بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

Comparative Study of the Prognosis of Patients with Septic Shock Related to Ventilator Associated Pneumonia Using Variance of Arterial and Venous CO_2 versus Serum Lactate

Thesis

Submitted to the Faculty of Medicine Ain Shams University In partial fulfilment of the Requirements of the degree of Master In Intensive Care

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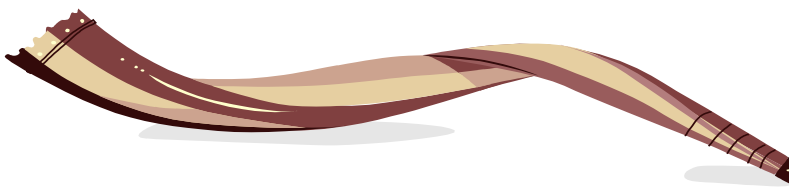

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List of Abbreviations

Abb.	Full term
ARDS	Acute respiratory distress syndrome
CO2	Carbon dioxide
CPIS score	Clinical pulmonary infection score
CRP	C-reactive protein
CtCO2	Total concentration of carbon dioxide
CVP	Central venous pressure
ECDC	European center for Disease prevention and control
EPIC	European Prevalence of Infection in Intensive Care
ESBL-PE	Extended spectrum β-lactamase-producing Enterobacteriaceae
FDA	Food and Drug Administration
FIO2	Fraction of inspired oxygen
HAP	Hospital acquired pneumonia
ICU	Intensive care unit
IV	Intervenes
JAMA	Journal of the American Medical Association
LPS–LBP	Lipopolysaccharide –lipopolysaccharide-binding protein
MAP	Mean arterial pressure
mCD14	Membrane-bound, CD14
MDR	Multi-drug resistance
MRSA	Methicillin-resistant Staphylococcus aureus
OR	Odds ratio
PaCO2	Partial pressure of carbon dioxide
PaO2	Arterial partial pressure of oxygen
PCT	Procalcitonin
sCD14	Soluble CD14
SIRS	Systemic inflammatory response syndrome
SOFA	Sequential organ failure assessment
VAP	Ventilator associated pneumonia

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Introduction

Ventilator associated pneumonia "VAP" is a type of hospital-acquired pneumonia that occurs more than 48 hours after endotracheal intubation. This can be further classified into early onset (within the first 96 hours of mechanical ventilation) and late onset (more than 96 hours after the initiation of mechanical ventilation), which is more commonly attributable to multidrug–resistant pathogens **(Rawal et al., 2018).**

Approximately one-third of nosocomial pneumonia cases, with the majority being VAP, are acquired in the intensive care units. United states of America epidemiological studies report an incidence of VAP of 2–16 episodes per 1000 ventilator-days estimated the risk of VAP to be 3% per day during the first 5 days on mechanical ventilation, 2% per day from day 5 to 10 and 1% per day for the remaining days **(Torres et al., 2017).**

Pneumonia is usually mild if it occurs in the early period of invasive ventilation and the organisms "mostly Gram-positive" are most responsive to the antibiotics administered, whereas after a few days (late onset), pneumonia is more severe in its course, with fewer organisms "mostly Gram-negative" responding to antibiotics and increased rate of morbidity and mortality among those with late onset infection **(El-Kolaly et al., 2019).**

The crude mortality of nosocomial pneumonia may be as high as 70%. Several reports have estimated that third to half of all VAP-related deaths are due to sepsis, with a higher mortality rate in cases caused by Pseudomonas aeruginosa and Acinetobacter spp **(Micek et al., 2015).**

Sepsis is now defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. Septic shock is a subset of sepsis with circulatory and cellular/metabolic dysfunction associated with a higher risk of mortality **(Rhodes et al., 2017).**

Adult patients with septic shock can be identified using the clinical criteria of hypotension requiring vasopressor therapy to maintain mean BP 65 mm Hg or greater and having a serum lactate level greater than 2 mmol/L after adequate fluid resuscitation **(Shankar-Har et al., 2016).**

Lactate is important source of energy, particularly during starvation. Lactate also contributes to acidic environment by converting to lactic acid. Next, lactate is converted to bicarbonate and becomes a main source of alkalemia under normal conditions. In tissue hypoxia, lactate is overproduced by increased anaerobic glycolysis. **(Lee et al., 2016).** The clinical prognostic role of serum lactate was suggested in 1964 by Broder and Weil as a risk prediction factor of VAP **(Mozafari et al., 2017).**

An increased venous to arterial partial pressure carbon dioxide "PCO2 variance", is a common finding in sepsis. Elevated tissue PCO2 could reflect the persistence of anaerobic metabolism as result of bicarbonate buffering of protons derived from fixed acids, like lactate. In this case, it could represent tissue dysoxia. Alternatively, an increase in tissue PCO2 could denote hypo-perfusion and diminished removal of the CO2 produced during the oxidation of pyruvate **(Ospina-Tascón et al., 2013).**

PCO2 variance or gap is an important hemodynamic variable in the management of sepsis-induced circulatory failure and can be a marker of the adequacy of cardiac output in severe sepsis **(Bitar et al., 2020).**

Aim of the Work

The aim of this study is to compare the variance between arterial and central venous carbon dioxide versus serum lactate as an early bedside prognostic factor in cases of septic shock due to ventilator associated pneumonia