The Role of MRI in Assessment of Hepatocellular Carcinoma after Transarterial Chemoembolization

Essay

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List of Abbreviations

Abb.	Full term
2D	Two dimensional.
3D	Three dimensional.
3D-GRE	Three Dimensional Gradient Recalled Echo.
ADC	Apparent diffusion coefficient.
AFP	Alpha-fetoprotein.
BB-EPI	Black Blood-Echo Planar Imaging.
BCLC	Barcelona Clinic Liver Cancer
BW	Band Width.
cm	Centimeter.
CP	Cross-product.
CR	Complete response.
CT	Computed Tomography.
cTACE	Conventional Trans-arterial chemoembolization.
DCE MRI	Dynamic contrast enhanced magnetic resonance imaging.
dL	Deciliter.
DN	Degeneration Nodule.
DW	Diffusion-Weighted.
DWI	Diffusion-Weighted imaging.
EASL	European Association for the Study of the Liver.
EPI	Echo Planar Imaging.
FA	Flip Angle.
FLASH	Fast Low Angle Shot.
FLH	Fibrolamellar hepatocellular carcinoma.
FSE	Fast Spin Echo.
Gd	Gadolinium.
GRE	Gradient Recalled Echo.
HASTE	Half-Fourier acquisition single-shot turbo spin-echo.
HCC	Hepatocellular carcinoma.

List of Abbreviations (Cont.)

Abb.	Full term
HFL	Hepatic Focal lesion.
IU	International Unit.
IVC	Inferior vena cava.
L	Liter.
LDH	Lactate Dehydrogenase.
LI-RADS	Liver Imaging-Reporting and Data System.
V	Version .
LR-TR	Liver Rads-Treatment Response.
MD	Maximum diameter.
mg	Milligram.
MIP	Maximum intensity projection.
mL	Milliliter.
mm	Millimeter.
mm^2/sec	Millimeter squared per second.
MR	Magnetic Resonance.
mRECIST	Modified Response Evaluation Criteria In Solid Tumors.
MRI	Magnetic Resonance Imaging.
msec	Millisecond.
NEX	Number of excitations.
ng	Nanogram.
PD	Progressive disease.
PR	Partial response.
RECICL	Response Evaluation Criteria in Cancer of the Liver.
RECIST	Response Evaluation Criteria in Solid Tumors.
RFA	Radio-Frequency Ablation.
RN	Regeneration nodule.
ROI	Region of interest.
RT	Respiratory Triggered.
s, sec	Second.

List of Abbreviations (Cont.)

Abb.	Full term
SD	Stable disease.
SE	Spin Echo.
SGE	Spoiled Gradient Echo.
SMD	Sum of maximum diameters.
STIR	Short-tau inversion recovery.
T1WI	T1- Weighted Image.
T2WI	T2- Weighted Image.
TACE	Trans-arterial chemoembolization.
TE	Time of Echo.
TL	Target lesion.
TR	Time of Repetition.
WHO	World Health Organization.

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INTRODUCTION

Hepatocellular carcinoma (HCC) is one of the most common cancers worldwide, and has a poor prognosis unless treated. In patients with unresectable tumors, the median survival is less than four months, whereas in patients with less-advanced disease survival is less than one year if left untreated ***(Cha et al., 2002)***.

Generally, surgical resection is the gold standard therapy for HCC, and has been proven to provide long-term survival in large, prospective trials ***(Cha et al., 2002)***.

Unfortunately, more than 80% of patients with HCC have underlying cirrhosis, and only 10–15% of HCC patients are eligible for liver resection due to the severity of underlying cirrhosis or the diffuse distribution of the tumor ***(Patt and Thuluvath, 2002)***.

However surgery remains the treatment of choice for hepatocellular carcinoma (HCC), several minimally invasive techniques have been used as alternatives for treating the disease. These include transcatheter arterial chemoembolization (TACE) and percutaneous therapy, such as percutaneous ethanol injection therapy, percutaneous microwave coagulation therapy, and radiofrequency ablation therapy ***(Goldberg and Ahmed, 2002)***.

Although several therapeutic options have been advocated in treatment of HCC, transcatheter arterial chemoembolization in particular has been widely performed in the treatment of HCC ***(Lee et al., 2002)***.

Transarterial chemoembolization (TACE) consists of transarterial administration of a mixture of chemotherapy (Doxorubicin or Cisplatin in most cases) and iodized oil (Lipiodol), followed by embolizing particles ***(Agnello et al., 2013)***.

After TACE, follow-up imaging studies, including CT, MRI, and contrast-enhanced sonography, have been used to assess the therapeutic efficacy ***(Lim et al., 2006)***.

There is suggestive evidence that MRI is more accurate than other radiological modalities in the detection of residual or recurrent tumors ***(Braga et al., 2005)***.

Post-intervention imaging is necessary to assess the treatment results, to monitor evolution of the ablated tissue over time, and to evaluate for complications. Because post-treatment imaging is such a critical component of the procedure, it is important that the radiology community recognizes the expected normal post-treatment imaging findings. This knowledge prevents post procedure changes from being confused with other pathologic processes. In addition, timely recognition of residual and recurrent disease or of treatment-related complications allows expedited management ***(Sainani et al., 2013)***.

MRI is known to be superior to CT for the evaluation of HCC after performing TACE ***(Agnello et al., 2013).***

AIM OF WORK

The aim of this study is to Evaluate the role of MRI in assessment of HCC after transcatheter arterial chemoembolization (TACE).

RADIOLOGICAL ANATOMY OF THE LIVER

I- Gross morphology of the liver

The liver is the largest intra abdominal organ weighting 1400-1800 gm in adults. It is wedge shaped (with its rounded base to the right) and occupies the right hypochondrium, epigastrium and left hypochondrium as far as left midclavicular line ***(Standring et al, 2008)***.

1- Hepatic surfaces and relations (Figs 1 and 2)

The liver assumes the shape of the cavity it occupies. It has two surfaces, the diaphragmatic surface and the visceral surface. The diaphragmatic surface is smooth and flat posteriorly and has a smooth, rounded upper surface with a large dome for the right hemidiaphragm and a smaller dome for the left hemidiaphragm. A depression between these marks the site of the central tendon and the overlying heart (***Ryan et al, 2007)***

The lateral extent of the left lobe is variable: it may extend only to the midline or may surround the stomach or spleen to reach the left lateral abdominal wall. In addition to the notch for the gallbladder, the inferior border is marked by a notch for the ligamentum teres. This ligament is the obliterated remnant of the left umbilical vein, which carries blood from the placenta to the fetus. It is also known