Role of High Intensity Focused Ultrasound in the Treatment of Hepatocellular Carcinoma

Essay

Submitted for partial fulfillment of the Master Degree in Radiodiagnosis

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2011

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Acknowledgement

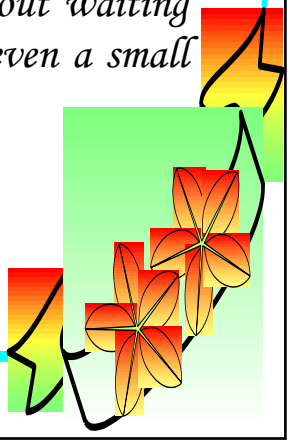
First of all, all gratitude is due to **God** *almighty for blessing this work, until it has reached its end, as a part of his generous help, throughout my life.*

Really I can hardly find the words to express my gratitude to **Prof. Dr. Sameh Mohamed Abdel Wahab,** *Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for his supervision, continuous help, encouragement throughout this work and tremendous effort he has done in the meticulous revision of the whole work. It is a great honor to work under his guidance and supervision.*

I am also indebted to **Dr.Mohamed Elgharib Abou Elmaaty,** *Assistant Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for his guidance, continuous assistance and sincere supervision of this work.*

Finally, I dedicate this work to my parents who have done and still doing a lot for me without waiting for anything in return and hope I can pay even a small part of my debt to them.

Ali Elsaeed Abdel Rahman Ali



List of Abbreviations

Abbrev.	
AFP	Alpha fetoprotein
AJCC	American joint Committee of Cancer
ALP	Alkaline Phosphatase
ALT	Alanin transaminase
AST	Aspartate trasaminase
BCLC	Barcelona Clinic Liver Cancer
CLIP	Cancer Liver Italian Program
CT	Computed tomography
CTAP	CT arterial portography
CTHA	CT of hepatic arteriography
CUPI	Chinese University Prognostic Index
d	Diameter of transducer element
DN	Degeneration nodule
F	French
Gy	Gray
HCC	Hepatocellular carcinoma
HIFU	High Intensity Focused Ultrasound
IVC	Inferior vena cava
KPS	Kafrnofsky performance status
LDH	Lactate Dehydrogenase
LLS	Left lobe side
MHz	Mega hertz
MR	Magnetic resonance
mRNA	Messenger Ribonuclic acid

List of Abbreviations (Cont.)

Abbrev.	
NRS	Numerical rating scales
OLV	One lung ventilation method
PEI	Percutaneous ethanol injection
PV	Portal vein
QOL	Quality of life
R	Radius of curvature
RF	Radiofrequency
RFA	Radiofrequency ablation
RN	Regeneration nodule
SMA	Superior mesenteric artery
SMV	Superior mesenteric vein
TACE	transcatheter arterial chemoembolization
TNM	Tumor, Node, Metastasis classification
UK	United kingdom
US	Ultrasound
Z	Acoustic impedance

Introduction

Hepatocellular carcinoma (HCC) is the fifth most frequent cancer in the world and the third common cause of cancer related mortality in the world ***(Verslype et al.,2009).***

Hepatocellular carcinoma is also one of the most difficult types of cancer to treat. Surgical resection can change the natural course of HCC at early stages. Unfortunately, because of tumor multifocality, portal venous tumor invasion, and underlying advanced liver cirrhosis, surgical resection can be performed in only 20 % of patients.

Therefore, non surgical treatment is the only available option for the majority of patients with HCC ***(Feng et al., 2005).***

Several minimally invasive technique5 have been used for the local ablation of liver lesions including laser, microwave, radiofrequency, cryo and ethanol ablation. Trans catheter arterial chemoembolization (TACE) is a widely used treatment for the patients with large volume HCC ***(Feng et al., 2005).***

Aim of the Work

The aim of this work is to review the role of the high intensity focused ultrasound (HIFU) technology in the treatment of hepatocellular carcinoma being a completely non invasive ablative technique.

Anatomy of the Liver

The shape of an organ is studied before its function except for the liver whose function has been studied at first and studying progress during three millenniums led to the modern knowledge ***(Bonnichon et al., 2006)***..

Embryologically, the pancreas and liver being as epithelium of the foregut grows out from the digestive tract and into the dorsal and ventral mesenteries, respectively. The *liver* (liver epithelial cords) and *biliary tree* appear late in the third week or early in the fourth week as the hepatic diverticulum, an outgrowth of the ventral wall of the distal foregut (duodenum) ***(Neas, 2003)***.

Gross morphology:

The anatomy of the liver can be detailed based on the external appearance of the organ (external or descriptive anatomy) or based on its vascular and biliary architecture (vascular or functional anatomy).

As regarding the *descriptive external anatomy* of the liver, it is the largest organ in the body. It is situated in the upper and right quadrants of the abdominal cavity, occupying almost the