The Effect of Prone Position on Patients with Covid-19: Case Study

Selda Sokoli Veizaj[1]

Aida Zotaj Lako[1]

Ersida Bode[2]

[1]Department of STM, Faculty of Professional Studies,
Aleksandër Moisiu University,
Durrës, Albania
[2]University Hospital Obstetrics-Gynecology
'Queen Geraldine' Anesthesiologist,
Tiranë, Albania

Abstract

Purpose: Evaluation of the prone position in the awake patient with a nasal cannula and diagnosed with Covid-19 in improving oxygen saturation. Methodology: Case study of a patient diagnosed with Sars Cov-2, Covid-19 through a pulmonary Ct with bilateral pneumonia and initial value of C-Reactive protein=38.01mg/l. This patient was treated in outpatient conditions (at home) in the period of October 2020. Result: The standard deviation in terms of oxygen uptake from day one to day eight had significant improvements from SD=94±1.8Sa(O2) to SD=95.7±2.0Sa(O2). Also, nasal cannula oxygen levels had significant reductions from SD=4.1±0.4 liters on day 1 to SD=1.2±0.2 liters. The pvalue results are significant with a value of p=<0.001, so the prone position was better compared to the supin position. Conclusion: The prone position in our patient's case was effective in improving blood oxygen saturation.

Keywords: *Covid-19, Prone position, Mechanical ventilation, ARDS*

1. Introduction

Sars Cov-2 Covid-19 was first identified in China in December 2019(3). It was identified as a coronavirus that had >95% homology to the bat coronavirus and >70% similarity to SARS-CoV(3). The disease advanced and spread rapidly from December 31, 2019 in Wuhan, China to Italy in March 2020 and then with a global spread, resulting in a pandemic(5). It is a respiratory disease, from a mild flu-like illness to severe forms of acute respiratory distress (ARDS), requiring mechanical ventilation(4). Patients requiring additional ventilation are referred for decreased blood saturation levels. (4). Our patient diagnosed by lung scanner with severe pneumonia, 40% affected right lung and 25% affected left lung. Pneumonia is the most common reason for hospitalization of patients with (COVID-19), and many such patients will require supplemental oxygen.(6)

Many studies have suggested that prone positioning can improve oxygenation in patients with decreased blood oxygen saturation who may be on nasal cannulae.(6)

Prone positioning is combined with the use of pillows or blankets on pressure points, such as the upper thorax and pelvis, which can increase the comfort and tolerance of the prone position and on the other hand relieve increased intra-abdominal pressure that can be transferred to the lungs. It is recommended that patients who breathe by nasal cannulae and can spontaneously change the position of the head and arm at least every 2 hours to avoid pressure injuries. (6) In order to prevent the urgent need of patients with covid-19 for oxygen due to acute respiratory injury, there was an urgent need for intervention before patients undergo intubation. (7)

2. Study Method

This is a case study,,treated in ambulatory conditions (home). The 37-year-old patient diagnosed with Sars Cov-2 in October 2020, Tirana through pulmonary Ct with bilateral pneumonia and with an initial value of C-Reactive protein=38.01mg/l positive result for SARS-CoV2-RNA and needed for oxygen on the 9th day after the first symptom. The variables that the patients measured were temperature, respiratory rate, oxygen saturation every 30 minutes on the first day to the third day post placement of the nasal cannula and every 50 minutes from the third day to the 7th day.

The prone position was explained to the patient and advised to remain in the prone position as much as possible during the first few days of intubation. The target time in the prone position was at least 15-20 hours per day. The specific medical treatment of the patient was with Cefoxin 400mg, tavanic, dexamethasone and xarelto with low molecular weight.

3. Result

The specific data of the patient included in the study are summarized in table number 1. The patient's age is 37 years, male without other accompanying diseases. The time from the first symptom to the urgent need for oxygen by nasal cannula was 9 days, where the blood saturation level reached 87 units of measurement. One day after the placement of the nasal cannula, the patient was placed in the prone position for at least 15-20 hours a day, asking him to change the position of the head in the prone position and the hand position at least every 2 hours. During the stay, small pillows and towels are placed on the patient's prone to reduce upper thoracic and pelvic pressure. The patient for a period of 8 years was a passive smoker. The patient required oxygen 3-5 liters/min, and the mode of receiving oxygen was through an oxygen machine with a nasal cannula.

Table 1:

Age	37 years old
Gender	Male
Time between first symptom and need for nasal cannula	9 days
Time between placement of nasal cannula and prone positioning	1 days
Smoking history : Passive smoker	8 years
Mode of receiving oxygen	Nasal cannula
The quantity per liter of oxygen	3/5 liters
Duration of keeping the nasal cannula	10 days

Table 2:

Nasal cannula retention days	The temperature	Saturation of in supine	Saturation of in prone	Liters of oxygen taken	
Day I	37,4 ˚C	SD=94	±1,8Sa(O2)	SD=4,1	±0,4l
Day II	37,6 ˚C	SD=93 ±1,4 Sa(O2)		SD=3,2 ±1l	
Day III	37,7 ˚C	SD=93,4 ±1,2Sa(O2)		SD=3,1±0,8l	
Day IV	36,7 ˚C	SD=94±1,5 Sa(O2)		SD=2,2 ± 0l	
Day V	36,6 ˚C	SD=94,6±1,3Sa(O2)		SD=2,1±0,3l	
Day VI	36,5 ˚C	SD=94,8±2,2 Sa(O2)		SD=1,8±0,4l	
Day VII	36,3 ˚C	SD=95,5 ±2,2Sa(O2)		SD=1,5±0,3 litra me shkëputje	
Day VIII	36,3˚C	SD=95,7±2,0Sa(O2)		SD=1,2±0,2l	

Table number two summarizes the data of temperature and blood oxygen saturation during six days in the most critical situation of the patient in our study.

In the Graph number three shows the oxygen level ¼e Sao2 in the prone position during the day, at night and in the supine position during the day from the first day to the eighth day. We notice that the oxygen saturation level from the first day to the eighth day begins increases progressively both in the prone position during the day, at night and in the supine position. We notice the most obvious changes in the first two days of treatment between the supine position on one side and the prone position during the day and at night. This was also influenced by the weight of gravity and the pressure that was applied on the lungs during the previous nine days where the patient did not lie down even though his health condition was not good. In the following of treatment , we notice from the third day to the ninth day that the oxygen saturation values are very close between the two positions. However, the saturation values in the prone position at night are relatively higher compared to the prone position during the day. If we compare the saturation values with the prone position with that of the supine position, we appreciate that there are obvious differences between them. According to the ready-made Excel formulas, the p values were significant, the prone position was effective compared to the supine position, $p = {<}0.001$.
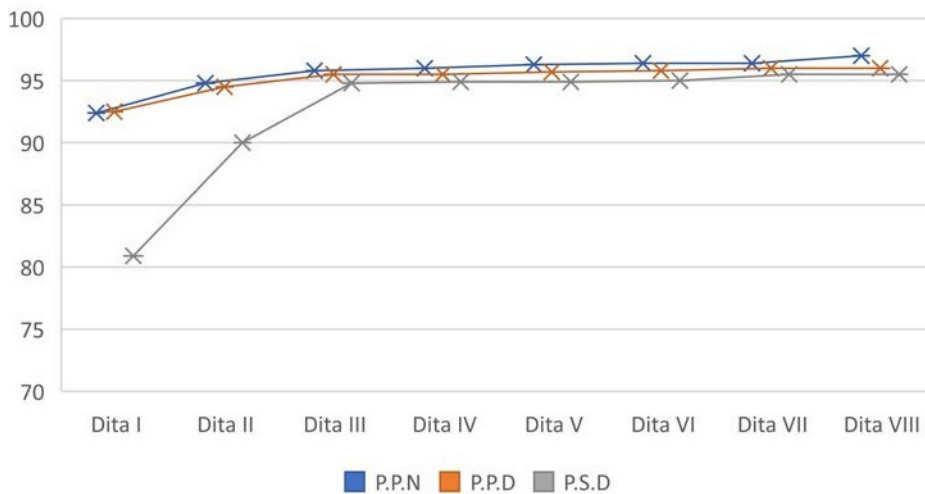
P.P.N *(prone position by night); P.P.D*(prone pozition by day); P.S.D *(supin position by day)

Graph 1: Evaluation of the oxygen level in the 8 days of treatment in supine and prone position

4. Discussion

In our case study in the patient diagnosed with COVID-19, evident improvements were observed between the prone and supine positions, and there were even minimal differences between the daytime and nighttime positions. Oxygen saturation values were relatively higher at the prone position at night compared to day. There are many studies that are positive about the effectiveness of the prone position compared to the supine position, however there are also studies that do not affirm the effectiveness of the prone position. In the (M.D., et al 2020)[7] study was evaluated by any additional cost the application of patient , especially in low- and middle-income countries. This study guarantees fast but also complete of prone position in patients at risk for intubation(7). In the study by (Anna Coppo et al 2020)[2], they concluded that prone position of patients was safe and feasible in most of them, and that it significantly improved physiological measures of oxygenation, although this effect was lost after returning to the supine position. They found that early prone position and the inflammatory response are associated with maintenance of improved oxygenation. Patients who responded to prone position had no significant difference in intubation rate compared to non responders(2).

In the study by (Prabhanjan Singh et al 2020) [4], prone position of awake patients showed significant improvement in P/f ratio and SpO2 in patients with COVID-19 with improvement in clinical symptoms and minimal complications(4).

In the study by (Kevin Venus et al 2020)[6] , the evidence for the effectiveness of the prone position was judged to be of low quality. Good evidence and data are needed to guide patient choice regarding when to start and stop prone position(6). Meanwhile in the study of Liji Thomas suggests that the prone position is associated with a lower risk of intubation and mortality in hospitalized patients with COVID-19.

In the study of (Luciano Gattinoni et al 2001)[9], the prone position improves oxygenation but does not improve survival.

In the study of (Franco Valenca et al 2005)[8] concluded that the prone position delays the progression of lung damage caused by mechanical ventilator. In the study of Luciano et al, regardless of the time in which it was carried out in August 2001, reflect on the effectiveness of the prone position in patients with acute respiratory injuries, in improving arterial oxygen, even they testified to a limited number of complications that this position brings.The prone position may be considered beneficial for patients with severe hypoxemia(9).

5. Conclusion

Our study results in improved oxygen saturation in our patient with COVID-19. The special in our case was the greatest improvement of the saturation especially during the night position, as well as there were visible changes between the daytime and prone positions. However, due to the inclusion of only one patient, we cannot be sure if the prone position affects alone or in combination with drug therapy effective in improving oxygen saturation.

6. Limitations

First, our study is a case study and the sample number is limited and the risk of bias is high. Second, we are not sure whether the improvement of oxygen saturation was influenced by the prone position or by the course of the disease, age, medical treatment applied in our patient. In the future studies, it is thought that a retrospective study with a larger number of patients, followed in the German Hospital, will be carried out.

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