

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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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

	PAGE
I. Introduction	1
II. Review of literature	
1. Chapter one: anatomy of the uterine cervix.	3
2. Chapter two: Pathology of uterine cancer cervix.	11
3. Chapter three: MR imaging of uterine cancer cervix diagnosis.	23
4. Chapter four: MRspectroscopy in the diagnosis of uterine cancer cervix.	53
5. Chapter five: Modalities of functional MRI in the diagnosis of uterine cancer cervix.	87
6. Chapter six: Staging & management of cervical carcinoma.	98
III. summary & conclusion	116
IV. References	118
V. Arabic summary	139

List of abbreviations

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

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

Table	Subject	P.
TABLE 1	Correlation between FIGO staging of uterine cervix cancer and MRI findings (Okamoto et al , 2003).	37
TABLE 2	Comparison of major imaging techniques for studying cancer metabolism.). (Lin and Chung, 2014).	54
TABLE 3	Commonly Studied MR-Detectable Nuclei (Glunde and Bhujwalla , 2011).	57
TABLE 4	comparison of peaks of MRspectroscopy in cervical carcinoma(Lee et al ,1998	74
TABLE 5	Revised FIGO staging of cervical carcinoma(Pecorelli ,2009)	105
TABLE 6	Imaging modality of choice in respect To treatment/outcome variants (Jeong et al ,2003)	115

List of Figures

Figures No.	Subject	P.
Figure 1	Urogenital of female human embryo of eight and a half to nine weeks old. (Gray ,2001)	3
Figure 2	Anatomic sketch of coronal view showing the uterine cervix (Klünér and Hamm, 2007).	4
Figure 3	Diagram of the peritoneum of the female pelvis in para median Section (Skandalakis et al., 2004).	6
Figure 4a-b	Lymphatic drainage of the cervix. (Pannu et al., 2001)	7
Figure 5	The major ligament of the cervix(Skandalakis et al., 2004)	8
Figure 6	Blood supply of the uterus (<i>Gray, 2001</i>).	10
Figure 7	Histological section showing squamo columnar junction (www. eurocytology.eu/static/.../LP1ContentAcontD.html)	12
Figure 8 (A,B,C,D)	Metaplastic changes in the cervix and its physiological basis (www.eurocytology.eu/static/.../eng/.../LP1ContentAcont.html)	13
Figure 9	The histological grading of cervical intraepithelial neoplasia (CIN) (Edessy et al ,2013)	15
Figure 10	Cervical carcinoma with exophytic growth in a 44-year-old woman(gross type) (Okamoto et al., 2003)	18
Figure 11	Squamous cell carcinoma of the cervix, large cell non Keratinizing type(Wei, 2009)	19
Figure 12	Squamous cell carcinoma of the cervix large cell keratinizing Type. (Wei, 2009)	19
Figure 13	Micro invasive adenocarcinoma of the cervix . (Wei, 2009)	20
Figure14a-b	Normal Cervix in T2 WI in Axial and sagittal views (Mahajan et al, 2013).	26

Figure 15	Cervical carcinoma with exophytic growth in a 44-year-old woman in Sagittal T2-weighted MR image (Okamoto et al., 2003)	28
Figure 16	Cervical carcinoma with endophytic growth pattern in Sagittal T2-weighted MR image(Okamoto et al., 2003)	29
Figure 17a-b	Squamous cell carcinoma of cervix (stage IB1). Axial and sagittal T2W MR images(Mahajan et al ,2013)	31
Figure18a-b	Carcinoma of the cervix (stagIB2). Axial and sagittal T2W MR images (Mahajan et al ,2013).	31
Figure19a-b	Adenocarcinoma of uterine cervix (stage IIA). Sagittal and axial T2W MR images (Mahajan et al ,2013).	32
Figure 20a-b	Squamous cell carcinoma of the uterine cervix (sage IIB) (Axial And coronalT2W MR images(Mahajan et al ,2013).	32
Figure 21	Poorly differentiated squamous cell carcinoma (stage IIIA) Sagittal. T2WMR image(Mahajan et al ,2013).	33
Figure 22a-b	Cancer of uterine cervix (stage IIIB). Axial and coronal T2W MR images (Mahajan et al ,2013).	34
Figure 23a-b	Squamous cell carcinoma in two different patients (stage IVA). sagittal T2W image(Mahajan et al ,2013).	35
Figure 24a-b	Poorly differentiated adenocarcinoma in a 54-year-old. Recurrent mass (stage IVA) .Axial and Sagittal T2WMR images (Mahajan et al, 2013).	35
Figure 25a-b	Lymphatic pathways of spread of cervical carcinoma (Wittekind et al., 2005).	40
Figure 26a-b	Pre- and post treatment. With radiotherapy of the cancer cervix in the cervix and upper vagina on T2W sagittal MR images(Mahajan et al ,2013).	41
Figure 27a-b	Post treatment adenocarcinoma of cervix stage (Ib1) with radical hysterectomy. Axial T2-weighted MR images (Kaur et al., 2003).	43

Figure 28a-b	Recurrent cervical carcinoma after hysterectomy. Sagittal and axial T2 W MR images. Sagittal and axial T1 weighted images 1 min after administration of Gd-DTPA. (Zaspel and Hamm, 2007).	44
Figure 29a-b	Post operative case of Cancer cervix in Sagittal T2W and Oblique axial T1 fat-suppressed post-gadolinium MR images (Mahajan et al ,2013).	45
Figure 30a-b	A Case of cervical cancer with Intracavitary delivery device is placed in cervix. In sagittal and axial T2W MR images(Beddy et al , 2011)	47
Figure 31a-b	A Case of cervical cancer before and after insertion of probe and packing In intracavitary brachytherapy in axial T2W M MR images (Beddy et al , 2011)	47
Figure 32a-b	A Case with cervical cancer. Sagittal T2-weighted MR image shows that applicator tip of intracavitary brachytherapy probe showing perforated fundus of uterus and posterior vaginal vault (Beddy et al , 2011)	48
Figure 33a-b	A Case with cervical cancer. Sagittal T2-weighted MR images showing incorrect positioning of intracavitary brachytherapy probe (Beddy et al , 2011)	48
Figure 34a-b	A case of cervical cancer. Sagittal T2-weighted MR image of pelvis obtained during interval between external beam radiotherapy and intracavitary brachytherapy and probe is correctly position after insertion of probe again (Beddy et al ,2011)	50
Figure 35a-b	A case of cervical cancer .sagittal and coronal T2-Weighted MR images and showing complication after radiotherapy with free fluid in pouch of Douglas and hydrosalpinges (Beddy et al , ,2011)	50
Figure 36	A case of cervical cancer. coronal T2-weighted MR image of pelvis shows diffuse sigmoid colitis in patient undergoing intracavitary brachytherapy. (Beddy et al , ,2011)	51
Figure 37	Multiple MR internal Coils for Prostate, Cervix, and Colon. (www.medrad.com/.../Prostate-cervix colon- Coil-photos...)	61
Figure 38	Axial T2 - W MR image of the cervix used for localization of voxel for spectroscopy (Lee et al ,1998)	64

Figure 39	Schematic overview of the pulse sequences PRESS and STEAM (<i>Van der Graaf et . al. ,2010</i>)	66
Figure 40	Image-guided 1H MR point resolved spectroscopic sequence spectrum of invasive carcinoma of human uterine cervix (Lee et al ,1998).	73
Figure 41	Atypical in vivo MR spectra with choline and lipid peaks highlighted. (<i>Booth et al , 2009</i>).	76
Figure 42	MR SPECTRA IN cervical cancer stage Ib (<i>Wakefield et al ,2013</i>)	78
Figure 43	Histological section and HR MAS MR standard pulse acquire Spectrum and spin echo spectrum of two cervical cancer with and without apoptosis(<i>Lyng et al ,2007</i>)	80
Figure 44a-b-c	1H NMR spectra (δ 5.5-0.5) of the plasma obtained from a patient with (A) CSCC, (B) CIN and (C) a healthy control. (<i>Hasim et al ,2012</i>)	83
Figure 45a-b	Proton magnetic resonance spectra before and after three cycle of neoadjuvant chemotherapy (de Souza et al ,2004)	84
Figure 46	Pre and post therapy spectroscopy with significant reduction in choline peak (<i>kundu et al,2012</i>).	85
Figure 47a-c	A case with recurrence cervical cancer with ADC and RBV mapping (<i>kundu et al,2012</i>).	89
Figure 48a-c	T2W image demonstrating tumor involving the cervix with diffusion and RBV mapping (<i>kundu et al,2012</i>)	89
Figure 49	A case of cervical cancer in sagittal and coronal of ADC with restricted diffusion (arrow) (<i>Wakefield et al,2013</i>)	90
Figure 50a-c	A case of central recurrence after radical surgery for cervical cancer and follow up after treatment with different modalities including ADC map (<i>Moreno et al ,2012</i>)	93
Figure51a-f	A case of vaginal fornix recurrence after radical surgery for cervical cancer <i>Ac and</i> follow up after treatment with different modalities including <i>DCE-MRI</i> (<i>Moreno et al ,2012</i>).	97
Figure52	Pap test. Clinically A speculum is inserted into the vagina to widen it (<i>NCI ,2014</i>)	101

Figure53	Micrograph of a Pap test (www.greensborogynecology.com/services/papsmear/)	101
Figure54	FIGO staging: Stage IA1 and IA2 cervical cancer. (<i>NCI, 2014</i>)	106
Figure55	FIGO staging: Stage IB1 and IB2 cervical cancer. (<i>NCI, 2014</i>)	106
Figure56	FIGO staging: Stage II cervical cancer. (<i>NCI, 2014</i>)	106
Figure57	FIGO staging: Stage IIIA cervical cancer. Cancer has spread to the lower third of the vagina but not to the pelvic wall. (<i>NCI, 2014</i>)	107
Figure58	FIGO staging: Stage IIIB cervical cancer. (<i>NCI, 2014</i>)	107
Figure59-60	FIGO staging : Stage IVA cervical cancer and Stage IVB cervical cancer. (<i>NCI, 2014</i>)	107

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 et al, 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**