Mechanical Ventilation With Conventional And Unconventional Rates In Hyaline Membrane Disease

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Master Degree In Pediatrics

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بسم الله الرحمن الرحيم

" ومـــا أوتيــتــم مــن الــعــلــم إلا قــلــيــلاً"

"صدق الله العظيم"

" ســـورة الاســـراء ، آيـة ٨٥ "

بسم الله الرحمن الرحيم

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LIST OF ABBREVIATIONS

AMV	Assisted mechanical ventilation
APRV	Air pressure release ventilation
Asynch	Asynchronous
BPD	Bronchopulmonary dysplasia
bpm	Breath per minute
BW	Birth weight
C	Compliance
CDP	Continuous distending pressure
CLD	Chronic lung disease
CLSE	Calf lung surfactant extract
CMV	Controlled mechanical ventilation
CNP	Continuous negative pressure
CPA	Cardiopulmonary arrest
CPAP	Continuous positive airway pressure
CPPV	Controlled positive pressure ventilation
CS	Caesarian section
CT	Connective tissue
CV	Conventional ventilation
e	Elastic forces
ECMO	Extracorporeal membrane oxygenation
ETT	Endotracheal tube
F	Flow
FDA	Food and Drug Administration
F_IO_2	Fractional concentration of Oxygen in inspired Gas
FPF	Fibroblast pneumocyte factor
FRC	Functional residual capacity
FVS	Full ventilatory support
GA	Gestational age
HFCWO	High frequency chest wall oscillation
HFFI	High frequency flow interruption
HFJV	High frequency jet ventilation
HFO	High frequency oscillation
HFPPV	High frequency positive pressure ventilation
HFV	High frequency ventilation
HMD	Hyaline membrane disease
IC tube	Intercostal tube
ICU	Intensive care unit
IDM	Infant of diabetic mother
I:E ratio	Inspiratory Expiratory ratio
IMV	Intermittent mandatory ventilation
IPPV	Intermittent positive pressure ventilation
IRV	Inverse ratio ventilation
MAP	Mean airway pressure
MAS	Meconium aspiration syndrome
MMV	Mandatory minute ventilation
MV	Mechanical ventilation

NICU	Neonatal intensive care unit
NPV	Negative pressure ventilation
NTB	Mecrotizing tracheobronchitis
OI	Oxygen index
$PaCO_2$	Pressure of arterial carbon dioxide
PAL	Pulmonary air leak
PaO_2	Pressure of arterial Oxygen
Paw	Mean airway pressure
PC	Phosphatidylcholine .
PCI RV	Pressure control inverse ratio ventilation
PDA	Patent ductus arteriosus
PEEP	Positive end expiratory pressure
PG	Phosphatidylglycerol
PIE	Pulmonary interstitial emphysema
PIP	Peak inspiratory pressure
PPHN	Persistant pulmonary hypertension
PPV	Positive pressure ventilation
PROM	Premature rupture of membranes
PSV	Pressure support ventilation
PVH	Periventricular Hemorrhage
PVS	Partial ventilatory support
R	Resistance
r	Raduis
RDS	Respiratory distress syndrome
REM	Rapid eye movement
ROP	Retinopathy of prematurity
RR	Respiratory rate
SaO_2	Arterial Oxygen saturation
Sec	Seconds
SIMV	Synchronized intermittent mandatory ventilation
SP – A, B, C	Types of pulmonary surfactant
ST	Surface tension
Synch	Synchronized
TGV	Thoracic Gas volume
Tex	Expiratory time
Ti	Inspiratory time
UAC	Umbilical Artery catheter
UVC	Umbilical vein catheter
V	Gas volume
V/Q match	Ventilation perfusion matching
V_A	Volume of alveolar gas
V_D	Volume of dead space gas
VLBW	Very low birth weight
V_T	Tidal volume

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Introduction & Aim of work

INTRODUCTION AND AIM OF WORK

Prematurity accounts for the highest number of admission to NICU (**Pilbeam,1992**). Most of these neonates have respiratory problems which are the leading cause of neonatal morbidity and mortality in the ICU in EGYPT (**El-Beleidy ,1990**) and all over the world (**Greenough et al,1992**) there are many forms of respiratory distress from which newborn infants suffer in their first days of life,the most common and the most important world-wide of which is HMD . This single entity is associated with 50%-70% of permature deaths (**Avery et al ,1987**)

HMD is caused by surfactant deficiency,which results in a severe decrease in compliance(Stiff lung).This causes diffuse alveolar collapse with severe V/Q mismatching and increased work of breathing (**Richardson,1991**).Prematurity is the most important single factor in the development of HMD, however , selected perinatal factors may increase its incidence and severity .

Patients with respiratory distress need to receive as early and as optimal a management as possible before serious complications develop (**Bahaa El Din ,1990**) . Mechanical ventilation is used when V/Q mismatching is severe enough that increased F_IO_2 and CPAP are inadequate or in infants who tire from the increased work of breathing (**Richardson,1991**).The ultimate goal to be achieved in assisting ventilation of the neonate is to provide optimal gas exchange while causing minimal damage to the lungs (**Harris,1988**)

In the past decade there have been a number of clinical trials designed to identify the optimum pattern of ventilation for idiopathic HMD. There is general agreement that certain alterations in ventilatory settings for newborn infants result in specific changes in gas exchange however, no consensus exists with regard to optimum management of ventilator settings to achieve survival with a minimum of complications (Heicher et al,1981) .

Techniques of artifical ventilation vary among NICU . Two basic conventional approaches used are slow and rapid rates.The slow rate technique achieves a high MAP with a long TI but requires a higher PI P which is initally estimated by good chest excursion while rates are generally 20-40 bpm (Reynolds , 1971).The rapid rate technique , relies on high rates to maintain MAP while reducing PIP to minimize barotrauma.Rates of 60-80 bpm are used with short TI (Heicher , 1981) . Controversy exists over the preferred method (Ramsden , 1987)

Aim Of the work

Is to compare between two basic ventilatory strategies in treatment of patients with HMD which are slow rates versus fast rates to detect the best method which may be applied to shorten the duration of ventilation, achieve rapid start of weaning and minimize the complications which may occur during the course of the disease .

Review of literature

Embryology