

Suicide during COVID-19 infection – Case report and literature review

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ABSTRACT

The COVID-19 pandemic has a global effect on people's mental health. The SARS-CoV-2 infection is a new source of anxiety, depression, and psycho-emotional changes in people without morbid conditions, with even more important impact on patients with associated diseases. We present the case of a previously diagnosed patient with COVID-19, in which the psychological effects accumulated during hospitalization triggered an autolytic behaviour. The case presented by us and the review of the literature show that serious diseases are frequently associated with depression and emotional disorders, and SARS-CoV-2 infection is no exception

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Introduction

Coronavirus Disease 2019 (COVID-19) mainly affects the human body through acute respiratory failure syndrome [1]. The first case of SARS-CoV-2 infection was reported in December 2019 in Wuhan, China, and in March 2020 the World Health Organization announced COVID-19 outbreak as a pandemic [2]. A new stress factor among the global population has been triggered by the speed of virus spreading around the world and the number of reported deaths. A serious somatic illness can be associated with anxiety, depression, and behavioural disorders, but in the case of SARS-CoV-2 infection, are the underlying conditions similar or are there any differences in the mechanism of depression? Depression leads to symptoms related to the emotional domain such as sadness, misery, decreased attention, and desire, not enjoying activities and life that were previously liked; psychomotor symptoms such as slowing, fatigue, and agitation; suicidal ideation.

Case report

Clinical data

A 68-year-old male who developed dyspnea and general malaise during several days presented to the emergency room. SARS-CoV-2 infection was suspected, and nasopharyngeal and oropharyngeal swabs were sampled, with a subsequent positive RT-PCR test. The patient had the following comorbidities: grade II obesity, coronary artery atherosclerosis, type 2 diabetes, and he had no history of psychiatric pathology or of psychoactive substances prolonged use. During the first day of hospital stay, he was diagnosed with acute respiratory failure, with a rapidly unfavourable evolution and he

was transferred to the COVID-19 Intensive Care Unit, where he was admitted with SARS-CoV-2 severe acute respiratory failure and COVID-19 pneumonia with the following parameters: oxygen saturation 75%, Glasgow Coma Scale (GCS) score 11, pulse 82 beats per minute, blood pressure 100/60 mmHg. The bloodwork conducted to this patient was consistent with COVID-19 and his comorbidities modifications. Imaging investigations were performed and revealed low to medium intensity, inhomogeneous opacities of both lungs and accentuated hilar shadows. During hospitalization, the evolution was favourable under treatment, with remission of symptoms. The neuroimaging and paraclinical tests showed no modification that could explain the psychiatric symptoms. In the patient's medical chart, it was recorded that he presented daily episodes of psychomotor agitation, visual hallucinations, and anxiety, for which he received benzodiazepines. The patient has been discharged after 14 days of hospitalization, with partially remitted symptoms, but with persistent episodes of anxiety. The next day, the emotional factors triggered during hospitalization and the environmental conditions created by the post-COVID-19 period, brought the patient in a situation in which the only escape was suicide by hanging.

Autopsy findings

The external examination revealed a suprahyoidian ligature abrasion, with an oblique ascendant orientation, from left to right and from bottom to top of unequal depth, with a maximum width of 0.5 cm and a maximum depth of 0.4 cm at the left latero-cervical level, which became more superficial and was not detectable at the right occipital level, which was consistent with a complete, atypical hanging. Bruises arranged at the level of both upper limbs were also found, injuries probably produced during the convulsive stage of asphyxia when the body had hit the surrounding objects. Signs

of mechanical asphyxia, such as confluent corpuscular lividities of purple-dark colour and subcutaneous haemorrhagic patches, were also observed.

The internal examination revealed general signs of asphyxia, like subpleural haemorrhagic patches, pulmonary stasis and emphysema, liquid blood in all organs and vessels, but also interstitial pneumonia in the fibrotic phase which was consistent with COVID-19 pulmonary damage changes. Signs of comorbidity were also found: aortic and coronary atherosclerosis, diffuse myocardial fibrosis, micronodular liver cirrhosis, and renal stasis.

Microscopic findings

Samples from lungs, heart, brain, liver, and kidneys were obtained from autopsy, formalin-fixed, and embedded in paraffin. The microscopic examination of the lung tissue with hematoxylin-eosin stain (H&E) showed diffuse alveolar damage with interstitial and intra-alveolar fibroblastic proliferation, perivascular mild mononuclear inflammation, interstitial collagen deposition, denudation of the bronchiolar epithelium, intense vascular congestion. These findings are consistent with the subacute, proliferative phase of diffuse alveolar damage. The microscopic examination of the liver showed moderate micronodular cirrhosis, with foci of macrovesicular steatosis. The myocardial tissue showed mild interstitial fibrosis, the brain sample presented mild edema and vascular congestion, and the kidney tissue showed stasis and mild edema (Figure 1).

The conclusions of the forensic report established that the death was violent; it was due to acute cardio-respiratory insufficiency, following mechanical asphyxia by hanging in a person with certain associated comorbidities (interstitial pneumonia in the fibrotic phase, aortic and coronary atherosclerosis, diffuse myocardial fibrosis, micronodular liver cirrhosis).

Literature review and discussion

The literature review focuses on psychiatric consequences of the new COVID-19 pandemic. We searched the English literature in PubMed, Google Scholar, Web of Science and Scopus, using keyword such, "suicide", "COVID-19", "death", "psychiatric

symptoms", "psychiatric disorders", "depression" and "anxiety". Articles that reported suicide or suicide attempts or mental health issues related to a SARS-CoV-2 infection were selected. Published peer-reviewed articles were included if they were in English, had empirical data on suicide or prevalence of mental health symptoms collected during the COVID-19 pandemic.

Table 1 presents a comprehensive review of the literature including scientific papers that focus on the share of depressive manifestations and suicides of COVID-19 diagnosed people.

All studies in the literature had significant results on the psychiatric symptoms associated with COVID-19. An average of 41.17% of all surveyed patients had depression, anxiety, and emotional disorders. Nalleballe et al. [14] identified in a study on 40.469 patients that insomnia and delirium were the prevalent manifestations of SARS-CoV-2 infection.

Like in our case, Rogers et al. [15] find that neuroimaging and other paraclinical test were normal, but this test cannot exclude the role of neuroinflammation, neurotropic infection or hypoxia as causes of patient's mental health consequences [11].

World history indicates that large-scale infections are associated with psychological symptoms such as anxiety and depression, and have even contributed to suicide in some cases. During the influenza virus pandemic in the United States between 1918-1920, the suicide rate increased considerably among people over the age of 65 [16]. The number of suicides is rising in the current context, harming increasingly vulnerable individuals. Fear represents an adaptive emotion, which can be the central structure in explaining the consequences of COVID-19 pandemic, meaning caring for one's own health or that of family members, with both social and individual implications. During this period, there are many types of fear: fear of contamination, fear of economic insecurity, fear of the unknown, as well as fear of the risk of dying from COVID-19 [17].

Severe somatic diseases are associated with mental and emotional health issues, which are a normal reaction to a diagnosis that requires rigorous drug administration and/or surgery, and that is usually associated with a high risk of death. Chronic or acute severe illnesses are often associated with an increased risk of depression and emotional disorders. Significant depressive symptoms affect

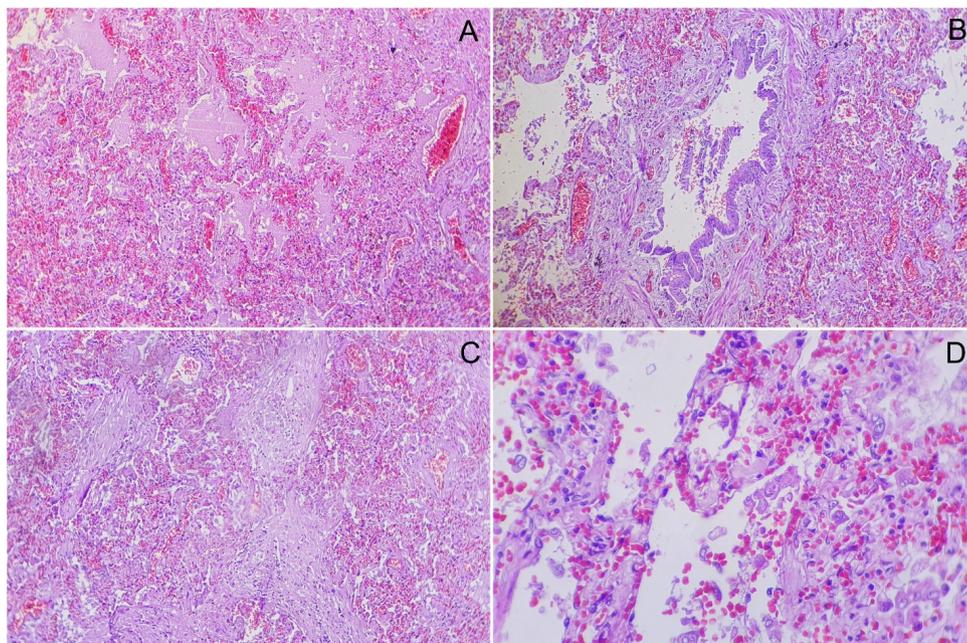


Figure 1. Pathological findings of the lung tissue. A) Diffuse alveolar damage organizing phase. H&E stain, 40x magnification. B) Denudation of the bronchiolar epithelium. H&E stain, 100x. C) Interstitial fibroblastic proliferation and collagen deposition. H&E stain, 100x. D) Alveolar epithelium denudation, vascular congestion. H&E stain, 400x.

Table 1. The share of cases with psychiatric symptoms associated with COVID-19.

Authors	Number of COVID-19 positive people	Mean Age	Sex	Symptoms	Psychiatric Comorbidity	Rate of psychiatric symptoms	Suicide / Suicide attempts
Mazza et al. [3]	402	57.8	F-137 M- 264	Depression, Anxiety, PTSD, Insomnia	7,8%	55%	
Sahan et al. [4]	281	55.0	F-138 M-143	Depression Anxiety	23.8%	42%	
Dong et al. [5]	144	49.98	F-74 M-70	Depression Anxiety	-	31,59%	
Paz et al. [6]	759	37	F-394 M- 365	Depression Anxiety	-	22,9%	
Speth et al. [7]	114	-	-	Depression Anxiety	-	37,3%	
Parker et al. [8]	44	59	F-9 M-37	Depression Anxiety	26%	32,5%	
Samrah et al. [9]	66	35.8	F-39 M-27	Depression Anxiety	-	44%	
Brooks [10]	144	44.6	F-52 M- 92	Depression Anxiety	1%	47,4%	
Gillett et al. [11]	1	37	M	Auditory hallucinations	NA	NA	Yes
Telles-Garcia et al. [12]	1	38	M	Anxiety Depression	NA	NA	Yes
Sripad et al. [13]	58	45	-	Depression Anxiety	8%	-	Yes

approximately 1 in 4 adults with type 1 and type 2 diabetes, whereas a formal diagnosis of depressive disorders is made in approximately 10%–15% of people with diabetes [18]. Frequently, patients with chronic illnesses and depression and their families overlook the symptoms of depression, assuming that sadness is a normal reaction for someone struggling with that type of disease [19]. There are two different ways to explain this, but they are not mutually exclusive: the first one is the most common, it is subsequent to a cognitive or psychological mechanism, explained by the fact that any severe pathology can influence the meaning of life of the individual; the second one is a more specific association between depression and the particular physical disorder of the patient [20].

All severe diseases can be more or less associated with depression, but the moment of receiving a diagnosis of cancer induces a considerable stress because of the patient's perception of the clinical course of the illness and because of the public stigma of cancer [21]. A study of cancer patients from New York points out that the prevalence of depression in these patients is, however, almost similar to that of patients diagnosed with other serious conditions. In the same study, attention was also paid to suicide cases. Neoplastic patients are often using the method of opioid analgesic overdose, but men can also resort to suicide by hanging or shooting. Suicidal ideation, which requires a careful evaluation, appears as a result of severe depression or because of the patient's desire to have the final control over the symptoms [22].

Between the 15th of March and 20th of April 2020, a study was conducted in Jordan, which included SARS-CoV-2 infected patients admitted to King Abdullah University Hospital. The symptoms of depression were assessed using a series of questions, after 10 days of quarantine. Out of the 91 patients, 66 completed the questionnaire, out of which 44% reported symptoms of depression and 21% had an increased risk of developing a major depressive disorder. The findings of the study show that symptoms of depression were present in both symptomatic and asymptomatic patients. The moral support of the family and friends, but also a good interaction with the medical staff, decreased the risk of depression [23].

Another large study from Switzerland, which included 144 patients diagnosed with COVID-19, analyzed the correlation between depression, anxiety, and decreased taste and smell sensations. The results showed that 47.4% of patients reported episodes of depression almost once a week, 21.1% had depressive episodes almost every day. Among the analyzed patients, only one presented depression and anxiety as an associated diagnosis, being under antidepressant treatment at the time of hospitalization, and also another patient presented with a personal history of depression and anxiety, which were successfully treated before contacting the virus [19].

The COVID-19 pandemic triggered an increase in the number of people who developed depressive symptoms, either patients or members of their families, or people affected by global socio-economic changes. A study conducted in the USA analysed the answers in a questionnaire on symptomatology, comparing the answers before the pandemic period with the post-pandemic period. The results showed that the percentage of people with mental disorders has increased three times during the pandemic. The most affected categories of people were those from social classes with a lower standard of living, those who did not have any household savings, and people who had lost their jobs [24].

In Germany, a meta-analysis was performed on a series of 110 postmortem cases of patients tested positive for COVID-19. The study focused on the neuropathology of SARS-CoV-2. The results found substantial, but highly variable changes: astrogliosis, lymphocytic infiltration of the assessed brain tissue [25]. Astrocytes are key regulators of homeostasis, responding to stimuli through upward regulation of glial fibrillary acidic protein (GFAP) and astroglial hypertrophy [25]. The study found SARS-CoV-2 RNA and viral proteins in the central nervous system (CNS) of 53% of the examined patients, and that the most common modification was pronounced neuroinflammatory changes in the brainstem. However, the presence of SARS-CoV-2 in the CNS was not associated with severe neuropathological changes, nor in the case presented by us, there were no major changes found in the brain tissue [26].

Conclusions

The case presented by us and the review of the literature show that serious diseases are frequently associated with depression and emotional disorders, and SARS-CoV-2 infection is no exception. Depressive disorders can have a fatal evolution, so our urge refers to the multidisciplinary approach to COVID-19 pathology.

The substrate of neuropathological changes still remains uncertain, studies in the literature mention some microscopic aspects, but there is still not enough data to correlate and associate these changes with SARS-CoV-2 infection. In the case presented by us, no significant microscopic changes in the brain tissue were highlighted. In conclusion, further research is needed to clarify these issues.

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