Introduction:

Acute respiratory distress syndrome (ARDS), a clinical entity with a high mortality rate, requires aggressive ventilatory management. With a picture compounded with features of septic shock and multiorgan failure (MOF) the overall management becomes a huge challenge indeed. Timely intervention by the critical care team in the form of organ support, intensive invasive monitoring, control of sepsis and use of unique ventilatory strategies like prone ventilation can, however, help salvage some patients.

This was a K/C/O COPD, OSA, Post PCI, admitted with infective exacerbation of COPD, intubated in view of worsening ventilator parameters, developed severe ARDS and MOF managed successfully with prone ventilation and aggressive intensive care.

Case report:

A 65 years old male, K/C/O COPD, OSA, Post PCI, was brought to the Emergency Department with complaints of increased breathlessness associated with fever, chills and rigors for 1-2 days. He has been on domiciliary BiPAP. He also gave a history of allergy to Amoxicillin on reaching the ICU he was fully conscious, had tachycardia (HR 112 bpm), hypertensive (BP 180/90mmHg), respiratory rate of

24 /min, chest had bilateral wheeze on auscultation. Blood gas showed Respiratory alkalosis. His chest X ray did not show any obvious opacity. However, he was breathing with effort. He was put on intermittent BiPAP support. All battery of tests and cultures as per ICU protocol were sent promptly. As per the dynamic hemodynamic parameters, he was fluid resuscitated. Empirical broad-spectrum antibiotics administered. His Echocardiography was performed which showed an of LVEF 55% with no evidence of regional wall motion abnormality with a PASP of 55mmHg. Subsequent days patient showed no signs of improvement, HRCT chest was done which showed bilateral lower lobes and right middle lobe patchy areas of air space opacity with reticular interstitial thickening suggestive of infective etiology (possibility of atypical interstitial pneumonia can be considered).

Following day his general condition worsened, got intubated in view of hypoxia. Soon ventilatory parameters soared high. The P/F ratio being < 150; increasing PEEP & FiO2 requirement > 60%. With all this picture the call to PRONE the patient was taken. He was proned as per ARDS protocol, with low tidal volume of 6ml/kg

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(predicted body wt.) plateau pressure < 30cm H2O. His blood gases were closely being monitored, a Permissive Hypercapnia was maintained, keeping pH > 7.15. A high PEEP of 14-15 was set and Tidal volumes closely being followed. He was being Proned on an average of 16-18 hours a day. Post proning, his blood gases did show improvement yet the periods of time when he remained Supine, respiratory parameters worsened. He had to be proned multiple times as per protocol with needed number of hours being supined as neither chest X-ray nor Ventilator parameters improved. A suspicion of H1N1 was raised and markers for same were sent and empirically was started on Oseltamivir. Meanwhile his cultures were seen to be sterile. His H1N1 too was negative. Although he did not worsen, yet did not show much improvement either. After 5-6 days of proning regularly, his general condition and hemodynamics plummeted, and ventilator parameters increased. At this juncture the option of ECMO was thought of for the patient and the pros & cons of ECMO therapy were discussed to the relatives, however decision on same was pending. Fresh set of cultures were sent and antibiotics upgraded as per the hospital's antibiogram, keeping hospital acquired infections in mind. Blood and the Endotracheal tube grew Klebsiella, antibiotics were modified as per sensitivity. His P/F ratio continued to be less than 150. No improvement in his lung imaging and ventilatory parameters remained high with increasing PEEP requirement.

After the 6th time he was proned, his ventilator parameters started showing subtle changes of improvement. His P/F ratio started going beyond 200-250. His blood gas started improving. After the 10th days of ventilations, patient was tracheostomized with due consent from his first-degree kin. In subsequent days he showed improvement in his ventilatory parameters but the known complication of a prolonged ventilation with paralyzing agent and steroids critical illness myopathy, did set in by this time. He was not able to move his limbs at all. All the

PRE-PRONE ABG

	1	2	3	4	5	6
pH	7	7.2	7.3	7.4	7.46	7.5
Pco2	64	60	56	60	54	48
Po2	58	60	60	68	72	78
HCo3	42	36	40	44	46	46
BE	14	14	12	8	6	2
So2	70	80	84	86	85	88
Na	122	128	134	144	144	145

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K	4	3.4	3.8	4.1	5	4.2
POST-PRONE ABG						
	1	2	3	4	5	6
pH	7.1	7.34	7.36	7.4	7.5	7.5
Pco2	58	54	54	52	46	46
Po2	66	64	68	70	74	78
Hco3	40	38	42	42	45	45
BE	12	14	10	7	5	2
So2	88	92	94	94	97	96
Na	12	129	138	148	146	148
K	3	3.6	3.9	4.2	4.9	4

ABG DIFFERENCES PRE-PONE AND POST-PONE

known sources of the same were discontinued. Mandatory physiotherapy continued. Within 1 week he started showing remarkable changes, being able to move his upper limbs and following days his lower limbs too. He was shifted to the step-down unit on a portable BiPAP support, which he tolerated well. When he was shifted to room. Regular physiotherapy follow-up was being done.

Discussion:

Recent studies report mortality of ARDS between 29% and 40% [1]. Institutions across the world, though, are experiencing a decline in the overall mortality, likely due to better general care for critically ill patients and, importantly, improved strategies of mechanical ventilation.

Prone ventilation has been extensively cited in literature in improving oxygenation in ARDS which was supported by the PROSEVA trail has shown the benefit in 28 days and 90 days mortality. The physiological mechanisms postulated are:

- Improvement in ventilation perfusion mismatch
- Recruitment of dependent lung areas
- Reduction in shunt
- Postural drainage
- Less compression of the lungs by the heart.

While prone ventilation cannot be recommended for routine ARDS treatment, a

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recent meta-analysis suggests improved outcomes using this approach in patients with severe ARDS.6 The ‘open lung’ approach calls for using higher levels of PEEP to keep alveoli open and prevent their collapse at end-expiration. A PEEP of 15 cm H2O, while prone, was reached in this case before attaining any oxygenation benefits and targeting the Pl pressure below 30 cm of H2O. High PEEP arm while

maintaining low tidal volumes during mechanical ventilation has been shown to improve oxygenation. Expertise is required in performing prone ventilation but at no additional cost. However, a patient in whom initial proning do not show improvement should always think of other optional treatment in the form of ECMO etc.

Conflicts of interest:

All authors have none to declare.

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