Role of MR Spectroscopy in The Diagnosis of Uterine Cervical Cancer

Essay

Submitted For Partial Fulfillment of Master Degree in Radio-Diagnosis

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Acknowledgement

First of all I am deeply thankful to GOD by the grace of whom this work was possible. Words could not express the feeling of gratitude and respect to ***Dr. Soha Talat Hamed*** . professor of Radiology, Faculty of Medicine, Cairo University for her guidance, helpful advice and constructive supervision of this work.

Also, my deep thanks to ***Dr. Rasha Wesam,*** lecturer of Radiology, Faculty of Medicine, Cairo University for her great help and guidance during this work.

It is my pleasure to express my deep appreciation to my professors, my colleagues and each member in the Radiology department, Cairo University,

ABSTRACT

Multifunctional MRI in uterine cancer cervix namely dynamic contrast enhanced MRI (DCE-MRI), diffusion weighted (DW) MR, spectroscopy and blood oxygen level dependent (BOLD) have facilitated high resolution imaging of tumor permeability, perfusion, cellularity, metabolites, and oxygenation such that baseline differences in these metrics could predict for differential therapeutic response **.**

Nowadays most clinical MR scanners have routine sequences for 1H-MRS measurements, providing a wide range of metabolic and functional information integrated with complementary MRI localization**.**

Keywords: MRI-DCE-DW- Uterine Cervical

Index of contents

List of abbreviations

A	
ADC	Apparent Diffusion Coefficient
AJCC	American Joint Committee on Cancer
ATPs	Adenosine Triphosphates
B	
B0	Magnetic field
BOLD	Blood Oxygen Level Dependent
C	
CCS	Cervical Cancers
CHo	Choline
CIN	Cervical Intraepithelial neoplasia
CIS	Carcinoma in situ
Cr	creatine
CSCC	Cervical squamous Cell Carcinoma
CT	Computed Tomography
CTV	Clinical Target Volume
D	
DCE- PWI	Dynamic contrast enhanced Perfusion weighted imaging
DCE-MRI	Dynamic contrast enhanced Magnetic resonance imaging
DNP-MRS	Dynamic nuclear polarization magnetic resonance spectroscopy
DSC-PWI	Dynamic susceptibility contrast Perfusion weighted imaging
DW	Diffusion weighted
DWI	Diffusion weighted imaging
E	
EBRT	External beam radio therapy
ED	Eddy Current

F FID FIGO FOV	 Free induction decay International Federation of gynecology and obstetrics Field of view
G GD-DTPA GTV	 Gadolinium Diethylene Triamine Pentaacetic Acid Gross Target Volume
H 1H-MRS HR-MAS HPV	 Proton-Magnetic resonance spectroscopy High resolution –magic angle spinning Human Papilloma Virus
I IVU	 Intra venous urography
L Lac LDA LEEP LSIL	 Lactate Linear Discriminate analysis Loop Electrical excision procedure Low grade intraepithelial lesion
M Mi MRI MRS	 Myoinositol Magnetic Resonance Imaging Magnetic Resonance Spectroscopy
N NAA NEX NMR NTP NPV	 N- acetyl aspirate Number of excitation Nuclear Magnetic Resonance Nuclside triphosphate Negative predictive value

P	
Pap	Papanicolaou
PO2	Pressure of oxygenation
PCr	Phospho creatine
PET-FDG	Positron emission tomography- with fluro- deoxy –D-glucose
Pi	Inorganic phosphate
PRESS	Point Resolved Spatially Localized Spectroscopy
31P-MRS	Phosphorus -31 Magnetic Resonance Spectroscopy
PPM	Parts Per million
PPV	Positive predictive value
PWI	Perfusion Weighted Imaging
R	
RBV	Relative blood volume
ROI	Region of interest
RF	Radiofrequency
S	
SNR	Signal to noise ratio
SCJ	Squamocolumnar junction
STEAM	Stimulated Echo Acquisition Mode
T	
tCho	Total choline
TE	Time of Echo
TR	Time of Repetition
T1W	T1-weighting; MRI sequence in which Short TR (time of repetition) And Short TE(time of echo) applied
T2W	T2-weighting; MRI sequence in which long TR(time of repetition) and long TE(time of echo) applied.
U	
US	Ultrasonography
V	
VLDL	Very low density lipoprotein

List of Tables

List of Figures

Introduction

Cervical cancer is considered the third most common gynecological malignancy in women. Although patient now survive longer due to radiation therapy and more effective chemotherapy , it remains the most frequent cause of death for women in developing countries .(Jeong etal ,2003)

There are different modalities in the diagnosis of cervical carcinoma including MRI imaging which is useful for obtaining exquisite high resolution images of the female pelvis which is useful for evaluation of the primary cervical tumour and the tumor extension into the uterine corpus, vagina, bladder or rectum and also the axial images are critical for evaluation the extent of stromal and for detecting parametrial invasion (Sala et al ,2008).

There are new modalities of functional MRI in the diagnosis of cervical carcinoma including Diffusion weighted imaging technique uses to capture images of the cervix. It exploits the degree of restriction of water diffusion around cells by quantifying apparent diffusion coefficient (ADC) to produce the image. The level of contrast between the developing tumors and surrounding normal tissue is enhanced by this technique, facilitating the capture of high contrast images compared to conventional pelvic scans (Charles –Edward et al ,2008).

MR spectroscopy is considered one of the new modalities of functional MRI in assessment of apoptosis in cervical carcinoma and also providing abroad metabolic mapping of intact tumor samples and studies was done revealed that lipid level, as measured by MRS, more than double in malignant cervical tissue compared to normal cervical tissue. It also demonstrate that the presence of elevated in-phase triglycerides—specifically CH2 and CH3—may be used in MRS for the detection of cancer in vivo (Mahon et al ,2004).

Aim of the work

To highlight the role of magnetic resonance spectroscopy in the diagnosis of uterine cancer cervix