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The Role of Inferior Vena Cava Diameter Variation ratio Measured by Ultrasonography versus Central Venous Pressure in Assessment Of Volume Responsiveness of Shocked Hepatic Patients

Thesis

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Mohamed Abdel Wareth Mohamed

Contents

List of Abbreviations

Abb.	Full term
ADH	Anti diuretic hormone
ALF	Acute liver failure
ALT	Alanine aminotransferase
ANA	Anti nuclear antibody
ANOVA	Analysis of variance
Anti LKM	Anti liver kidney microsome antibody
AP diameter	Anteroposterior diameter
AST	Aspartate aminotransferase
BMI	Body mass index
BUS	Bed side ultrasound
CT	Computed tomography
CVC	Central venous catheter
CVL	central venous line
CVP	Central venous pressure
DNA	Deoxyribonucleic acid
Ea	Effective arterial elastance
ECG	Electrocardiogram
FACTT	Fluid and Catheter Treatment Trial
HE	Hepatic encephalopathy
HR	Heart rate

Abb.	Full term
HRS	Hepatorenal syndrome
Ht.	Height
ICU	Intensive care unit
IgA	Immunoglobulin A
IgG	Immunoglobulin G
IgM	Immunoglobulin M
INR	International normalized ratio
IVC	Inferior vena cava
IVC-CI	Inferior vena cava collapsibility index
IVCd-max	Maximum inferior vena cava diameter
IVCd-min	Minimum inferior vena cava diameter
LV	Left ventricle
MAP	Mean arterial pressure
MELD	Model for End-Stage Liver Disease
MRCP	Magnetic resonance cholangiopancreatography
MRI	Magnetic resonance imaging
NASH	Non alcoholic steatohepatitis
NIBP	Non invasive blood pressure
NO-synthase	Nitric oxide synthase
PAC	Pulmonary artery catheter
PEEP	Positive end expiratory pressure

Abb.	Full term
PELD	Pediatric End-Stage Liver Disease
PLR	Passive leg raising
P-value	Probability value
RA	Right atrium
RAP	Right atrial pressure
RV	Right ventricle
SBP	Spontaneous bacterial peritonitis
SD	Standard deviation
SPO_2	Peripheral oxygen saturation
SVR	Systemic vascular resistance
TNF-alpha	Tumor necrosis factor alpha
USA	United States of America
USG	Ultrasonography
Wt.	Weight

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The Role of Inferior Vena Cava Diameter Variation Ratio Measured by Ultrasonogaphy versus Central venous Pressure in Assessment of Volume Responsiveness of Shocked Hepatic Patients

Abstract

Background: Liver cirrhosis is a major cause of morbidity and mortality in chronic liver disease patients which is multifactorial in nature, leading to several complications including ascites, variceal bleeding, hepatic encephalopathy, spontaneous bacterial peritonitis and hepatorenal syndrome. **Aim of the Work:** to evaluate the relationship between inferior vena cava (IVC) diameter measured by ultrasonography (USG) versus central venous pressure as measured via central venous catheter, and whether it is reliable for use in evaluating intravascular volume status during the management of shock in hepatic patients. **Patients and Methods:** This study included one hundred cirrhotic liver patients with Child-Pugh classification B and C with acute circulatory failure of either sex, aging >18 years old, admitted in the ICU at Ain Shams University hospitals during the last two years, after the approval of the ethical medical committee and obtaining a written informed consent, central venous pressure (CVP) and IVC collapsibility index (IVC-CI) are measured simultaneously at baseline and along the subsequent stages of standard shock management protocol at intervals 1, 4 and 8 hours. **Results:** The current study showed that 77 patients of 93 patients (83%) responded to volume resuscitation. While 16 patients of 93 patients (17%) didn't respond to volume resuscitation regimen, and their blood pressure improved only after introduction of vasopressor. **Conclusion:** Measurements of CVP and IVC-CI throughout the study in volume responder patients were found to have a solid negative correlation denoting that Inferior Vena Cava collapsibility index assessment is relatively safe option being non invasive technique and sensitive at least when compared to measuring CVP and to avoid complications of central venous line (CVL) insertion with its complications especially in hepatic patients with coagulopathy.

Key words: inferior vena cava diameter, ultrasonogaphy, central venous pressure, volume responsiveness of shocked hepatic patients

Introduction

Cirrhotic patients are prone to develop life-threatening complications that require emergency care and intensive care unit (ICU) admission. They can present with specific decompensations related to cirrhosis such as variceal bleeding, hepatorenal syndrome (HRS) or other critical events that are observed in the general population such as severe sepsis or septic shock. Clinical management of all these entities requires a specific approach in cirrhosis **(Ginès et al., 2012)**.

Cirrhotic patients have a hyperdynamic circulation with high cardiac output and low systemic vascular resistance in the absence of infection. Circulatory dysfunction increases the susceptibility of critically-ill cirrhotic patients to develop multiple organ failure and attenuates vascular reactivity to vasopressor drugs. Moreover, hypotensive cirrhotic patients require a carefully balanced replacement of volume status, since overtransfusion increases portal hypertension and the risk of variceal bleeding and undertransfusion causes tissue hypoperfusion which increases the risk of multiple organ failure **(Ginès et al., 2012)**.