

Intrarenal resistance index for the assessment of early renal impairment in patients with liver cirrhosis

THESIS

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بسم الله الرحمن الرحيم

"رب إني لما أنزلت إلي من خير فقير"

صدق الله العظيم

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Abstract

Title: Intrarenal resistance index for the assessment of early renal function impairment in patients with liver cirrhosis.

Background: Kidney dysfunction commonly develops in patients with liver cirrhosis. Renal failure develops due to renal vascular constriction and can be present weeks or even months before clinical signs or increased levels of blood urea nitrogen or serum creatinine concentrations become detectable. In this study we analyze the value of renal arterial resistance index, measured by duplex-Doppler ultrasonography for detecting early impairment of renal function in patients with liver cirrhosis.

Objectives: to illustrate that the Intrarenal Resistive Index (RI) measurement is a predictor of renal vasoconstriction and serves to detect early renal function impairment in cirrhotic patients. The diagnosis of elevated RI may be taken into account in the clinical management of these patients.

Methods: Subjects were divided into 3 groups containing 30 patients with liver cirrhosis and ascites, 30 patients with liver cirrhosis without ascites, and 15 control subjects. All patients underwent abdominal ultrasound examination with renal RI measurement and correlation with laboratory results for renal function.

Results: RI was significantly higher in ascitic patients compared to non-ascitic patients (0.74 vs. 0.67, $p < 0.01$) and in non-ascitic patients with liver cirrhosis than in control subjects (0.67 vs. 0.62, $p < 0.01$). 48%

(19/40) of patients with liver cirrhosis and normal serum creatinine concentration showed elevated RI levels.

Conclusion: Intrarenal RI measurement is a predictor of renal vasoconstriction and serves to detect early renal function impairment in cirrhotic patients. The diagnosis of elevated RI may be taken into account in the clinical management of these patients.

Keywords: Resistance Index, Hepatorenal Syndrom, Liver Cirrhosis.

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LIST OF ABBRAVIATIONS

A1AT	alph 1 antitrypsin
ATN	acute tubular necrosis
DSRS	distal splenorenal shunt
GFR	glomerular filtration rate
HAV	hepatitis A virus
HBV	hepatitis B virus
HCC	hepatocellular carcinoma
HCV	hepatitis C virus
HDV	hepatitis D virus
HRS	hepatorenal syndrom
INR	international normalized ratio
MARS	molecular adsorbants recirculation system
MELD	model for end stage liver disease
N	number of cases
NAFLD	non alcoholic fatty liver disease
NASH	non alcoholic steatohepatitis
NSAIDS	non steroidal antiinflammatory drugs
PBC	primary biliary cirrhosis
PSC	primary sclerosing cholangitis
RI	resistive index
SBP	spontaneous bacterial peritonitis
SD	standerd deviasion
TIPS	transjugular intrahepatic portosystemic shunt
UDCA	ursodeoxycholic acid
UNOS	united network for organ sharing

Introduction

Liver cirrhosis, most frequently caused by hepatitis C or alcoholism, was the 12th leading cause of death in the United States in 2000, accounting for more than 25,000 deaths. **(Ginès et al.,2004)**

In Egypt, schistosomiasis was traditionally the major cause of liver disease. From the 1950s until the 1980s, the Egyptian Ministry of Health (MOH) undertook large control campaigns using intravenous tartar emetic, the standard treatment for schistosomiasis, as community-wide therapy. This commendable effort to control a major health problem unfortunately established a very large reservoir of hepatitis C virus (HCV) in the country. **(Colli et al.,2008)**

Ascites is the most common complication of cirrhosis and is associated with a poor quality of life, increased risks of infections and renal failure, and a poor long-term outcome. The onset of ascites in a patient with cirrhosis signals the beginning of compromised quality and expectancy of life. This common complication of end-stage liver disease results from a complex pathogenesis that leads to marked renal sodium and water retention. **(Ginès et al.,2005)**

Kidney dysfunction commonly develops in patients with liver cirrhosis. Renal failure develops due to renal vascular constriction and can be present weeks or even months before clinical signs or increased levels of blood urea nitrogen or serum creatinine concentrations become detectible. **(Kastelan et al.,2004)**

Studies of renal perfusion when kidney function tests are still normal could be useful to understand the pathophysiology of functional kidney impairment in cirrhosis; currently, this requires invasive methodology. Duplex doppler ultrasonography allows noninvasive evaluation of intrarenal arterial resistances. (David.,et al 2006)

AIM OF THE STUDY

The purpose of this study is to illustrate intrarenal resistance index (RI) measurement by duplex doppler ultrasonography in patients with liver cirrhosis with or without ascites as a predictor of renal vasoconstriction and serves to detect early renal function impairment in cirrhotic patients.

CHAPTER I

LIVER CIRRHOSIS

What is cirrhosis?

Cirrhosis is a complication of many liver diseases that is characterized by abnormal structure and function of the liver. The diseases that lead to cirrhosis do so because they injure and kill liver cells, and the inflammation and repair that is associated with the dying liver cells causes scar tissue to form. The liver cells that do not die multiply in an attempt to replace the cells that have died. This results in clusters of newly-formed liver cells (regenerative nodules) within the scar tissue. (as shown in fig.1) (Arroyo et al., 2003)



Fig.1(liver cirrhosis)

What are the common causes of cirrhosis?

- 1. Chronic viral hepatitis:** Most patients infected with hepatitis B virus and hepatitis C virus develop chronic hepatitis, which, in turn, causes progressive liver damage and leads to cirrhosis, and, sometimes, liver cancers.

The common types of viral hepatitis:

Hepatitis A

Viral hepatitis A (HAV) accounts for about 150,000 of the 500,000-600,000 new cases of viral hepatitis that occur each year in the United States. The hepatitis caused by HAV is an acute illness (acute viral hepatitis) that very rare becomes chronic. At one time, hepatitis A was referred to as "infectious hepatitis" because it could be spread from person to person like other viral infections. Infection with hepatitis A virus can be spread through the ingestion of food or water, especially where unsanitary conditions allow water or food to become contaminated by human waste containing hepatitis A . Hepatitis A typically is spread among household members and close contacts through the passage of oral secretions or stool (poor hand washing). It also is common to have infection spread to customers in restaurants and among children and workers in day care centers if hand washing and sanitary precautions are not observed. **(Arroyo et al., 2002)**

Hepatitis B

There are 200,000-300,000 new cases of viral hepatitis B (HBV) infection each year in the United States. Type B hepatitis was at one time referred to as "serum hepatitis," because it was thought that the only way hepatitis B virus (HBV) could spread was through blood or serum containing the virus. It is now known that hepatitis B can spread by sexual contact, the transfer of blood or serum through shared needles in drug abusers, accidental needle sticks with needles contaminated with infected blood, blood transfusions, hemodialysis, and by infected mothers to their newborns. The infection also can be spread by tattooing, body piercing, and sharing razors and toothbrushes (if there is contamination with infected blood). About 6-10% of patients with hepatitis B develop chronic HBV infection (infection lasting at least six months and often years to decades) and can infect others as long as they remain infected. Patients with chronic hepatitis B infection also are at risk of developing cirrhosis, liver failure and liver cancer. It is estimated that there are 1.2 million people in the United States and 200-300 million people world-wide who suffer with chronic hepatitis B infection. **(Han and Ginès., 2004)**

Hepatitis C

There are about 150,000 new cases of hepatitis C each year. Type C hepatitis was previously referred to as "non-A, non-