International Journal of Medical Arts

Volume 4, Issue 8, August 2022

https://ijma.journals.ekb.eg/

Print ISSN: 2636-4174

Online ISSN: 2682-3780

Available online at Journal Website
https://ijma.journals.ekb.eg/
Main Subject [Critical Care]

Case Report

A Single Intensive Care Experience for Early Awake Proning in A Non-Intubated Patient During the COVID-19 Pandemic

Sameh Seyam [1]*, Rajini Ashok [2], Mohamed Abdelhamid [3], Islam Elkousy [3], Hassan Razein [4], Anurag Ayachit [5]

[1] Department of Anesthesia and Intensive Care, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

[2] Department of Internal Medicine, Zulekha Hospital, Dubai, United Arab of Emirates.

[3] Department of Critical Care Medicine, Zulekha Hospital, Dubai, United Arab of Emirates.

[4] Department of Pulmonology, Zulekha Hospital, Dubai, United Arab of Emirates.

[5] Department of Radiology, Zulekha Hospital, Dubai, United Arab of Emirates.

Article information

Received: 22-09-2022

Accepted: 26-10-2022

DOI: 10.21608/IJMA.2022.164692.1516

* Corresponding author

Email: sameh_icu1@yahoo.com

Citation: Seyam S, Ashok R, Abdelhamid M, Elkousy I, Razein H, Ayachit A. A Single Intensive Care Experience for Early Awake Proning in A Non-Intubated Patient During the COVID-19 Pandemic. IJMA 2022 August; 4 [8]: 2564-2569. doi: 10.21608/IJMA.2022.164692.1516

ABSTRACT

Background: Proning is an evidence-based method that has been used frequently in patients diagnosed with ARDS. There is scarce evidence on the prone positioning of alert patients who are not on a mechanical ventilator.

Case presentation: A 59-year-old male patient presented to the emergency room complaining of respiratory distress. The findings from the CT scan was consistent with coronavirus pneumonia. The patient tested positive for SARS- Cov-2 after RT-PCR amplification testing. The laboratory findings were within the normal limits apart from the partial arterial oxygen pressure [PaO_2] which was relatively low. The patient was started on Favipiravir, multivitamins, anti-PUD, and anti-DVT prophylaxis. The patient was transferred to ICU on the 2nd day on NIMV because of deoxygenation and started on Methylprednisolone, Interferon Alpha 2B, Camostat mesylate, and Levofloxacine. The patient was instructed to be in a proning position. A sample of arterial blood gas [ABG] was taken two and three hours following proning, and throughout the patient's stay in the ICU, the findings revealed perfect outcomes during the prone position. As a result, the patient was transferred from the ICU to the normal ward. On the 21st day after hospital admission, the patient was discharged.

Conclusion: Prone positioning is associated with improved oxygenation as reported in several case reports and case series.

Keywords: Proning; Pneumonia; COVID-19.

INTRODUCTION

Prone positioning is an evidence-based method that has been used frequently in patients diagnosed with acute respiratory distress syndrome [ARDS] and under invasive mechanical ventilation [1]. However, as **Sartini et al.** [2] provide, there is scarce evidence on the prone positioning of alert patients who are not on a mechanical ventilator. During the COVID-19 pandemic, observational evidence was the basis for the prone positioning of awake non-intubated patients with COVID-19 [3].

This study provides a case study of outstanding managing of an alert non-intubated patient with COVID-19 pneumonia using early awake-proning.

CASE PRESENTATION

The ethical committee of Zulekha hospital, Dubai approved this case study to be published. A 59-year-old male patient presented to the emergency room complaining of fever, chest discomfort, and breathlessness. He did not have any medical comorbidities or tobacco smoking. The findings from the CT scan of the patient's chest indicated "Bilateral multiple patchy areas of air space opacifications with some areas showing crazy paving appearance seen diffusely scattered in the bilateral lung parenchyma in peripheral and peri-bronchovascular scattering, atelectatic bands are seen in the right middle lobe, inferior lingula and anteromedial basal segment of left lower lobe, right pleural effusion, CT severity score 14/24 and CORADS score of 6" suggesting coronavirus pneumonia [Figure 1].

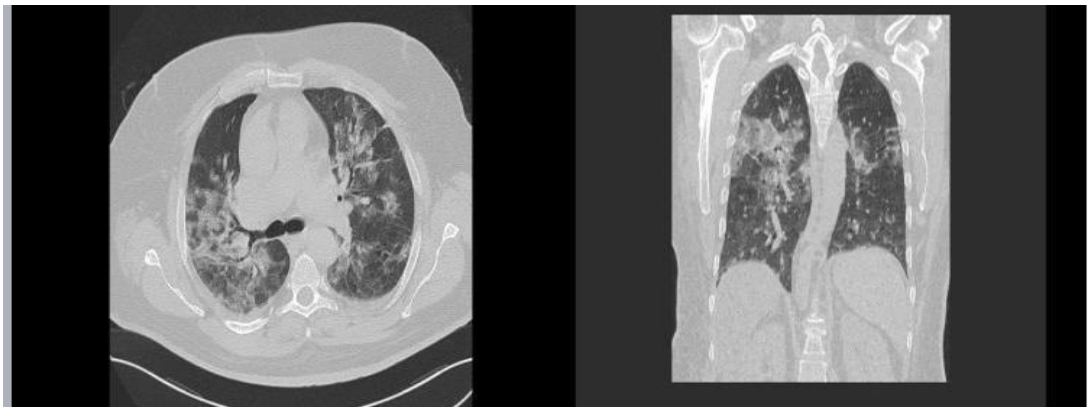

Figure [1]: CT Chest observations in both AX and COR sections at admission time

Additionally, the patient tested positive for SARS- Cov-2 after RT-PCR amplification testing. During admission, the patient's vital parameters were within normal limits, and also the findings from the physical examination were normal; however, chest auscultation revealed bilateral pulmonary coarse crepitations and wheezing. Trans-thoracic Echocardiography was done for the patient with mild concentric left ventricular hypertrophy, dilated left atrium, trivial mitral regurgitation, mild tricuspid regurgitation, and mild pulmonary hypertension [PASP 35mmHg] [Figure 2].

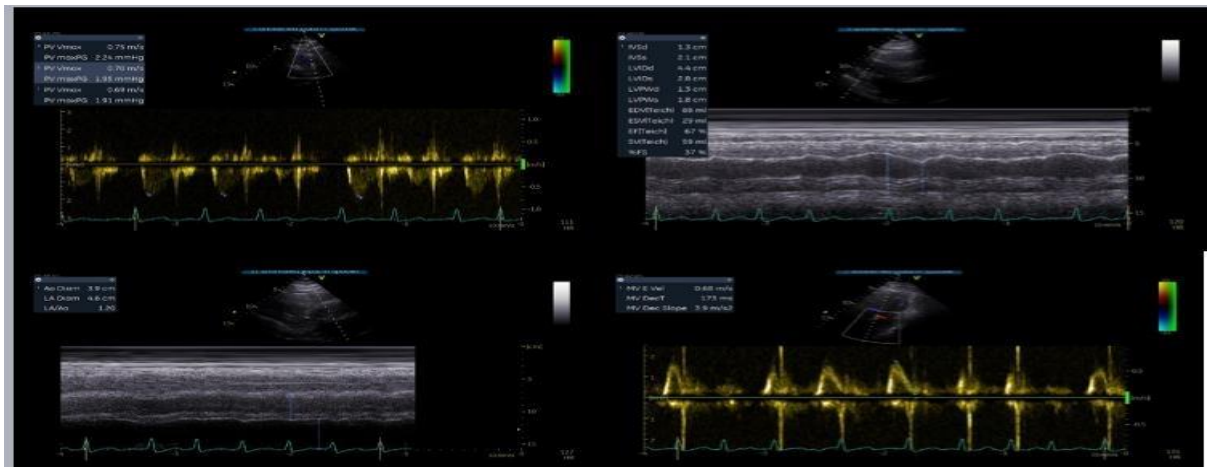

Figure [2]: Trans-Thoracic Echocardiography findings.

The laboratory findings were also within the normal limits apart from the partial arterial oxygen pressure [PaO2] which was relatively low.

The patient was then moved to a specialized COVID-19 unit within the hospital for further management. The patient was prescribed and administered Favipiravir [600 mg twice /day orally], in addition to multivitamins, anti-peptic ulcer disease [PUD], and anti-deep venous thrombosis [DVT] prophylaxis. The oxygenation of the patient worsened and as a result, the patient was transferred to the intensive care unit [ICU] isolation area on the 2nd day after admission. During the transfer, the patient was connected to non-invasive mechanical ventilation [NIMV] in the semi-setting position to maintain saturation [Spo2].

The patient was then started on Methylprednisolone [32 mg once/day orally], Interferon Alpha 2B [10 million international units twice/day by nebulization for 4 days], Camostat mesylate [200 mg three times/day orally for 5 days], and Levofloxacine [500 mg once/day orally for 5 days.

Additionally, after ICU admission, the patient was instructed to be in a "proning position" according to the patient's comfort. Therefore, throughout his stay in the ICU, the patient was maintained in the prone position as much as possible. Following the placement of the patient in the prone position, a sample of arterial blood gas [ABG] was taken two and three hours following proning, and throughout the patient's stay in the ICU, the findings revealed perfect outcomes during the prone position. The "awake early self-proning" was maintained throughout the patient's stay in the ICU [Table 1and Figure 3].

Table [1]: Serial arterial blood gases throughout the ICU stay

ABG TIME		PH	PO2	PCO2	HCO3
Day 1	Semi sitting position	7.44	71.3	29.6	24.8
	2 hours after proning	7.46	80.9	34.1	24.3
	3hours after proning	7.42	98	32.6	23.3
Day 3	Semi sitting position	7.44	70	33.8	25
	2 hours after proning	7.44	74.0	40.1	26.0
	3hours after proning	7.45	101.1	34.1	25.4
Day 9	Semi sitting position	7.39	71.3	39.3	26.0
	2 hours after proning	7.44	80.9	35	26
	3hours after proning	7.39	102	37	25.5
Day 12	Semi sitting position	7.44	63	41	28
	2 hours after proning	7.43	79	39	27
	3hours after proning	7.45	109	36	27
Day 14	Semi sitting position	7.47	61	39	28
	2 hours after proning	7.43	81	40	26.5
	3hours after proning	7.35	118	34	24
Day of discharge	Semi sitting position	7.41	122	40	24.5

During the time of his ICU stay, the patient was on supplemental oxygen aiming to keep PaO_2 55 to 70 mmHg; SpO_2 88 to 92%. Observations revealed that his partial oxygen tension, as well as peripheral oxygen saturation, significantly improved after every awake proning. Arterial blood gas samples indicated improved oxygenation as evidenced by increasing PaO_2 and peripheral oxygen saturation. The patient did not need any anxiolytics during prone positioning. Intermittent chest X-rays were performed during the patient's stay in the ICU with clear improvement in both lung fields [Figures 4, 5].

RT-PCR amplification tests were repeated on days 3,9 and 14 of his ICU stay. All tests came out positive except for the last one came negative for SARS-Cov-2. On the last day in the ICU, the patient was gradually weaned off supplementary oxygen. No reported side effects from proning as the patient was self-proning. His O2 saturation level was at 97% and the chest radiography revealed significant improvement. As a result, the patient was transferred from the ICU to the normal ward. On the 21st day after hospital admission, the patient was discharged.

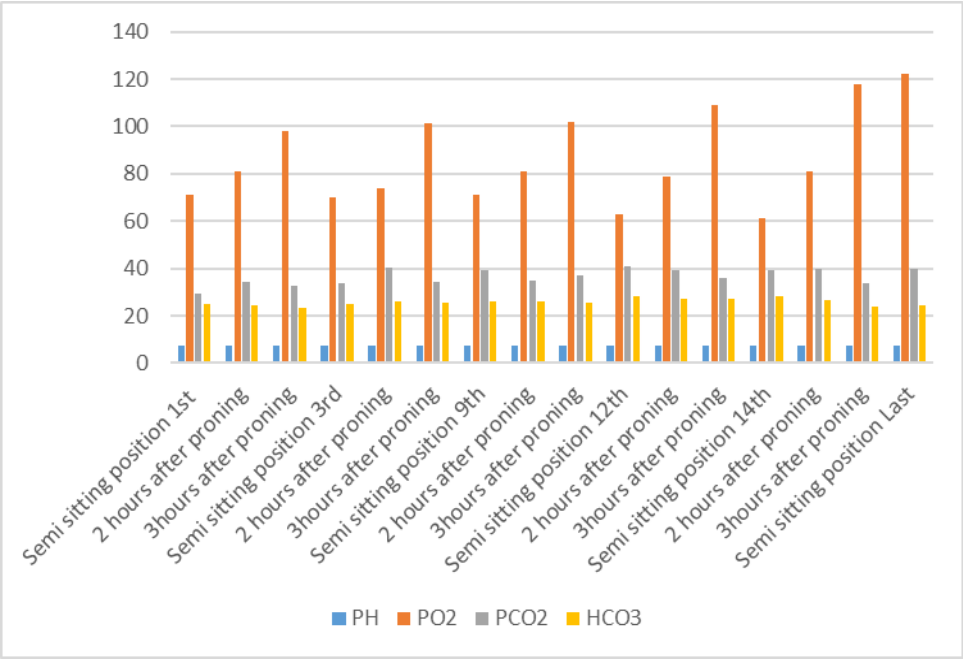

Figure [3]: Serial arterial blood gases throughout the ICU stay

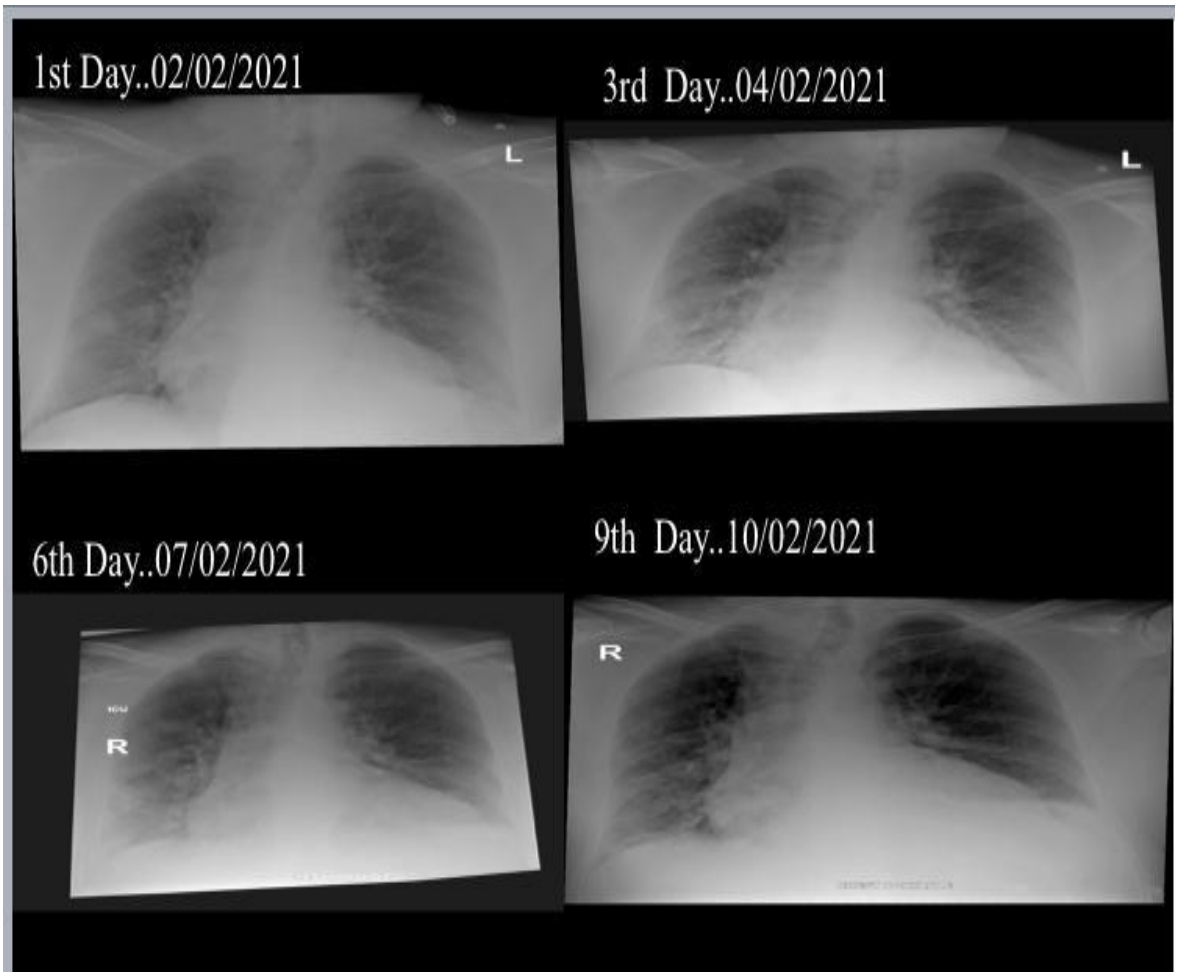

Figure [4]: Serial chest x-ray on the 1st, 3rd, 6th, and 9th day

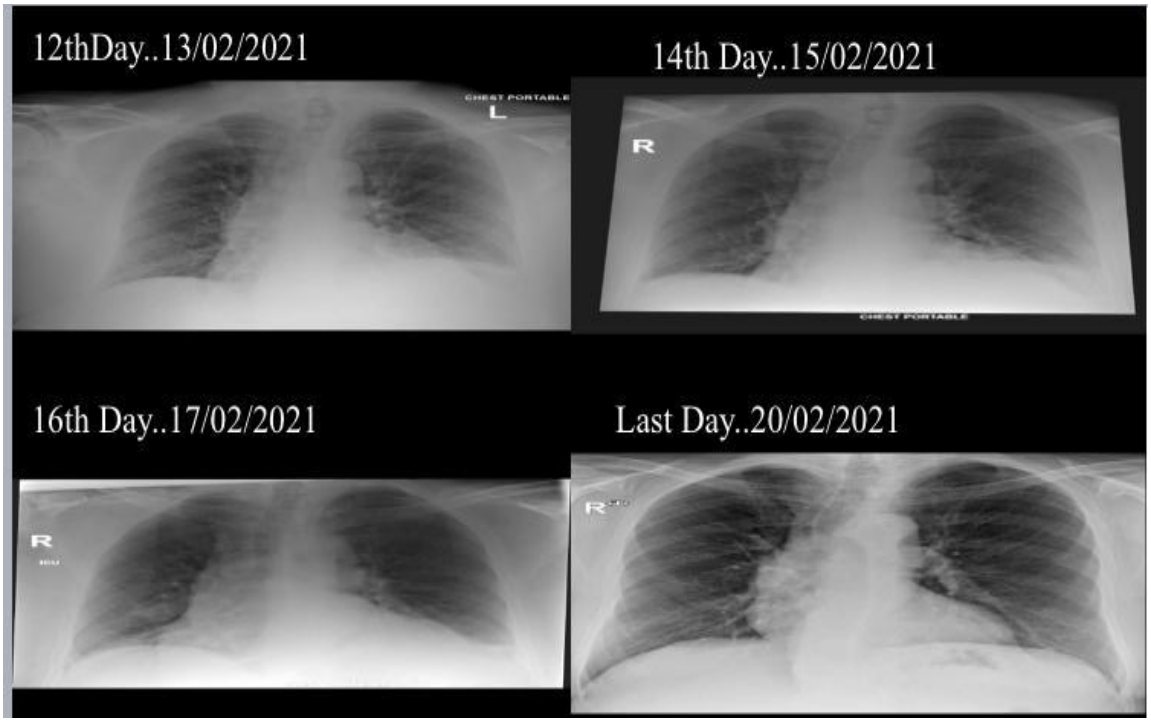

Figure [5]: Serial chest x-ray on 12th 14th, 16th, and last day

DISCUSSION

Studies showed that prone positioning improves secretion management, supports alveolar recruitment, and decreases ventral-dorsal transpulmonary pressure [4]. According to **Ding *et al.*,** [5] prone positioning for an alert patient is a simple intervention that does not require additional charges, additional work-force, or special devices. However, **Scholten *et al.*** [6] concluded that proning increases the risk of microbial contamination of the patient's environment, and alerts that proning is refuted in some situations such as vomiting, spinal instability, delirium, unstable chest injuries, and fractures on the face or pelvic bone.

A study by **Thompson *et al*.** [7] indicated that prone positioning significantly improves oxygenation in alert non-intubated patients diagnosed with COVID-19 and experiencing type I respiratory failure. This is consistent with the findings from the current study as the case study shows that prone positioning significantly improved oxygenation for the patient. Similarly, findings from the study by **Pavlov *et al.*** [8] indicated that awake prone positioning for non-ventilated oxygen-dependent diagnosed with COVID-19 showed improved oxygenation and decreased need to be mechanically ventilated.

Jayakumar *et al.* [9] also demonstrated that early use of self-proning improved oxygen saturations in alert non-intubated patients diagnosed with COVID-19. The study by **Argenziano *et al.*** [10] further demonstrated that oxygenation significantly improved in patients who were able to remain in the prone position for over 3 hours. Similarly, a study by **Elharrar *et al*.** [11] evaluated the prone positioning of non-invasive ventilated patients with COVID-19 and the findings showed improved oxygenation levels. Therefore, the reviewed studies support the case study findings where the oxygenation and health status of the patient improved with prone positioning.

The findings and limitations of all reviewed studies were comparable. For example, all the studies showed oxygenation improvement with awake pruning. The main limitation in all studies was the small sample size and lack of control groups.

Unlike the reviewed studies, early awake self-proning in the patient in the case study was applied. The patient reported that prone positioning was very comfortable and the most preferable position while in the ICU. The reviewed studies did not have specific exclusion criteria in awake prone positioning and thus this study concludes that awake prone positioning can be used in the majority of patients diagnosed with COVID-19. From the findings from the current case study, comfort seems to be among the most essential aspect of the duration of awake prone positioning.

Despite the promising findings, there are still gaps regarding the prone positioning of awake patients with COVID-19. Therefore, further research needs to be conducted on the criteria to use to identify suitable candidates for awake prone positioning, the optimal duration, and timing of awake prone positioning and if prone positioning fails, and monitoring of prone positioned patients to avoid any delay in intubation in case the proning fails [12].

Conclusion: Even prone positioning is associated with improved oxygenation as reported in several case reports and case series, and particularly in the current case presentation, further research is needed to determine the appropriate use of prone positioning for wake patients diagnosed with COVID-19.

Recommendation: Early awake proning is recommended as an early effective management of COVID-19 pneumonia.

Conflict of interests and Funding support: None.

Abbreviations: ARDS [acute respiratory distress syndrome, ICU [intensive care unit], RT-PCR [real time- polymerase chain reaction], PUD [peptic ulcer disease], DVT [deep venous thrombosis], ABG [arterial blood gases], PaO2 [partial pressure of oxygen in arterial blood], SARS-CoV-2 [severe acute respiratory syndrome coronavirus 2], NIMV [non-invasive mechanical ventilation], CT [computed tomography], CORADS [a categorical assessment scheme for suspicion of pulmonary involvement of coronavirus disease 2019], PASP [pulmonary artery systolic pressure], SPO2 [oxygen saturation].

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https://ijma.journals.ekb.eg/
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