شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

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قسم

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Role of MRI-DWI in Post Therapy Follow Up of Non Operable Cervical Cancer Patient

Thesis

Submitted in Partial Fulfillment of the Master Degree in **Radiology**

Presented by

Ahmed Hussein Saad Zaghloul
M.B.,B.Ch

Under Supervision of

Prof. Dr. Aida Mohamed Elshibiny
Professor of Radiodiagnosis
Faculty of Medicine, Ain Shams University

Dr. Wafaa Raafat Ali
Lecturer of Radiodiagnosis
Faculty of Medicine, Ain Shams University

Faculty of Medicine,
Ain Shams University
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Ahmed Zaghloul

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List of Abbreviations

Abb.	Full term
ACIP	*Advisory Committee on Immunization Practices*
ADC	*Apparent Diffusion Coefficient*
ASCCP	*American Society for Colposcopy and Cervical Pathology*
CCRT	*Concurrent chemoradiotherrapy*
CIN	*Cervical intraepithelial neoplasia*
CRT	*Chemoradiotherapy*
CT	*Computed tomography*
DCE-MRI	*Dynamic Contrast Enhanced MRI*
DFS	*Disease-free survival*
DNA	*Deoxyribonucleic acid*
DWI	*Diffusion Weighed Imaging*
FDA	*U.S. Food and Drug Administration*
FDG	*Fluorodeoxyglucose*
FIGO	*International Federation of Gynecology and Obstetrics*
GFR	*Glomerular filtration rate*
GOG	*Gynecologic oncology group*
HPV	*Human Papilloma Virus*
HS	*Highly Significant*
IQR	*Interquartile range*
IV	*Intravenous*
LEEP	*Loop electrosurgical excision procedure*
LVSI	*Lymphovascular space invasion*
Mg	*Milligram*
Mmol	*Millimol*
MRI	*Magnetic Resonance Imaging*
NS	*Non significant*
PAP	*Papanicolau*
PET	*Positron emission tomography*
PFS	*Progression free survival*
ROI	*Region of interest*

List of Abbreviations cont...

Abb.	Full term
RT	*Radiotherapy*
S	*Significant*
SD	*Standard deviation*
SPIR	*Spectral presaturation with inversion recovery*
VEGF	*Vascular endothelial growth factor*
VIA	*Visual inspection with acetic acid*

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INTRODUCTION

Cervical cancer is the fourth most common cancer in women worldwide ***(Ferlay et al., 2015).***

Nearly 80% of cervical cancers occur in the developing countries and most patients are diagnosed with the disease at an advanced stage, thus not suitable for surgical staging. Therefore cervical cancer usually remains a clinically staged disease ***(Odicino et al., 2007).***

Previously, clinical staging of cervical cancer relied on pelvic examination and several other simple radiologic examinations according to the International Federation of Gynecology and Obstetrics (FIGO) ***(Bermudez et al., 2015).***

In 2018, clinical staging of cervical cancer underwent a major revision by FIGO. Radiologic examinations such as magnetic resonance imaging (MRI) are allowed to be combined into clinical staging where available ***(Bhatla et al., 2018).***

With advances in MR techniques, DWI is widely included as a routine sequence in many imaging protocols, including the female pelvis. The clinical application of DWI to cervical cancer has been investigated in many studies. Previous studies demonstrated that ADC value could be useful for differentiating cervical cancer from normal cervix especially in early stages as well as for prediction of the degree and histological type of cervical cancer ***(Kuang et al., 2013).***

If poor treatment response to chemoradiotherapy can be reliably predicted, this information could be effectively used in changing therapeutic strategies to avoid toxicity or negative side effects of ineffective therapy. Furthermore, if pretreatment imaging was able to identify patients at high risk for disease recurrence before CRT, better treatment could be accomplished by conducting more intensive follow-ups or considering a choice of clinical trials ***(Thoeny et al., 2010).***

Imaging of local spread (e.g. involvement of the myometrium/vagina bladder, rectum, and parametrium), depth of cervical stromal invasion, and the detection of lymph node involvement still remains challenging, yet are considered crucial for determination of an appropriate effective management plan. For the evaluation of the International Federation of Gynecology and Obstetrics (FIGO) staging, MRI has been shown to be accurate. A systematic review of 57 single-institution studies showed a sensitivity of 74% for detecting parametrial invasion and 75% for both detecting bladder and rectal invasion. Several recent studies even showed sensitivity values up to 100% for the detection of parametrial infiltration, vaginal infiltration, tumor extension to the stroma, urinary bladder invasion, and rectal invasion ***(Dhoot et al., 2012).***

MR techniques including DWI are used as a routine imaging protocol for the female pelvis ***(Sala et al., 2010).*** The additional role of diffusion-weighted imaging (DWI) in uterine cervical cancer has been introduced to improve

characterization, detection and verification of extent of local invasion ***(McVeigh et al., 2008).***

For patients with locally advanced cervical cancer, concurrent chemoradiotherapy (CCRT) is currently considered the standard treatment modality. The addition of chemotherapy to the radiotherapy regimen for patients with cervical cancer has been shown to improve survival but at the expense of increased complications and morbidity. Thus, an early and reliable indicator of therapeutic response would be of value in the management of patients with locally advanced cervical cancer ***(Kim et al., 2013).***

In DWI, the diffusion capacity of tissues can be quantitatively measured, through a parameter that is called the apparent diffusion coefficient (ADC). In tissues with a normal cellularity (most healthy soft tissues) or low cellularity (fluids), there is enough extracellular space and water protons can diffuse relatively freely. This random Brownian movement of water protons causes a signal loss on diffusion-weighted images. In tissues with increased cellularity (tumor), the extracellular space is limited and the movement of water protons is restricted. As a result, the signal on DWI is high. Because DWI suppresses the signal in normal tissues, the high signal of malignant tissues stands out, which renders DWI a highly promising tool for detection of malignant tissues at early stages ***(Park et al., 2013).***