Clinical Infectious Diseases

CORRESPONDENCE

Bacterial Pneumonia in COVID-19 Critically Ill Patients: A Case Series

To the Editor—We read with great interest the article by Rawson et al recently published in this journal [1]. In this article, the authors described low rates of pulmonary bacterial coinfection in patients with coronavirus disease 2019 (COVID-19). They also warn about the extensive use of broad-spectrum empirical antibiotics in critically ill COVID-19 patients, in the context of reduced routine microbiological investigation making antibiotic stewardship difficult. However, the low rate of coinfection described seems to us to be underestimated. We experienced in our center a much more important incidence of bacterial pneumonia, possibly related to the sampling method and the rate of sampling. Here we report bacterial pneumonia in critically ill patients with COVID-19 diagnosed by bacterial cultures of blind bronchoalveolar lavage (BBAL) [2].

We conducted a prospective single-center study including every patient admitted to the Saint-Louis surgical intensive care unit (ICU) (Assistance Publique–Hôpitaux de Paris, Paris, France) for respiratory failure related to COVID-19. Exclusion criteria were age <18 years, pregnancy, or moribundity patient at admission. Acute respiratory distress syndrome (ARDS) was defined according to the Berlin definition [3]. COVID-19–associated ARDS was managed as recommended [4]. Early-onset and late-onset ventilator-associated pneumonia (VAP) were defined as pneumonia diagnosed before and after 5 days of mechanical ventilation, respectively [5].

All patients or their surrogate had an information about the data collection and gave their nonopposition to the study (ethical committee of the Société Française d'Anesthésie Réanimation, institutional review board 00010254-2019–203). Continuous variables were described as median while categorical variables were expressed as frequencies (%), and group comparisons of continuous variables were performed using Student *t* test. Categorical data were compared using χ^2 test for count data.

Of 54 COVID-19 patients admitted in our ICU from 20 March 2020 to 15 April 2020, 49 have been mechanically ventilated. Characteristics of patients are summarized in Table 1. In univariate analysis, patients with VAP had more ARDS, had more acute kidney injury, were mechanically ventilated longer, and had a longer ICU length of stay (Table 1).

BBAL was performed in 45 patients during ICU stay; all were mechanically ventilated and suspected of bacterial pneumonia. Bacterial cultures of BBAL grew with significant amount of bacteria (ie, $\geq 10^4$ colony-forming units/mL) in 37% (n = 20) of patients. Bacterial pathogens causing pneumonia are summarized in Supplementary Table 1. Among the 20 bacterial pneumoniae, 4 (20%) were classified as community-acquired, 1 (5%) hospital-acquired, and 15 (75%) VAP including 3 early-onset and 12 late-onset. In early-onset VAP, bacterial pathogens were mostly gram-positive bacteria (2/3), and 67% (2/3) were susceptible to piperacillin-tazobactam, cefotaxime, cefepime, and meropenem. Conversely, in late-onset VAP, most bacterial pathogens were gram-negative bacteria (12/14) including 8 nonfermenting bacilli and 4 Enterobacterales. Among gram-negative bacteria causing late-onset VAP, 8% (1/12), 43% (5/12), 58% (7/12), and 83% (10/12) were susceptible to cefotaxime, piperacillin-tazobactam, cefepime, and meropenem, respectively.

We reported significant rate of bacterial pneumonia, mostly late-onset VAP, in critically ill patients with COVID-19 in our unit. We would emphasize the importance of performing respiratory samples to diagnose bacterial pneumonia and therefore based antimicrobial therapy on bacterial cultures. BBAL does not require bronchoscopy, decreasing the risk of contamination, and is suitable for bacterial culture. Recently, a new molecular test named FilmArray Pneumonia plus panel (BioFire, Salt Lake City, Utah) showed excellent performance compared to bacterial culture in bacterial pneumonia with rapid turnaround time [6]. This new tool for detection of pathogens could lead to a reduction of spectrum and duration of antibiotic therapy.

Supplementary Data

Supplementary materials are available at *Clinical Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

Author contributions. E. D. and F. D. designed the study, collected the data, and drafted the manuscript. F. C., B. D., A. H., M. C., and Q. R. collected the data and drafted the manuscript. B. P. and B. B. drafted the manuscript. All authors approved the final version of the manuscript.

Potential conflicts of interest. F. D. reports grants from the French Ministry of Health, Société française d'anesthésie reanimation, European Society of Intensive Care, and lecture fees from Sedana Medical, outside the submitted work. B.D. reports travel fees from 4TEEN4 Pharmaceuticals GmbH. All other authors report no potential conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

Table 1. Characteristics of Patients

Characteristic	All Patients (N = 54)	Pneumonia (n = 20)	No Pneumonia (n = 34)	*P* Value
Age, y	63 (57–68)	64 (59–72)	62 (56–67)	.291
Weight, kg	83 (75–94)	82 (72–89)	83 (77–95)	.407
Height, cm	175 (166–178)	176 (168–180)	174 (165–178)	.341
BMI, kg/m^2	27 (26–30)	27 (23–29)	27 (26–32)	.288
Male sex	42 (77.8)	16 (80.0)	26 (76.5)	.763
Comorbidities				
Tobacco use	5 (9.3)	1 (5.0)	4 (11.8)	.408
Hypertension	35 (64.8)	12 (60.0)	23 (67.6)	.570
ACEI or ARB	19 (35.2)	6 (30.0)	13 (38.2)	.541
Diabetes mellitus	21 (38.9)	8 (40.0)	13 (38.2)	.898
Dyslipidemia	18 (33.3)	7 (35.0)	11 (32.4)	.842
Coronary disease	5 (9.3)	1 (5.0)	4 (11.8)	.408
Chronic pulmonary disease	7 (13.0)	2 (10.0)	5 (14.7)	.619
Treatments before admission				
Antibiotics	35 (64.8)	12 (60.0)	23 (67.6)	.570
Cephalosporin third generation	26 (48.1)	9 (45.0)	17 (50.0)	.723
Rovamycin	17 (31.5)	6 (30.0)	11 (32.4)	.857
Amoxicillin-clavulanate	3 (5.6)	1 (5.0)	2 (5.9)	.891
Hydroxychloroquine	4 (7.4)	1 (5.0)	3 (8.8)	.604
Azithromycin	10 (18.5)	2 (10.0)	8 (23.5)	.216
Severity of illness, median (IQR)				
Delay between onset of symptoms and intubation, d	8 (3–11)	10 (5–12)	8 (1–11)	.299
SAPS II	37 (27–46)	40 (29–56)	34 (27–43)	.209
SOFA score	5 (4–7)	5 (4–7)	4 (3–6)	.279
Organ failure				
ARDS	46 (85.2)	20 (100.0)	26 (76.5)	.019
Admission PaO_2/FiO_2	126 (80–174)	115 (80–155)	141 (81–194)	.500
Worst PaO_2/FiO_2	79 (70–114)	76 (70–101)	82 (68–136)	.476
AKI	28 (51.9)	14 (70.0)	14 (41.2)	.041
RRT	11 (20.4)	5 (25.0)	6 (17.6)	.517
Outcome				
ICU mortality	15 (27.8)	6 (30.0)	9 (26.5)	.780
Length of mechanical ventilation, d	12 (7–21)	15 (11–32)	7 (5–20)	.046
Length of stay in ICU, d	12 (6–17)	17 (14–34)	9 (3–12)	.001

Continuous variables are described as median (interquartile range) and categorical variables as frequency (%).

Abbreviations: ACEI, angiotensin-converting enzyme inhibitor; AKI, acute kidney injury; ARB, angiotensin receptor blocker; ARDS, acute respiratory distress syndrome; BMI, body mass index; ICU, intensive care unit; PaO_2/FiO_2, arterial partial pressure of oxygen/fraction of inspired oxygen; RRT, renal replacement therapy; SAPS II, Simplified Acute Physiology Score II; SOFA, Sequential Organ Failure Assessment.

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