ROLE OF COMPUTED TOMOGRAPHY PERFUSION COMPARED TO COMPUTED TOMOGRAPHY TRIPHASIC STUDY IN ASSESSMENT OF HEPATIC FOCAL LESIONS

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Contents

1.	*Introduction and aim of the work*	*1*
2.	*Review of the literature:*	*4*
	I- anatomy of the liver	*4*
	II-pathology of hepatic focal lesion	*21*
	III-technique of perfusion CT	*39*
3.	*Patients and methods*	*66*
4.	*Results*	*69*
5.	*Illustrated cases.*	*76*
6.	*Discussion*	*86*
7.	*Summary and conclusion*	*98*
8.	*References*	*100*
9.	*Arabic summary*	

List of Abbreviations

AFP	Alpha feto-protien
BF	Blood Flow
BV	Blood Volume
CCC	Chloangiocarcinoma
CECT	Contrast enhancement CT
CR	Complete Response
CT	Computed tomography
CTP	Computed Tomography Perfusion
FNH	Focal nodular hyperplasia
HAF	Hepatic arterial flow
HAI	Hepatic Artery Index
HAP	Hepatic Arterial Perfusion
HAV	Hepatitis A virus
HBF	Hepatic blood flow
HCC	Hepatocellular Carcinoma
HCT	Helical Computed Tomography
HCV	Hepatitis C virus
HHT	Hereditary hemorrhagic telangiectasia
HPI	Hepatic Perfusion index
HU	Hounsfield Unit
IRF	Impulse Residue Function
MDCT	Multi-detector row CT
MIP	Maximum Intensity Projection
ML	Milliliter
MRI	Magnetic Resonance Imaging
MSV	Mille Sievert
MTT	Mean Transient Time

List of Abbreviations (Cont.)

NCECT............	Non contrast-enhanced CT scan
PD	Partial Response
PET..................	Positron Emission Tomography
PR	Progressive disease
PS......................	Permeability Surface Area
PVP	Portal venous perfusion
ROI..................	Region Of Interest
TAC	Time Attenuation Curve
TACE...............	Trans arterial hepatic chemoembolization
TTP..................	Time to Peak

List of Figures

No	Title	page
1	Superior aspect of the liver	5
2	Inferior surface of the liver	5
3	Inferior and posterior surfaces of the liver	6
4	Segmental anatomy of the liver according to Couinaud	8
5	(A) Above the level of the left portal vein (B) At the level of the left portal vein	10
6	(A) At the level of the right portal vein (B) At the level of the splenic vein	10
7	Normal anatomy of the liver	12
8	Biliary drainage of the liver	15
9	Sequential CT scan through the liver with Couinaud's segments divided and numbered	17
10	Normal hepatic arterial anatomy	18
11	Hepatic venous confluence	18
12	Normal portal venous anatomy	19
13	Variant hepatic arterial anatomy	19
14	Replaced left hepatic artery	20
15	Replaced right and left hepatic arteries	20
16	The time–enhancement curve of the liver	41
17	By analysis of the liver time–density curve, it is possible to derive parametric images displaying a range of parameters reflecting the hepatic vasculature.	42
18	Time–attenuation curves for CT perfusion are improved by use of high-concentration contrast media	44
19	Typical arterial, a(t), tissue, c(t), and venous, v(t), time enhancement curves. Note secondary peak in arterial curve due to recirculation	49
20	Normal liver perfusion image	50
21	Hepatic blood flow map	51

No	Title	page
22	Hepatic blood volume map	**52**
23	Mean transient time map	**53**
24	Permeability surface map	**54**
25	(a) Transverse contrast material–enhanced CT image and (b) functional CT perfusion color map of BF demonstrate technique of CT perfusion in a patient with HCC in right lobe of liver	**56**
26	Liver perfusion image of primary hepatic carcinoma at right posterior lobe	**58**
27	Images obtained from a patient with HCC with treatment response of PD group	**60**
28	Axial perfusion images (a) and functional CT perfusion map (b–f) of a 29-year-old woman with hemangioma.	**62**
29	Axial perfusion images (a) and functional CT perfusion map (b–f) of a 70-year-old woman with liver metastasis from pancreatic adenocarcinoma	**64**
30	Pie chart distribution of the study group.	**70**
31	Pie chart Sex distribution of the study group	**71**
32	Hemangioma, HCC and metastatic depsits distribution of the study group.	**72**
33	Pie chart triphasic results distribution of the study group.	**73**
34	Pie chart triphasic results distribution of the study group.	**74**

List of Tables

Table	Title	page
1	Hepatic Arterial Variants according to the Michel Classification	***13***
2	Glossary of terms commonly used in CT perfusion	***55***
3	Perfusion parameters of normal liver	***55***
4	CT Perfusion Parameters of Primary HCC, Background Liver, and Spleen	***57***
5	Studies reporting perfusion parameters in liver metastases	***65***
6	Age distribution of the study group.	***70***
7	Sex distribution of the study group.	***71***
8	Metastatic deposits, HCC and hemangioma distribution of the study group	***72***
9	Triphasic results distribution of the study group	***73***
10	Perfusion parameters distribution of the study group.	***74***
11	Diagnostic Performance of triphasic results and perfusion parameters.	***75***

ABSTRACT

Purpose of this study is: to evaluate the role of computed tomography perfusion and computed tomography triphasic in assessment of hepatic focal lesions.

Methods: The study included 43 patients (between 30 to 60 years old) referred from radiodiagnosis department. Each patient included in the study was subjected to full history taking and availability of the previous studies.

Results: The study showed that CT perfusion revealed more accurate results than CT triphasic.

Conclusion: The current application of CT perfusion to patient with hepatic focal lesions showed that it enhanced our understanding of the disease diagnosis staging, prognostic evaluation and monitoring therapeutic response.

Key Words: CT PERFUSION – HEPATIC FOCAL LESIONS

INTRODUCTION AND AIM OF THE WORK

Globally primary liver cancer is the fifth most frequently diagnosed cancer***(Sahani et al., 2007).***

Early diagnosis is important to improve survival rates in the affected individuals. The liver has a dual blood supply and most liver diseases cause changes in blood flow (BF). Hence it is important to evaluate the hemodynamic changes to discover lesions early and assess therapeutic response***(Ippolito et al., 2010).***

Currently, the perfusion imaging techniques with multi-slice computed tomography (CT) allow quantification of the perfusion parameters of tissues***(Tsushima et al., 2004)***.

As the liver plays an important role in blood circulation by acting as a filter, metastatic liver cancer occurs in over 75% of all terminal cancer patients***(Jiang et al., 2008).***

Metastatic foci smaller than 10 mm are difficult to detect even with advanced imaging modalities. Thus tools are needed that provide earlier detection. Occult metastasis gives rise to detectable changes in liver BF similar to those caused by overt metastasis. CT techniques allow quantification of perfusion parameters of tissues allowing early detection of occult metastasis***(Gabata et al., 2008).***

Hepatic hemangiomas are small, asymptomatic lesions seen in all age groups often discovered incidentally in routine cross-sectional imaging. They are the second most common hepatic tumor, exceeded only by metastasis. Sometimes with conventional imaging techniques differentiation between hemangiomas and malignant hepatic lesions becomes difficult, especially in patients who have a known primary tumor***(Zhong et al., 2009)*****.**

Conventional cross-sectional imaging methods such as CT and magnetic resonance, as well as imaging with ultrasonography, may not be adequate for detection of tumor-associated vascularity. CT perfusion imaging is a recently developed noninvasive imaging technique that allows both qualitative and quantitative evaluation of tumor vascularity***(Sahani et al., 2007).***

One goal of perfusion CT is to improve detection and characterization of liver lesions compared to standard triphasic imaging***(Boas et al., 2015).***

AIM OF THE WORK

The aim of the work is to show the role of CT perfusion and triphasic in the assessment of Hepatic focal lesions.

Gross morphology

Liver is the largest organ in the body. It is situated in the upper and
right quadrants of the abdominal cavity, occupying almost the whole of the right hypochondrium, the greater part of the epigastrium, and not uncommonly extending into the left hypochondrium as far as the mammillary line. In the male it weighs from 1.4 to 1.6 kilogm, in the female from 1.2 to 1.4 kilogm constituting about one-eighteenth of the entire body weight. Its greatest transverse measurement is from 20 to 22.5 cm. Vertically, near its lateral or right surface, it measures about 15 to17.5 cm., while its greatest antero-posterior diameter is on a level with the upper end of the right kidney, and is from 10 to 12.5 cm. Opposite the vertebral column its measurement from before backward is reduced to about 7.5 cm ***(Grey, 2004).***

The liver has three surfaces, superior, inferior and posterior. A sharp, well-defined margin divides the inferior from the superior in front; the other margins are rounded. The superior surface is attached to the diaphragm and anterior abdominal wall by a triangular or falciform fold of peritoneum, the falciform ligament, in the free margin of which is a rounded cord, the ligamentum teres (obliterated umbilical vein). The line of attachment of the falciform ligament divides the liver into two parts, termed the right and left lobes, the right being much larger ***(Grey, 2004).***

The inferior and posterior surfaces are divided into four lobes by

five fossae, which are arranged in the form of the letter H. The left limb of the H marks on these surfaces the division of the liver into right and left lobes; it is known as the left sagittal fossa, and consists of two parts, the fossa for the umbilical vein in front and the fossa for the ductus venosus behind. The right limb of the H is formed in front by the fossa for the gall-bladder, and behind by the fossa for the inferior vena cava; these two fossae are separated from one another by a band of liver substance, termed the caudate process. The bar connecting the two limbs of the H is the porta (transverse fissure); in front of it is the quadrate lobe, behind it the caudate lobe ***(Fig 1-3) (Grey, 2004).***

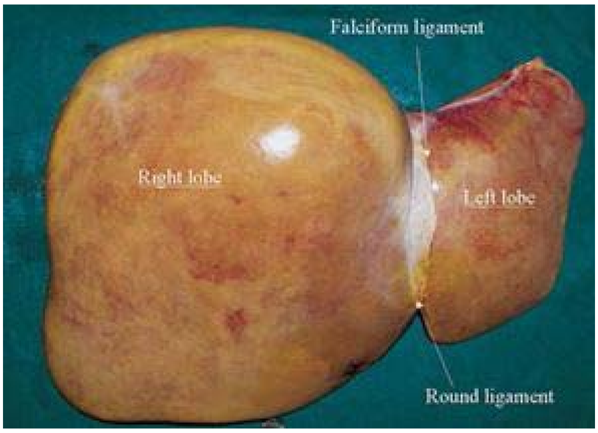

Fig. (1): *Superior aspect of the liver* ***(Quoted from Majno et al.,2005).***

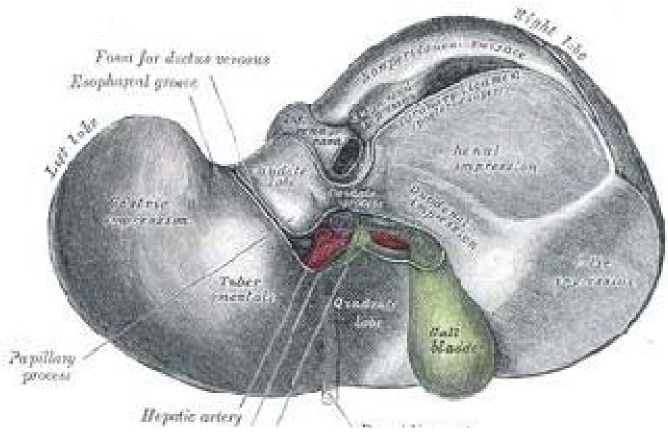

Fig. (2): *Inferior surface of the liver* ***(Quoted from MGrey, 2004).***

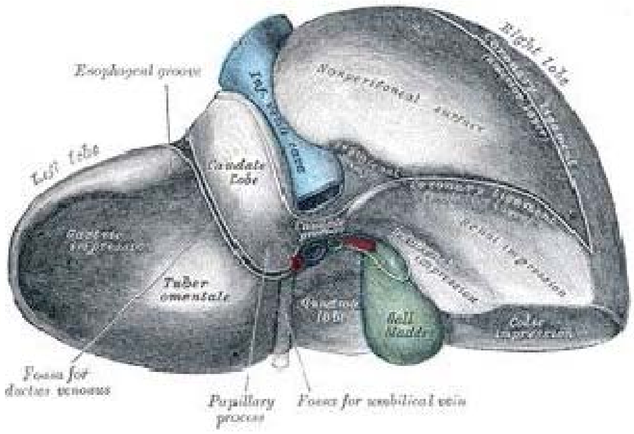

Fig. (3): *Inferior and posterior surfaces of the liver* ***(Quoted from MGrey, 2004).***

The anatomical lobes of the liver

The right lobe (lobus hepatis dexter) is much larger than the left;
the proportion between them being as six to one. It occupies the right hypochondrium, and is separated from the left lobe on its upper surface by the falciform ligament; on its under and posterior surfaces by the left sagittal fossa; and in front by the umbilical notch. It is of a somewhat quadrilateral form, it's under and posterior surfaces being marked by three fossae: the porta

and the fossae for the gall-bladder and inferior vena cava, which separate its left part into two smaller lobes; the quadrate and caudate lobes ***(Grey, 2004).***

The quadrate lobe (lobus quadratus) is situated on the under surface of the right lobe, bounded in front by the anterior margin of the liver; behind by the porta; on the right, by the fossa for the gall-bladder; and on the left, by the fossa for the umbilical vein. It is oblong in shape, its antero-posterior diameter being greater than its transverse ***(Grey,2004).***

The caudate lobe (lobus caudatus; Spigelian lobe) is situated upon the posterior surface of the right lobe of the liver, opposite the tenth and eleventh thoracic vertebrae. It is bounded, below, by the porta; on the right, by the fossa for the inferior vena cava; and, on the left, by the fossa for the ductus venosus. It looks backward, being nearly vertical in position; it is longer from above downward than from side to side, and is somewhat concave in the transverse direction. The caudate process is a small elevation of the hepatic substance extending obliquely laterally from the lower extremity of the caudate lobe to the under surface of the right lobe. It is situated behind the porta, and separates the fossa for the gall-bladder from the commencement of the fossa for the inferior vena cava ***(Grey, 2004).***

The left lobe (lobus hepatis sinister) is smaller and more flattened than the right. It is situated in the epigastric and left hypochondriac regions. Its upper surface is slightly convex and is moulded on to the diaphragm; it's under surface presents the