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Case Report

ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS) MANAGEMENT IN SEVERE COVID-19

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ABSTRACT

Introduction: The Coronavirus disease 2019 (COVID-19) caused a global pandemic and many management challenges. Acute Respiratory Distress Syndrome (ARDS) is one of the most common pneumonia complications in COVID-19 cases. ARDS in COVID-19 have worse outcomes and increased risk of intensive care unit (ICU) admission. **Objective**: This case report aims to recognize and understand ARDS management in a severe COVID-19 case. **Case Report:** A 68-year-old man with diabetes mellitus and hypertension arrived at the Emergency Room (ER) after experiencing five days of fever, cough, diarrhea with frequency of four times a day, weakness, and a positive antigen result for COVID-19 at admission. Anosmia was absent. The patient had been vaccinated for COVID-19 twice. The main problem was his desaturation of 88%, blood pressure of 156/73 mmHg, heart rate of 80x/minute, and respiratory rate of 20x/minute. However, the patient was alert and admitted to the isolation ward. After 21 days of hospitalization, the patient's condition worsened. The patient developed ARDS and was referred to the COVID ICU for 25 days and 20 days to the non-COVID ICU, where he was intubated, and a tracheostomy was performed. After 45 days of admission to the ICU, the patient's condition improved. **Discussion**: COVID-19 patients with ARDS should be immediately intubated when conditions such as dyspnea, RR>30x/min, SpO2<92% (for patients with no comorbidities) or <95% (for patients with comorbidities), unconsciousness, or shock appears. Furthermore, other conditions, such as an HR> of 120x/min and a ROX index of <3.851, should be considered an indication for intubation. **Conclusion**: Timely intubation improves the outcome of COVID-19 patients with ARDS.

Keywords: ARDS; Covid-19; Desaturation; Intubation; Management

ABSTRAK

Pendahuluan: *Coronavirus disease* 2019 (COVID-19) merupakan pandemi global dan memiliki banyak tantangan dalam tatalaksananya. *Acute Respiratory Distress Syndrome* (ARDS) merupakan salah satu komplikasi yang paling sering dari COVID-19 dengan pneumonia. ARDS pada COVID-10 memiliki luaran yang kurang baik dan sering membutuhkan perawatan di *Intensive Care Unit* (ICU). **Tujuan**: Tujuan laporan kasus ini adalah untuk memahami penanganan ARDS pada pasien dengan COVID-19. **Laporan Kasus:** Seorang laki-laki usia 68 tahun datang ke Unit Gawat Darurat dengan keluhan demam, batuk, diare 4 kali per hari, lemas, dan hasil swab antigen COVID-19 positif pada hari yang sama. Pasien tidak mengalami anosmia. Pasien telah mendapatkan vaksin COVID-19 sebanyak 2x sebelumnya. Masalah utama dalam kasus ini adalah pasien mengalami desaturasi hingga 88%. Tekanan darah pasien adalah 156/73 mmHg, *heart rate* 80 kali per menit, dan *respiratory rate* 20 kali per menit. Pasien dalam keadaan kompos mentis. Setelah perawatan selama 21 hari di rumah sakit, pasien mengalami perburukan kondisi, yaitu pasien mengalami ARDS. Pasien kemudian dirawat di bangsal ICU COVID selama 25 hari, kemudian dipindahkan ke ICU Non-COVID dan dirawat selama 20 hari. Pasien dilakukan tindakan intubasi dan trakeostomi. Setelah 45 hari perawatan di ICU, kondisi pasien membaik. **Pembahasan**: Pasien COVID-19 dengan ARDS harus segera dilakukan intubasi apabila terdapat kondisi seperti *dyspnea* dengan RR>30 kali per menit, SpO2<92% pada pasien tanpa komorbid/ SpO2<95% pada pasien dengan komorbid, pasien tidak sadar, atau terdapat tanda syok. Kondisi lain seperti HR>120x/menit dan ROX index <3,851 juga dapat menjadi pertimbangan apakah perlu dilakukan intubasi. **Kesimpulan**: Tindakan intubasi yang tepat dan sesuai indikasi dapat meningkatkan luaran pasien dengan COVID-19 dengan ARDS.

Kata kunci: ARDS; Covid-19; Desaturasi; Intubasi; Manajemen

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INTRODUCTION

The coronavirus causes disease in humans and animals. COVID-19 has emerged as one of the leading causes of death worldwide (1). People suffering from COVID-19 usually experience respiratory tract infections from mild types, such as the common cold, to severe types, such as the middle east respiratory syndrome and severe acute respiratory syndrome. The new type of coronavirus was found in Wuhan, China, in December 2019, later named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV2) and caused the Coronavirus disease-2019 (COVID-19) (2).

The signs and symptoms of COVID-19 are a fever of 38^0C, cough, and in severe cases, dyspnea. Dyspnea is present in almost 50% of COVID cases (Jiang et al., 2020). Individuals who traveled within the past 14 days to an infected country or had borderless contact with suspected COVID-19 cases were examined in the laboratory (2). Based on the severity of the disease, COVID-19 can be classified as asymptomatic, mild, moderate, severe, and critical.

The severity of COVID-19 is classified into the following degrees, as shown in Table 1.

Table 1. Severity Degree of Covid-19 (2)

Degree	Sign
Asymptomatic	No sign and clinical symptom
Mild	Fever, fatigue, anorexia, shortness of breath, myalgia, headache, diarrhea, anosmia, ageusia, with SpO2 >95% room air. No pneumonia
Moderate	Sign of pneumonia (fever, cough, dyspnea, takipnea) without any sign of severe pneumonia. SpO2 93-95% in room air
Severe	Signs of pneumonia such as fever, cough, dyspnea, tachypnoea, and one of the symptoms respiratory rate >30 or distress of respiratory. SpO2 < 93% in room air
Critical	Patient with Acute Respiratory Distress Syndrome (ARDS), septic and septic shock

CASE REPORT

A 68-year-old man with a weight of 65 kg arrived at the Emergency Room (ER) with a history of the fifth day of fever, cough, diarrhea four times a day, weakness, and dyspnea. The patient was still alert, and his blood saturation was 88%. His blood pressure was 156/73 mmHg, HR 80x/min, and RR 20x/min. The patient was vaccinated twice with the Sinovac vaccine for the COVID-19 virus. The patient also had a medical history of hypertension and diabetes mellitus. He was given supplemental oxygen with a binasal cannula of 4 lpm, and his blood saturation improved to 98%. The patient was admitted to the isolation ward.

Table 2. The Patient's Blood Saturation, Oxygen Supplementation, BP, HR, Temperature, and GCS During Admission

Parameter	COVID ICU	Non-COVID ICU	Post-PDT
SpO2	91-94	97-100	98-100
VM mode	PSIMV	PSIMV	PSIMV
PEEP	8	8	8
RR	22	32	26
VTE	420	306-501	500-700
FiO2	80-90	70-80	70-80
BP	150/60	90/40	130/70
HR	80-100	110-120	80

Table 3. Sputum Culture Result

Day	Bacteria	Sensitive	Resistant
21	Acitenobacter Baumanii	Amikacin	Tigecycline
46	Pseudomonas Aeruginosa	Gentamicin, cefepime, ciprofloxacin, meropenem, ceftazidime	Abstract title and contents
62	Pseudomonas Aeruginosa	Gentamicin, amikacin, cefepime, ciprofloxacin, moxifloxacin, ceftazidime	Azithromycin, meropenem

Table 4. Blood Culture Result

Day	Bacteria	Sensitive	Resistant
49	Streptomonas maltophilia	Ciprofloxacin, levofloxacin, cotrimoxazole, fosfomycin	Tetracycline, chloramphenicol

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Table 5. Patient's Laboratory Parameters

Parameter	ER	COVID ICU	Non-COVID ICU	Post-PDT
Hb	14.9	10.1	8.6	8.5
Hmt	38.9	31.1	27.1	26.6
WBC	9700	6750	8740	13540
Plt	136.000	290.000	275.555	270.000
Na	119	145	145	144
K	4.02	4.71	3.11	3.23
Cl	87	107	107	104
Alb	3.53	2.28	2.15	2.67
SGOT	104	15	34	32
SGPT	38	12	26	18
BUN	-	-	23.9	62.4
Creat	-	-	1.14	2.69
BG	157	-	127	120
PT	16.9	14.9	15.6	16.5
APTT	50.3	36.5	35.8	33.2
INR	1.17	1.01	1.06	1.13

Table 6. Blood Gas Analysis

Parameter	ER	COVID ICU	Non-COVID ICU	Post-PDT
pH	7.56	7.42	7.44	7.31
pO2	90.2	67.8	106	134
pCO2	23.2	45.4	55.1	53.7
HCO3	20.8	29.9	38	27.2
BE	0.9	5.2	14	1
SO2	98	93.5	98	99
AaDO2	118.5	566.4	-	-
FiO2	35	100	80	70
Temperature	37	36	39	36.9
TCO2	-	-	40	29

After 21 days in the ward, the patient's condition worsened. Thus, he was admitted to the COVID ICU. The patient was diagnosed with Severe COVID-19 with acute respiratory distress syndrome and intubated after three days of diagnosis. He was intubated with ETT number 7.5, a ventilator setting of PSIMV mode, inspiratory pressure of 15, P control of 20-22, and FiO2 80%. The patient also underwent insertion of central venous catheterization in the subclavian vein and the arterial line. The patient was sedated with fentanyl at a 50 mcg/hour dose.

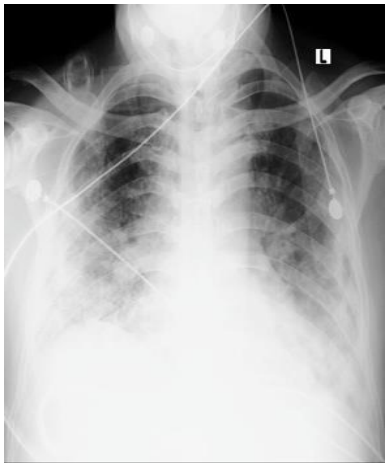

Figure 1. Patient's Chest X-ray in the Isolation Ward (before admission to the COVID ICU)

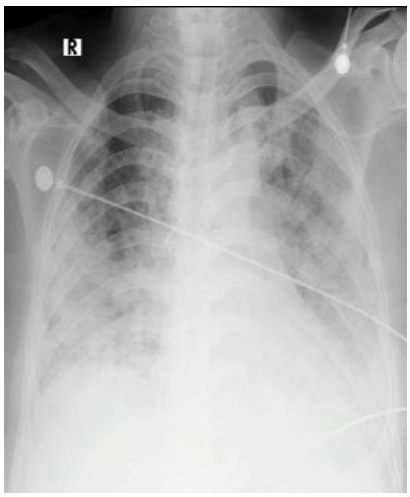

Figure 2. Patient's Chest X-ray in the COVID ICU

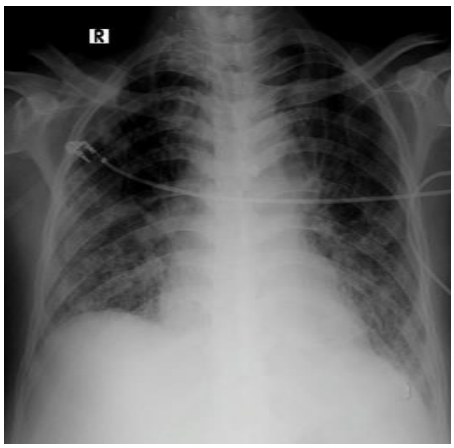

Figure 3. Patient's Chest X-ray After a Tracheostomy in the Non-COVID ICU

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The patient was initially administered favipiravir tablets in the isolation ward. It was then changed to remdesivir with a loading dose of 200 mg, followed by a 100 mg/day dose until ten days in the COVID ICU. Acetylcysteine injection was administered until 14 days, followed by 200 mg/8 hour orally. Other medication given to the patient was Vitamin C 500 mg/ 8 hours, Vitamin D 1000 IU/day, Zinc 20 mg/day, salbutamol 4 mg/12 hours, paracetamol 1000 mg when he had a fever, nifedipine 30 mg/day, omeprazole 40 mg/day, and enoxaparin 100 mg/12 hours subcutaneously until eight days, then orally. Azithromycin and fluconazole 200 mg/day were given on the patient's first day in the hospital.

The chest X-ray showed improvements in the patient's condition after 28 days of intubation. Tracheostomy was performed after 28 days of admission to the ICU. Nineteen days after the tracheostomy, the patient was transferred to the general ward with an improved condition, compos mentis.

This patient's complications in the ICU include acute kidney injury, pneumonia, hypoalbuminemia, decubitus ulcer, and rigidity of four extremities. The case report is compared with other cases in the discussion.

DISCUSSION

The patient was intubated on the 21st day (PF ratio 72.5), more than 24 hours after being diagnosed with ARDS. The Indonesian Society of Internists released their third recommendation for COVID-19 management. They stated that patients with ARDS should be immediately intubated when conditions such as dyspnea, RR>30x/min, SpO2<92% (no comorbid patient), or <95% (comorbid patient), unconsciousness, or shock appear. Another condition, such as an HR>120x/min and a ROX index of <3.851, should be considered an indication for intubation.

The fifth recommendation by the Indonesian Ministry of Health for COVID-19 management was the immediate intubation of ARDS patients (2,3,4). In this case, the patient's intubation was delayed (>24 hours after being diagnosed with ARDS) because of the family's initial refusal of intubation.

Tracheostomy was performed by the percutaneous dilatational technique (PDT) in ICU on day 49 (PF ratio after PDT was 263.2). Meanwhile, the patient's length of stay in the ICU was 45 days.

This patient had no supplemental therapy, such as tocilizumab, as the hospital did not have it in stock. Tocilizumab in the third clinical trial phase of EMPACTA (September 2020) is recommended and resulted in 44% lower complications but has no difference in 28-day mortality (tocilizumab 10.4% vs. placebo 8.6%, p: 0.5146). Other COVACTA clinical trials showed no difference in the clinical status of the patients administered tocilizumab and placebo (4,5). Immunoglobulin and plasma convalescence was not given due to the patient's critical status (6). The antibiotic was given according to the culture results.

The National Institute of Health of the United States of America released treatment guidelines for COVID-19. The panel recommends that adults with COVID-19 that were administered conventional oxygen therapy and still had acute hypoxemic respiratory failure should start therapy with a high-flow nasal cannula (HFNC) oxygen. If patients fail to respond, non-invasive ventilation (NIV) or intubation and mechanical ventilation should be initiated.

If intubation becomes necessary, the procedure should be performed by an experienced practitioner in a controlled setting

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due to the enhanced risk of exposing healthcare practitioners to SARS-CoV-2 during intubation. Pisano et al. state that signs or symptoms of significant respiratory distress or tissue hypoxia (e.g., respiratory rate above 25-30 per minute, use of accessory respiratory muscles, sweating, dyspnea, tachycardia, increased blood lactate levels, and more) are an indication for intubation in COVID patient.

Severe respiratory distress, hypoxia, and loss of consciousness are indications for intubation (7). Furthermore, advanced age, obesity, the male sex, and underlying systemic diseases such as hypertension and diabetes also increase the risk for intubation in COVID-19 patients (8) (9). Moreover, early intubation with ≤ 6 L/min of oxygen usage was associated with decreased in-hospital mortality among COVID-19 patients who required intubation (10).

CONCLUSION

COVID-19 patients should be monitored closely for acute hypoxemic respiratory failure. Supplementary oxygen should be given as needed. To improve patient outcomes, COVID-19 patients with ARDS should be immediately intubated when indications for intubation arise.

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Conflict of Interest

There is no Conflict of Interest.

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Authors' Contribution

Both of the authors contributed in the writing of this case report.

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