ADULT RESPIRATORY DISTRESS SYNDROME (ARDS)
THE PAST, THE PRESENT, AND THE FUTURE.

ESSAY
Submitted for Partial Fulfilment
of
Master Degree in Anaesthesia

By
Adel Mikhail Fahmy
M.B., B.Ch.

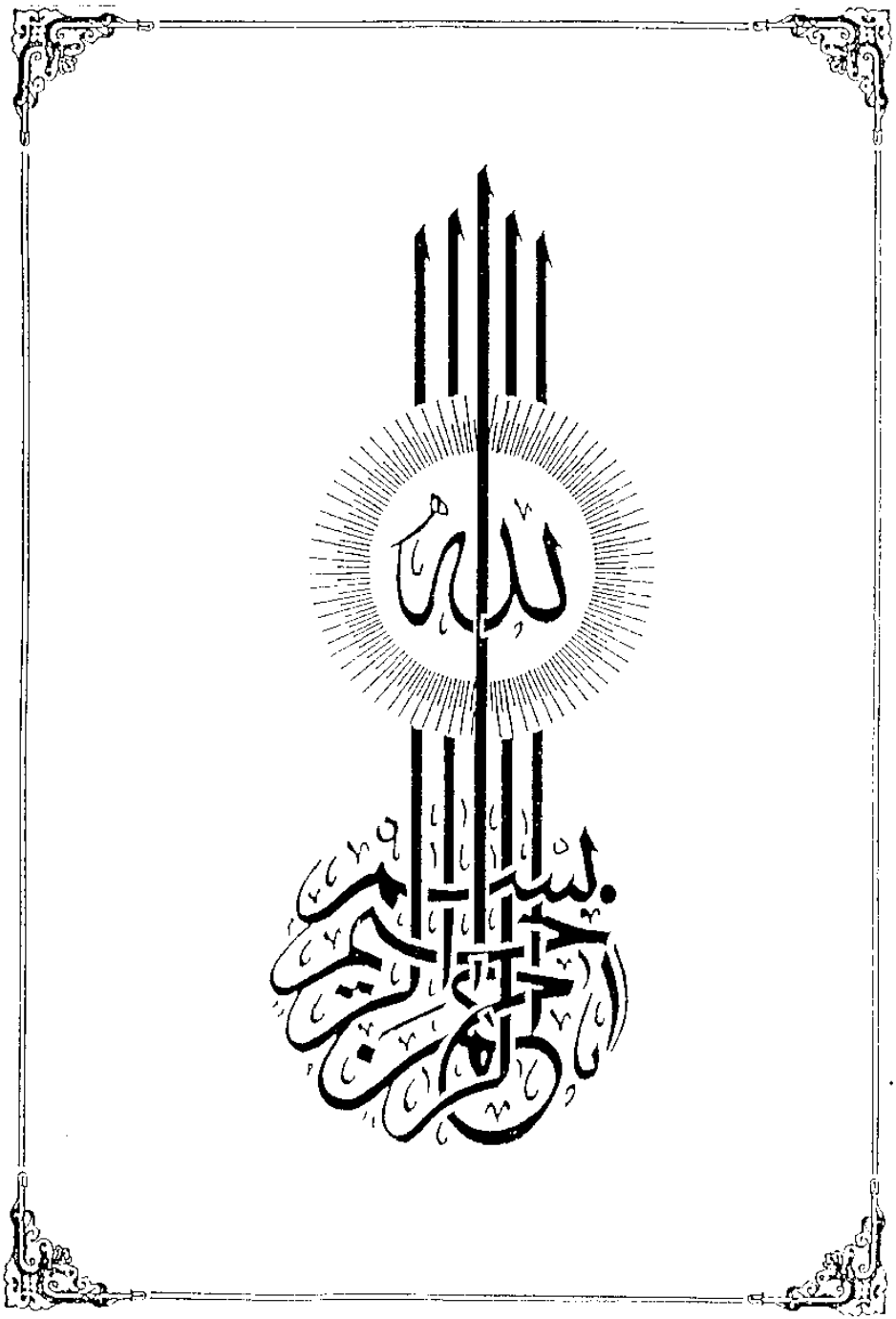
Supervised by
Prof. Dr. MOHAMED HAMED SHAKER
Professor of Anaesthesia and ICU
Faculty of Medicine, Ain Shams University.

Prof. Dr. MEGAHED MOHAMED ABDEL FATTAH
Assistant Professor of Anaesthesia and ICU
Faculty of Medicine, Ain Shams University.

FACULTY OF MEDICINE
AIN SHAMS UNIVERSITY

1995

To My Family



ACKNOWLEDGEMENT

First, Thanks are all due to ***Holly God*** for blessing this work until it has reached its end, as a part of His generous help throughout my life.

I would like to direct special thanks to ***Prof. Dr. Mohamed Hamed Shaker***, Professor of Anaesthesia, Ain Shams University, for his great support and encouragement he gave me throughout the whole work. It is a great honour to work under his guidance and supervision.

I would like to express my sincere gratitude to ***Prof. Dr. Megahed Mohamed Abdel Fatah,*** Assistant Professor of Anaesthesia, Ain Shams University, for his close supervision, continuous help, and the tremendous effort he done in the meticulous revision of the whole work.

Also, I am greatly honoured to express my utmost thanks to ***Dr. Fouad Hassan Lotfy***, Lecturer in Anaesthesia, Ain Shams University, for his great support.

Adel Mikhail Fahmy.

CONTENTS

---ooOoo---

LIST OF TABLES

LIST OF FIGURES

Introduction

INTRODUCTION

The adult respiratory distress syndrome is a life-threatening pulmonary disease. It has many aetiologies and a variety of clinical manifestations. Modern ARDS is considered as the pulmonary component of a systemic inflammatory process, resulting from sepsis.

Despite advances in the understanding of its pathophysiology and the development of new approaches for its management, morbidity and mortality remain high.

Mechanical ventilation serves as the basic management technique for patients with ARDS. New ventilatory modes have been used. They include inverse ratio ventilation, pressure-controlled ventilation, permissive hypercapnia and ventilation in the prone position.

A new approach for management which, if successful may eliminate the use of invasive procedures such as extracorporeal membrane oxygenation, is the use of the inhalation route for agents such as nitric oxide and prostacyclin. However, nitric oxide seems to be more promising as it causes selective pulmonary vasodilation improving perfusion to ventilated alveoli only. So, reducing pulmonary artery pressure as well as improving arterial oxygenation by decreasing the intrapulmonary shunt.

Chapter I

CHAPTER I
PATHOPHYSIOLOGY, AETIOLOGY AND CLINICAL PICTURE OF ARDS

Adult respiratory distress syndrome is a diffuse pulmonary disorder associated with a life-threatening pulmonary oedema and hypoxemia. It can be precipitated by a wide variety of peripheral and pulmonary insults ***(Blenerhassett, 1985).***

In ***1967, Ashbaugh and colleagues*** described data on 12 patients whose striking but uniform clinical, physiologic, roentgenographic and pathologic abnormalities distinguished them from among 272 adult patients who had received respiratory support in the intensive care units of Colorado General Hospital and Denver General Hospital. The 12 patients all had severe dyspnea, tachypnea, cyanosis, decreased respiratory system compliance, and diffuse infiltrations on their chest radiographs. Pathologic examination in seven patients who died revealed atelectasis, vascular congestion, severe pulmonary oedema and hyaline membranes. Shortly afterward, ***Petty and coworkers*** called this constellation of findings the adult respiratory distress syndrome.

The syndrome was previously described by a colorful array of names (Table 1).

Table (1) Synonyms for ARDS

Adult hyaline membrane disease.
Adult respiratory insufficiency syndrome
Congestive atelectasis.
Haemorrhagic lung syndrome
Post perfusion lung
Post traumatic atelectasis.
Post traumatic pulmonary insufficiency.
Progressive respiratory distress.
Shock lung.
Wet lung.

Adapted from Taylor & Duncan (1983).

In ***1988, Murray et al.*** developed a lung injury score that was used to characterize the presence and extent of a particular patient's manifestations of acute pulmonary damage (Table 2).

Table (2) Components and Individual Values of the Lung Injury Score.

1	**Chest roentgenogram score**	
	No alveolar consolidation.	0
	Alveolar consolidation confined to 1 quadrant.	1
	Alveolar consolidation confined to 2 quadrants	2
	Alveolar consolidation confined to 3 quadrants	3
	Alveolar consolidation in all 4 quadrants	4
2	**Hypoxemia score (PaO_2/F_IO_2)**	
	$\geqslant 300$	0
	225-299	1
	175-224	2
	100-174	3
	< 100	4
3	**PEEP score**	
	$\leqslant 5$ cm H_2O	0
	6 - 8 cm H_2O	1
	9 - 11cm H_2O	2
	12-14cm H_2O	3
	$\geqslant 15$ cm H_2O	4
4	**Respiratory system compliance score**	
	$\geqslant$ 80 ml/cm H_2O	0
	60 - 79 ml/cm H_2O	1
	40 - 59 ml/cm H_2O	2
	20 - 39 ml/cm H_2O	3
	$\leqslant$ 19 ml/cm H_2O	4
The final value is obtained by dividing the aggregate sum by the number of components that were used.		
		Score
No lung injury		0
Mild to moderate lung injury		0.1 - 2.5
Severe lung injury (ARDS)		> 2.5

Adapted from Murray et al. (1988).

They used the term ARDS for patients who collectively yield a score > 2.5.

To describe the state, severity, and underlying cause or associated condition, ***Murray et al., in 1988*** proposed the three-part definition of lung injury. The first part indicates whether the condition is acute or chronic; the second part whether the lung injury is mild to moderate or severe (ARDS); and the third part designates what the injury is caused by (when known) or associated with (when the cause is unknown).

It should be emphasized that the syndrome is more accurately called acute respiratory distress syndrome because it is an acute syndrome and because it can affect adolescents and children as well as adults. All definitions of the syndrome tend to describe a group of people with severe respiratory failure. It is widely recongized that a much larger group of people will develop respiratory failure on the basis of the same pathologic mechanisms, but will not progress to the oxygenation abnormality that defines ARDS. These individuals with lesser degrees of lung dysfunction can conveniently be referred to as having acute lung injury (ALI). The Joint European - American Consensus Conference on ARDS held in 1992 had derived the following definitions of acute lung injury and ARDS (Table 3).