

Adult Respiratory Distress Syndrome - Still a Challenge to the Treating Physician

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Abstract: Introduction: ARDS or adult respiratory distress syndrome is serious illness of high mortality and morbidity .A high index of suspicion and lookout for early signs ,helps in early diagnosis ,treatment and a fairly good outcome. Aims and objectives: This cross-sectional observational study had the following aim-To study the clinical profile of Acute Respiratory Distress Syndrome,its radiology,and echocardiography , to identify etiology and co-morbid conditions. Methodology: 30 consecutive patients admitted to ICU of a Medical College Hospital in Semi-urban Maharashtra were selected after meeting inclusion criteria on the lines of Berlin Criteria of ARDS.Data collected ,tabulated and analysed. Conclusions: Our Study concluded that outcomes were not related to age, gender or the existence of co-morbidities .Rather Etiology , the time of coming to hospital, early detection and treatment of ARDS , affected outcomes.Both H1N1 ,with severe ARDS and Klebsiella +ve culture had worse prognosis.

Keywords: ARDS, H1N1, Acute pancreatitis, Klebsiella

1. Introduction

ARDS is defined as permeability pulmonary edema characterized by increased permeability of pulmonary capillary endothelial cells and alveolar epithelial cells, leading to hypoxemia that is refractory to usual oxygen therapy. ARDS must be high on suspicion list in every patient who presents with breathlessness and falling saturation despite nasal oxygen irrespective of primary disease.

2. Aims and objectives

This cross-sectional observational study had the following aim-To study the clinical profile of Acute Respiratory Distress Syndrome , its radiology, and echocardiography , to identify etiology and co-morbid conditions

3. Methodology

30 consecutive patients admitted to ICU of a Medical College Hospital in Semi-urban Maharashtra were selected after meeting inclusion criteria on the lines of Berlin Criteria of ARDS . Data collected, tabulated and analysed

Criteria for Diagnosis

ABG: arterial blood gas analysis showing hypoxemia (type 1 respiratory failure) Berlin Criteria, Pao₂ /Fio₂ <300, X-ray Chest: showing bilateral haziness/fluffy shadows with or without pre-existing consolidation

4. Observation & Results

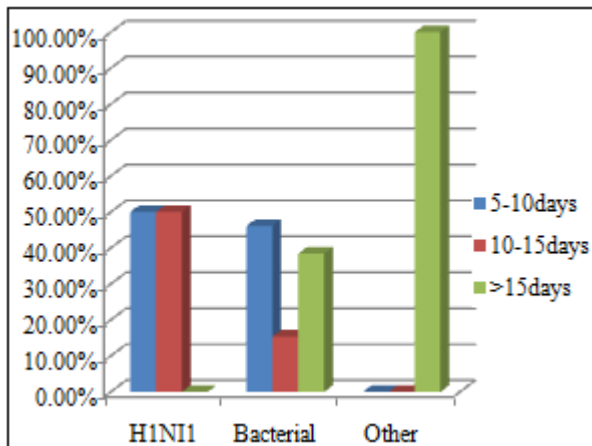
Our study had 30 cases, 16 females and 14 males, with maximum number in age group 40-60 yrs. Age and sex did not have a significance in outcome in our study of the 30 cases, 20 had a primary pulmonary disease.

The most common presenting symptoms were fever and acute dyspnoea, with tachypnoea .Patients were diagnosed, graded and treated according to Berlin Criteria and modified guidelines .ABG of all patients showed varying degrees of hypoxia.2D echocardiography of all patients did not reveal any new changes .Of 30 patients , 12 succumbed and 18 survived .50% of our patients fit into severe grade of ARDS by Berlin criteria. Etiologically , we had more patients with a primary pulmonary disease ,maximum of H1N1 pneumonia ,followed closely by Klebsiella pneumonia ,both groups having more no. of severe grades of ARDS.The extra-pulmonary group of 10 patients had 3 each of acute pancreatitis and sepsis,1 malaria,1 dengue and 1 Alcoholic liver disease.The outcome here also depended on the severity grade of ARDS

Table: Showing relation of pulmonary aetiology with ARDS Severity among study subjects

Pulmonary aetiology	ARDS Severity			Total
	Mild	Moderate	Severe	
H1N1	2(33.33%)	1(16.67%)	3(50.00%)	6
Bacterial	2(15.38%)	4(30.77%)	7(53.85%)	13
Other	0	1(100.0%)	0	1
TOTAL	4(20.00%)	6(30.00%)	10(50.00%)	20

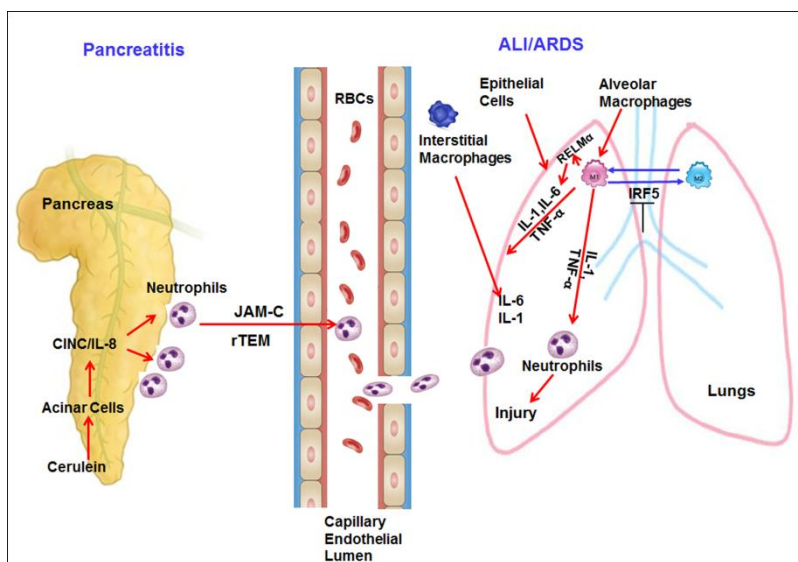
Table showing relation of pulmonary aetiology with ARDS Severity among study subjects. Among H1N1 infected 50% had severe ARDS, 33.3% had mild ARDS. Among bacterial aetiology 53% had severe ARDS, 30.7% had moderate ARDS.



5. Discussion

An exhaustive Update on ARDS is now published in BMJ Open by Griffiths MJD ,McAuley DF et al⁽¹⁾Supported by British Thoracic Society this manuscript has been used as Reference. They have used GRADE methodology to formulate guidelines on every aspect of ARDS.In our study some of these were followed like Low tidal volumes to minimize VILI, Neuromuscular blockade ,moderate PEEP (6-10),fluid management according to CVP,Antibiotics according to sensitivity reports,and use of corticosteroids. However ,prone-positioning, ECMO, and extra-corporeal CO2 removal were not available.

Our study had 3 cases of pancreatitis,2 of whom succumbed .Acute Pancreatitis with ARDS ,according to Woody Denham et.al, and Meng –Tao Zhou et.al ^(2,9)poses a major challenge as explained in the diagram



3 of our study cases had Malaria. Researchers in Brazil, China, Agarwal R et.al in North India, and Mohan A.et.al from South India ^(3,4,5,6,15,30) have reported cases and case studies of Malaria and ARDS, both Falciparum , and Vivax Malaria. According to Mohan A et.al ARDS can develop in Malaria initially or after starting treatment , and many times a Bacterial Sepsis co-exists. Hence patient should be given both anti-malarials and antibiotics. One patient in our study was Dengue +ve .Mahajan S. N. et. al ⁽¹⁴⁾reported a cse series of ARDS in Dengue Of the larger Pulmonary group in our study ,maximum patients had H1N1 infection .

H.Henry Guo et.al,Raktima Anand et.al ^(7,12), in their studies both during 2009 Global Epidemic of H1N1 felt that imaging findings in their cases were the clue to diagnosis. They recommend isolation and aggressive management of these patients which includes anti-viral therapy. The presence of co-morbidities, increased chances of a fatal outcome. Virendra Singh et.al ⁽¹³⁾ studied pulmonary sequele in patients post H1N1 ARDS and found that they developed Interstitial Lung Disease. Gautam Rawal used ECMO successfully to treat H1N1 induced ARDS^(27,28)while Pawel

Zatorski et.al reported 5 cases of H1N1 ARDS in post Renal Transplant patients.

Klebsiella Pneumonia was the most common organism grown in aspirates and Et. Tube tip culture in our study . Frequent stepping-up of antibiotics was also required in these patients, where there were maximum casualties . Michelle K. et.al in their “Microbiology and Molecular Biology reviews”^(31,32) and Torsten T.et.al in their review in Clinical Infectious Disease , talk about a “Hypervirulent strain of Klebsiella Pneumoniae”. This strain can be identified on simple agar-plate colonies of Klebsiella , where they are more hypermuco-viscous and can be picked up with an inoculation loop and will form a more than 5mm viscous string ...’string-test’. This strain has an rmpA-gene containing plasmid which forms capsules for the organism leading to anti-microbial resistance. This Hypervirulent strain of Klebsiella is resistant to Carbapenems ,and sometimes to Polymixins .A combination of Polymixin and Carbapenem may be effective ,or dual Carbapenems.

Pulmonary Tuberculosis, (1 case in our study), can also be a cause of ARDS in countries like India where TB is rampant.

Bhupen Barman et.al. ⁽²⁶⁾ reported a case of Miliary TB with ARDS

Comparing outcome of patients of our study with others ^(8,18,19,22,23,25), we fared similar with respiratory illnesses topping the list.

Bhadade RR, De souza R.A. et al compared clinical characteristics with outcomes ⁽¹⁰⁾ and found similar predictors.

Many studies followed the Berlin Definitions, criteria and guidelines ^(11,20)

Studies also developed 'models' to study ARDS and tried NIV in mild ARDS ^(16,17,21,24)

Similar to Yanfei Shen et.al our study also used Low Tidal volumes, giving benefit of doubt to protect the Lung.

6. Conclusion

Our Study concluded that outcomes were not related to age, gender or the existence of co-morbidities. Rather Etiology, the time of coming to hospital, early detection and treatment of ARDS, affected outcomes. Both H1N1, with severe ARDS and Klebsiella +ve culture had worse prognosis.

7. Limitation of study

Our study group was small, and further large scale studies will be required for definite conclusions.

8. Clinical Implication

Community acquired Pneumonias are preventable. H1N1 vaccines are available. Klebsiella, the 'hyper-virulent' strain, the culprit in Community acquired, Hospital acquired or Ventilator acquired Infection can be prevented by Strict Adherence to Basic Infection Prevention Practises in all Hospitals and especially ICU. Antimicrobial Resistance can be prevented by stepping up antibiotics according to culture-sensitivity, and use of optimum dose. By preventing a Pneumonia we can prevent the dreaded complication of ARDS of Pulmonary origin. For Extra-pulmonary etiology ARDS a high index of suspicion and early diagnosis and treatment can help towards a favourable outcome.

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