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Letter to the Editor

Barotrauma in Patients with COVID-19 Infection on Invasive Mechanical Ventilation

Hakan Abdullah Özgül[1], Naciye Sinem Gezer[1], Begüm Ergan[2], Ali Necati Gökmen[3]

[1]Department of Radiology, Dokuz Eylul University, Faculty of Medicine, Izmir, Turkey
[2]Department of Pulmonology, Dokuz Eylul University, Faculty of Medicine, Izmir, Turkey
[3]Department of Anaesthesiology, Dokuz Eylul University, Faculty of Medicine, Izmir, Turkey

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Dear Editor,

The novel coronavirus defined as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was first identified in Wuhan, China, in December 2019 and spread worldwide from there [1]. The World Health Organization named the disease caused by SARS-CoV-2 the coronavirus disease 2019 (COVID-19) and declared this outbreak a pandemic in March 2020 [2]. The first case in Turkey was officially announced on March 10, 2020 [3].

Although finds from radiological imaging are not used as a criterion in the diagnosis of COVID-19, chest X-ray (CXR) and computed tomography (CT) have been frequently used as useful examinations in practice. Typical CT findings frequently seen in COVID-19 pneumonia are well defined in the literature [4]. COVID-19 usually presents with multifocal patchy or nodular ground-glass opacities and/or consolidations that are usually bilateral, peripheral, and basal in distribution [1].

Beyond pulmonary parenchyma findings, a study by McGuiness et al [5]. reported that the frequency of pneumothorax, pneumomediastinum, and pneumopericardium increased 30 times in COVID-19 patients treated via invasive mechanical ventilation (IMV) compared to a non-COVID-19 group. These barotraumas prolong hospital stay and increase mortality rates.[5] We encountered a few similar cases in our hospital and wanted to present one of them to draw attention to this issue.

A 52-year-old male patient with reverse-transcription-polymerase-chain-reaction-confirmed COVID-19 pneumonia was admitted to the intensive care unit (ICU) with the diagnosis of acute respiratory failure and possible acute respiratory distress syndrome after 10 days of hospitalization. Just after admission, he was intubated by the ICU team, who were experts on this. It was noted that the patient had a difficult airway, and the third attempt at intubation was successful. Control portable CXR after intubation was negative for any complications, including pneumothorax. The patient was afterwards ventilated with the lung-protective ventilation protocol.

On the third day of admission, it was observed that the hypoxemia of the patient worsened despite a high FiO_2 application, and physical examination revealed subcutaneous crepitations with palpation concordant with subcutaneous emphysema in the torso of the patient (Table 1). Thereupon, a portable CXR was taken, and the continuous diaphragm sign was seen as a sign of pneumomediastinum (Figure 1A). The chest CT obtained after the patient was stabilized showed extraluminal gas of pneumomediastinum and widespread subcutaneous emphysema (Figure 1B-D).

Based on our experience and data in the literature, it should be kept in mind that barotraumas are more common in COVID-19-positive patients than in non-COVID-19 patients. We emphasize that in ICUs particularly, caution should be exercised in the presence of sudden clinical worsening, arterial oxygen saturation lowness, and subcutaneous crepitations in COVID-19 patients receiving treatment with IMV. In such cases, it would be beneficial for patient management to use CXR first to diagnose possible barotraumas.

Address for Correspondence: Hakan Abdullah Özgül, Department of Radiology, Dokuz Eylul University, Faculty of Medicine, Izmir, Turkey
E-mail: haozgul@hotmail.com

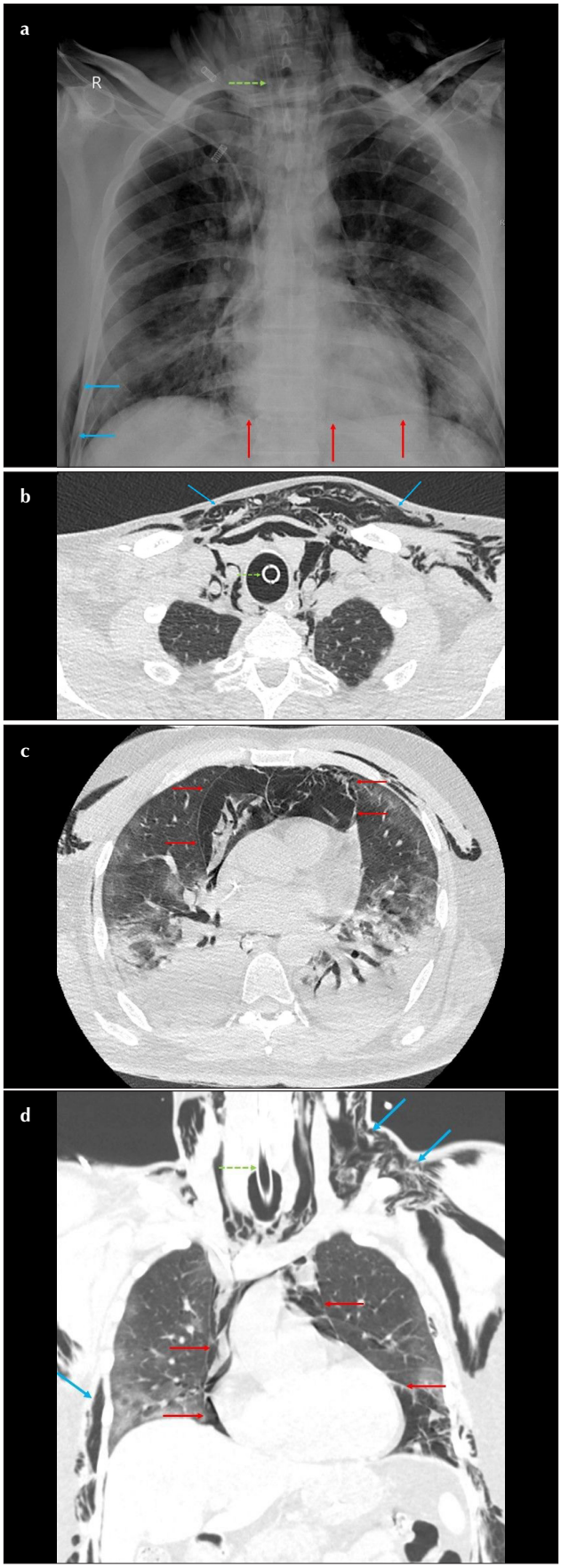

Figure 1. a-d. 52-year-old male patient's portable chest X-ray (a), axial (b and c), and coronal (d) images of non-contrast-enhanced chest CT show intubation tube (dashed green arrow), subcutaneous emphysema (blue arrows), and pneumomediastinum (red arrows).

Table 1. Mechanical ventilation settings and ABG values used for a 52-year-old patient

	After intubation	Day 1	Day 2	Day 3
Ventilation mode	PC SIMV	APRV	APRV	APRV
Frequency	12	NA	NA	NA
PEEP (cmH_2O)	5	0	0	0
Inspiratory pressure	18*	22	24	22
I/E ratio	1/2	5.4/1	5.4/1	5.4/1
FiO_2	0.55	0.6	0.6	0.6
Minute ventilation (L/d)	6	8	8.7	8.5
ABG values				
pH	7.34	7.26	7.33	7.27
$PaCO_2$ (mmHg)	62	58	43	63
PaO_2 (mmHg)	74	73	66	71
HCO_3 (mEQ/L)	30	22	22	25
Sat O_2 (%)	96	91	92	95
Lactate (mmol/dL)	2.5	2.8	2.2	2.7

*Inspiratory pressure was adjusted to a target tidal volume of 6 mL/predicted body weight.
ABG: arterial blood gas; APRV: airway pressure release ventilation; FiO2: oxygen fraction in inspired gas; I/E Ratio: inspiratory/expiratory time ratio; PC: pressure control; PEEP: positive end-expiratory pressure; SIMV: synchronized intermittent mandatory ventilation

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