CT PORTOGRAPHY USING MDCT VERSUS COLOR DOPPLER SONOGRAPHY IN DETECTION OF GASTRO-ESOPHAGEAL VARICES IN CIRRHOTIC PATIENTS

Essay

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First thanks to **GOD** *to whom I relate any success in achieving any work in my life.*

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List of Abbreviations

2 D	Two dimensional.
3 D	Three dimensional.
CD	Color Doppler .
CDVP	Color Doppler velocity profile.
CI	Congestion index.
CSV	Cross sectional velocity.
CT	Computed tomography.
CTA	Computed tomography angiography.
EVB	Esophageal variceal bleeding.
GIT	gastrointestinal tract.
HCC	Hepatocellular carcinoma.
INR	International normalized ratio.
Kv	Kilovoltage.
LGV	Left gastric vein.
LPV	Left portal vein.
MDCT	Multi-detector row computed tomography.
MIP	Maximum intensity projection.
MPR	Multiplanar reformatting.
MR	Magnetic resonance.
PBC	Primary biliary cirrhosis.
PI	Pulsatility index.
PSC	Presinusoidal cirrhosis.
PT	Portal trunk.
PV	Portal vein.
PVP	Portal venous phase.
SSD	Shaded surface display.
SV	Splenic vein.
U/S	Ultrasound.
VR	Volume rendering.

INTRODUCTION

The portal system includes all the veins which drain the blood from the abdominal part of the digestive tube (with the exception of the lower part of the rectum) and from the spleen, pancreas and gall bladder. From these viscera the blood is conveyed to the liver by the portal vein **(Gray's, 2000).**

The portal vein is about 8 cm in length, and is formed at the level of the second lumbar vertebra by the junction of the superior mesenteric and splenic veins in front of the inferior vena cava and behind the neck of the pancreas **(Gray's, 2000).**

Portal vein tributaries include the splenic vein, the superior mesenteric vein, the coronary vein (the left gastric vein), the pyloric vein, the cystic vein and the para-umbilical veins **(Gray's, 2000).**

Portal hypertension may be defined as a portal pressure gradient of 12mm Hg or greater and is often associated with varices and ascites. Many conditions are associated with portal hypertension of which cirrhosis is the most common cause **(Carale et al., 2006).**

Numerous small tributaries connect the portal and systemic venous systems, and these can evolve into major

collateral channels when portal hypertension supervenes **(Sherlock and Dooley, 1999).**

The most common and most clinically important porto-systemic shunt is through gastro-esophageal varices. The blood flow to gastro-esophageal varices is predominantly from the left gastric vein. The vein originated at the portal venous confluence, traverses the gastric fundus and drains into the veins of the lower esophageal plexus. Shunting also occurs from the splenic vein through the short gastric veins and into the esophageal plexus. These varices flow into the deep, intrinsic, longitudinal veins of the lower esophagus, which dilate and are responsible for the bleeding encountered in cases of gastro-esophageal varices. Identification of all the vessels shunting blood to the gastro-esophageal varices is important, since it has been demonstrated that there is extensive collateralization throughout this network **(Vianna et al., 1997).**

Non-invasive measurements of the portal flow velocity, especially by Pulsed and Color Doppler became an important technique to study portal venous system hemodynamics **(Lomas et al., 1998; Iwao et al., 1999).**

Color Doppler sonography is a combined ultrasound modality offering blood flow information superimposed on a grey scale image. Areas within the image which contain

flowing blood are assigned color-overlay information **(Fruhwald and Blackwell, 1999).**

Although Color Doppler sonography is a useful, non invasive modality for evaluating the hemodynamics of the inflowing and out-flowing vessels of gastric varies in half of the patients when compared with Computed Tomography **(Takahiro et al., 2002).**

The use of Multi-Detector Row Computed Tomography (MDCT) combined with post-processing of the imaging data, allows creation of vascular maps whose quality equals or exceeds that of maps created at classic angiography for many applications. Three-Dimentional Multi-Detector Row CT portal venography can help determine the extent and location of porto-systemic collateral vessels in patients with liver cirrhosis and is probably the optimal imaging technique in this setting **(Akiko et al., 2000).**

AIM OF THE STUDY

The aim of this study is to assess the value of Multi-Detector CT portography in detection, grading and visualization of varices and porto-systemic collaterals in comparison with Color Coded Doppler.

ANATOMY OF THE PORTAL SYSTEM

The portal system includes all the veins which drain the blood from the abdominal part of the digestive tube (with the exception of the lower part of the rectum) and from the spleen, pancreas and gall- bladder. From these viscera the blood is conveyed to the liver by the portal vein. In the liver, this vein ramifies like an artery and ends in capillary – like vessels termed sinusoids, from which the blood is conveyed to the inferior vena cava (IVC)by the hepatic veins **(Gray's, 2000).**

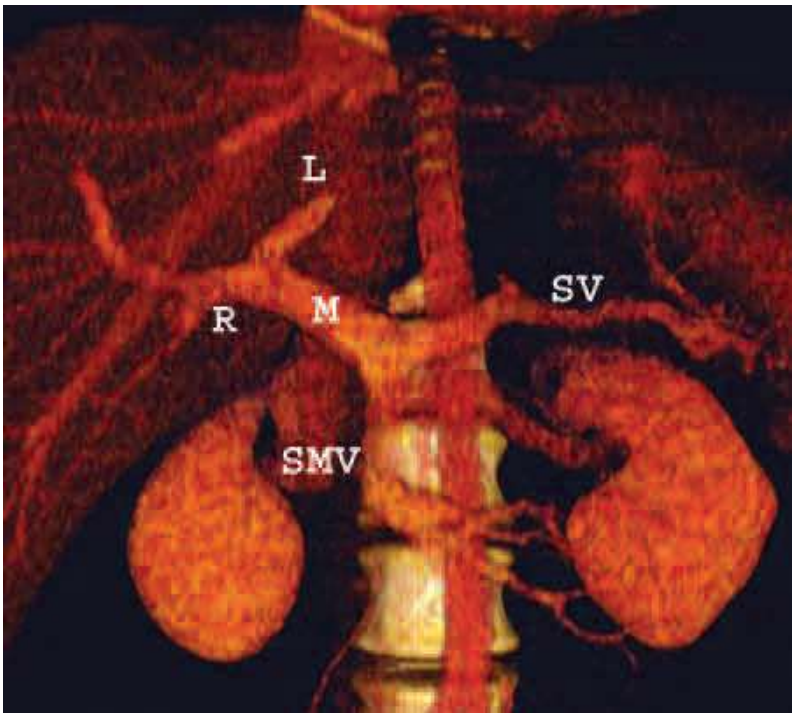

Fig. (1): Anterior VR image shows the normal portal venous anatomy. The left *(L)*, main *(M)*, and right *(R)* portal veins are well visualized. *SMV* _ superior mesenteric vein, *SV* _ splenic vein **(Inomata et al., 2000)**.

The portal vein is about 8 cm in length, and is formed at the level of the second lumber vertebra by the junction of the superior mesenteric and splenic veins. The union of these veins takes place in front of the IVC and behind the neck of the pancreas. It passes upward behind the superior part of the duodenum and then ascends in the right border of the lesser omentum to the right extremity of the porta hepatis, where it divides into right and left branches, which accompany the corresponding branches of the hepatic artery into the substance of the liver.

In the lesser omentum, it is placed behind the common bile duct and the hepatic artery, the former lying to the right of the latter **(Gray's, 2000)**.

The right branch of the portal vein enters the right lobe of the liver, but before doing so, it receives the cystic vein. The left branch, longer but of smaller caliber than the right, gives branches to the caudate lobe, and then enters the left lobe of the liver. It is joined in front by a fibrous cord, the ligamentum teres (obliterated umbilical vein), and united to the IVC by a second fibrous cord, the ligamentum venosum (obliterated ductus venosus) **(Gray's, 2000).**

Portal vein branches

The portal vein bifurcates at the hilum into right and left pedicles.