

# **ASSESSMENT OF THE PORTAL VENOUS SYSTEM USING ADVANCED CT TECHNIQUES**

*Essay*

*Submitted for fulfillment of Master degree  
in Radiodiagnosis*

*By*

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# ~~A knowledge~~

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# *Dedication*

*This humble work is dedicated with love*

*To*

*My Parents*

*The reason of what I become today*

*Thanks for your support and continuous care.*

*To*

*My Husband and Daughter*

*I am really grateful to all of you*

*You have been my inspiration and my soul mates.*

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# List of Abbreviations

<b>3D</b>	Three dimensional
<b>AV</b>	Azygos vein
<b>CBD</b>	Common bile duct
<b>CE</b>	Contrast enhanced
<b>CECT</b>	Contrast enhanced CT
<b>CE-MDCT</b>	Contrast enhanced multi-detector computed tomography
<b>CEMR</b>	contrast-enhanced MRI
<b>CEPS:</b>	Congenital extrahepatic portosystemic shunt
<b>CM</b>	Contrast Medium
<b>CPR</b>	curved planar reconstruction
<b>CT</b>	Computed tomography
<b>CTA</b>	CT Angiography
<b>GB</b>	Gall Bladder
<b>GT</b>	Gastrocolic Trunk
<b>HBV</b>	Hepatitis B virus
<b>HCV</b>	Hepatitis C virus
<b>HV</b>	Hepatic vein
<b>IMV</b>	Inferior mesenteric vein
<b>LA</b>	Left atrium
<b>LGV</b>	Left gastric vein
<b>LPV</b>	left portal vein

<b>LRV</b>	Left renal vein
<b>MDCT</b>	Multi detector Computed tomography
<b>MIP</b>	maximum intensity projection
<b>MPR</b>	Multiplanar reconstruction
<b>MPV</b>	Main portal vein
<b>MSCT</b>	Multislice CT
<b>NCE</b>	Non-contrast enhanced
<b>PDPV</b>	Predudodenal portal vein
<b>PV</b>	Portal vein
<b>PVP</b>	Portal venous phase
<b>PVS</b>	Portal venous system
<b>PVT</b>	Portal vein thrombosis
<b>RA</b>	Right atrium
<b>RAPV</b>	Right anterior portal vein
<b>RF</b>	Radio frequency
<b>ROI</b>	Region Of Interest
<b>RPPV</b>	Right posterior portal vein
<b>RPV</b>	Right portal vein
<b>SMA</b>	superior mesenteric artery
<b>SMV</b>	Superior mesenteric vein
<b>SplV</b>	Splenic vein
<b>SR</b>	Surface rendering

<b>SSCT</b>	Single-Slice CT
<b>SSD</b>	Shaded surface display
<b>SV</b>	Splenic vein
<b>SVC</b>	Superior vena cava
<b>TACTP</b>	Transarterial CT portography
<b>TIPS</b>	Transjugular intrahepatic portosystemic shun
<b>VR</b>	volume rendering

## INTRODUCTION

Abnormalities of the portal venous system are a heterogeneous group of conditions that can cause substantial morbidity, mortality and may lead to complications during surgery or percutaneous interventions involving the portal venous system (*Lee et al., 2011*).

However, understanding the embryologic development of the normal portal venous anatomy and in anatomic variants is essential to accurately interpret the imaging findings (*Lee et al., 2011*).

Since most acute hepatic vasculature disorders occur less commonly than disorders affecting the hepatic parenchyma and biliary system, they may be overlooked during routine evaluation of the liver in the acute setting. By considering the imaging findings of disease processes that primarily affect the hepatic veins and portal veins, an anatomy-based approach of acute hepatic vascular diseases can be applied to image interpretation to facilitate diagnosis (*Heller and Hattoum, 2012*).

Computed tomography (CT) permits a comprehensive, noninvasive evaluation of the portal venous system, enabling the detection of both structural and functional abnormalities (*Lee et al., 2011*).

Introduction of nearly isotropic CT permits excellent anatomical depiction of the portal system in a noninvasive manner (*Aguirre et al., 2012*).

Advanced CT scanners allow a high-resolution, comprehensive evaluation of the portal vasculature. The advantages of multidetector CT include short acquisition time for a large volume; isotropic acquisition, which allows easy generation of high-resolution angiograms with three-dimensional reconstruction of vascular anatomy for surgical or percutaneous interventional planning; and simultaneous identification of any associated complications (*Lee et al., 2011*).

Three-dimensional (3D) multi-detector row CT angiography allows improved temporal resolution, as well as, spatial resolution. It clearly demonstrates the vascular anatomy and improves visualization of the collaterals vessels in portal hypertension (*Sugiura et al., 2008*).

CT angiography for the hepatic arterial tree & portal vein (CT portography) is extremely valuable for applications such as preoperative planning for hepatic resection, preoperative evaluation and planning for liver transplantation, pretreatment planning for patients considered for hepatic arterial infusion chemotherapy, and pre-treatment evaluation of portal vein patency for a variety of reasons. It also helps in the evaluation of vascular anatomical information, vascular invasion of tumors, provide supplemental information in

patients with cirrhosis, upper gastrointestinal tract bleeding due to varices, or primary extrahepatic neoplasms (*Murakami et al., 2005*).

Knowledge of the characteristic appearances of abnormalities of the portal venous system allows a more confident diagnosis, permitting timely treatment and more informed guidance of surgical procedures and percutaneous interventions, which may lead to an improved outcome (*Lee et al., 2011*).