بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

Ultrasound Guided Preoperative Assessment of Inferior Vena Cava Collapsibility Index in Prediction of Intraoperative Hypotension in Patients undergoing Laparoscopic Cholecystectomy Surgery under General Anesthesia

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا إلا ما علمتنا إنك أنت العليم الحكيم

صدق الله العظيم

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List of Abbreviations

Abb.	Full term
ΔP	*Pressure gradient*
ANP	*Atrial natriuretic peptide*
ARDS	*Acute respiratory distress syndrome*
ASA	*American society association of anesthesiology*
BMI	*Body mass index*
cGMP	*Cyclic guanosine monophosphate*
CI	*Cardiac index / collapsibility index*
CO	*Cardiac output*
CVP	*Central venous pressure*
DBP	*Diastolic blood pressure*
DM	*Diabetes mellitus*
DO_2	*Oxygen delivery*
ET	*Endothelin*
$ETCO_2$	*End tidal carbon dioxide*
F	*Flow*
FHM	*Functional hemodynamic monitoring*
FiO_2	*Fraction of inspired oxygen*
HR	*Heart rate*
HTN	*Hypertension*
IAP	*Intra-abdominal pressure*
ICU	*Intensive care unit*
IVC	*Inferior venacava*
IVC/Ao	*Inferior venacava diameter/Aortic diameter*
IVC-CI	*Inferior venacava collapsibility index*
IVC-DI	*Inferior venacava distensibility index*
IVCmax	*Inferior venacava maximum diameter*

List of Abbreviations cont...

Abb.	Full term
IVCmin	*Inferior venacava minimal diameter*
L	*Length of the tube*
LA	*Left atrium*
LV	*Left ventricle*
MAC	*Minimal alveolar concentration*
MAP	*Mean arterial pressure*
η	*Viscosity*
NIRS	*Near-infrared spectroscopy*
NO	*Nitric oxide*
P_A	*Arterial pressure*
PAC	*Pulmonary artery catheter*
PaO_2	*arterial partial pressure of oxygen*
PAOP	*Pulmonary artery occlusion pressure*
PCO_2	*Partial pressure of carbon dioxide*
PCWP	*Pulmonary artery wedge pressure*
PLR	*Passive leg raising test*
PPmax	*Maximum pulse pressure*
PPmin	*Minimal pulse pressure*
PPV	*Pulse pressure variation*
P_V	*Venous pressure*
Q	*Flow rate*
R	*Resistance*
RA	*Right atrium*
RAAS	*Renin angiotensin aldosterone system*
RASS	*Richmond Agitation Sedation Scale*
ROC	*Receiver operator curve*
RR	*Respiratory rate*

List of Abbreviations cont...

Abb.	Full term
RV	*Right ventricle*
SBP	*Systolic blood pressure*
$ScvO_2$	*Central venous oxygen saturation*
SD	*Standard deviation*
SDF	*Side stream dark field*
SPP	*Systolic pressure variation*
StO_2	*Local tissue oxygen saturation*
SV	*Stroke volume*
SVC	*Superior venacava*
SvO_2	*Venous oxygen saturation*
SVR	*Systemic vascular resistance*
SVV	*Stroke volume variation*
VO_2	*Oxygen uptake*
VOT	*Vascular occlusion test*

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INTRODUCTION

No doubt Laparoscopic surgery aims to minimize trauma of the interventional process but still achieve a satisfactory therapeutic results. It is commonly performed because of various advantages such as reduced postoperative pain, faster recovery and more rapid return to normal activities, shorter hospital stay, and reduced postoperative pulmonary complications. The operative technique requires inflating gas into the abdominal cavity to provide a surgical procedure. An intra-abdominal pressure (IAP) of 10-15 mmHg is used ***(Gerges et al., 2006).***

Hemodynamic changes include the alterations in arterial blood pressure, arrhythmias and cardiac arrest may happen. These cardiovascular changes depend on the interaction of several factors including patient positioning, neurohumoral response and the patient factors such as cardiorespiratory status and intravascular volume ***(Leonard and Cunningham, 2002).***

Although patients with normal cardiovascular function are able to well tolerate these hemodynamic changes but hypovolemic patients perioperatively or At IAP levels greater than 15 mmHg, venous return decreases leading to decreased cardiac output and hypotension ***(Şevki et al., 2019)***.

So maintaining hemodynamic stability is essential for reducing the rate of postoperative complications and intraoperative hypotension incidence. Although intraoperative hypotension has no universal definition, it has a serious impact on myocardial injury, acute kidney injury, septic complications ***(Haynes et al., 2011)***, the risk of 30-day mortality ***(Gu et al., 2018),*** as well as the risk of one-year mortality in selected patient populations ***(Bijker et al., 2009).***

Reoperative fluid deficit should be determined and restored through history, physical examination, hemodynamic measurements and laboratory outcomes in order to eliminate the risk for intraoperative hypotension ***(Butterworth et al., 2013)***. Given the limitations of static parameters, the use of dynamic parameters may be superior in evaluation of hemodynamic response ***(Marik et al., 2008; Renner et al., 2009; Thiele et al., 2015)***.

Several invasive devices (e.g., pulmonary arterial catheter, PiCCO®, Vigileo®, etc.) are available for evaluating preload among other elements of hemodynamic status, but their universal use is not a reasonable option due to financial constraints, relatively high complication rates, known limitations and unnecessary invasiveness compared to most surgical procedures ***(Vincent et al., 2015).***

In a recent meta-analysis, Ferreira et al. reported an approximately 31% change in anaesthesia management when ultrasound was used. Thirty-five percent of the performed ultrasonographies were transthoracic echocardiographies