NOSO-COR 2 Project (0.4% of 785 patients) (no. CNIL 21 5255) and hospitalized in Lyon University hospitals (France) (Table 1).

In total, 9 centenarians, 7 females and 2 males, with a laboratory-confirmed COVID-19 diagnosis were hospitalized. All patients presented at least 1 comorbidity: 7 had cardiovascular diseases (mainly high blood pressure); 4 had chronic neurological disorders; and 4 had rheumatic syndromes. Six presented mild symptoms, particularly fever lower than 39°C, moderate weakness, and cough. Only 1 patient had anosmia and ageusia. Of the 5 patients with a chest x-ray available, 4 presented lung lesions. High levels of C-reactive protein were observed in 7 cases. Neutrophil-to-lymphocyte ratio was increased in 3 patients. Except for an observed increase in renal markers, creatinine, and urea in 3 deceased centenarians, other hematologic and chemistry data were in the range of normal values. Of the 3 patients with elevated renal markers, 2 had no known renal comorbidities. Three patients underwent ventilation and required the use of a high concentration mask. Antibiotics were prescribed in 6 patients, whereas 1 patient received both antibiotics and antiviral drugs. Four patients died during their hospital stay, 1 (n = 1), 7 (n = 2), and 37 days (n = 1), respectively, after admission to COVID-19-dedicated hospital ward. These patients have presented digestive disorders, confusion, shortness of breath, and renal failure at admission.

The results of our study showed that clinical features of COVID-19 in very old patients were very heterogeneous ranging from asymptomatic to severe disease with rapid disease progression and death. Similar atypical presentation was also reported for influenza and other respiratory viral infections [4]. The large majority of centenarians were female (77.8%). A longer life span in women than in men may partly explain the observed results. For example, in France, women represented 82% of centenarians in 2017 [5]. Furthermore, elderly women are known to be less affected by life-threatening diseases than their male counterparts [6]. In addition, higher COVID-19-related mortality rates were reported in males [2].

In summary, we observed that centenarians could recover from a SARS-CoV-2 infection. High SARS-CoV-2 antibody titers have been suggested to be associated with convalescence and recovery [7] and could explain the survival in some of our patients. More studies investigating other potential predictors of outcome (ie, nutrition, comorbidities) in this frail population are warranted.

Finally, no centenarian was transferred to intensive care units (ICUs) in our study. As reported in our previous publication [8], rapid management, thanks to earlier presentation at hospital, and/or shortage of intensive care resources in the context of a pandemic could impact the decisions about ICU admission in this population.

Considering the potential increase in the number of centenarians in the future, lessons learned from the COVID-19 pandemic should be kept in mind for better management of this population in case of a new emerging infectious disease.

PATIENT CONSENT

Patients had been informed of the objectives and their rights to refuse to participate in the study or withdraw at any time using simple, understandable terms. The data in this study come from data collected in the context of medical care. Therefore, in accordance with the French law, General Data Protection Regulation (RGPD), this study does not fall within the scope of research involving the human person and therefore does not require written consent from the patients included. For the NOSO-COR study, ethical approval was obtained from the clinical research and committee of Île de France V on March 8, 2020. The registration number on ClinicalTrial.gov is NCT04290780. Ethical approval was obtained for NOSO-COR 2 from the committee of Hospices Civils de Lyon on December 31, 2020 and has been registered with the Commission Nationale de l’Informatique et Libertés (CNIL) under number 21_5255.

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Table 1. Demographic, Clinical, and Laboratory Features in Nine Centenarians With COVID-19 Hospitalized at Lyon University Hospitals, 2020

| Characteristics                                      | Normal Values | Patient No. 1 | Patient No. 2 | Patient No. 3 | Patient No. 4 | Patient No. 5 | Patient No. 6 | Patient No. 7 | Patient No. 8 | Patient No. 9 |
|------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Age in years                                         | 100           | 101           | 100           | 102           | 100           | 101           | 100           | 100           | 100           | 100           |
| Sex                                                  | Female        | Female        | Female        | Female        | Female        | Male          | Male          | Male          | Female        | Female        |
| Body mass index (kg/m²)                              | 19.9          | 16.6          | 30.4          | 26.4          | 26.3          | 31.6          | 25.2          | NK            | 14.3          |
| Underlying conditions and comorbidities at admission |               |               |               |               |               |               |               |               |               |               |
| Chronic neurological disease, Rheumatic disease       |               |               |               |               |               |               |               |               |               |               |
| Chronic neurological disease, Hypothyroidism          |               |               |               |               |               |               |               |               |               |               |
| High blood pressure, Obesity                         |               |               |               |               |               |               |               |               |               |               |
| High blood pressure, Hypothyroidism diabetes         |               |               |               |               |               |               |               |               |               |               |
| Chronic neurological disease, High blood pressure, Rheumatic disease |               |               |               |               |               |               |               |               |               |               |
| Cardiac rhythm disorder, Chronic pulmonary disease   |               |               |               |               |               |               |               |               |               |               |
| High blood pressure, Obesity, Rheumatic disease      |               |               |               |               |               |               |               |               |               |               |
| Renal disease, Chronic pulmonary disease, Urinary infection |               |               |               |               |               |               |               |               |               |               |
| Temperature at admission (°C)                         | 38.6          | 36.8          | 36.7          | 38.1          | 38.4          | 37.0          | 38.2          | 37.4          | 37/4          | 36.2          |
| Symptoms<sup>a</sup>                                 |               |               |               |               |               |               |               |               |               |               |
| Fever, Diarrhea, General weakness                    | None          | None          | None          | Fever, Cough, General weakness, Diarrhea, Nausea, Headache, Muscular pain | Fever, Cough, Confusion | Fever, Shortness of breath | Fever, Cough General weakness | Fever, Cough, Shortness of breath, Chills, General weakness, Ageusia, Anosmia, Anorexia, Cardiac symptoms | Fever, Cough, Shortness of breath, High blood pressure, General weakness, Renal failure | Fever, Cough, Shortness of breath, High blood pressure, General weakness, Renal failure | Fever, Cough, Shortness of breath, High blood pressure, General weakness, Renal failure |
| Lung x-ray                                           | Not performed | Not performed | Not performed | Abnormal      | Abnormal      | Abnormal      | Abnormal      | Abnormal      | Normal        | Normal        |
| COVID-19 acquisition (ECDC definition)<sup>b</sup>   | Hospital-acquired | NA            | Hospital-acquired | Community-acquired | Community-acquired | Community-acquired | Community-acquired | Community-acquired | Community-acquired | Community-acquired |
| Delay between hospital admission and symptoms<sup>c</sup> | 26            | NA            | 463<sup>d</sup> | 0            | 0            | –1           | 0            | –3           | –1            |
| Duration of symptoms in days                         | 24            | NA            | 29            | 7            | 1            | 11           | 35           | 9            | 4             |
| COVID-19-related clinical features during hospital stay | None          | None          | Dyspnoea, Abnormal lung auscultation, Pharyngeal exudate, Constipation | Abnormal lung auscultation | Dyspnoea, Abnormal lung auscultation, Secondary bacterial infection | Abnormal lung auscultation | Abnormal lung auscultation, Secondary bacterial infection | Abnormal lung auscultation, Secondary bacterial infection | Abnormal lung auscultation |
| Biological Parameters<sup>e</sup>                   |               |               |               |               |               |               |               |               |               |               |
| C reactive protein (mg/L)                            | <5            | 62.8          | 78            | 54.4          | 95.6          | 70.2          | 100.4         | 83.4          | 116           | 46            |
| Neutrophile-to-lymphocyte ratio                      | <6            | 24.8          | 2.5           | 3.4           | 9.4           | 13.5          | 3.6           | 4.8           | 5.2           | 6             |
| Treatments                                           |               |               |               |               |               |               |               |               |               |               |
| Antibiotics                                          | None          | NK            | Beta-lactamase inhibitor | Beta-lactamase inhibitor | Cephalosporin | None          | Cephalosporin, Quinolone | Penicillin, Quinolone | Other antibiotic |
| Antivirals                                           | None          | NK            | None          | None          | None          | None          | None          | None          | None          | None          |
| Outcome                                              | Recovered     | Recovered     | Deceased      | Deceased      | Deceased      | Recovered     | Recovered     | Deceased      | Recovered     |

Abbreviations: COVID-19, coronavirus disease 2019; ECDC, European Centre for Disease Prevention and Control; NA, not applicable; NK, not known.

<sup>a</sup>Symptom at admission for community-acquired COVID-19 patients, or at suspicion for hospital-acquired or indeterminate COVID-19 patients.

<sup>b</sup>Surveillance definitions for COVID-19; European Centre for Disease Prevention and Control (https://www.ecdc.europa.eu/en/covid-19/surveillance/surveillance-definitions).

<sup>c</sup>Negative value means that onset of symptoms occurred before hospital admission, and zero indicates that patients were hospitalized the day of onset of symptoms.

<sup>d</sup>Patient hospitalized in rehabilitation ward since 2018.

<sup>e</sup>Collected on the day of COVID-19 diagnosis.
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