

Prevalence and factors associated with radiological alterations in patients with mild SARS-COV-2 infection: Cross-sectional study at a private clinic in Buenos Aires, Argentina

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Abstract

Introduction: The SARS-COV-2 infection has been characterized by the heterogeneity in the clinical presentation. The knowledge development, as well as the availability of resources have modified the way to evaluate patients. During 2020 in Argentina, the realization of chest images was a routine practice regardless of the clinical condition.

Objective: To explore the associated factors that determine the radiological alteration in patients with the diagnostic suspicion of a mild SARS-COV-2 infection and to estimate their prevalence.

Methods: Cross-sectional study between March and October 2020 in patients with mild infection suspicion and later confirmation through the PCR study.

Results: 687 patients were recruited. The prevalence in the whole population was 16% for chest radiography and 14% for Scans. The presence of tachycardia ($p:0,016$), oxygen saturation lower than 94% breathing environmental air ($p:0,03$) and more than 5 days from the beginning of symptoms ($0,03$) result into factors associated with the findings of imaging alterations.

Conclusion: In patients with a mild condition who consult within 5 days from the beginning of the symptoms, without tachycardia and without oxygen requirement, the realization of lung imaging would not be recommended due to the scarce possibility of pathological findings.

Keywords: SARS COV 2; COVID; Chest radiography; Chest scan; Lung imaging.

Introduction

On December 2019, severe respiratory infections appeared in a community in China in the city of Wuhan in the province of Hubei, caused by a new infectious agent of viral etiology belonging to the family of the coronavirus and naming SARSCOV2 and COVID 19 to the disease it provoked [1,3]. Later in the following months there were cases in the rest of the continents, in special in Europe and North America. In Argentina the appearance of the virus started in March 2020 [4], simultaneously to the declaration by the World Health Organization of a pandemic at a global level [1,2]. As the time went by it was possible to register the heterogeneity regarding the clinical presentation, severity, and handling of patients in the ambulatory environment or hospitalization. The realization of a multidisciplinary work of different areas to develop action plans was essential to face this challenge [5]. With the development of the pandemic, the generation of knowledge, the availability of resources associated also to the number of affected by community transmission, the protocols of assistance recommended by the governmental authority were modified in the Argentine Republic. The realization of lung imaging was an initial recommendation in the assistance of patients with infection suspicion or confirmation [6].

Objectives

- To explore the associated factors that determine the radiological alteration (pneumonia) through a portable chest radiography or chest scan in adult patients who consult an Emergency Department with the diagnostic suspicion of a mild SARS- COV-2 infection.
- To estimate the prevalence of radiological alterations (pneumonia) through a portable chest radiography or chest scan in adult patients who consult an Emergency Department with the diagnostic suspicion of a mild SARS- COV-2 infection.
- To describe the clinical characteristics, symptoms and laboratory results of adult patients who consult an Emergency Department with the diagnostic suspicion of a mild SARS- COV-2 infection and later confirmation by detectable PCR.

Material and Methods

Design: Cross-sectional study, with administrative admission date corresponding to the day of assistance (03/20/2020-10/31/2020) at the Emergency Department of the Sanatorio Finochietto de Buenos Aires, Argentina with mild SARS-COV- 2 infection suspicion and later confirmation by detectable PCR.

Inclusion criteria

- Patients older than 16 years old.
- Patients with mild SARS-COV-2 infection suspicion with chest imaging (radiography or scan) on the day of assistance at the emergency department and later diagnostic confirmation by dewtectable PCR.

Exclusion criteria

- Patients with SARS-COV-2 PCR made in other centers.

Environment: The Sanatorio Finochietto is located in the Autonomous City of Buenos Aires, Argentina, with an infrastructure of 17.000 square meters. It has an Emergency Department with active assistance specialties (emergencies, internal medicine, pediatrics, general surgery, traumatology, and obstetrics gynecology). The Emergency Department has 2 Shock Room Stations, 8 observation Rooms, all of them with a centralized multiparametric monitoring, 7 consulting rooms, and 2 evaluation rooms. The whole area has centralized gases. The General Adults Clinical-Surgical hospitalization area (including Obstetrics) has 163 individual rooms for the different hospitalization areas, a Closed Unit (intensive care with 24 beds, Coronary Unit with 8 rooms).

The diagnostic image service has a central and portable radiography equipment model FA, DX-100 and chest multislice scan equipment Philips ingenuity with 128 channels.

Sample calculation: By working with a captive population, the totality of the patients recruited were the ones fulfilling all the inclusion and not exclusion criteria, during the period of this study.

Statistical analysis: They were presented continuous variables as average or standard deviation, or middle and interquartile range, according to the distribution. They were presented the categorical variables as absolute and relative frequencies with their respective 95 confidence intervals. In order to explore the associated factors with clinical relevance and the variable of interest result: dichotomous categorical (radiological alteration yes or no), the data was analyzed through a multivariable logistic regression model, only when the test assumptions were fulfilled. They were considered significant 95-confidence intervals and the possibilities lower than 0.05. The statistical software STATA version 14 was used for the analysis.

Table 1: General characteristics in patients with PCR detectable for SARS COV 2 and mild clinical condition.

Demographic Characteristics	N:687
Age, years old (IQR)	36(IQR 16-93)
Female Sex	54,7% (376)
Comorbidities	
Smoker	25(3,6%)
Arterial Hypertension	79(11,5%)
Asthma	25(3,6%)
COPD	9(1,3%)
Diabetes	28(4%)
Immunosuppression	6(0,87%)
Chronic Kidney Disease	14(5%)
Pregnancy	14(2%)
Duration of symptoms (days)	2(IQR 0-21)
IQR: Interquartile Range COPD: Chronical obstructive pulmonary disease	

Table 2: General characteristics in patients with PCR detectable for SARS COV 2 and mild clinical condition.

Clinical characteristics	N:688
Cardiac Frequency (beat/min)	85(IQR 56-157)
Respiratory Frequency (oscillation/min)	17(IQR 12-45)
Systolic Blood Pressure (mm/hg)	130(IQR 80-190)
Diastolic Blood Pressure (mm/hg)	80(IQR 80-120)
Oxygen Saturation (21%)	98(IQR 86-100)
Temperature (Celsius Degrees)	36,6(IQR 35-39,4)
IQR: Interquartile Range	

Table 3: Radiological Characteristics in patients with PCR detectable for SARS COV 2 and mild clinical condition.

Thoracic Radiography N:619	
Normal	514(84%)
Doubtful	44(7%)
Infiltrated	34(6%)
Consolidation	19(3%)
Thoracic Scan N:569	
Normal	484(85%)
Infiltrated	68(12%)
Consolidation	10(1,7%)
Mixed (infiltrated/consolidation)	7(1,3%)

Table 4: Factors associated to imaging alterations (thoracic radiography and thoracic scan) in patients with detectable PCR for SARS COV 2.

Factors	OR	CI 95	P
Cardiac Frequency (beat/min) >100	1.01	1,00 - 1,03	0.016
Respiratory Frequency (oscillation/min) >20	0.31	0,20 - 1,65	0.309
Systolic Blood Pressure (mm/hg)	1.00	0.99 - 1.02	0.34
Diastolic Blood Pressure (mm/hg)	0.99	0.98 - 1.0	0.57
Oxygen saturation (%) < 94%	13.08	2,46 - 69,7	0.03
Temperature (Celsius Degrees) > 37,5 degrees	01.02	0.51 - 2.93	0.93
Beginning of Symptoms (> 5 days)	1.72	1.04 - 3.03	0.03
Sex	1.48	0.72 - 3.02	0.27
Smoker	2.65	0.91 - 7.66	0.07
Blood Pressure	1.47	0.77 - 2.80	0.23
Asthma	0.59	0.16 - 2.22	0.44
COPD	5.98	0.91 - 39.12	0.06
Diabetes	1.83	0.67 - 4.96	0.23
Chronic Kidney Disease	1.86	0.31 - 11.02	0.49
Pregnancy	0.39	0.50 - 2.70	0.34
Immunosuppression	2.51	0.40 - 15.11	0.32

Discussion

Thoracic images (simple radiography and computerized scan) are essential in the evaluation of patients with diseases which generate respiratory engagement. The thoracic radiography is the complementary study more commonly used in people with pulmonary pathologies and, therefore, in those with COVID-19. Because of its easy access and low cost, it was used for the initial evaluation and follow up of patients with suspicion or confirmation of such disease. At the beginning of the pandemic, it was used as a complementary study of evaluation of the totality of the patients despite its relatively low sensitivity for the diagnosis of interstitial pneumonia related with the SARS-CoV-2, according to some reports [9-11].

In this context some studies have shown that the thoracic radiography is a prognostic tool, above all in the critical cases of the disease [12,14]. And several authors have highlighted that, in case of not having serological tests confirming the result, it could be useful to orient the diagnostic and the clinical decision making in patients with suspicion of COVID-19 [15,17]. In spite of this, there are very few studies which have evaluated the utility of this in patients with case definition of mild to moderate infection by Covid 19.

In our cohort, relatively young, healthy and with early consultation, we have found that they showed pulmonary pathology (infiltrated or consolidation) in a low number of cases. Thus, in this specific population, it does not seem to be of great use if imaging at the moment of the initial consultation. The thoracic scan has more specificity for the detection of pneumonia associated with SARS-COV2 [18]. The most frequent and early pattern is the presence of opacities in a frosted, unifocal glass, or, more frequently a multifocal one; peripheral and bilateral with rear predominance and in the inferior lobules, which is reported in the international literature. They can be detected within the 5 days of beginning symptoms [19].

With the development of the investigation during pandemic and based on the availability limitations, need for transportation and a deficient sensitiveness and specificity, the different international organizations of radiology did not recommend the routinary realization of thoracic scans on patients with infection suspicion by SARCoV2 Covid-19, and being considered on patients with a higher risk of developing critical disease [6,20]. Despite some consensus statements made in 2020 by the WHO and Society, its utility was not clear [20,21]. In spite of this, it was used either for the presence of doubtful images in the radiography or because of suspicion of pneumonia within the context of handling an unknown entity.

As for the initial clinical evaluation of our patients with suspicion of mild SARS-COV-2 infection and later confirmation by PCR, the presence of tachycardia, time of beginning of symptoms and oxygen saturation of environmental air lower than 94%, we found that they are factors associated to the finding of lung imaging alterations. Those patients with more than 5 days from the beginning of symptoms, and those who require oxygen of up to 3 liters through nasal cannula increase the possibilities of presenting radiological lung injuries. The other parameters of the initial evaluation do not lead us to presume the existence of radiological alterations. Both the values of blood pressure (systolic and diastolic), the temperature and the respiratory frequency did not result in factors associated with injuries in lung radiological images. The same happens with comorbidities analyzed which are considered as risk factors of a bad evolution for the COVID-19 infection. The latter different from what is reported by international literature [22,24].

This work has limitations associated with protocol modifications of the sanitary authority regarding the hospitalization criteria and the handling of treatment because during an important period of patient incorporation, it was not precisely known the behavior of the disease and treatments were not available. This study was of great practical use to know the basal situation of our patients before a recently appeared disease. Apart from being a study where patients are evaluated, treated, and followed in a different way than in clinical trials.

Conclusions

In patients with a mild SARS-COV-2 clinical condition who consult within 5 days from the beginning of the symptoms, without tachycardia and without oxygen requirement, the realization of lung imaging would not be recommended due to the scarce possibility of pathological findings.

Declarations

Ethical Considerations: The present study was made respecting the considerations regarding the care of the participants in clinical investigation included in the Helsinki Declaration and according to the Guide for Human Health Investigations (Resolution 1480/11) of the National Ministry of Health. All the data of the study were treated with maximum confidentiality, in an anonymous way, with restricted access only to the authorized staff for the study according to the ruling regulation of the Personal Data Protection Act 25. 326 (Habeas data law).

Logistics: As a secondary base, the institutional electronic clinical record of the Sanatorio Finochietto de la Ciudad Autónoma de Buenos Aires was used. It was presented the (CODEI) (Committee of Teaching and Institutional Investigation) protocol, which was approved for its development carried out at the Emergency Department of the Sanatorio Finochietto de la Ciudad Autónoma de Buenos Aires, Argentina.

The collection of data was made through the revision of electronic clinical records, by trained staff protecting the human participant of the investigation (NIH).

Funding: The costs of administrative and human resources to carry out the study were in charge of the main investigators. It did not generate any additional costs for either the investigation staff or their health insurance.

Conflict of interest: The investigators declare no conflict of interest.

Disclosure text: The SARS-COV-2 virus is the one which generates the infection by COVID19 in the population. Within the initial evaluation it is important to identify the clinical variables for the patients' severity categorization and the use of complementary diagnostic methods.

Key concepts

A) What is known about the subject?

The SARS-COV-2 infection has been characterized by the heterogeneity in the clinical presentation. The study of patients with mild SARS-COV-2 infection is essential for a proper clinical assessment and use of diagnostic resources in the clinical practice.

B) What does this article bring us? / What is the contribution of this article?

This study brings information about the radiological behavior of young patients with mild SARS-COV-2 infection.

References

1. Burillo S. CORONAVIRUS COVID19 como enfrentarse a una pandemia: Las preguntas más realizadas en consulta. (CORONAVIRUS COVID 19 how to face a pandemic. The questions most frequently made in consultations) Sara Burillo Molinero. 2020; 25.
2. Hallal P. Worldwide differences in COVID19-related mortality [Internet]. Available from: <http://dx.doi.org/10.1590/scielopreprints.167>.
3. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020; 395(10223): 497-506.
4. Gemelli NA. MANAGEMENT OF COVID-19 OUTBREAK IN ARGENTINA: THE BEGINNING. *Disaster Med Public Health Prep*. 2020; 1-6.
5. Research CM, Case Medical Research. Clinical Outcomes of Patients With COVID19 [Internet]. Case Medical Research. 2020. Available from: <http://dx.doi.org/10.31525/ct1-nct04280913>.
6. Manna S, Wruble J, Maron SZ, Toussie D, Voutsinas N, Finkelstein M, et al. COVID-19: A Multimodality Review of Radiologic

Techniques, Clinical Utility, and Imaging Features [Internet]. *Radiology: Cardiothoracic Imaging*. 2020; 2: 200210. Available from: <http://dx.doi.org/10.1148/ryct.2020200210>.

7. Boietti BR, Mirofsky M, Valentini R, Peuchot VA, Cámara LA, Pollán JA, et al. [Descriptive analysis of 4776 patients admitted to medical clinic services for COVID-19. Results of the Argentine Multi-Center Registry - REMA-COVID-19]. *Medicina*. 2021; 81(5): 703-14.

8. Abdellatif OS, Behbehani A. Argentina COVID-19 Governmental Response [Internet]. 2021. Available from: <http://dx.doi.org/10.52008/arg0501>.

9. Yoon SH, Lee KH, Kim JY, Lee YK, Ko H, Kim KH, et al. Chest Radiographic and CT Findings of the 2019 Novel Coronavirus Disease (COVID-19): Analysis of Nine Patients Treated in Korea. *Korean J Radiol*. 2020; 21(4): 494-500.

10. Wong HYF, Lam HYS, Fong AHT, Leung ST, Chin TWY, Lo CSY, et al. Frequency and Distribution of Chest Radiographic Findings in Patients Positive for COVID-19. *Radiology*. 2020; 296(2): 72-8.

11. Bandirali M, Sconfienza LM, Serra R, Brembilla R, Albano D, Pregliasco FE, et al. Chest Radiograph Findings in Asymptomatic and Minimally Symptomatic Quarantined Patients in Codogno, Italy during COVID-19 Pandemic. *Radiology*. 2020; 295(3): 7.

12. Toussie D, Voutsinas N, Finkelstein M, Cedillo MA, Manna S, Maron SZ, et al. Clinical and Chest Radiography Features Determine Patient Outcomes in Young and Middle-aged Adults with COVID-19 [Internet]. *Radiology*. 2020; 297: 197-206. Available from: <http://dx.doi.org/10.1148/radiol.2020201754>.

13. Schalekamp S, Huisman M, van Dijk RA, Boomsma MF, Freire Jorge PJ, de Boer WS, et al. Model-based Prediction of Critical Illness in Hospitalized Patients with COVID-19. *Radiology*. 2021; 298(1): 46-54.

14. Chen X, Peng F, Zhou X, Zhu J, Chen X, Gong Y, et al. Predicting severe or critical symptoms in hospitalized patients with COVID-19 from Yichang, China. *Aging*. 2020; 13(2): 1608-19.

15. Borghesi A, Maroldi R. COVID-19 outbreak in Italy: Experimental chest x-ray scoring system for quantifying and monitoring disease progression [Internet]. Available from: <http://dx.doi.org/10.21203/rs.3.rs-19842/v1>.

16. Agrawal N, Chougale SD, Jedge P, Iyer S, Dsouza J. Brixia Chest X-ray Scoring System in Critically Ill Patients with COVID-19 Pneumonia for Determining Outcomes [Internet]. *JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH*. 2021. Available from: <http://dx.doi.org/10.7860/jcdr/2021/48844.15197>.

17. Warren MA, Zhao Z, Koyama T, Bastarache JA, Shaver CM, Semler MW, et al. Severity scoring of lung oedema on the chest radiograph is associated with clinical outcomes in ARDS. *Thorax*. 2018; 73(9): 840-6.

18. Bai HX, Hsieh B, Xiong Z, Halsey K, Choi JW, Tran TML, et al. Performance of Radiologists in Differentiating COVID-19 from Non-COVID-19 Viral Pneumonia at Chest CT [Internet]. *Radiology*. 2020; 296: 46-54. Available from: <http://dx.doi.org/10.1148/radiol.2020200823>.

19. Kovács A, Palásti P, Veréb D, Bozsik B, Palkó A, Kincses ZT. The sensitivity and specificity of chest CT in the diagnosis of COVID-19. *Eur Radiol*. 2021; 31(5): 2819-24.

20. Rubin GD, Ryerson CJ, Haramati LB, Sverzellati N, Kanne JP, Raouf S, et al. The Role of Chest Imaging in Patient Management During the COVID-19 Pandemic: A Multinational Consensus Statement From the Fleischner Society. *Chest*. 2020; 158(1): 106-16.

21. Sun Z. Chest CT Imaging in the Diagnosis of COVID-19: Rapid Publications are not Equal to Quality of Research [Internet]. *Current Medical Imaging Formerly Current Medical Imaging Reviews*. 2021; 17: 447-51. Available from: <http://dx.doi.org/10.2174/157340561704210419121707>.

22. Woolcott OO, Castilla-Bancayán JP. The effect of age on the association between diabetes and mortality in adult patients with COVID-19 in Mexico [Internet]. *Scientific Reports*. 2021; 11. Available from: <http://dx.doi.org/10.1038/s41598-021-88014-z>.

23. Huang I, Lim MA, Pranata R. Diabetes mellitus is associated with increased mortality and severity of disease in COVID-19 pneumonia – A systematic review, meta-analysis, and meta-regression [Internet]. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 2020; 14: 395-403. Available from: <http://dx.doi.org/10.1016/j.dsx.2020.04.018>.

24. Smadja DM, Mentzer SJ, Fontenay M, Laffan MA, Ackermann M, Helms J, et al. COVID-19 is a systemic vascular hemopathy: insight for mechanistic and clinical aspects. *Angiogenesis*. 2021; 24(4): 755-88.

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