

Research Article

Clinical Complications in Patients with SARS-CoV-2 in a Secondary Care Hospital in Tijuana, Mexico

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Abstract

Background: The SARS-CoV-2 has caused a social, economic and health crisis around the world. Its clinical manifestations present a variety that ranges from the absence of symptoms to the most serious forms of the disease, which require intensive care with high mortality.

Objective: To analyze the clinical complications in patients with SARS-CoV-2 in the regional general hospital #1 of Tijuana, Mexico.

Methods: A review of clinical records of patients with SARS-CoV-2 was carried out at regional general hospital #1 in Tijuana, Mexico, from April 2020 to April 2021. Clinical complications were identified such as Severe Acute Respiratory Syndrome (SARS), acute kidney injury, acute liver failure, heart attack, shock, myocarditis, arrhythmia, pulmonary thromboembolism, cerebrovascular event, delirium, acute meningoencephalitis, seizures, anosmia, dysgeusia, Guillain-Barré syndrome, gastrointestinal bleeding, systemic inflammatory response syndrome, depression, anxiety and confirmed death. Descriptive statistics were used, the qualitative variables were expressed in frequencies and percentages, and the quantitative variables in measures of central tendency and dispersion, the information obtained was analyzed in the statistical program SPSS version 25.

Results: 722 patients were analyzed, of which 59% (n=426) were men and 41% (n=296) were women, with a median of 55 years. The most frequent occupation was employees (51%, n= 369). Of the clinical characteristics, SARS appeared in 72% (n=520), SIRS 71% (n=515), acute kidney injury in 14% (n=100) and death in 50% (n=361) of the cases.

Conclusions: It is important to know all the SARS-CoV-2 complications. Patients who recover from this pathology develop sequelae of different degrees of severity.

Keywords: COVID-19; SARS-CoV-2; Pandemic; Complications

Introduction

On December 31, 2019, the WHO China Office was informed of cases of pneumonia of unknown etiology detected in Wuhan city, Hubei province of China [1]. The number of patients increased rapidly, the Chinese government decided to close the city on January 23, 2020, although the virus had already spread throughout China and around the world. The World Health Organization officially declared the pandemic on March 11, 2020. The virus that causes pneumonia was isolated in December 2019 and was found to be a strain of β -coronavirus [2]. On January 9, 2021, a total of 87,589,206 confirmed cases of patients infected by SARS-CoV-2 were reported worldwide, with a global fatality rate of 2.2%; a total of 38,417,522 confirmed cases were registered in the American continent [3]. In Mexico the number of cases was 1,524,036 [4].

The transmission of SARS-CoV-2 can occur through direct, indirect or close contact with infected people through their respiratory secretions which are expelled when they cough, sneeze, speak or sing [5]. Droplets of respiratory secretions remain suspended in the air and can be moved more than one meter away. Particles and droplets

that are $<5 \mu\text{m}$ in diameter have the ability to easily enter the alveolar region [6]. Body secretions and excretions that contain viruses can be aerosolized into infectious droplets or particles in many ways. Respiratory secretions are aerosolized through daily activities and medical procedures [7].

The incubation period is 14 days after exposure, with a median of 4 days. The most common symptoms that appear in this pathology are fever, fatigue, dry cough, anorexia, myalgia, dyspnea and sputum production; the less frequent symptoms are gastrointestinal such as nausea, vomiting and diarrhea [8]. Anosmia/hyposmia has also been present, which could be due to an inflammatory obstruction of the olfactory clefts or postviral anosmia, due to alteration of the olfactory neuroepithelium [9]. The majority of patients infected with SARS-CoV-2 have mild or moderate disease, but approximately 15% have severe disease and 5% have critical illness with complications such as SARS, respiratory failure, septicemia, septic shock, thromboembolism, multiorgan failure, cardiac and renal lesions [10].

The diagnosis of SARS-CoV-2 must be made with an epidemiological study, clinical manifestations and the reverse

transcriptase polymerase chain reaction (RT-PCR). RT-PCR is the gold standard; it becomes negative in nasopharyngeal samples from day eight from the onset of symptoms [11]. Another laboratory technique is the detection of IgM/IgG antibodies against the SARS-CoV-2 virus, after 7 days by ELISA or immunochromatographic technique; the sensitivity and specificity of both techniques are different [12]. In the diagnostic imaging, computed tomography (CT) is the most evaluated. The findings in the CT scan of patients with SARS-CoV-2 have divided into typical, atypical or very atypical; the typical findings are multiple peripheral and basal distribution ground glass opacities, vascular thickening, and a cobblestone pattern; the atypical findings are ground glass opacities, parahilar, apical and lymphadenopathies, and the very atypical findings are calcifications, nodular pattern, masses, cavities, pleural thickening and budding tree [13].

In risk factors, higher mortality has been seen in patients older than 60 years, men and patients than with comorbidities [13]. Specifically, cardiovascular disease, high blood pressure, diabetes mellitus, and cancer can predict severe disease [14]. Of the laboratory severity markers, a gradual elevation of neutrophil levels, indicators of inflammation and damage to the myocardial muscle, has been observed as the disease progresses. There is activation of the coagulation, in which thrombin converts fibrinogen to fibrin and is subsequently degraded, generating D-Dimer. Excessive activation of coagulation is related to thrombotic events, tissue damage and worse prognosis [15].

The complications by SARS-CoV-2 can generate sequelae and high mortality rates. It is essential to recognize complications in order to improve therapeutic strategies and limit the damage as much as possible; currently, there are few publications in our region about complications related to SARS-CoV-2, the present study aims to analyze clinical complications in patients with SARS-CoV-2 in the Regional General Hospital #1 of Tijuana, Mexico.

Materials and Methods

Study design and population

A descriptive cross-sectional study was carried out in Tijuana, Mexico between April 2020 to April 2021. The research was developed at the regional general hospital #1 of the Instituto Mexicano del Seguro Social (IMSS), a secondary level hospital. The records of patients hospitalized by SARS-CoV-2 were included. Patients without confirmatory test by PCR and with incomplete records were excluded and patients who had voluntarily discharged were eliminated from the study.

Variables

The Hospital Administration System was accessed to locate only patients who met the inclusion criteria, to collect their age, gender, occupation and any of the following complications: SARS, acute kidney injury, acute liver failure, heart failure, medical condition shock, myocarditis, arrhythmia, pulmonary embolism, cerebrovascular event, delirium, acute meningoencephalitis, seizures, anosmia, dysgeusia, Guillain-Barré syndrome, gastrointestinal bleeding, systemic inflammatory response syndrome, depression, anxiety and confirmed death. The information obtained was attached to the standardized data collection form.

Statistical analysis

Once the information was collected, the analysis was carried out using the SPSS version 25. Descriptive statistics were used; the qualitative variables were expressed as frequencies and percentages, and the quantitative variables as measures of central tendency and dispersion.

Ethics

The study was approved by the Local Committee for Ethics and Health Research number 204, with registration number R-2021-204-014. The research was conducted under the General Health Law on Health Research, the Declaration of Helsinki and bioethical principles.

Results

A census of patients with SARS-CoV-2 was carried out, obtaining a total of 722 patients, according to our selection criteria. The sample had the following sociodemographic characteristics: Of the 722 patients, 59% (n=426) were men and 41% (n=296) were women, the median age was 55 years. In occupation, 51.1% (n=369) were employees, 23.9% (n=173) were dedicated to the home, 19.3% (n=140) were retired, 3.1% (n=23) were merchants, 0.5% (n=4) students, 1.2% (n=9) unemployed and the remaining 0.5% (n=4) were infants or newborns (Table 1).

Of the patients hospitalized for SARS-CoV-2, 21.1% (n=153) did not present any complication, 5.1% (n=37) only one complication, 20.2% (n=146) two complications, 23.6% (n= 171) three complications, 17.5% (n=127) four complications and 8.0% (n=58) five complications (Table 1). The most frequent complications were the following: SARS 72% (n=520); systemic inflammatory response syndrome 71.3% (n=515), death 50% (n=361); acute kidney injury 13.9% (n=100); septic shock 12.3% (n=89) and cardiogenic shock

Table 1: Baseline characteristics of participants.

Characteristic (n=722)	n (%)	95% CI
Age (years)	55 (13) ^a	--
Sex		
Male	426 (59)	55-62
Female	296 (41)	37-44
Occupation^b		
Employee	369 (51)	47-54
Housewife	173 (24)	20-27
Retired	140 (19)	16-21
Merchant	23 (3)	4-Jan
Student	4 (1)	0.2-2
Others	13 (2)	3-Jan
Number of Complications^b		
0	153 (21)	18-23
1	37 (5)	6-Mar
2	146 (20)	17-22
3	171 (24)	20-27
≥4	215 (30)	26-33

a: Median (Interquartile range); b: Frequency (percentage); n: Frequency; %: Percentage; CI: Confidence Interval.

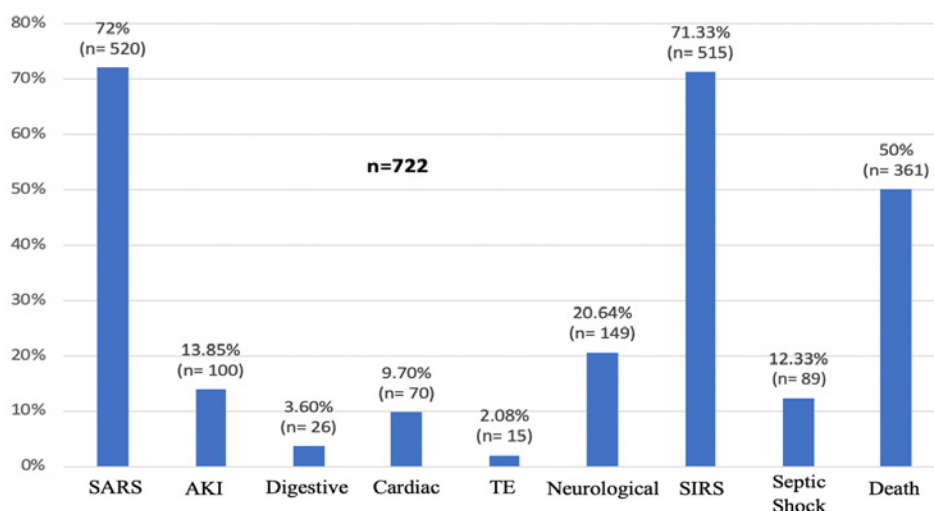


Figure 1: Frequency of complications (n= 722).

SARS: Severe Acute Respiratory Stress; AKI: Acute Kidney Injury; TE: Thromboembolic Complications; SIRS: Systemic Inflammatory Response Syndrome; Digestive: Acute Liver Failure, Gastrointestinal Bleeding; Cardiac: Heart Failure, Myocarditis, Cardiogenic Shock, Arrhythmia; TE: Ischemic Cerebrovascular Event, Pulmonary Thromboembolism; Neurological: Hemorrhagic Cerebrovascular Event, Delirium, Meningoencephalitis, Seizures, Anosmia, Dysgeusia, Guillain Barre Syndrome, Depression, Anxiety.

6.9% (n=50). The main complications are shown in Figure 1.

Of all the patients, 1.5% (n=11) were pregnant women, of which two deaths were observed secondary to SARS and SIRS; one by pulmonary septic shock and one by HELLP syndrome and acute kidney injury. One patient had SARS and SIRS with subsequent recovery, three patients had only anosmia and dysgeusia, and three had no complications. Among the death cases, the following findings were observed: two patients with leukemia had septic shock, and one patient with dysmorphic syndrome under study had metabolic acidosis. These patients develop SARS and SIRS with a fatal outcome.

Discussion

Of the 722 patients, we found a median age of 55 years, a result close to Quiang Li et al. (2020), which found a median of 51 years in 325 patients analyzed [16]. In sex, the male was the most frequent in our study with 59%, as in the study by Joseph et al. (2020) who reported a male predominance of up to 70% with a sample of 100 patients; compared with the study by Quiang Li et al. (2020) also reported a majority of the male sex, representing 51.4% of patients [16,17]. Regarding occupation, the most affected population were employees, representing 51.1% of the sample.

In the complications, the most frequent was SARS in 72% of the patients, which is higher than Quiang Li et al. (2020) who reported only 5.5%. In a series of cases based on the studies of Chen, Wang, Guan, Richardson and the CNE reported by the Center for the Coordination of Health Alerts and Emergencies of the Secretary of the State of Health of Spain in 2021, they showed a lower percentage regarding this complication: Chen (n=99) 17%, Wang (n=138) 16%, Guan (n=1,099) 3%, Richardson (n=5,700) 17.3% and CNE (n=18,609) 4% [15,16].

The second most frequent complication in our study was SIRS in 71.3% of cases, usually associated with SARS. In our study, acute kidney injury was reported in 13.9%, a higher percentage than in the

study by Quiang Li et al. (2020) that only reported 5.8%; Joseph et al. (2020) reported 81% in a sample of 100 patients, which agree with our results [16,17]. The cardiac complications reported in our study (9.7%) are similar to Quiang Li et al. (2020), 9.2% of the cases [16]. In the neurological complications, our results are similar to Mao et al. (2020), in our study, the ischemic cerebral vascular event was 1.1% and the hemorrhagic type 0.6%; on the other hand, Mao et al. reported acute cerebral vascular events in 2.8% of cases [18].

Septic shock was 12.3% of the cases in our study, greater than Quiang Li et al. (2020) that reported 4.9% [16]. Pulmonary embolism in our study was reported in only 1% of cases, compared with Klok et al. (2020), they found that 30% of the patients had pulmonary embolism, perhaps this large difference is due to diagnostic methods such as contrasted CT that are limited in these critically patients [19].

We found a mortality of 50%, a higher result than compared to the series of cases reported by the Center for the Coordination of Health Alerts and Emergencies of the Secretary of the State of Health of Spain in 2021, reporting: Chen (n=99) 11%, Wang (n=138) 4%, Guan (n=1,099) 1.4%, Richardson (n=5,700) 21%, Berenguer (n=4,035) 28% and Spain CNE (n=18,609) 3.6%. We report other interesting findings: acute myocardial infarction in 0.55% of cases disseminated intravascular coagulation 0.14%, acute lung edema 0.42% and hydropneumothorax 0.28%. Martinelli et al. (2020) found that 62 of the patients infected by SARS-CoV-2 developed pneumothorax or pneumomediastinum, with a higher incidence in men [20].

Conclusions

This study provides new information about the sociodemographic and clinical characteristics of the population affected by SARS-CoV-2 treated in Tijuana, Mexico. The most frequent complications were acute respiratory distress syndrome, followed by systemic inflammatory response syndrome, neurological complications, acute kidney injury, septic shock, cardiac complications and death.

It was evidenced that the male gender appeared more frequently and the median age of the patients was 55 years, these two variables studied agree with the results of other international studies. The occupation of the patients with the highest frequency was employees, this information is important since it is about the active working population. Another group affected by SARS-CoV-2 were pregnant patients, which presented in 1.5% of cases with a death of 0.28%, this data is also relevant since in the last year the number of maternal deaths due to this cause.

An advantage of the present study is the large sample which reduces the risk of bias in the research. It also allows us to estimate the prevalence of hospitalized patients, which helps to improve the resources in the patient care. It can also help improve therapeutic strategies based on the most frequent type of complications. It opens up new lines of research for the conduct of prospective studies of SARS-CoV-2, for example, it would be interesting to investigate the sequelae presented by patients who managed to recover after hospitalization for SARS-CoV-2, as well as the treatments for these sequelae.

Among the weaknesses of the study is that the information obtained is based on a review of electronic records, with retrospective technique, obtained from different specialist physicians. The precision may vary between the different professionals and some of the variables such as depression or anxiety could be underestimated due to the lack of registration of the diagnosis. Another limitation of the study is that we did not include a personal pathological history, information that could further enrich the study and help to associate possible risk factors with the severity of the disease.

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