Intensive Critical Care

Dyselectrolytemia in acute exacerbation of chronic obstructive pulmonary disease patients: An observational cross-sectional study

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Background: Chronic obstructive pulmonary disease (COPD) is a common preventable and treatable disease. An exacerbation of COPD (AE COPD) is an acute worsening of respiratory symptoms beyond normal day-to-day variations. It’s not only presents with respiratory symptoms, but also with many extra-pulmonary manifestations. Disturbance in serum electrolytes is one of the extra-pulmonary manifestations. The objective of the study was to find out these serum electrolytes (sodium, potassium) abnormalities in AE COPD patients.

Objective: To evaluate levels of Serum Electrolytes (Sodium and Potassium) in AE COPD patients. (1) To correlate dyselectrolytemia (Sodium and Potassium) with Peak Expiratory Flow Rate (PEFR) or Spirometry in AE COPD patients.

Materials and Methods: An Observational Cross-sectional study was conducted for a period of one and half year in Respiratory Medicine department. 50 diagnosed COPD patients based on GOLD guidelines with detailed history of all patients were taken. Along with Serum Electrolytes.

Results: In this study the 92% of the total patients had sodium levels below normal and 86% has serum potassium level below normal limits. 60% of the patients had MMRC grade 3 and 40% had MMRC grade 4. 54% had COPD GOLD staging as severe whereas 46% Very Sever seen that serum sodium and serum potassium levels were significantly lower in very severe cases. Detailed results will be discussed in presentation.

Conclusion: Dyselectrolytemia was commonly encountered in patients presenting with AE COPD. Significant correlation was seen between serum electrolytes and various indicators of severity of acute exacerbation of COPD.

Percentage change in diaphragmatic thickness is better than rapid-shallow-breathing-index for weaning prediction: A prospective observational study

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Background: Acute respiratory failure (ARF) is commonly managed with invasive mechanical ventilation (IMV). Majority of time a patient spends on IMV, is in the process of weaning. Prediction of the weaning outcome is of paramount importance, as untimely/delayed extubation is associated with a high-risk of mortality. Diaphragmatic-ultrasonography is a promising tool in ICU.

Objective: To predict utility of diaphragmatic-ultrasonography in predicting the success of weaning.

Methods: In this prospective-observational study, we recruited 54 patients of ARF on IMV, along with 50 healthy controls. During spontaneous-breathing-trial, all subjects underwent diaphragmatic-ultrasonography along with RSBI (rapid-shallow-breathing-index) assessment.

Results: Mean age was 41.78±17 and 37.62±10.52 years in cases and control groups, respectively. Demographic variables were similar in the two groups. Most common cause of ARF was obstructive-airway-disease. Average duration of IMV was 5.41±2.81 days. Out of 54 subjects, 45 were successfully weaned and nine patients failed weaning. Age, BMI, and severity of disease were similar in successful and failed weaning patients. The sensitivity to predict successful weaning of \( \text{percentage change in diaphragmatic thickness (Δtdi\%)} > 29.71\% \) was 93.33\% while specificity was 66.67\%. The sensitivity and specificity of \( \text{mean diaphragmatic thickness (tdi[end-expiratory > 0.178cm)} \) was 60\% and 77.78\%, respectively. RSBI value at 1 min of 93.75 had an equally high sensitivity (93.33\%) but a lower specificity (22.22\%). Similar results were found for RSBI measured at 5 minutes as well.

Conclusion: During assessment for weaning, the purpose is to minimise both premature as well as delayed extubation. We found that diaphragmatic-ultrasoundography, especially Δtdi\%, is better than RSBI in predicting weaning outcomes.

An observational cohort study comparing the outcome of high intensity noninvasive ventilation and conventional noninvasive ventilation in acute exacerbation of COPD
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Background: Non-invasive ventilation (NIV) is increasingly used in management of acute exacerbation of COPD (AECOPD). Failure rate of NIV in AECOPD is about 15%. Inadequate inspiratory positive pressure (IPAP) in conventional NIV (low-intensity NIV-LI NIV) is an important cause of NIV failure. High intensity NIV (HI NIV) is a novel therapeutic option which can maximally decrease severely elevated PaCO2 to normal levels. Our study was to compare the effect of high intensity NIV and conventional NIV in AECOPD.

Methods: Two groups with each of 200 patients diagnosed with AECOPD as defined by criteria of GOLD 2020, was included in the study. Baseline vital signs including blood gases were noted. Patients in HI-NIV group were implemented NIV with IPAP titrated up to a maximum 30 cm H2O, while in LI NIV, IPAP was titrated to a maximum 20 cm H2O. Vital signs and blood gases were assessed at 4 and 24 hours. Patients were subjected to mechanical ventilation following NIV failure. All patients were monitored until discharge and followed up at 28 days and 90 days.

Results: Failure rate in HI-NIV group was 8% compared to LI-NIV group 13% (p=2.05). Mean NIV hours and length of hospital stay was 46.05 ± 7.88 hours and 5.77 ± 1.45 days in HI-NIV group compared to 57.16 ± 7.55 and 7.01 ± 1.96 days in LI-NIV (p<0.001). Complication rates were comparable in both groups.

Conclusion: Use of HI NIV in AECOPD was associated with a lower failure rate, reduced NIV hours and hospital stay compared to LI NIV with comparable complication rates.

Evaluation of the use of nebulised glycopyrronium as an add on to ICS/LABA in hospitalized, acute exacerbating obstructive airway disease patients

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Background: Nebulization therapy plays an essential role in hospitalized AEOAD patients. Glycopyrronium has more potent, quicker and long lasting bronchodilatory action compared to ipratropium and has better cardiovascular safety leading to its increasing use for AEOAD in Indian clinical setting.

Objective: To evaluate real world use of glycopyrronium based triple nebulization in hospitalized AEOAD cases.

Methodology: Retrospective, drug utilization study (DUS) was conducted in hospitalized AEOAD patients who received glycopyrronium nebulization with ICS/LABA from single Indian centre after independent ethics committee approval. Medical records from Oct 2020 – Feb 2021 were analysed to capture details about demography, diagnosis, co-morbidities, existing OAD treatment, nebulization therapy and post-discharge medications.

Results: Average age of 394 consecutive AEOAD patients was 61.6 ± 9.48 yrs. 77% patients had comorbidities. Most common OAD diagnosis was COPD (88%), followed by asthma (5%) & ACO (7%). Formoterol/budesonide combination was the most frequently prescribed medication prior to hospitalization. Median duration of OAD was 6 yrs (1-30 yrs). Adherence to previous OAD treatment was 32%. Common presentation of AEOAD included dyspnea, cough and chest tightness. 90% of the hospitalized patients were treated with triple nebulization of budesonide/formoterol/glycopyrronium while 10% were given mometasone/formoterol with nebulised glycopyrronium (25 mcg). Median duration of hospitalization was 28 days (1-25 days). Maximum patients (86%) received glycopyrronium nebulization via a jet nebuliser.

Conclusion: Glycopyrronium and formoterol/budesonide based triple nebulization was the most commonly prescribed. Use of glycopyrronium in hospitalised AEOAD patients can be attributed to its faster onset of action and cardiovascular safety.

Study of indications, associated comorbid conditions and outcome of patients requiring BiLevel type of Non Invasive Positive Pressure Ventilation in Respiratory Medicine Indoor

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Background: BiLevel type of non-invasive ventilation is a supportive technique for respiratory failure in intensive care. Mechanical ventilation is of two types – Non-Invasive (NIV) and Invasive (IMV). NIV is associated with marked reduction in need for IMV, which is effectively supports ventilation but carries risks of complications. The most common indication is COPD. Co-morbidities are common in patients needing NIV and their presence influences NIV outcomes and mortality.

Objective: To study the indications, associated co-morbidities and outcome of patients requiring BiLevel type of NIPPV.
Abstracts

Methods: It is a descriptive, observational, cross-sectional study conducted over a period of 12 months, wherein 60 patients requiring BiLevel type of NIV were included and evaluated.

Results: The most common indication of BiLevel NIV was Type II Respiratory Failure with COPD being the most common underlying disease (71.4%). The most commonly associated comorbidities were hypertension and diabetes mellitus. Their presence was associated with higher NIV failures (51.6%), higher mortality (45.2%) and a prolonged hospital stay. NIV prevented IMV in 66.7% of patients. In patients with Type I respiratory failure, NIV did not provide better outcomes except in patients with cardiogenic pulmonary edema (66.7% success).

Conclusion: BiLevel type of NIV is an effective method of reducing the need for IMV in patients with Type II respiratory failure with COPD being the most common underlying disease. Presence of comorbidities was associated with a poorer outcome. NIV does not provide much benefit in cases of Type I respiratory failure except in cardiogenic pulmonary edema when it can be used.

To compare the outcomes of patients with Pneumocystis jiroveci pneumonia who receive high flow nasal oxygen therapy versus other oxygenation strategies

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Introduction: Pneumocystis jiroveci pneumonia (PJP) is a serious infection that occurs in immunocompromised patients and is associated with high morbidity and mortality. High flow nasal oxygen (HFNO) has been demonstrated to decrease mortality compared standard oxygen therapy in patients with pneumonia and possibly in immunocompromised patients with acute respiratory failure.

Aims: To compare the outcomes of patients with Pneumocystis jiroveci pneumonia who receive High Flow Nasal Oxygen (HFNO) therapy versus other oxygenation strategies.

Methodology: 40 HIV positive patients diagnosed with acute hypoxemic respiratory failure due to Pneumocystis pneumonia were selected for this study. The patients were randomized into two groups. The control group received standard care along with conventional oxygen therapy. The intervention group received the same standard care along with high flow nasal oxygen. The primary outcome measured was day 28 mortality. The secondary outcomes measured were: patient dyspnea, patient comfort, oxygenation, duration of ICU stay, duration of hospital stay, incidence of ICU acquired infections.

Results: There was no significant difference between the HFNO and conventional oxygen therapy groups in day 28 mortality. Among the secondary outcomes measured, there was a significantly higher incidence of ICU acquired infections in the conventional oxygen therapy group. The Verbal Numerical Rating Scale comfort score of patients in the HFNO group was significantly higher than the conventional oxygen therapy group. There was no benefit in terms of dyspnea score on day 1 versus day 3, length of hospital stay, length of ICU stay, PaO2/FiO2 ratio on day 1 versus day 3.

Comparison of clinico-biochemical outcome of acute exacerbation of COPD with type 2 respiratory failure using noninvasive ventilation ventilator strategy (average volume assured pressure support vs. spontaneous timed), a prospective randomized clinical trial

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Introduction: Recently hybrid modes of non invasive ventilation have been developed in treatment of acute exacerbation of COPD patients in type 2 respiratory failure. Average volume pressure support (AVAPS) is one of the newly developed modes, which uses a fixed tidal volume that automatically adjusts to a patient needs.

Objectives: To compare the clinico-biochemical improvement of patients of Acute Exacerbation of COPD in type 2 respiratory failure by using Noninvasive ventilator strategy Average volume pressure support (AVAPS) vs spontaneous timed (ST) mode.

Methods: This prospective randomized controlled trial carried out over a period of 1 year recruited a total of 100 patients of which 50 patients was put on NIV AVAPS mode and other 50 patients received NIV ST mode. Appropriate investigations were done and data was analysed.

Results: 100 patients were included (ST n=50, AVAPS n=50). A rapid and significant improvement in arterial blood gases PH, PCO2, PO2 was observed in patients treated with BiPAP AVAPS compared to ST mode at 2hr, 24hr, at discharge. There was a trend towards reduced LOS in patient on AVAPS (Median [IQR] AVAPS 7 [5, 10] vs ST 9 [7, 15] (p-value 0.001). Also our study demonstrated duration of niv application was lesser in AVAPS group.

Conclusion: BiPAP S/T with AVAPS as a strategy that ensures safe and appropriate pressures and tidal volumes, facilitating a rapid correction of arterial blood gases, especially pCO2, and thus, minimizing the deleterious effects to the brain compared to conventional ST mode. Also our study demonstrated that Length of hospital stay and duration of niv application was lesser in AVAPS group compared to the conventional ST mode.

Outcome predictors of noninvasive positive pressure ventilation in acute type II respiratory failure in a tertiary care centre

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Background: Acute hypercapnic respiratory failure occurs due to ventilatory pump insufficiency. Non-invasive ventilation can be used successfully in such cases. With proper monitoring of parameters favourable outcome may be achieved.

Methods: 77 patients were included in this prospective observational study, who were admitted with acute hypercapnic respiratory failure and met inclusion and exclusion criteria. Basic demographic, ABG parameters like pH PaCO2 PaO2 HCO3, and clinical parameters (Heart rate, respiratory Rate) were recorded at baseline, 1, 4, 12, 24 hours after initiation of NIV. Outcomes were recorded as success/failure of NIV.

Results: Out of 77 (all) were diagnosed as Acute exacerbation of COPD, 58 patients (75.3%) were successfully managed with NIV. Factors including absence of co-morbidities, baseline high GCS (13.1±0.98 vs 11.1±1.03), high pH (7.31±0.21 vs 7.28±0.03), lower respiratory & heart rate (119±5.9 vs 128±3.39) and significant improvement of Heart rate (100±6.6 / 95±5.9 VS 128±10.5 / 129±16.6 in 1 & 4 hours respectively), Respiratory rate 1hr (23±5.9 vs 30±3.29) & 4hr (20±2.1 vs 28±4.13), pH, PaCO2 (57.7±6.4 vs 63.2±8.2 in 1 hr, 50.1±5.2 vs 63.2±8.2 in 4 hr) after initiation of NIV are associated with NIV success.

Conclusion: Improvement in clinical parameters like respiratory rate, heart rate and improvement in ABG variables like pH, PaCO2 after 1st and 4 hours of start of Non-invasive ventilation and maintaining the improvement at 24 hours are predictors of success of non-invasive ventilation in hypercapnic patients.

Outcomes of noninvasive ventilation support in patients with various respiratory conditions in intensive care settings

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Background: Non-invasive ventilation is a mode of oxygen delivery system via facemask, eliminating need for endotracheal airway. NIV plays a predominant role in acute respiratory failure, pulmonary oedema, post operative care etc. NIV helps improving oxygenation, relief of dyspnoea and reduction in respiratory muscle overload.

Aim: To assess the relationship of disease severity with treatment outcomes when non-invasive ventilation is used in respiratory intensive care unit.

Objectives:
1. To assess indications for using NIV in a respiratory ICU.
2. To monitor short term outcomes of NIV during hospital stay.
3. To determine the relationship of disease severity with outcomes of treatment with NIV

Methods: Patient admitted to respiratory ICU was recruited for this study. Clinical examination was performed. Investigations like ABG, chest x ray and routine hemogram were recorded to determine the severity of respiratory failure. The severity was correlated to treatment outcomes.

Results: In our study 130 patients required NIV, there was male preponderance, and more of smokers than non-smokers. Age group affected was 40-70 years. NIV usage was found to be successful in 80% of patients in our study.

Conclusion: The present study showed that NIV is promising therapeutic modality for management of various emergency cases. This study highlights NIV importance in avoiding invasive ventilation and its associated complications while providing the required positive pressure ventilation.

Early predictors of noninvasive ventilation failure in patients with acute respiratory failure

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Objectives: Non-invasive ventilation (NIV) has become an increasingly accepted mode of treatment for acute respiratory failure. Estimating predictors of NIV failure is crucial in the management. Early identification patients who likely to fail NIV can prevent mortality in such scenarios. The study was aimed at deciphering early predictors of NIV failure.

Methods: In this prospective observational study, all patients who underwent NIV therapy based on institutional protocol for acute respiratory failure from September 2019 to June 2020 were recruited. The clinical, laboratory and other relevant data including ABG parameters were collected after getting informed consent. Multivariate regression analysis of significant parameters was done to analyse predictors of NIV failure.

Results: Out of the 96 applications, NIV failed in 19 (19.8%) with in-hospital mortality in 8 (8.3%). A baseline respiratory rate of more than 37 per minute, pH <7.28 and pCO2>77 mm Hg measured 1-2 hours after NIV initiation, hyponatremia, and prior NIV failure history were identified as the independent predictors of NIV failure. Using NIV as a treatment modality in respiratory failure secondary to pneumonia has more chances of failure (p<0.05). The median length of hospital stay was significantly higher in the NIV failure group and in-hospital mortality group than those who were successfully ventilated with NIV and survived.

Conclusion: NIV should be avoided in respiratory failure patients who had a prior history of NIV failure and intubation, in those with a higher baseline respiratory rate and hyponatremia, and low pH and hypercapnia despite 1-2 hours of NIV. Predicting NIV failure and using up-front invasive mechanical ventilation can prevent morbidity and mortality in respiratory failure patients.