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CORRESPONDENCE

Clinical differentiation of severe acute respiratory syndrome coronavirus 2 pneumonia using the Japanese guidelines

To the Editors:

The coronavirus disease 2019 (COVID-19) pandemic, caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has caused a sudden and substantial increase in hospitalizations for pneumonia worldwide.[1] Although the reverse transcription PCR assay is a commonly used tool for the diagnosis of COVID-19, the sensitivity of PCR is not high using oropharyngeal and nasopharyngeal swab specimens and depends on the time of collection and the collector.[2,3] The Japanese Respiratory Society (JRS) scoring system, consisting of six parameters, is a useful tool for the early presumptive diagnosis of mild-to-moderate atypical pneumonia, mainly *Mycoplasma pneumoniae* pneumonia.[4] These parameters were: (1) age < 60 years, (2) no or minor comorbid illness, (3) presence of stubborn cough, (4) absence of chest adventitious sounds, (5) no sputum or no identified aetiological agent by rapid diagnostic tests (Gram staining, urinary antigen tests and nasopharyngeal antigen test) and (6) a peripheral white blood cell (WBC) count of <10,000/μl. We evaluated whether the JRS scoring system could be adapted to the diagnosis of mild-to-moderate SARS-CoV-2 pneumonia.

This study was conducted at five institutions between February 2020 and June 2021, and assessed a total of 823 patients with SARS-CoV-2 pneumonia (335 had lineage B.1.1.7., also known as the Alpha variant; Table 1) and 202 patients with bacterial pneumonia. COVID-19 was diagnosed with positive PCR results from sputum or

TABLE 1 Underlying conditions and clinical findings in patients with SARS-CoV-2 pneumonia in the non-Alpha variant and Alpha variant groups at the first examination

Variables	Non-Alpha variant	Alpha variant	*p*-value
No. of patients	488	335	
Median age (IQR), years	65 (46–76)	64 (51–74)	0.387
No. of males/females	302/186	227/108	0.889
No. (%) of patients with comorbid illnesses			
Diabetes mellitus	100 (20.5)	65 (19.4)	0.723
Chronic lung disease	55 (11.3)	43 (12.8)	0.512
Chronic heart disease	38 (7.8)	23 (6.9)	0.685
Cerebrovascular disease	32 (6.6)	20 (6.0)	0.772
Chronic renal disease	31 (6.4)	24 (7.2)	0.671
Neoplastic disease	30 (6.1)	14 (4.2)	0.269
Chronic liver disease	15 (3.1)	9 (2.7)	0.834
Autoimmune disease	15 (3.1)	7 (2.1)	0.510
No. (%) of patients with the following clinical signs and symptoms			
History of fever (≥37.0°C)	413 (84.6)	295 (88.1)	0.183
Cough	249 (51.0)	209 (62.4)	0.001
Fatigue	167 (35.9)	110 (32.8)	0.707
Shortness of breath	132 (27.0)	109 (32.5)	0.101
Sore throat	97 (19.9)	68 (20.3)	0.929
Loss of taste	65 (13.3)	55 (16.4)	0.228
Anosmia	54 (11.1)	49 (14.6)	0.134
Headache	54 (11.1)	33 (9.9)	0.644

(Continues)

TABLE 1 (Continued)

Variables	Non-Alpha variant	Alpha variant	*p*-value
Diarrhoea	51 (10.5)	27 (8.1)	0.276
Sputum production	49 (10.0)	54 (16.1)	0.013
Runny nose	36 (7.4)	24 (7.2)	>0.999
Joint pain	28 (5.7)	14 (4.2)	0.338
Chest pain	18 (3.7)	5 (1.5)	0.083
Muscle ache	17 (3.5)	4 (1.2)	0.044
Nausea or vomiting	16 (3.3)	14 (4.2)	0.571
Abdominal pain	6 (1.2)	1 (0.3)	0.250
Laboratory findings, median (IQR)			
White blood cell count, /μl	5100 (4295–6400)	5400 (4400–7350)	0.242
No. (%) of patients with each pneumonia severity score[a]			
0	197 (40.4)	57 (17.0)	<0.001
1	128 (26.2)	134 (40.0)	<0.001
2	110 (22.5)	88 (26.3)	0.245
3	52 (10.7)	56 (16.7)	0.015
Positive cases/no. (%) for the presumptive diagnosis of atypical pneumonia in different age groups			
20–29 years	41/41 (100)	29/29 (100)	>0.999
30–39 years	54/54 (100)	15/15 (100)	>0.999
40–49 years	41/42 (97.6)	37/37 (100)	>0.999
50–59 years	53/63 (84.1)	52/56 (92.9)	0.164
60–69 years	46/96 (47.9)	30/71 (42.3)	0.531
70–79 years	29/112 (25.9)	23/90 (25.6)	>0.999
≥80 years	23/80 (28.8)	7/37 (18.9)	0.363

Note: Continuous values are presented as medians and IQRs and categorical/binary values as counts and percentages.
Abbreviations: IQR, interquartile range; JRS, Japanese Respiratory Society; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.
[a]The severity of pneumonia was evaluated using predictive rules via the A-DROP system (a 5-point scoring system) proposed by the JRS guidelines: age over 70 years in men and over 75 years in women, dehydration, respiratory failure, orientation disturbance and low blood pressure. An A-DROP score of 0–3 points was classified as mild-to-moderate pneumonia.

nasopharyngeal swab specimens according to the protocol recommended by the National Institute of Infectious Diseases, Japan.

Matching rates to the six parameters of the JRS scoring system were identical in both non-Alpha variant and Alpha variant groups, and high matching rates were observed in the following parameters: absence of chest adventitious sounds, 71.6% (non-Alpha variant group, 73.2%; Alpha variant group, 69.3%); no sputum or no identified aetiological agent by rapid diagnostic tests, 87.1% (90.0% and 83.0%); and a peripheral WBC count of <10,000/μl, 97.6% (98.2% and 96.7%). The matching rates of the other three parameters were as follows: age < 60 years, 42.2% (43.0% and 40.9%); no or minor comorbid illness, 57.8% (57.8% and 57.9%); and presence of stubborn cough, 10.4% (9.4% and 11.9%). The sensitivity and specificity for the diagnosis of atypical pneumonia in patients with SARS-CoV-2 pneumonia based on four or more parameters were 58.3% (58.8% in the non-Alpha variant group and 57.6% in the Alpha variant group, respectively) and 92.2%, respectively.

When the diagnostic sensitivity was analysed for different ages stratified into the 10-year groups, the diagnostic sensitivity of patients in both the non-Alpha variant and Alpha variant groups was highest in the 20–39-year age group and decreased in order from the youngest to the oldest age group (Table 1). There was a clear difference between elderly (aged ≥60 years) and non-elderly (aged <60 years) patients with SARS-CoV-2 pneumonia. The diagnostic sensitivity for SARS-CoV-2 pneumonia was 95.5% for non-elderly patients and 32.5% for elderly patients.

Our results demonstrated that the JRS scoring system is a useful tool for distinguishing between SARS-CoV-2 pneumonia and bacterial pneumonia in patients aged <60 years, but not in patients aged ≥60 years.

KEYWORDS
coronavirus disease, COVID-19, pneumonia, SARS-CoV-2, severe acute respiratory syndrome coronavirus 2

CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTION

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HUMAN ETHICS APPROVAL STATEMENT

The study protocol was approved by the Ethics Committee of Kansai Medical University and all participating facilities (approval number 2020319). Informed consent was obtained from all individual participants in the study.

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