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A Study on Clinical Profile and Outcome of Patients with Acute Respiratory Distress Syndrome in a Tertiary Care Hospital

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Abstract
Introduction: *Acute respiratory failure may be defined as disruption in the function of the respiratory system that acutely impairs delivering adequate oxygen to or removing carbon dioxide from pulmonary capillary bed or both. It has varied etiology-related manifestations and has a high mortality in the pediatric age group. The diagnosis of respiratory failure relies primarily on arterial blood gas (ABG) analysis.*
Materials and Methods: *An observational retrospective analysis of 60 patients of ARDS admitted at Medical Intensive Care Unit of a tertiary care teaching hospital for a period of 2 years. This study included 60 consecutive ARDS patients who fulfilled the AECC definition of ARDS. Patients who were not on mechanical ventilator were excluded from study.*
Results: *We studied 60 patients of ARDS who fulfilled the above-mentioned inclusion and exclusion criteria. Various demographic features and other clinical characteristics are presented in the following tables. As shown in table 1, there were more males than females (48 out of total 60). From table 2, it can be inferred that most of the patients were referred from Emergency department.*
Conclusion: *ARDS has high mortality rate (60% in our study). The most common risk factors for mortality in ARDS were: pneumonia and sepsis and low PaO2/FiO2 ratio.*
Key Words: *Acute respiratory failure, ARDS, AECC, ABC Analysis*

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I. Introduction

Acute respiratory failure may be defined as disruption in the function of the respiratory system that acutely impairs delivering adequate oxygen to or removing carbon dioxide from pulmonary capillary bed or both.[1] It has varied etiology-related manifestations and has a high mortality in the pediatric age group. The diagnosis of respiratory failure relies primarily on arterial blood gas (ABG) analysis. Early diagnosis can be made by the physician who has a high index of suspicion and who is aware of the clinical situations in which respiratory failure is likely to be a complication.[2] If good clinical judgment and thorough knowledge of the natural history of the disease can be combined with a proper assessment of oxygenation, ventilation and acid base status, the management of many of patients can be exceptionally rewarding.[3] Careful assessment of history, complete physical examination and evaluation of laboratory parameters may clarify the diagnosis. Serial assessments of sensorium, respiratory symptoms, ABG and response to treatment provide valuable clues to determine the need for intervention. Clinical signs of respiratory distress include tachypnea, altered depth of respiration, chest wall retraction, flaring of alae nasae, decreased breath sounds, grunting and cyanosis.[4] In addition to cardiac signs like tachycardia, hypertension or bradycardia, hypotension and cardiac arrest can also be present. The diagnosis is confirmed by ABG. The recognition of respiratory failure as a life-threatening problem led to development of the concept of the intensive care unit (ICU) in modern hospitals. ICU personnel and equipment support vital functions to give patients' their best chance for recovery.[5] Today's sophisticated ICU facilities with their novel mechanical life-support devices evolved as doctors and scientists learnt more and more about the cause of respiratory failure and how to treat it. In recent years, the rapid evolution of pediatric ICU (PICU) has stimulated an increasing need to understand the types of patients cared for in such units, their outcome and the services they require.[6] In a developing country like India, very few centers are in a position to provide intensive care to the critically sick children. The present study was undertaken to determine the causes, clinical features and outcome of acute respiratory failure in children.[7]

II. Materials And Methods

This was retrospective observational study of 60 patients of acute respiratory distress syndrome admitted at the Department of Medicine, Tagore Medical College, Rathinamangalam, Melakottaiyur, Chennai, Tamil Nadu. The study period was between Jan 2015 to Dec 2017. Informed consent was taken before the start of study. The inclusion criteria were based on the American/European consensus statement for definition of ALI and ARDS,

1 Acute Onset
2 PaO2/FiO2 ratio less than 200 regardless of PEEP level
3 Bilateral infiltrates seen on chest radiograph
4 Pulmonary Artery Wedge pressure less than 18 mm Hg or no clinical evidence of left atrial hypertension.
Patients who did not require mechanical ventilation were excluded from study.

A case record form was developed and validated by local experts for collection of data. Ethical approval was obtained from local institution level committee. Patients demographic details like name, age, sex, date of admission, vital signs, laboratory investigations, etiologies, comorbidities, site of referral, maximum APACHE II score, PaO2/FiO2 ratio, duration of ICU stay, mode of mechanical ventilation, duration of mechanical ventilation, maximum PEEP used, maximum tidal volume recorded, duration of steroid therapy, complications and mortality data were recorded in case record form.

STATISTICAL ANALYSIS: Statistical analysis was done with the help of Microsoft office 2007. Descriptive statistics like mean and percentages were used for the analysis.

III. Results

We studied 60 patients of ARDS who fulfilled the above-mentioned inclusion and exclusion criteria. Various demographic features and other clinical characteristics are presented in the following tables. As shown in table 1, there were more males than females (48 out of total 60). From table 2, it can be inferred that most of the patients were referred from Emergency department.

S.No	Demographic Variable	Value
1	**Age (Mean)**	**48**
2	**Male (%)**	**42 (70)**
3	**Most Frequent Comorbidities**	
4	**Hypertension**	**18**
5	**Diabetes Mellitus**	**10**
6	**Ischemic heart disease**	**04**

Table-1: Demographic characteristics of 60 patients of ARDS

S.No	Referral Origin	Number
1	**Emergency Dept**	**27**
2	**Intermediate care unit**	**08**
3	**Operative room**	**04**
4	**Surgical Ward**	**03**
5	**Medical Ward**	**12**
6	**Ortho Ward**	**02**
7	**Other Hospital**	**04**

Table 2: Characteristics of 60 patients in relation to referral origin

S.No	Variable	Value
1	Mean APACHE II	21.6
2	Number of organ system failure (Mean)	05
3	Length of ICU Stay (days)	10
4	Etiology Pneumonia including Tropical infections	28
5	Aspiration of gastric Contents	02
6	Sepsis	26
7	Acute Pancreatitis	03
8	Severe non Thoracic injury	01
9	Mean PaO2/FiO2	92

Table 3: Etiologic Profile of Patients of ARDS

S.No	Variable	Value
1	**Duration**	**10**
2	**Predominant Ventilation mode Pressure control**	**50**
3	**Volume Control**	**10**
4	**Maximum PEEP(Cm H2O)**	**13.1**
5	**Maximum tidal vol (ml/IBW)**	**8.1**
6	**Steroid Therapy**	**16**
7	**Pneumothorax after initiation of MV**	**08**

Table 4: Therapy and Mechanic Ventilation Strategies

Total	60	100%
Survived	**24**	**40%**
Not Survived	**36**	**60%**

Table 5: Outcome of patients

Common etiological factors of ARDS were Pneumonia and Sepsis.

Mean PaO2/FiO2 on admission was 92.All patients were on mechanical ventilation. Most of the patients were managed on pressure control ventilation and mean tidal volume delivered was 8.1ml/ideal body weight. (Table 3 and 4)

Mean duration for which patients were put on ventilatory support was 10 days. Total mortality observed was 60%.

IV. Discussion

This was a retrospective study of 60 patients of Acute Respiratory Distress Syndrome conducted at a tertiary care teaching hospital. The primary objective of our study was to analyze the clinical characteristics of ARDS patients. As shown above the etiological profile, ventilatory strategies and outcome was also studied in great detail.[8]

The primary targets for ARDS treatment are to ensure adequate gas exchange while minimizing the risk of VILI. Current recommendations for mechanical ventilation via endotracheal intubation emphasize lower tidal volumes based on a patient's predicted body weight. PEEP remains a mainstay in the ventilatory strategy for acute lung injury, although the method for determining the optimal level of PEEP has not been established.[9]

The main determinant of VILI is the ratio between the size of tidal volume and that of the resting lung volume in which it is distributed: together, they determine the non-physiologic stress (tension generated within the lung tissue) and strain (deformation of the lung). Then, to maintain a low stress and strain we need a low tidal volume or a high resting volume. A seminal study on ventilator strategy in ARDS (the ARMA trial), demonstrated how using a tidal volume of 6 mL/kg (predicted body weight), as compared to the then conventional setting of 12 mL/kg, a 22% reduction in mortality could be achieved.

In our study, as shown in results, gender distribution had male predominance. This finding was similar to study conducted by Hemptinne et al in which 59% of ARDS patients were males.

Mean stay in MICU was 10.4 days and average in hospital mortality in our study was observed in 60% which was more than that observed during recent studies. In past two decades there are studies from world claiming that mortality has decreased to up to 30%. Study done by Widdermann et al had observed mortality of 30%, which may have been as a result of improvement in the specific management of patients of ARDS such lung protective ventilation as well as in the general management of ICU patients.[10]

V. Conclusion

ARDS has high mortality rate (60% in our study). The most common risk factors for mortality in ARDS were: pneumonia and sepsis and low PaO2/FiO2 ratio.

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