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RESEARCH ARTICLE

EFFECTIVENESS OF PRONE VENTILATION IN AWAKE, NON-IN TUBATED COVID 19 PATIENTS IN A TERTIARY CARE CENTRE IN RAJASTHAN

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ABSTRACT

Background: India witnessed a disaster in the form of covid in 2020-21 crippling the healthcare system like never before. With multiple waves happening consecutively with unexpected death rates, hospitals couldn't make arrangements for the overspill from the ICU under such short notice. Awake proning which is an accepted treatment modality for mechanically ventilated ARDS patients was adopted into the treatment protocol of most of the hospitals with the hypothesis that it would delay the escalation of respiratory support, ICU admissions and intubation. **Methods:** We conducted a longitudinal study and evaluated the effectiveness of awake proning in terms of improvement in oxygen saturations, incidence of ICU admissions and death rates in non-intubated patients managed in general covid care wards. Chi square test and paired t test was applied for statistical analysis. **Results:** All patients who could tolerate prone positioning for at least an hour had significant improvement in oxygen saturation with significant decrease in ICU admissions and death rates. The death rate among successfully proned patients were 6.4% in comparison to 66.6% in patients who couldn't maintain prone. Best results were obtained in patients who tolerated prone positioning for more than 1 hour. **Conclusions:** Incorporating awake proning into the treatment protocol has significantly reduced the freight on Intensive care units by being able to manage notable number of patients in the general wards.

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INTRODUCTION

Ventilation in the supine position results in gravitational forces that may increase pulmonary oedema and atelectasis in posterior lung zones. Abdominal organs displace the posterior diaphragm superiorly, exacerbating posterior lung collapse. ⁽²⁾ Defective hypoxic pulmonary vasoconstriction may also contribute to ventilation/perfusion (V/Q) mismatch. ⁽³⁾ Prone positioning refers to making the patient to lay with face down onto their anterior chest and abdomen with appropriate cushioning over pressure points.

METHODS

Patient selection: A longitudinal study was conducted in general covid care wards of government medical college Kota during the time period of April 2021- May 2021 after taking verbal informed consent from the patient.

Laboratory-confirmed SARS-CoV-2 infection as determined by PCR and/or CT scan showing typical radiological findings (ground glass abnormalities) with a need for O₂ 3L/min to get an SpO₂ higher or equal to 93% or not maintaining 93% in room air were included in the study. Patients requiring immediate intubation, with cardiovascular instability, altered consciousness, pregnancy or other factors rendering proning unsafe were excluded. Ethical clearance was taken from the concerned authority of institution.

Evaluation and follow-up: Prone positioning (PP) was initiated in the ward with recording of baseline oxygen requirement, oxygen saturation, extent of dyspnoea. Proned patients were instructed to alternate between prone and supine for a minimum duration of one hour for as long as tolerated. Patients were followed up for a period of 2 weeks.

Outcome measures: The outcomes were primarily measured in terms of change in oxygen saturations before, during and 1 hour post proning along with the level of discomfort during

proning, need for ICU admission and number of deaths. No further follow up of patients were done outside the duration of study period. Patients who couldn't successfully complete the proning trial were not excluded from the study and were closely watched for escalation of respiratory support. Two tailed student t- test and chi square or Fischer's exact test were used for statistical analysis.

RESULTS

Patient characteristics: A total of 41 patients were enrolled out of which 31 patients were successfully prone for 1-hour sessions for as long as tolerated. The reasons for intolerance to proning were respiratory distress (90%) and morbid obesity (10%). Out of the 10 patients who failed to prone, three patients were maintained on oxygen via non-rebreathing mask, seven patients were in Bain circuit and one in NIV support. Three patients could not tolerate proning for more than three hours a day. The remaining patients (68.3%) tolerated an average of 6 to 8 hours of proning a day. The Patient demographics are given in Table 1.

Table 1. Demographics of Patients

Characteristics	Proning < 1 Hrs (10)	Proning 1-3 Hrs (3)	Proning > 3 Hrs (28)
Male(30)	5	2	22
Female(12)	5	1	6
Oxygen Supplementation			
Room Air	0	1	4
1-3 L	0	0	4
4-8 L	0	0	3
>8 L	3	2	17
Bain Circuit	7	0	0
NIV	1(morbidly obese)	0	0

Table 2. Outcome Measures

	PP<1 HR	PP 1-3HR	PP>3HR
■MEAN SPO2 BEFORE PP	85.5%	79.6	87
■DURING PP	NA	87.6	92.53
■ AFTER PP	NA	89	90.88
■NUMBER OF ICU REQUIREMENT%	100%	66%	14.8%
■ICU ADMISSION %	50%	33%	7.4%
■NUMBER OF DEATHS %	66.6%	33%	3.5%

PP- prone positioning

Outcomes: All patients who could tolerate prone positioning for at least an hour had significant improvement in oxygen saturation from an average of 86.53 to 91% (5.43%) during the period of proning. The mean oxygen saturation one hour post proning showed an improvement to an average of 90.61% from the baseline oxygen saturation in 27 subjects (65.85%, $P<.001$). The changes observed were independent of mode or rate of oxygen delivery. Interestingly, though the discomfort was more during proning, the extent of improvement in oxygen saturation during prone positioning was better compared to re-supination. The outcome measures have been summarised in table 2. Total of 14 patients were found unable to maintain the oxygen saturation achieved during proning on re-supination. Among the successfully prone patients (PP>1 HR) three patients required ICU admission (9.6%) with a death rate of 6.4% ($p=0.0001$). Among patients with PP < 1 hour, 50% required ICU admission with a death rate of 66.6% which is almost double that of the other cohort ($P=0.0001$). No severe adverse effects were noticed. All statistical analysis were performed with IBM SPSS software version 28.0.0.

DISCUSSION

In this study, awake prone positioning was shown to have an impact in reducing the escalation in respiratory support and ICU admissions. The effect was conspicuous in patients who tolerated prone positioning for more than 1 hour. Though oxygenation improved rapidly during the initial proning period itself, a sustained improvement was achieved over a period of 4-7 days of continued proning. The results were consistent with the previous small studied on awake proning in non-intubated patients. No ethical issues were encountered during the study.

LIMITATIONS: There are several limitations to this study. First and foremost is that the sample size is less and there is no control group. It is impossible to know whether these patients would have improved without proning though the improved oxygenation in tolerating patients are more in favour of it. The increased ICU admissions and death rate in patients who failed to prone can also be due to the severity of disease in it is uncertain whether proning would have increased the survival in them. Other factors like comorbidities and severity of illness was not considered due to unavailability of the whole details.

CONCLUSIONS

Incorporating awake proning into the treatment protocol has significantly reduced the freight on Intensive care units by being able to manage notable number of patients in the general wards. It has shown to improve oxygenation significantly with successful weaning to room air in majority.

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KEY POINTS

- The role of proning in mechanically ventilated ARDS patients were already established and has been incorporated into the management strategies
- This study was done to look for the impact of prone positioning in non-intubated covid 19 patients in wards.
- Overlooking the limitations and that the disease severity and co morbidities were not compared, proning was found to bring an improvement in oxygen saturation and decline in ICU admissions in patients managed in general wards.

LIST OF ABBREVIATIONS

ICU – Intensive care unit

PP- Prone positioning

PCR- Polymerase chain reaction

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