

Lombardy, Italy: COVID-19 second wave less severe than the first? A preliminary investigation

Andrea Borghesi (✉ andrea.borghesi@unibs.it)

Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia, ASST Spedali Civili of Brescia <https://orcid.org/0000-0002-4761-2923>

Salvatore Golemi

Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia, ASST Spedali Civili of Brescia

Nicola Carapella

Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia, ASST Spedali Civili of Brescia

Angelo Zigliani

Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia, ASST Spedali Civili of Brescia

Davide Farina

Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia, ASST Spedali Civili of Brescia

Roberto Maroldi

Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia, ASST Spedali Civili of Brescia

Short Report

Keywords: SARS-CoV-2, COVID-19, Chest X-ray, Scoring System, Mechanical Ventilation

Posted Date: November 3rd, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-101345/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Version of Record: A version of this preprint was published on February 9th, 2021. See the published version at <https://doi.org/10.1080/23744235.2021.1884745>.

Abstract

The much-heralded second wave of coronavirus disease (COVID-19) has arrived in Italy. Right now, one of the main questions about COVID-19 in Italy is whether the second wave will be less severe than the first. Currently, the answer to this question remains open.

According to the Italian Ministry of Health website (COVID-19 – Situation in Italy), it would appear that in Italy the COVID-19 second wave is less severe and deadly than the first one was.

However, this difference could be affected by several factors, including the different number of swabs performed in the two waves, as it is approximately seven to eight times higher in the second wave. Therefore, it is not yet clear whether the COVID-19 second wave in Italy, specifically in Lombardy, is less severe and deadly than the first wave.

In order to answer this challenging question, we decided to quantify the radiographic severity of COVID-19 pneumonia during the second wave and compare it with that of the first wave. In addition, to further test whether the severity of the second wave is indeed lower than that of the first one, we compared the use of mechanical ventilation between the two waves.

Introduction

Italy is one of the countries that has been most affected by the coronavirus disease (COVID-19) pandemic, and Lombardy is the region of Italy with the highest number of infected patients [1]. On October 30, 2020, the overall number of confirmed COVID-19 cases in Lombardy was 186825, corresponding to about 30% of all cases in Italy [1].

During the COVID-19 first wave, the peak incidence in Italy was reached on March 21, 2020 [1]. After a progressive and significant descent, since late August 2020, the infections have started to rise again.

On March 21, 2020, the number of new severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections in Italy was 6557. On October 30, 2020, the number of new SARS-CoV-2 infections was 31084 [1]. However, on March 21, the number of newly hospitalized patients with SARS-CoV-2 infection was 1890, with a hospitalization rate (HR) of 28.8% (10.7% in intensive care units), whereas the number of new hospitalized patients with SARS-CoV-2 infection on October 30 was 1125 with a HR of 3.6% (8.4% in intensive care units) [1]. In addition, while on March 21, the number of new deaths was 793 with a daily case fatality rate (dCFR, calculated as the reported number of new COVID-19 deaths divided by the total number of positive cases) of 1.8 %, the number of new deaths on October 30 was 199 with a dCFR of 0.06% [1].

Similarly, on March 21, the daily HR and dCFR in Lombardy were 17.4% and 3%, respectively, whereas the daily HR and dCFR on October 30 were 4.1% and 0.06%, respectively [1].

The thing worth highlighting is that Lombardy had a significantly higher dCFR than the rest of Italy only in the first COVID-19 wave.

According to these preliminary data, it would appear that in Italy, especially in Lombardy, the COVID-19 second wave is less severe (reduced daily HR) and deadly (reduced dCFR) than the first one was. In particular, it should be stressed that in Lombardy the dCFR in the COVID-19 second wave (calculated on October 30) was about 50 times lower than in the first one (calculated on March 21).

However, this difference could be affected by several factors, including the different number of swabs performed in the two waves. In fact, while on March 21, the number of nasal/pharyngeal swabs was 26336 (with a 24.9% positivity rate), the number of nasal/pharyngeal swabs on October 30 was 215085 (with a 14.5% positivity rate) [1]. Therefore, it is not yet clear whether the COVID-19 second wave in Italy, specifically in Lombardy, is less severe and deadly than the first one.

Considering the close relationship between pulmonary involvement, in-hospital mortality [2, 3], and the need for ventilatory support [3, 4], the main purpose of this study was to quantify the radiographic severity of COVID-19 pneumonia during the second wave and compare it with that of the first one. In addition, to further test whether the severity of the second wave is indeed lower than that of the first wave, we also compared the use of mechanical ventilation (MV) in the two waves.

Materials And Methods

To quantify and compare the radiographic severity of COVID-19 pneumonia in both waves, we selected two independent groups of hospitalized patients with SARS-CoV-2 infection (confirmed by real-time polymerase chain reaction). The first group consisted of the first 100 male patients with COVID-19 admitted to our hospital during the first wave. The second group consisted of 100 consecutive male patients with COVID-19 admitted to our hospital during the second wave, from August 21 to October 26, 2020. For this study, we decided to enlist only Caucasian male patients over the age of fifty, as the literature reports that this subgroup of the population is more likely to develop severe lung disease [5]. Patients with previous interstitial lung disease or lung resection were excluded from this analysis. The selected patients, retrospectively obtained through a search on our departmental digital archive, were also divided into four groups according to age: 50–59 years (group A), 60–69 years (group B), 70–79 years (group C), and ≥ 80 years (group D).

The radiographic severity of COVID-19 pneumonia was assessed using a dedicated chest X-ray (CXR) scoring system (*Brixia* score) [6]. For each patient, only the CXR examination showing the worst pneumonia was considered for comparison. The frontal chest projection of these examinations was independently evaluated by a thoracic radiologist (A.B.) with 15 years of experience in thoracic imaging who assigned the appropriate *Brixia* score. In addition, we also compared the use of MV in the two waves.

Statistical analysis

The data are presented as numbers (%) or as median and interquartile range (IQR), because the *Brixia* scores in both waves were not normally distributed. The Mann–Whitney *U*test was used to compare the *Brixia* scores between the first and second waves. The chi-square test was used to analyze significant differences in the frequency of MV use between the two waves. In addition, the Mann–Whitney *U*test was also used to compare the *Brixia* scores in the group of patients who needed MV. Statistical analysis was performed using MedCalc® Statistical Software version 19.5.1 (MedCalc Software Ltd, Ostend, Belgium), and *p* values <0.05 were considered statistically significant.

Results

In the first wave, the *Brixia* score ranged from 1 to 16 (median, 10; IQR, 7.5–13). In the second wave, the *Brixia* score ranged from 0 to 14 (median 5; IQR, 2–8). The *Brixia* score was significantly higher in the first wave than in the second wave (*p* < 0.001). The *Brixia* scores of groups A, B, C, and D were also significantly higher in the first wave than in the second wave (Table 1, and Fig. 1).

In addition, in the first wave 35/100 (35%) patients required the MV, whereas 21/100 (21%) patients required MV in the second wave (*p* = 0.028). With regard to this group of COVID-19 patients, the *Brixia* score was significantly higher in the first wave than in the second wave (*p* < 0.001) (Table 1).

Discussion

The much-heralded second wave of COVID-19 has arrived in Italy [7–9]. Right now, one of the most challenging questions about COVID-19 in Italy is whether the second wave will be less severe than the first. Currently, the answer to this question remains open, as the published data on COVID-19 in Italy were obtained almost exclusively from the first wave [10].

To the best of our knowledge, this is the first study to assess and compare the radiographic severity of COVID-19 pneumonia and the use of MV in the two waves.

In our study sample, we found that the CXR severity index of COVID-19 pneumonia and the frequency of MV use was significantly lower in the second wave than in the first wave.

From a clinical point of view, this indicates a decreased severity of COVID-19 in the second wave, which should result in fewer hospitalizations, shorter hospitalization stays, fewer life-threatening complications [11–13], and lower mortality [2–4].

Of course, we realize that the differences between the two COVID-19 waves could be influenced by several factors, such as the different number of swabs performed, the improved patient treatment, the different season (late winter/early spring for the first wave, late summer/early autumn for the second wave), and

the widespread use of face masks [14]. However, in our opinion, these factors cannot fully justify the results of this preliminary investigation.

Another thing worth pointing is that, in our study, the patients who required MV had a significantly lower *Brixia* score in the second wave than in the first wave. From a clinical point of view, this could indicate a different (improved) management of patients with acute respiratory failure for the increased availability of ventilators.

Our study has some limitations. First, the retrospective nature of our analysisSecond, the relatively large sample (100 patients per group); however, we enrolled only hospitalized male patients over the age of 50. Third, the lack of comparison with the final outcome (since we are at the beginning of the COVID-19 second wave), and the fact that in the second patient group this data was collected in a relatively small number of cases.

In conclusion, this study seems to confirm that the COVID-19 second wave is less severe than the first one. Although preliminary, this information is of particular interest not only for clinicians but also for the general population in Italy, as it allows us to look to the near future with less pessimism.

Declarations

Funding

The author states that this work has not received any funding

Compliance with ethical standards

Conflict of interest/Competing interests

The authors declare that they have no conflict of interest

Ethical standards

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the 2013 version of the Declaration of Helsinki. This preliminary investigation was notified to our local ethics committee (Ethics Committee of Brescia) as a retrospective analysis. Given the retrospective nature of this analysis, performed with data collected in an anonymous manner, and in accordance with the current legislation, the need for informed consent was waived.

References

1. Ministero della Salute. COVID-19 – Situazione in Italia. October 28, 2020.
<http://www.salute.gov.it/portale/nuovocoronavirus/homeNuovoCoronavirus.jsp>
2. Borghesi A, Ziglianì A, Golemi S, Carapella N, Maculotti P, Farina D, Maroldi R (2020) Chest X-ray severity index as a predictor of in-hospital mortality in coronavirus disease 2019: A study of 302 patients from Italy. *Int J Infect Dis* 96:291-293. <https://doi.org/10.1016/j.ijid.2020.05.021>.
3. Larici AR, Cicchetti G, Marano R, Merlino B, Elia L, Calandriello L, Del Ciello A, Farchione A, Savino G, Infante A, Larosa L, Colosimo C, Manfredi R, Natale L (2020) Multimodality imaging of COVID-19 pneumonia: from diagnosis to follow-up. A comprehensive review. *Eur J Radiol* 131:109217. <https://doi.org/10.1016/j.ejrad.2020.109217>.
4. Balbi M, Caroli A, Corsi A, Milanese G, Surace A, Di Marco F, Novelli L, Silva M, Lorini FL, Duca A, Cosentini R, Sverzellati N, Bonaffini PA, Sironi S (2020) Chest X-ray for predicting mortality and the need for ventilatory support in COVID-19 patients presenting to the emergency department. *Eur Radiol* 8:1–14. <https://doi.org/10.1007/s00330-020-07270-1>.
5. Borghesi A, Ziglianì A, Masciullo R, Golemi S, Maculotti P, Farina D, Maroldi R (2020) Radiographic severity index in COVID-19 pneumonia: relationship to age and sex in 783 Italian patients. *Radiol Med* 125:461-464. <https://doi.org/10.1007/s11547-020-01202-1>.
6. Borghesi A, Maroldi R (2020) COVID-19 outbreak in Italy: experimental chest X-ray scoring system for quantifying and monitoring disease progression. *Radiol Med* 125:509-513. <https://doi.org/10.1007/s11547-020-01200-3>.
7. Wise J (2020) Covid-19: Risk of second wave is very real, say researchers. *BMJ* 369:m2294. <https://doi.org/10.1136/bmj.m2294>.
8. Cacciapaglia G, Cot C, Sannino F (2020) Second wave COVID-19 pandemics in Europe: a temporal playbook. *Sci Rep* 10:15514. <https://doi.org/10.1038/s41598-020-72611-5>.
9. Ciaffi J, Meliconi R, Landini MP, Ursini F (2020) Are we on brink of a second COVID-19 wave in Italy? Let's look at Google Trends. *Intern Emerg Med* 17:1–2. <https://doi.org/10.1007/s11739-020-02502-0>.
10. Fan G, Yang Z, Lin Q, Zhao S, Yang L, He D (2020) Decreased Case Fatality Rate of COVID-19 in the Second Wave: A study in 53 countries or regions. *Transbound Emerg Dis*. <https://doi.org/10.1111/tbed.13819>.
11. Sakr Y, Giovini M, Leone M, Pizzilli G, Kortgen A, Bauer M, Tonetti T, Duclos G, Zieleskiewicz L, Buschbeck S, Ranieri VM, Antonucci E (2020) Pulmonary embolism in patients with coronavirus disease-2019 (COVID-19) pneumonia: a narrative review. *Ann Intensive Care* 10:124. <https://doi.org/10.1186/s13613-020-00741-0>.
12. Fang Y, Zhou J, Ding X, Ling G, Yu S (2020) Pulmonary fibrosis in critical ill patients recovered from COVID-19 pneumonia: Preliminary experience. *Am J Emerg Med* S0735-6757(20)30620-3. <https://doi.org/10.1016/j.ajem.2020.05.120>.

13. Borghesi A, Aggiusti C, Farina D, Maroldi R, Muijsen ML (2020) COVID-19 Pneumonia: Three Thoracic Complications in the Same Patient. *Diagnostics* (Basel) 10:498. <https://doi.org/10.3390/diagnostics10070498>.
14. Eikenberry SE, Mancuso M, Iboi E, Phan T, Eikenberry K, Kuang Y, Kostelich E, Gumel AB (2020) To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID-19 pandemic. *Infect Dis Model* 5:293-308. <https://doi.org/10.1016/j.idm.2020.04.001>.

Table

Table 1 Comparison of the *Brixia* scores by group in the two COVID-19 waves

Group	COVID-19 wave	Patients	<i>Brixia</i> score	Mann-Whitney U-test
				<i>p-value</i>
A (50–59 years old)	First	22	9.5 (6–13)	< 0.001
	Second	32	4 (2.5–7.5)	
B (60–69 years old)	First	27	10 (6.3–12)	< 0.001
	Second	27	6 (2–7)	
C (70–79 years old)	First	34	10 (7–13)	< 0.001
	Second	24	6 (2.5–8.5)	
D (≥ 80 years old)	First	17	10 (9–13)	< 0.001
	Second	17	7 (4.8–8.3)	
MV	First	35	13 (11.3–14)	< 0.001
	Second	21	9 (7.8–12)	

Data are presented as numbers (%) or medians (interquartile range).

MV, group of patients who needed mechanical ventilation

Figures

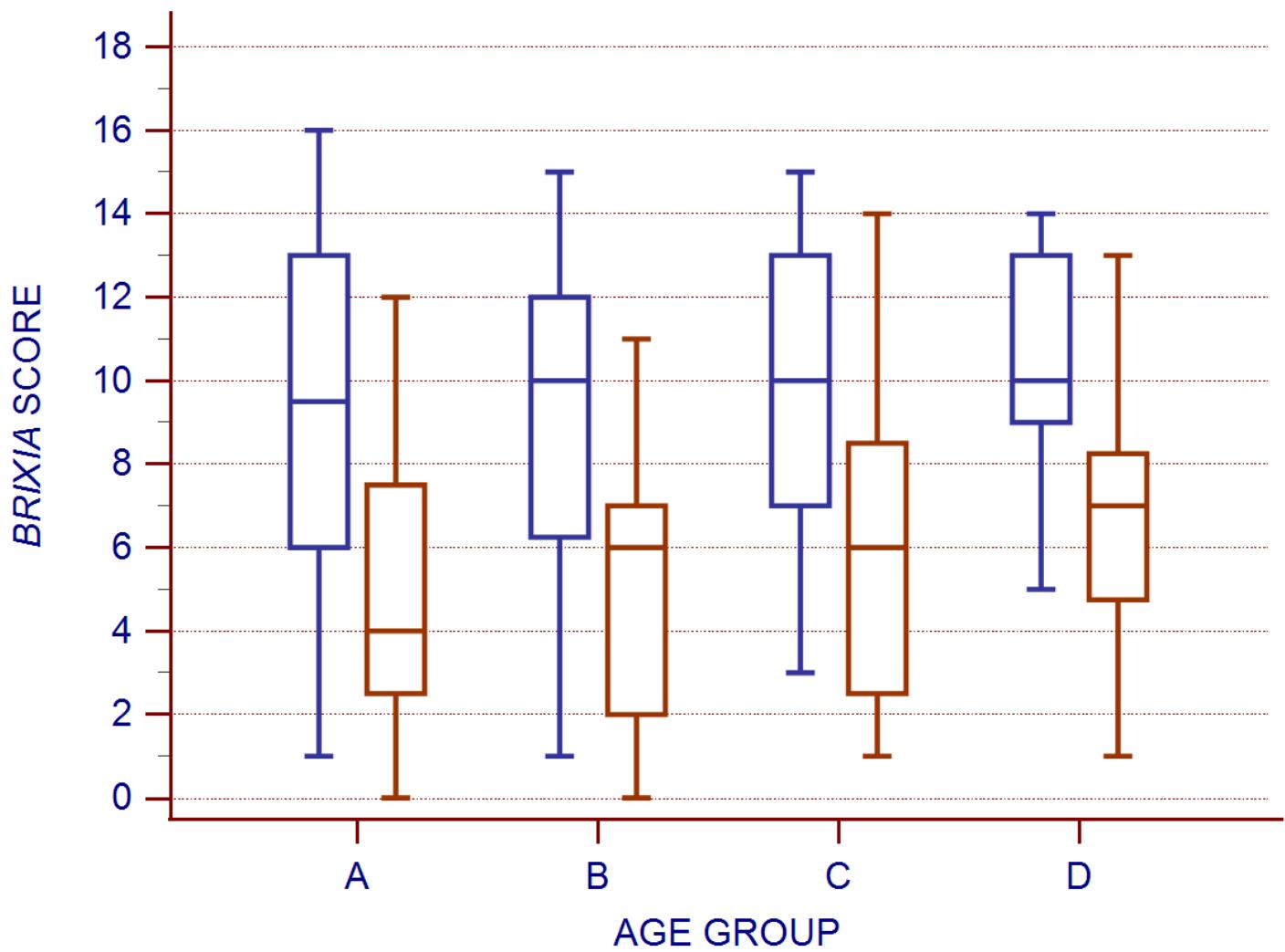


Figure 1

Box-and-Whisker plots showing the comparison of the Brixia scores by age group in the first (blue) and second (red) COVID-19 waves