Comparative Study Between Pulse Oximetry And Transcutaneous Oxygen Tension Measurments In Neonatal Oxygen Monitoring

Thesis
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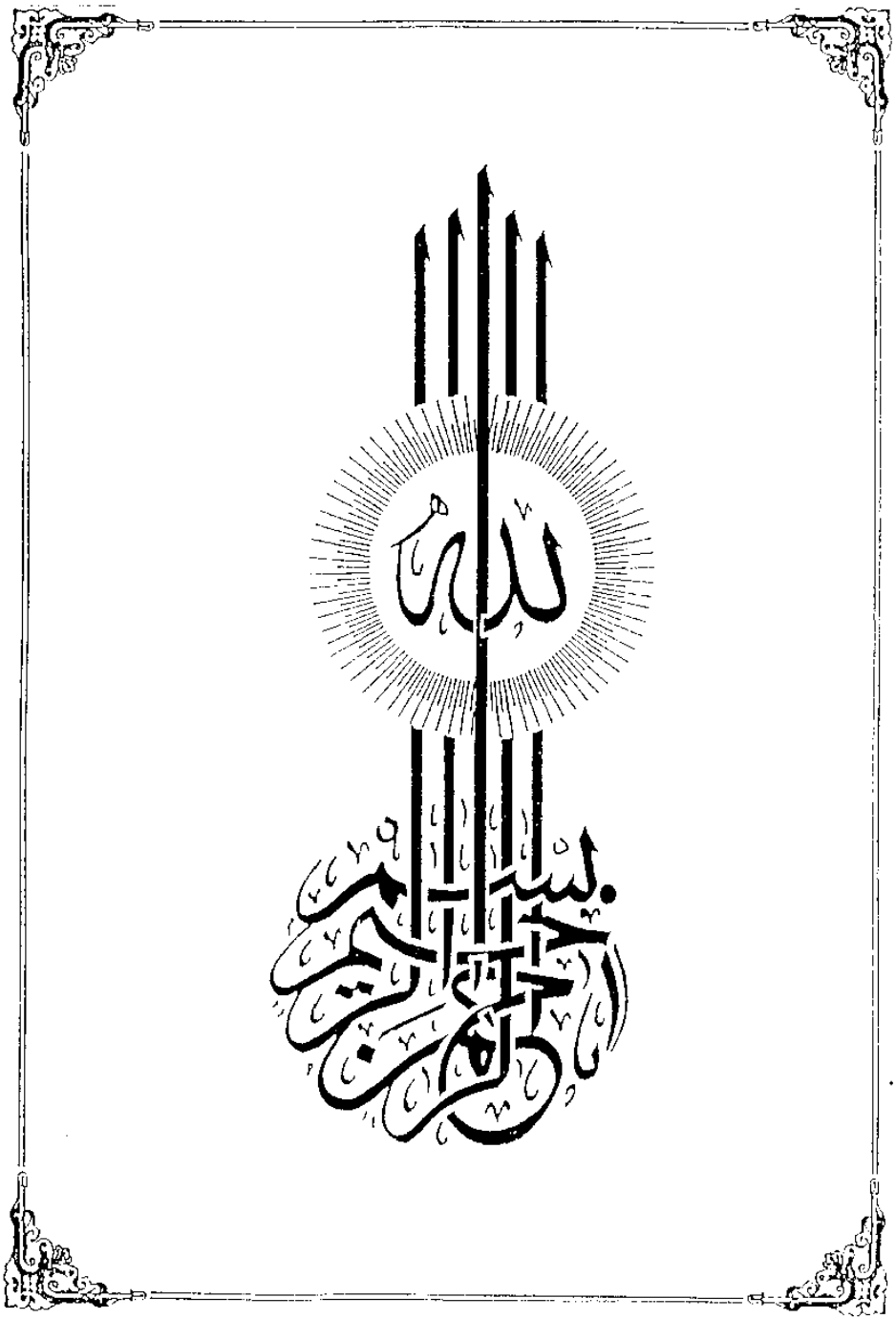

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This simple work is dedicated to my Mother
and my Husband, who were always
a major driving force and support to me
and to whom I owe my success

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LIST OF ABBREVIATIONS

% Sat	=	Percent Saturation
COHb	=	Carboxyhaemoglobin
F.T.	=	Full term
FIO2	=	Fractional Concentration of O2 in Inspired Air
Hb	=	Haemoglobin
HB-O2 Curve	=	Haemoglobin Oxygen Dissociation Curve
HbF	=	Fetal Haemoglobin
HbO2	=	Oxyhaemoglobin
I.R	=	Infra Red
ICUs	=	Intensive Care Units
ITU	=	Internal Data Storage
KPa	=	Kilopascalss
LEDs	=	Light Emitting Diodes
Met Hb	=	Methaemoglobinemia
NICU	=	Neonatal Intensive Care Unit
nm	=	Nanometer
P.T	=	Preterm
PACO2	=	Alveolar CO2 Tension
PaO2	=	Arterial Oxygen Partial Pressure
PAO2	=	Partial Pressure of Oxygen
PCO2	=	Partial of Pressure CO2
PIO2	=	Inspired Oxygen Tension
PVO2	=	Mixed Venous Oxygen Tension
R	=	Respiratory Exchange Ratio
RLF	=	Retrolental Fibroplasia
ROP	=	Retinopathy of Prematurity
SaO2	=	Arterial Blood Oxygen Saturation
SPO2	=	Pulse Oxygen Saturation
tcPO2	=	Transcutaneous Oxygen Partial Pressure
V/Q	=	Ventilation Perfusion Ratio
VD	=	Physiological Dead Space
VT	=	Tidal Volume

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1. INTRODUCTION AND AIM OF THE WORK

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1. INTRODUCTION

Continuous monitoring of oxygenation in infants with cardio-respiratory problems is vitally important (*Michael S.Jennis and Joyce et al 1987*).

Avoiding both hypoxia and hyperoxia is a major goal in the management of infants with prolonged oxygen dependency. Blood gas monitoring by repeated arterial sampling carries significant risks, is technically difficult, and provides intermittent information only (*Alfonso et al 1986*).

Currently the most frequently used non-invasive device for measuring the arterial oxygenation is the $TCPO_2$ monitor. This allows for continuous measurements, but response time varies, frequent calibration is necessary, and change of site is required to prevent skin damage. There may be a poor correlation with PaO_2, depending on site of electrode, oxygen levels, cardiac output, peripheral perfusion, and condition of the skin (*Beran A.V. et al 1971*).

Arterial SaO_2 can be measured non-invasively with oximetric techniques (*Sergio Fanconiet al 1985*).

The pulse oximeter which is a newly available monitor, continuously and non-invasively measures the oxygen saturation (SaO_2) of arterial haemoglobin (*Yoshiyal et al 1980*) beat by beat. This devise uses spectrophotometric power principles to determine SaO_2 with each arterial pulsation. (*Michael S. etal 1987*).

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Pulse oximetry functions by positioning a pulsating arterial vascular bed between a two wave length light and light detecting sensor. The difference in light absorbance between reduced haemoglobin and oxyhaemoglobin is measured in phase with arterial pulsation (*Alfonso et al 1986*).

In general these reports have been favorable regarding the application of pulse oximetry to neonatal oxygen monitoring, emphasizing the easy application of SPO_2 probes, lack of instrument calibration requirement, in frequency of cutaneous injury as their sensor is unheated so they will not cause skin burns, rapid response of SPO_2 to changes in blood oxygenation, and significant correlation of SPO_2 and SaO_2 (*William et al 1989*).

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AIM OF THE WORK

This work is designed to study neonatal oxygen monitoring by the use of pulse oximetry and transcutaneous oxygen measurement.

The study will evaluate and compare the two methods with relevance to, accuracy, reliability and how well does the pulse oximeter compare with currently non-invasive, continuous $TcPO_2$.

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2. REVIEW OF LITERATURE
Chapter I
Physiology of Oxygen

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CHAPTER I

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2. TERMINOLOGY
3. THE NORMAL ARTERIAL OXYGEN TENSION
4. PHYSIOLOGY OF BLOOD GASES.
5. MECHANISM OF GAS TRANSPORT
6. FACTORS AFFECTING OXYGEN TRANSPORT
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