

تبيكة المعلومات الجامعية

CLETIN TENNY CONTROLLER





ثبكة المعلومات الجامعية



شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم



جامعة عين شمس

التوثيق الالكتروني والميكروفيلم



نقسم بللله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأفلام قد اعدت دون آية تغيرات



بجب أن

تحفظ هذه الأفلام بعيداً عن الغبار في درجة حرارة من 15 - 20 منوية ورطوبة نسبية من 20 - 40 %

To be kept away from dust in dry cool place of 15 – 25c and relative humidity 20-40 %



ثبكة المعلومات الجامعية



يعض الوثائق

الأصلية تالفة





ترد بالأص

الرى دې المال كالمال كا



Tissue Oxygenation

Essay submitted for Partial Fulfillment of the Master Degree in Anesthesia $\mathcal{B}_{\mathcal{Y}}$

Milad Ragaey Zekri

M.B.B.ch

Under Supervision of

Prof. Dr. Salwa Mehanny Abdel-Malek

Professor of Anesthesia and Intensive Care Faculty of Medicine - Ain Shams University

Prof. Dr. Basel Mohamed Essam Nour El-Din

Assistant professor of Anesthesia and Intensive Care Faculty of Medicine - Ain Shams University

Dr. Hanan Mohamed Farag

Lecturer in Anesthesia and Intensive Care Faculty of Medicine - Ain Shams University

Ain Shams University Faculty of Medicine 2000

BVYGE

Contents

| • | Page |
|---|------|
| Chapter I: Introduction | 1 |
| Chapter II: Oxygen transport system | 7 |
| Chapter III: Monitoring of tissue oxygenation | 23 |
| Chapter IV: Tissue hypoxia | 51 |
| Summary | 83 |
| References | 85 |
| Arabic Summary | 00 |

List of Fables

| | Page |
|---|------|
| Table 2-1: Solubility of oxygen and carbon dioxide in plasma | ġ |
| Table 2-2: Concentration of oxygen and carbon dioxide in | |
| whole blood | 10 |
| Table 2-3: Relative influence of anemia and hypoxemia on | |
| arterial oxygenation | 10 |
| Table 2-4: Parameters of oxygen and carbon dioxide transport | 16 |
| Table 2-5: Pulmonary arterial oxygenation values | 20 |
| Table 3-1: Indirect measures of tissue oxygen balance | 28 |
| Table 3-2: Variability in the calculated and measured VO ₂ | 36 |
| Table 3-3: Correlation with outcome in patients with septic | |
| shock | 41 |
| Table 3-4: Influence of lactate threshold on mortality | |
| predictions | 42 |
| Table 3-5: Lactate as an oxidative fuel | 44 |
| Table 3-6: The gastric tonometry method | 45 |
| Table 4-1: Positive and negative aspects of PEEP therapy | 66 |
| Table 4-2: Endogenous and exogenous antioxidants | 79 |
| Table 4-3: Clinical conditions that are accompanied by oxidant | 19 |
| stress | อา |
| ou coo | 82 |

List of Figures

| | Page |
|---|------|
| Figure 1-1: Scheme of the oxygen partial pressures from air to | |
| tissues | 2 |
| Figure 2-1: Oxygen-hemoglobin dissociation curve | 13 |
| Figure 2-2: Oxygen delivery | 15 |
| Figure 2-3: Schematic view of oxygen uptake | 16 |
| Figure 2-4: Graph describing the normal relationship between | |
| oxygen delivery and oxygen uptake | 19 |
| Figure 3-1: Tissue oxygen balance | 24 |
| Figure 3-2: Oxygen delivery/consumption relationship | 26 |
| Figure 3-3: Serial measurement of blood lactate levels before | |
| and after abdominal aortic aneurysm surgery | 29 |
| Figure 3-4: Sequential management of blood volume, blood | |
| flow, oxygen transport and tissue oxygenation | 31 |
| Figure 3-5: Relation of oxygen delivery and oxygen uptake | 34 |
| Figure 3-6: Influence of endotoxin and hypoxic challenge on | |
| arterial lactate levels | 43 |
| Figure 3-7: Postoperative changes in oxygen uptake and gastric | |
| intramucosal pH in a patient with postoperative sepsis | 47 |
| Figure 4-1: The metabolism of molecular oxygen to water | 76 |
| Figure 4-2: The actions of three antioxidant enzymes and a free | |
| radical scavenger | 80 |

List of Abbreviations

P_AO₂ : Alveolar oxygen partial pressure P_aO₂ : Arterial oxygen partial pressure Tissue PO₂ : Tissue oxygen partial pressure

DO₂ : Oxygen delivery COP : Cardiac output

S_aO₂ : Arterial oxygen saturation
VO₂ : Oxygen consumption
C_aO₂ : Arterial oxygen content
ODC : Oxygen dissociation curve

P_vO₂ : Venous blood oxygen partial pressure

S_vO₂ : Venous blood oxygen saturation

DPG : Diphosphoglycerate

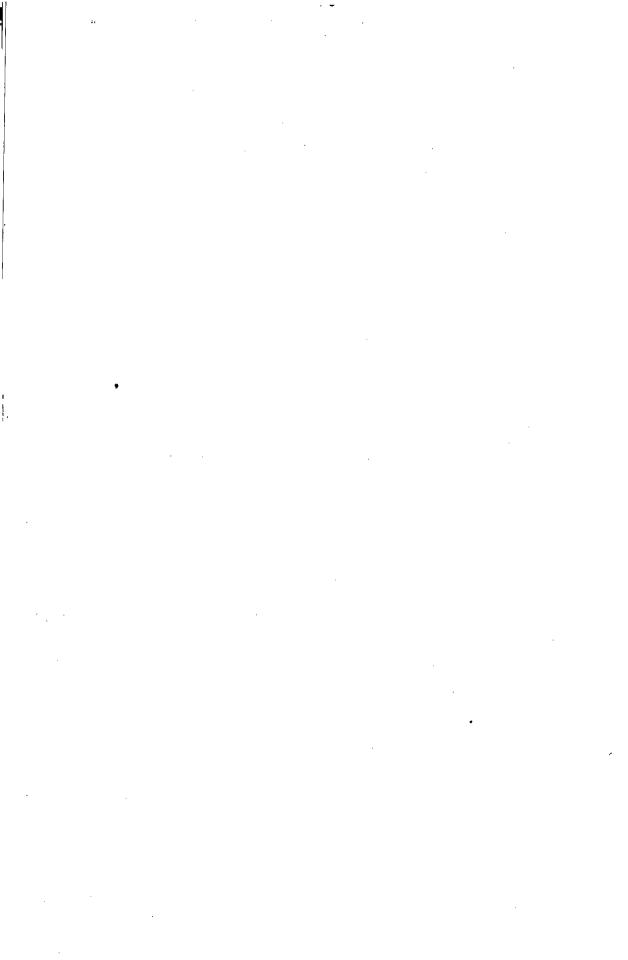
O₂ER Oxygen extraction ratio

MODS : Multiple organ dysfunction syndrome MRO₂ : Metabolic requirement for oxygen ARDS : Adult respiratory distress syndrome

CV : Coefficient of variation VCO₂ : Carbon dioxide production

F₁O₂ : Inspired oxygen fraction V/P ratio : Ventilation/perfusion ratio

PEEP : Positive end expiratory pressure FRC : Functional residual capacity



Chapter I