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بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات:
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Role of dynamic contrast enhanced MRI and Diffusion Weighted Imaging in Prediction of Tumor Response to TACE in Unresectable H.C.C Patients

Thesis

Submitted for Partial fulfillment of Doctorate Degree in Radio-diagnosis

Presented by

Ahmed Ibrahim Ibrahim Nassar

M.B. B. Ch., M.Sc.

Faculty of Medicine – Ain Shams University

Supervised by

Prof.Dr. Ahmed Mohamed Monib

Professor of Radio-diagnosis

Faculty of Medicine

Ain Shams University

Dr. Mohammed Sobhy Hassan

Assistant Professor of Radio-diagnosis

Faculty of Medicine

Ain Shams University

Dr. Ahmed Hassan Soliman

Assistant Professor of Radio-diagnosis

Faculty of Medicine

Ain Shams University

Faculty of Medicine

Ain Shams University

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List of Abbreviations

Abb.	Full term
3D	Three-dimensional
AASLD	Association for the study of liver diseases
ADC	Apparent diffusion coefficient
AFP	Alpha fetoprotein
APF	Arterioportal fistula
APHE	Arterial phase hyper-enhancement
BBEPI	Black-blood echo-planar imaging
BCLC	Barcelona clinic liver cancer
CNR	Contrast-to-noise ratio.
DCE MRI	Dynamic contrast-enhanced MRI
DEB-TACE	Drug-eluting beads transarterial chemoembolization
DM	Diabetes mellitus
DWI	Diffusion-weighted magnetic resonance imaging
ETL	Echo train length
FL	Falciform ligament
FSE/TSE	Fast/turbo spin echo
GRAPPA	Generalized auto- calibrating partially parallel acquisition
GRE	Gradient echo
H.C.C	Hepatocellular carcinoma
HASTE	Half acquisition single shot turbo echo
HIV	Human immunodeficiency virus
IBR	Institutional board review
ICC	Intrahepatic cholangiocarcinoma
IP	In-phase
IVC	Inferior vena cava

List of Abbreviations Cont...

Abb.	Full term
IVIM	Intravoxel incoherent motion
LAVA	Liver acquisition with volume acceleration
Lga	Left gastric artery
Lha	Left hepatic artery
LHV	Left hepatic vein
LI-RADS	Liver imaging-reporting and data system
LR-TIV	LR-tumor in vein
LR-TR	Liver imaging reporting and data system treatment response
LV	Ligamentum venosum
MDCT	Multi-detector computed tomography
Mha	Middle hepatic artery
MHV	Middle hepatic vein
MIP	Maximum intensity projection
MRCP	Magnetic resonance cholangiopancreatography
MRI	Magnetic resonance imaging
NEX	Number of excitations
NPV	Negative predictive value
NSF	Nephrogenic systemic fibrosis
OLT	Orthotropic liver transplantation
OP	Out-of-phase
PEI	Percutaneous ethanol injection
PI	Parallel imaging
PPV	Positive predictive value
RF	Radiofrequency.
RFA	Radiofrequency ablation
Rha	Right hepatic artery

List of Abbreviations Cont...

Abb.	Full term

RHV..... Right hepatic vein
RT..... Radiation therapy
R-T..... Respiratory-triggered
SE ..... Single-shot spin-echo
Sma ..... Superior mesenteric artery
SNR ..... Signal to noise ratios.
SPAIR..... Spectrally adiabatic inversion recovery
SPIO..... Superparamagnetic iron oxide particle
SPSS ..... Statistical package for the social sciences
SSFSE..... Single shot fast spin echo.
STIR..... Short time inversion recovery sequences
TACE..... Trans-arterial chemo-embolization
TAE ..... Trans-arterial embolization
TARE ..... Trans arterial radio-embolization
TE..... Echo time
TR..... Time of repetition
TVDT ..... Tumor volume doubling time
WO..... Wash-out

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Role of dynamic contrast enhanced MRI and Diffusion Weighted Imaging in Prediction of Tumor Response to TACE in Unresectable H.C.C Patients

Ahmed Ibrahim Nassar [1], Ahmed Mohamed Monib [2], Mohamed Sobhy Hassan [3], Ahmed Hassan Soliman [4]

[1]Radio-diagnosis specialist, El-Agouza police hospital, [2]Professor of Radio-diagnosis, Faculty of Medicine / Ain-shams University, [3] Professor of Radio-diagnosis, Faculty of Medicine / Ain-shams University, [4] Assistant Professor of Radio-diagnosis, Faculty of Medicine / Ain-shams University.

Abstract

Background: To evaluate the role of MRI in the detection of recurrent or residual tumor viability in prediction of the response of the irresectable HCC patients who had locally treated with TACE by studying the enhancement (vascularity) pattern and the volume changes of the HCC after TACE. We were also aiming to improve the technique and to standardize MR protocol to be used after interventional therapy for malignant hepatic tumors.

Results: The study group consisted of 20 patients and the results were analyzed as 31 treated hepatic focal lesions. The patients underwent DCE MRI with DWI in one / three months duration following TACE procedure and were radiologically assessed to observe tumoral post treatment response for non-viable, viable post treatment response categories Statistical analysis showed that dynamic MRI had 100% level of sensitivity, specificity of 88.89 %, PPV of 91.67% and NPV of 100% with an overall agreement of 95%. While on the other hand, statistics showed that DWI has 81.82 % level of sensitivity, specificity of 88.9%, PPV of 90%, NPV of 80% with an overall agreement of 85%. The difference between non-viable and viable groups' ADC variables was found statistically significant at P value < 0.018 and best cut off value that augments sensitivity and specificity is 1.24. At this ADC value, showed 90.91% level of sensitivity, specificity of 87.5%, PPV of 90.9%, NPV of 87.50% with an overall agreement of 79.5%.

Conclusion: Dynamic contrast enhanced MRI is a powerful tool in detection of tumour viability and complications after TACE of hepatocellular carcinoma. Imaging protocol should include dynamic study combined with diffusion imaging with post processing of the images to obtain ADC measurements for better tissue characterization and should be performed at regular time intervals to enhance the diagnostic confidence of MRI for post treatment response viability detection.

Keywords: HCC–TACE– DCE MRI –DWI.

INTRODUCTION

Hepatocellular carcinoma (HCC) is the most common primary malignant disease of the liver and is the third leading cause of death from cancer worldwide ***(Bonekamp et al., 2013).***

Only a minority of all patients with HCC are surgical candidates at the time of diagnosis ***(Wang et al., 2014).***

Treatment options are divided into surgical therapies (i.e., resection, cryoablation and orthotropic liver transplantation (OLT), and nonsurgical therapies (i.e., percutaneous ethanol injection (PEI), radiofrequency ablation (RFA), trans-arterial chemo-embolization (TACE), radiation therapy (RT) and systemic therapy) ***(Curley et al., 2017).***

Transcatheter arterial chemoembolization (TACE) is one of the most commonly used intra-arterial therapies to treat unresectable HCC, and several clinical trials have demonstrated that TACE has the potential to show survival benefits in patients with HCC. TACE is a frequently used technique and usually includes intra-arterial delivery of emulsions mixed with chemotherapeutic agents and lipiodol, followed by the administration of the embolic agent ***(Wang et al., 2014).***

Assessing early response to therapy using objective criteria is paramount for clinical care. Identifying early responders could help individualize therapy and tailor future treatment strategies ***(Bonekamp et al., 2013).***