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Letter to the Editor

Rescue fibrinolysis in suspected massive pulmonary embolism during SARS-CoV-2 pandemic



To the Editor:

We report on 6 systemic fibrinolysis uses for suspected PE among 53 cases with severe coronavirus 2 (SARS-CoV-2) pneumonia managed in our intensive care unit (ICU) since March 23 2020 (Table 1).

PE was suspected in 5 patients on combination of obstructive shock or unexpected cardiac arrest (CA) and acute cor pulmonale

(ACP) on transthoracic echocardiography. Systemic fibrinolysis consisted of 100 mg Alteplase (Boehringer Ingelheim, France) intravenously. The conditions of 2 patients (#3–1 and #5) with obstructive shock improved, with a decreased norepinephrine dose shortly after fibrinolysis. However, another rescue therapy for the second hit did not succeed (#3–2), leading to multi-organ failure

Table 1 – Characteristics of patients treated with rescue systemic fibrinolysis.

Patient	1	2	3–1	3–2	4	5
Age (years)	67	41	63	63	55	46
Sex	Male	Male	Male	Male	Male	Male
BMI (kg/m ²)	26.2	25.8	27.2	27.2	20.7	24.3
SAPS II	26	22	47	47	28	31
Invasive MV	No	Yes	Yes	Yes	Yes	Yes
Number of PP sessions	0	1	1	1	1	4
PaO ₂ /FiO ₂ ratio (mmHg)	80	85	80	91	94	62
PaCO ₂ (mmHg)	36	56	76	46	53	53
Respiratory system compliance (ml/cmH ₂ O)	NA	33	30	16	17	10
Driving pressure (cmH ₂ O)	NA	12	15	25	23	16
NE dose (μg/kg/min)	2.94	0.22	1.06	2.05	0.25	3.46
VV-ECMO	No	No	No	No	No	Yes
Antithrombotic regimen	Curative LMWH	Preventive LMWH	Curative LMWH	Curative UFH	Curative LMWH	Curative UFH
D-Dimer (ng/ml)	2281	NA	4208	4208	7794	9943
PR (%)	64	67	77	71	70	80
Platelet count (Giga/l)	355	194	391	403	199	176
Fibrinogen (g/l)	7.7	8.4	7.0	6.4	6.5	4.8
Reason for fibrinolysis	CA	CA	Shock	Shock	Shock	Shock
Imaging	ACP	ACP + CFV thrombosis	ACP	ACP	ACP	ACP
Complications	–	–	–	–	Femoral hemorrhage: 8 RBC transfused	Jugular + femoral hemorrhage: 3 RBC transfused
Immediate effect	No ROSC	No ROSC	60% NE decrease in 1 h	Persistent shock	Persistent shock	80% NE decrease in 3 h
Vital status	Death	Death	Death 3 days later	Death 2 days later	Death 3 days later	Alive at 7 days

All clinical characteristics are reported before initiation of rescue therapy.

Abbreviations: ACP: acute cor pulmonale, BMI: body mass index, CA: cardiac arrest, CFV: common femoral vein, h: hour, LMWH: low molecular weight heparin, MV: mechanical ventilation, NA: not applied, NE: norepinephrine, PC: platelet concentrate, PE: pulmonary embolism, PP: prone position, PR: prothrombin ratio, RBC: red blood cell, ROSC: return of spontaneous circulation, SAPS II: simplified acute physiology score II, UFH: unfractionated heparin, VV-ECMO: veno-venous extracorporeal membrane oxygenation.

despite veno-arterial extracorporeal membrane oxygenation (V-A ECMO) support. Fibrinolysis in patient #4 did not resolve shock, requiring V-A ECMO. Circumstances of CA were typical: during prone to supine position mobilization (#2) or after tracheal intubation (#1). Chest compressions were performed during 1 h after therapy, without return of spontaneous circulation. Among survivors, thrombolytic therapy was complicated with major hemorrhage requiring transfusion.

Here, we discuss on the interest of fibrinolysis, because no specific report is available to date in the setting of COVID-19. Since high incidence of thromboembolic events (25–40%) was reported in SARS-CoV-2 patients,¹ the majority of our ICU patients was treated with therapeutic doses of anticoagulant agents. Whereas systemic fibrinolysis is the treatment of choice in PE-related shock or CA in the absence of contraindication,² how could this poor outcome be explained? First, PE may be oversuspected, because ACP does not systematically mean PE diagnosis. Indeed, ACP can be described in as many as 22% cases of acute respiratory distress syndrome (ARDS) due to lung vascular dysfunction driven by inflammation, thrombosis, fluid overload and two hits (pneumonia and mechanical ventilation).³ Risk factors of ACP are pneumonia as cause of ARDS, severe hypoxemia, hypercapnia, elevated driving pressure, all these elements being encountered in the most severe COVID-19 patients. Second, poor prognosis could be the consequence of deleterious association of 2 severe conditions, namely, ARDS and PE-related shock or CA. At least, COVID-19 pneumonia is to date a dreadful disease, with around 50% mortality in ICU.⁴

In conclusion, despite favorable benefit/risk ratio in medical patients, we highlight that rescue systemic fibrinolysis in suspected PE is associated with poor outcome and that ACP should not always lead to PE diagnosis. To our sense, lower limbs ultrasound should systematically complete echocardiography to search for venous thrombosis, providing further clues for PE diagnosis in case of shock/CA.⁵ Further studies are required to appreciate the place of systemic fibrinolysis during SARS-CoV-2 pandemic.

Ethics approval and consent to participate

Approval to analyze these data was granted by the local ethic committee. The need for informed consent was waived in view of the retrospective nature of the report.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

Funding

The authors received no funding related to this manuscript.

Authors' contribution

AL and NM wrote the manuscript. CA collected patients' data. All authors took care of the patients, read and approved the final manuscript. NM conceptualized the main letter and proofread the contents.

Acknowledgements

Not applicable.

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Received 9 May 2020

<http://dx.doi.org/10.1016/j.resuscitation.2020.05.020>

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