ASSESSMENT OF THE PORTAL VENOUS SYSTEM USING ADVANCED CT TECHNIQUES

Essay
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Asmaa Mohamed Ragab Abd El-Rahman

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.

Contents

List of Figures

List of Table

List of Abbreviations

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

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

SSCT	Single-Slice CT
SSD	Shaded surface display
SV	Splenic vein
SVC	Superior vena cava
TACTP	Transarterial CT portography
TIPS	Transjugular intrahepatic portosystemic shun
VR	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)***.