

### **TWO CASES OF TYPE II RESPIRATORY FAILURE IN COPD TREATED IN KATURI MEDICAL COLLEGE HOSPITAL, GUNTUR AND AN OVERVIEW OF TREATMENT OF ACUTE EXACERBATION AND RESPIRATORY FAILURE**

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#### **HOW TO CITE THIS ARTICLE:**

R. Ramakrishna, P. V. Kalyankumar, M. Venu, G. Nageswara Rao. "Two Cases of Type II Respiratory Failure in COPD Treated in Katuri Medical College Hospital, Guntur and an Overview of Treatment of Acute Exacerbation and Respiratory Failure". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 17, April 27, 2015; Page: 2512-2516.

**ABSTRACT:** Treatment of Type II Respiratory Failure in a COPD patient is a difficult task for the ICU and Pulmonary physician. Multi factorial and multi-disciplinary approach is required. Our experience of two cases treated recently in Katuri medical College Hospital have common features. One is a male of 54 years age and the other is a female of similar age. Both of them were obese and were nonsmokers. Both were poor and could not afford any ICU treatment on their own. Both were rescued by State sponsored Arogyasree programme. Both of them had the advantage of support from their families. Aided by Arogyasree programme, dedicated staff of ICU, Pulmonology, ENT departments, timely interventions with electrolyte balance, balanced antibiotic therapy, Noninvasive and invasive ventilator strategies, Nutritional support, Blood transfusions, Timely Tracheostomy and excellent nursing care and drug administration in ICU both patients recovered back to normalcy. Initially both required home oxygen therapy and both were subsequently seen maintaining normal oxygenation status even without oxygen causing happiness to family members and the treating physicians.

**KEYWORDS:** Invasive Ventilation, Type II respiratory failure (Hypoxia with Hypercapnia), Noninvasive ventilation, Bilevel Positive airway pressure, Respiratory acidosis, ABG (Arterial blood Gases).

**CASE 1:** 54 year old male patient was brought to ICU of Katuri Medical college hospital on 9<sup>th</sup> of September 2014. Family members gave history of Ischaemic heart disease three years ago and the angio at that time revealed a 40% block of circumflex artery. Patient was drowsy but arousable. He was a bus driver by occupation with long history of exposure to dust but was a non-smoker. Patient had generalized edema laboured breathing. Initial examination revealed PR 122/mt, BP 110/70. Respiratory rate 12 breaths/mt and SpO<sub>2</sub> 82%. Cardiovascular status was normal with normal ejection fraction suggesting diagnosis of COPD, pulmonary Hypertension and cor pulmonale.

The first ABG revealed a pH 7.23, pO<sub>2</sub> 74mmof Hg, pCO<sub>2</sub> 99 mm of Hg and HCO<sub>3</sub> of 41 mmol/l. A diagnosis of Type II respiratory failure with partially compensated respiratory acidosis was made. He was put on noninvasive ventilation (Bilevel Positive airway pressure). By next morning Patient's General condition worsened with increased acidosis decreased pH to 7.17 with bicarbonate of 43.4 mmol/l. Patient was registered under Arogyasree (State sponsored health programme where selective diseases were given free treatment with the Government aid) and Invasive ventilation was started. Subsequent ABGs showed improvement with pCO<sub>2</sub> coming back

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to 65 mm of Hg and improved pH and Oxygenation (pO<sub>2</sub>). We tried to to wean the patient off the ventilator after 4 days of ventilation with CPAP and pressure support of 30 cm of water on ventilator.

To make the matters worse patient self extubated and injured his trachea. He collapsed to drowsiness and was reintubated. Patient was stabilized with Piperacillin + tazobactam, Deriphylline, Hydrocortisone, diuretics and supportive therapy. We corrected the electrolytes especially potassium, Magnesium sulfate and calcium gluconate were also given. We reduced the dose of steroids and diuretics when the hypokalaemia was persisting. By 25<sup>th</sup> of September 2014 the patient was still dependent on the ventilator and we were desperately thinking of weaning him off the ventilator which appeared near impossible at that time. We improved nutrition with aminoacid infusions, Blood transfusions. After the Blood transfusions and nutritional therapy NGT feeds patients started improving. Tracheostomy was performed around 25<sup>th</sup> of September. He was given Modafinil, Sildenafil Citrate and Medroxyprogesterone(Deviry).

By 10<sup>th</sup> of October 2014 we attempted weaning by CPAP and pressure support on ventilation as the respiratory effort improved and gradually weaned off the ventilator with ABG revealing pH of 7.3 and pCO<sub>2</sub> of 62mm of Hg. By 26<sup>th</sup> of October 2014. Patient was shifted to General ward. Tracheostomy tube was removed after one week. Patient was given advise of home oxygen. And is under follow up. Now maintaining 92% saturation of sPO<sub>2</sub> without Oxygen. Patient stayed in ICU for nearly six weeks.

**CASE 2:** 55 year old female patient obese nonsmoker was admitted in February 2015 with Type II respiratory failure with bilateral bronchopneumonia. She was also ventilated initially with Bilevel positive airway pressure and subsequently intubated and ventilated. Tracheostomy was done. In this case we had complications of azotemia and hyperbilirubinaemia which returned back to baseline soon. Cardiologiccal examination and Echocardiogram revealed pulmonary hyper tension and corpulmonale with 50% ejection fraction. She received antibiotics, bronchodilators, Blood transfusion, nutritional support and electrolyte treatment, magnesium sulfate and calcium gluconate. She had excellent family care in the form of a supporting daughter and husband. We weaned her off ventilator after 2 weeks. Tracheostomy was performed after 10 days of intubation. Patient was discharged home nearly after 25 days in hospital with majority of days spent in ICU. Our observation in these two critically ill patients revealed that midnight ABGs were better in terms of pO<sub>2</sub> and pCO<sub>2</sub> levels and morning levels deteriorated while on BIPAP indicating that the hypoxic spells were more early in the morning or possibly less supervision early in the morning The two patients in our study were given Pneumococcal and Influenza vaccination at the time of discharge<sup>1</sup>

**DISCUSSION:** COPD –Acute exacerbation-Respiratory failure- Overview.

COPD is presently accepted as an overall umbrella term for a variety of clinical disorders with chronic bronchitis at the one and emphysema at the other end of the spectrum. Chronic Obstructive Pulmonary Disease (COPD) kills more than 3 million people every year, making it the 4th largest cause of death in the world<sup>2,3</sup> Half a million people die every year due to COPD in India, which is over 4 times the number of people who die due to COPD in USA and Europe<sup>4</sup> Exposure to high levels of indoor air pollution due to the burning of biomass fuel (animal dung, crop residues, wood) seems to be a greater risk factor for COPD than tobacco smoking not only in the Indian subcontinent, but across the world.<sup>5</sup>

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The cost of COPD treatment is increasing every year more in rural India than urban India.<sup>6</sup> More people in India now die due to non-communicable diseases and chronic respiratory diseases and COPD tops this list.<sup>7</sup> COPD problem in India is so enormous that a national programme is needed to prevent and control COPD. Further there is poor awareness among physicians about COPD.

An exacerbation of COPD is an acute event characterized by worsening of patient's respiratory symptoms that is beyond normal day to day variations and leads to change in medication. Exacerbations of COPD negatively affect the quality of life.<sup>8,9</sup>

**Assessment of COPD exacerbations:** Severity of acute exacerbation is assessed: 1) Degree of airflow limitation 2) Duration of worsening of symptoms 3) Number of Previous episodes or hospital admissions 4) Comorbidities 5) Present treatment regimens 6) History of previous requirement of mechanical ventilators.<sup>1</sup>

Signs of severity include 1) Use of accessory muscles of respiration 2) Paradoxical chest wall movements 3) Worsening or new onset central cyanosis 4) Development of peripheral edema 5) Haemodynamic instability 6) Deterioration of mental status.<sup>1</sup>

Pharmacological therapy for acute exacerbations revolves around Short acting beta 2 agonists and anti-cholinergic bronchodilators, corticosteroids and antibiotics.

Respiratory failure is indicated by PO<sub>2</sub> of less than 60 mm of hg with or without PCO<sub>2</sub> of 45mm of Hg or more.

Supplemental oxygen therapy basing on serial ABG analyses, invasive or noninvasive ventilation depending on the requirement of patients is necessary. Supplemental oxygen should be titrated to maintain oxygen saturation of 88-92%.<sup>10</sup>

Indications for non-invasive ventilation include 1) Respiratory acidosis (pH<7.35 and or pCO<sub>2</sub>>45mmofHg), 2) Severe dyspnea associated with use of accessory muscles of respiration, intercostal retractions and signs of impending respiratory muscle fatigue

Indications for invasive mechanical ventilation include 1) NIV failure or intolerance 2) Respiratory or cardiac arrest 3) Respiratory pauses with loss of consciousness 4) Diminished consciousness or psychomotor agitation 5) Aspiration 6) Inability to remove respiratory secretions 7) Haemodynamic instability 8) Refractory hypoxemia<sup>9</sup>

Adjuvant therapies in the form of fluid and electrolyte balance, nutritional support, diuretics, anticoagulants and treatment of comorbidities improves the outcome. Ultimate prognosis or mortality depends on preexisting FEV<sub>1</sub> and coexisting comorbidities. Blood or packed cell transfusion improves the oxygen carrying capacity. Treatment of hypokalaemia secondary to diuretic therapy and corticosteroid administration helps in improving muscular weakness. Intravenous Magnesium can improve respiratory function.<sup>11</sup>

Anticoagulant therapy in the form of low molecular heparin was given in these two cases. It can prevent thromboembolic complications in these patients with hypercoagulable state.<sup>2</sup> Corticosteroid induced myopathy can prolong ventilation and ICU stay in COPD acute exacerbations.<sup>12</sup>

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Patients are benefited by timely tracheostomy because of better drainage of respiratory secretions by suction, improvement oral hygiene, lessening laryngeal damage and ability to eat and speak and reduced dead space ventilation.<sup>13</sup>

Despite all the strategies of management a dedicated team work of coordinated multispecialty medical team, nursing care are important. As a majority of COPD patients are dependent on their family members because of their inability to earn the outcome obviously depends on the interest shown by the family members. Family support enhances the medical effort.

ICU related neuromuscular abnormalities of unknown aetiology in mechanically ventilated COPD patients can make weaning difficult.<sup>13</sup>

Coexisting Obstructive apnea and hypopnea can aggravate hypoxic desaturation and hypercapnea in patients having overlapping disease<sup>14</sup> Nutritional therapy in the form of aminoacids, Blood transfusion, protein and nutritional supplements with low carbohydrate and high fat and protein can hasten recovery.<sup>15</sup>

The problem of smoking related COPD is very common in India. In addition post tubercular COPD, and COPD related to exposure to biological fuels and occupational dust is high in India. Requirement for hospital admission for acute exacerbations is frequently required. As the costs of therapy are very high it is now important to have a national programme for COPD and programmatic management of acute exacerbation of COPD with Government assistance like Arogyasree programme in Andhra Pradesh.

**SUMMARY AND CONCLUSION:** Type II respiratory failure in COPD patients is a difficult task to deal with. A multi-disciplinary approach is needed. Correlation of ICU, Anaesthesia, Pulmonology, ENT and General medicine departments is required. Honest and sincere effort can bring back the patient to normalcy though we are not assured of success always. Good nursing care is required. Family support can psychologically boost a patient. It is difficult to revive a patient without family support. The treatment modalities are not within the reach of a common man. The treatment provided by us in this hospital by is expensive and is impossible for a lower or middle income person. State sponsored Health Programme has helped both these patients. Support of Hospital administration is needed as such patients have uncertain prognosis despite adequate medical care. With support of Hospital Administration we tried our best to recover these patients with the idea of getting excellent Medical experience if not financial gain

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Date of Submission: 05/04/2015.

Date of Peer Review: 06/04/2015.

Date of Acceptance: 16/04/2015.

Date of Publishing: 22/04/2015.