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Acute respiratory distress syndrome: Underrecognition by clinicians☆

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Abstract

Background: Previous reports suggest that acute lung injury (ALI)/acute respiratory distress syndrome (ARDS) is underdiagnosed in both adult and pediatric clinical practice. Underrecognition of this condition may be a barrier to instituting a low tidal volume ventilation strategy. This study aimed to determine the accuracy of clinical diagnoses of ARDS in daily practice using the American European Consensus Conference (AECC) criteria as a criterion standard and to investigate whether clinical recognition of ARDS altered ventilator management.

Methods: This retrospective study included intensive care unit (ICU) patients who died and underwent postmortem examination. Two independent reviewers assigned each patient to those with ALI/ARDS or no ALI. For those who met AECC criteria for ARDS, all patient records were reviewed for the presence of a documented diagnosis of the condition. The accuracy of the clinicians in diagnosing ALI/ARDS was determined, and ventilator settings between the clinically "diagnosed" and "non-diagnosed" groups were compared. The diagnostic accuracy in predetermined subgroups (those with diffuse alveolar damage, with ≥ 3 affected chest x-ray quadrants, with diagnosis ≥ 3 days, with pulmonary vs extrapulmonary cause) was also examined.

Results: Of 98 consecutive ICU patients who died and underwent autopsy, 51 met the inclusion criteria. Sixteen of 51 patients (31.3%) who had ALI/ARDS according to the AECC criteria had this recorded in their clinical notes. Those with histologic evidence of ALI/ARDS (diffuse alveolar damage) and with a more severe chest x-ray pattern or who satisfied the criteria for a number of consecutive days were no more likely to have a clinical diagnosis of ALI/ARDS recorded. However, those with a pulmonary cause of ALI/ARDS were more likely to have a diagnosis recorded. Tidal volumes, positive end-expiratory pressure, and mean airway pressure were higher in those with a clinical diagnosis of ARDS.

☆ Conflicts of interest: None.

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Conclusions: Acute respiratory distress syndrome is underrecognized by clinicians in ICU, and recognition does not result in lower tidal volume ventilation. Significant barriers remain to the recognition of ALI/ARDS and application of an evidence-based ventilator strategy.

1. Background

Acute lung injury (ALI) and its more severe form acute respiratory distress syndrome (ARDS) represent a major global public health problem, with an incidence of 78.9 per 100 000 population [1]. Mortality has not reduced globally in this syndrome since the introduction of a consensus definition almost 2 decades ago, although recent reports suggest that progress has been made in reducing incidence and improving outcome in some centers [2,3]. Despite more than 100 clinical trials, only 1 therapeutic intervention, namely, low tidal volume ventilation, has been consistently shown to reduce mortality in this condition.

Timely recognition of ALI/ARDS and institution of lung protective ventilator strategies are important determinants of outcome and are essential for appropriate enrollment to research studies. Lack of recognition by treating clinicians may result in the appropriate treatment being commenced too late, or not at all. However, recognizing specific patterns of intensive care unit (ICU) syndromes is difficult, particularly in patients with multiple comorbidities or where the syndrome is in an organ remote from the initial presenting complaint.

Acute lung injury/ARDS has previously been shown to be underrecognized by clinicians. In an adult ICU population, only 47.6% of patients who fulfilled both clinical and pathologic diagnoses of ARDS had any mention of ARDS in their chart [4]. Similarly in a pediatric population, only 24.4% of patients who satisfied the diagnostic criteria for ALI/ARDS had a diagnosis clinically documented [5]. This underdiagnosis of ALI/ARDS by treating clinicians may represent a barrier to institution of appropriate ventilator strategies in affected patients.

The current study examined a group of patients who satisfied the clinical criteria for ALI/ARDS, died in the ICU, and underwent autopsy. We aimed to determine the rate of clinically documented ALI/ARDS in this group and whether there was increased accuracy of clinical diagnosis in those patients who had autopsy evidence of diffuse alveolar damage (DAD), worse chest x-ray (CXR) findings, a longer time meeting ARDS criteria, or had had a pulmonary cause of ARDS. In addition, this study sought to investigate whether those with clinically diagnosed ARDS received different ventilator management.

2. Methods

Approval of the local ethics committee was obtained. Ninety-eight consecutive patients who underwent autopsy following their death in the ICU of St Vincent's University Hospital, Dublin, Ireland, and had been intubated and mechanically ventilated were included. A retrospective systematic review of the clinical, radiologic, and laboratory records was undertaken by 2 independent reviewers.

Firstly, the patient's clinical data were retrospectively examined for the presence or absence of a clinical diagnosis of ALI/ARDS as per the AECC criteria [6]. Unless chronic lung disease was considered to be the primary cause of respiratory failure, onset was considered to be acute. A patient data management system (Metavision, Imd soft, Israel) was used to calculate Pa_{O_2}/fraction of inspired oxygen (F_{IO_2}) ratios. Chest x-rays were examined independently by 2 senior intensive care physicians, blinded to the other clinical findings. Presence or absence of left ventricular failure was determined by a review of the medical history, contemporaneous medical notes, relevant investigations (including ECHO and pulmonary artery catheter measurements where available) and review of cardiac postmortem findings. All 4 diagnostic parameters for ARDS were then reviewed by 2 independent physicians (SF and NM) and a diagnosis of (1) no ALI, (2) ALI, or (3) ARDS assigned to each patient for each day in intensive care. If a patient met the criteria for any 1 day, they were assigned that clinical diagnosis. Discrepant opinions were resolved by discussion and/or consultation with a third physician.

Secondly, lung specimens taken at autopsy in those patients who met AECC criteria for ARDS were examined by a senior pathologist. Histopathologic diagnosis of DAD (the pathologic correlate of ARDS) was classified according to the American European Consensus Statement on the classification of idiopathic interstitial pneumonias [7]. Thus, in addition to the clinical classification above, patients were classified according to a "histological" diagnosis of ARDS, based on the presence or absence of DAD.

Thirdly, medical charts, nursing notes, and electronic records were examined for any mention of possible, probable, or definite ARDS or ALI, to determine whether the treating physicians clinically suspected or diagnosed ARDS. The agreement between the clinically documented diagnosis of ARDS and criterion-based diagnosis (AECC criteria) was then reported. Specific subgroups (those meeting clinical criteria for ≥ 3 days, those with ≥ 3 quadrants affected on CXR, and those with extrapulmonary ARDS) were also examined, and the agreement with clinical diagnosis was reported. Statistical analysis was performed using Prism version 6 (Graphpad Software, La Jolla, CA). Data were assessed for normality using the Kolmogorov-Smirnov test. Groups were compared using the Mann-Whitney U test. Categorical data were analyzed using the χ^2