بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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Prediction of fluid responsiveness in mechanically ventilated patients in surgical intensive care unit by pleth variability index and inferior vena cava diameter

Thesis

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Diaa EL Din Badr Metwally

بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

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List of Abbreviations

Abb.	Full term
A4C	*Apical four-chamber.*
A5C	*Apical five-chamber.*
APACHE II	*Acute Physiology and Chronic Health Evaluation.*
AUC	*Area under the curve.*
BMI	*Body mass index.*
BP	*Blood pressure.*
CI	*cardiac index.*
CO	*Cardiac output.*
CSA	*Cross-sectional area.*
CVP	*Central venous pressure.*
D	*Diameter.*
dIVC	*Inferior vena cava distensibility index.*
EEO	*End-expiratory occlusion.*
HF	*Heart failure.*
HR	*Heart rate.*
ICU	*Intensive care unit.*
ITP	*Intrathoracic pressure.*
IV	*Intravenous.*
IVC	*Inferior vena cava.*
LV	*Left ventricle.*
LVEDP	*Left ventricular end-diastolic pressure.*
LVOT	*Left ventricular outflow track.*
MAP	*Mean arterial pressure.*
OR	*Operating room.*
PAOP	*Pulmonary artery occlusion pressure.*
PI	*Perfusion index.*
PLR	*Passive leg raising.*
PPV	*Positive pressure ventilation.*
PPV	*Pulse pressure variation.*
PVI	*Pleth variability index.*
PW	*Pulse-wave.*
RAP	*Right atrial pressure.*

List of Abbreviations Cont…

Abb.	Full term
ROC	*Receiver operating characteristic.*
RV	*Right ventricle.*
SVV	*Stroke volume variation.*
SV	*Stroke volume.*
TTE	*Transthoracic echocardiography.*
UOP	*Urine output.*
US	*Ultrasound.*
VR	*Venous return.*
VTI	*Velocity-time integral.*

INTRODUCTION

Perioperative prediction of fluid responsiveness was a challenge for many years. It is knowing as the ability of the circulation to increase cardiac output (CO) in response to volume expansion. Accommodation of the large volume of venous return (VR) is done by stretching ventricles, which is knowing as cardiac preload. Since preload is related to CO, increased negativity of intrathoracic pressure (ITP) during inspiration subsequently increases VR and then CO, and the reverse occur during expiration. **(Chu et al., 2016).**

Hemodynamic optimization by intravenous (IV) fluids administration is very important to correct any fluid deficits created by fasting, blood loss, urinary excretion, or in septic and other critically ill patients to improve oxygen delivery and overall hemodynamic function. However, it may be ineffective or harmful to patient if no suitable monitoring methods are used. Interstitial fluid accumulation by more volume expansion may worsen oxygen diffusion to the tissues and decrease myocardial compliance. Therefore, it became essential to develop an approach for evaluation of patients who are likely to get benefit from fluid administration **(Cumpstey et al., 2016).**

Static variables, as central venous pressure (CVP), pulse pressure, systolic pressure, and pulmonary artery occlusion pressure (PAOP), were documented as unreliable methods for assessment of fluid responsiveness. These techniques cannot predict the effect on ITP during inspiration and expiration **(Wise et al., 2017).**

Dynamic measurements, as pulse pressure variation (PPV), and stroke volume variation (SVV) can predict fluid responsiveness in more accurate way, especially in sedated mechanically ventilated patients. However, these methods may be invasive, and technically difficult. Therefore, bedside non-invasive techniques became more popular (**Haas et al., 2012).**

Pleth variability index (PVI) is a dynamic variable, which has recently gained a lot of interest. By using the amplitude of pulse oximeter waveform it measures the respiratory variation continuously and automatically, so it become an effective dynamic fluid response predictor in sedated mechanically ventilated patients with sinus rhythm by providing simple numeric value on the monitor screen **(Chu et al., 2016).**

Ultrasound devices are widely used for many purposes in the intensive care unit (ICU) because it is easy to record, entirely non-invasive, already available on most ICUs and requires only a short training period. Therefore, measuring inferior vena cava (IVC) diameter variation during mechanical ventilation or inferior vena cava distensibility index (dIVC) has been used as a non-invasive method to predict fluid responsiveness **(Theerawit et al., 2016).**

AIM OF THE WORK

This study is aiming to compare the effectiveness and reliability of the pleth variability index (PVI) and IVC distensibility index (dIVC) as predictors of fluid responsiveness by simultaneous recordings in all sedated mechanically ventilated patients in Ain shams university surgical intensive care unit (ICU).