ROLE OF DIFFUSION WEIGHTED MAGNETIC RESONANCE IMAGING IN ASSESSMENT OF URINARY BLADDER CANCER

Thesis

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Contents

Subject

List of Abbreviations……..……..……...

List of Tables…….…….....

List of Figures……...…….…….....

Introduction…….....

Aim of the Work……..……...….....

Review of Literature

- **Anatomy of Urinary Bladder…….....**
- **MRI Anatomy of the Urinary Bladder …….....**
- **Neoplasms of the Urinary Bladder Radiologic-Pathologic correlation……..…….....**
- **Imaging of the Urinary Bladder Neoplasms……..……**
- **MRI Techniques of the Urinary Bladder …….……**

Patients and Methods ...…….....…….

Results…….....

Illustrative Cases...……

Discussion……..…….....

Summary and Conclusion……...…….

References……...…….....

Arabic Summary……..

List of Abbreviations

Abb.	Full-term
ADC	Apparent Diffusion coefficient
AJCC	American Joint Committee on Cancer
CIA	Carcinoma in situ
CT	: Computed Tomography
CTU	: Computed Tomography Urography
DCE	Dynamic contrast enhancement study
DWI	: Diffusion Weighted Image
Fig.	: Figure
FOV	: Field of view
FSE	: Fat-saturated fast-spin echo
Gd	: Gadolinium
Gd- DTPA	: Gadolinium diethyl-triamine-pentaacetic
MIBT	: Muscle invasive bladder tumors
MRI	: Magnetic Resonance Imaging
MRU	: Magnetic Resonance Uroghraphy
NEX	: Number of excitations
NMIBT	: Non muscle invasive bladder tumors
PPV	:Positive predictive value
NPV	:Negative predictive value

PUC	plasmacytoid urothelial carcinoma
PUNLMP	: Papillary urothelial neoplasm of low malignant Potential

Abb.	*Full-term*
SCC	**: Squamous cell carcinoma**
SI	: Signal intensity
SLE	: Submucosal linear enhancement
SNR	: Signal to noise ratio
T1WI	: T1-weighted image
T2WI	: T2-weighted image
TCC	: Transitional cell carcinoma
TE	: Echo time
TR	: Repetition time
TSE	: Turbo spin echo
TURBT	: Transurethral resection of bladder tumor
UB	: Urinary bladder
US	: Ultrasound
USPIO	: Ultra small super paramagnetic iron oxide
VIBE	: Volumetric interpolated breathhold examination

Table No.	Title	Page No.

Table (1): 2009 TNM classification of urinary bladder cancer……..22

Table (2): 1973 and 2004 WHO Classification of non-invasive urothelial neoplasia…….....25

Table (3): WHO 2004 histological classification for flat lesions……..26

Table (4): Sex and Age distribution among the studied patients……...66

Table (5): Distribution of symptoms among the studied patients…....67

Table (6): Distribution of the studied patients according to number of lesions…….....67

Table (7): Distribution of urinary bladder lesions in MRI regarding appearance……68

Table (8): Distribution of the studied patients regarding pathological type and grade of UB lesions……...69

Table (9): TNM staging of the studied patients…**.....71**

Table (10): Characters and staging of the UB lesions in T2W imaging among the studied patients……72

Table (11): Characters and staging of the UB lesions in DW imaging among the studied patients…….....73

Table (12): Characters and staging of the UB lesions in Post-contrast T1W imaging among the studied patients…….74

Table (13): T2 staging results on a stage-by-stage basis compared with histo-pathological staging……75

Table (14): T2 staging results on a stage-by-stage basis compared with histo-pathological staging……**75**

Table (15): Post-contrast T1WI staging results on a stage-by-stage basis compared with histo-pathological staging…….76

Table (16): Degree of agreement between pathological staging & T2 staging……...77

Table (17): Degree of agreement between pathological staging & DW staging……..77

Table (18): Degree of agreement between pathological staging & post contrast T1staging……78

Table (19): Diagnostic Accuracy using T2WIs and DWIs for differentiating Stage Tis to T2 Tumors from T3 to T4 Tumors……...78

Table (20): The mean ADC value in high and low grade tumors……..79

Table (21): The cut off value between low-grade (G1) and high grade (G2 and G3) tumors……79

Diagnostic Accuracy using post-contrast T1WIs for differentiating Stage Tis to T1 Tumors from T2 to T4 Tumors……...70

Table (19): The mean ADC value in high and low grade tumors……...70

Table (20): The cut off value between low-grade (G1) and high grade (G2 and G3) tumors…….....71

Figure No.	*Title*	*Page No.*

Figure (1): Diagrammatic relations of the female bladder, sagittal section of the pelvis ……..……..……..4

Figure (2): Diagrammatic relationship of the bladder and prostate: sagittal section, male pelvis…….....5

Figure (3): Coronal section of the urinary bladder in the male. The mucosal folds are dependent on the state of filling …….....5

Figure (4): Normal bladder wall diagram ….....7

Figure (5): Innervation of the lower urinary tract and male genitalia…...8

Figure (6): MRI anatomy of urinary bladder wall……...10

Figure (7): MRI anatomy of mid male pelvis in coronal T2W images…..……....12

Figure (8): MRI anatomy of mid female pelvis……...15

Figure (9): Normal mural stratification of rectal wall on T2W images…….……..16

Figure (10): World Health Organization (WHO) classification of tumors of the urothelial tract……...18

Figure (11): Diagram illustrating tumor staging based on depth of invasion the UB wall layers …….…….....23

Figure (12): Ultrasound examination of urothelial cancer…….....28

Figure (13): Enhancing urothelial cancer. A contrast enhanced CT image……..29

Figure (14): Bladder cancer during CT excretory phase. …….30

Figure (15): urinary bladder cancer(stageT1) ……32

Figure (16): pathological lymph node imaging…….35

Figure (17): urachal adenocarcinoma ……38

Figure (18): Urinary bladder cancer (stage T3) with radiomic analysis illustration……...40

Figure (19): Urinary bladder cancer (stage T1) with radiomic analysis illustration……...41

Figure (20): Multifocal bladder cancer ……42

Figure (21): T2a bladder cancer…….....43

Figure (22): Urinary bladder cancer (stage T3b) …..……....44

Figure (23): T4a bladder cancer …….. ...……..……...45

Figure (24): T4b bladder cancer.……....46

Figure (25) T3bN1 bladder cancer ……47

Figure (26): T3b N2 bladder cancer…… ……48

Figure (27): Urachal cancer.……..49

Figure (28): Multifocal urothelial carcinoma ……...50

Figure *(29)*: Urothelial carcinoma (stage T1)with 3D acquisition…....52

Figure (30*)*: stage T1 urinary bladder cancer…**.....54**

Figure (31): multifocal urothelial carcinoma with MRU assessment….59

Figure (32): Motion artifact reduction T2W sagittal images…….60

Figure (33): Sex distribution among the studied patients……...66

Figure (34): Distribution of symptoms among the studied patients…..67

Figure (35): Distribution of the studied patients according to number of lesions. ……68

Figure (36): Distribution of the studied UB lesions regarding appearance……..69

Figure (37): Distribution of the studied patients regarding pathological type and grade of UB lesions…**.....**70

Figure (38): Distribution of the studied patients according to TNM staging…….....71

Figure (39): Characters and staging of UB lesions in T2WIs……...72

Figure (40): Characters and staging of UB lesions in DWIs…….....73

Figure (41): Characters and staging of UB lesions in post contrast T1WIs…….74

Figure (42): Case (1)……..81

Figure (43): Case (2)…….....83

Figure (44): Case (3)…….…. ...86

Figure (45): Case (4)……...……...….88

Figure (46): Case (5)……...……....90

Figure (47): Case (6)……..….92

Figure (48): Case (7)…….…….....94

Figure (49): Case (8) …….……..……..96

Figure (50): Case (9)……...……...……98

Figure (51): Case (10)……..……...……...…...100

Introduction

Bladder cancer is a prevalent cancer worldwide,arising from the urothelium, which represents 3- to 7-cell mucosal layer within the muscular bladder. In North America, South America, Europe, and Asia, transitional cell carcinoma is the most common type, while squamous cell carcinoma (SCC) is the most common in developing nations.

It is closely related to exposure to particular pollutions, like Tobacco use which is the most common cause as well as exposure to substances in a number of occupations, like aromatic amines, diesel exhaust, petroleum products, solvents, organic chemicals, dyes (Beauticians, Dry cleaners, Painters, Paper production workers).

Schistosoma haematobium infection is considered a predisposing factor for most cases of bladder SCC in many developing countries, particularly in the Middle East.

Painless gross hematuria represents the most important symptom, in addition to irritative bladder symptoms such as dysuria, urgency, or frequency of urination which represents about 20-30% of the patients' complaints.

Prognosis of the tumor depends mainly on grade, depth of invasion, and the presence of carcinoma in situ (CIS) ***(Hemdan, T. 2016).***

Post operative tumor relapse is reportedly 5–70%, mostly occurring within 2 years of surgery ***(D.M. Koh et al., 2015).***

Cystoscopy and biopsy remains the gold standard tool for staging of the tumor due to its high sensitivity in diagnosis and the possibilities of treatment**, however** invasiveness, missing flat lesions and non visualization of extra-vesical tumor invasion represent the main defects ***(Teama Atef H et al., 2014)***.

Computed tomography (CT) and magnetic resonance (MR) imaging became the standard imaging work – up for diagnosis of urinary bladder cancer.

Magnetic resonance imaging has the upper hand in the staging of bladder carcinomas over CT because of its high soft-tissue contrast resolution, which allows clear differentiation between bladder wall layers ***(S Verma et al., 2012)***.

Aim of the Work

The aim of this work is to ellucidate the role of diffusion-weighted imaging in T-stage of bladder cancer, to find correlation between the apparent diffusion coefficient (ADC) and histologic grade and to detect early tumor recurrence.

Urinary Bladder Anatomy

▪ Introduction:

The urinary bladder is a tetrahedral structure located within the pelvis, having base (fundus), neck, apex, a superior (dome) and two infero-lateral surfaces.***(Ginzburg et al., 2016***). It shows relation as shown in figures 1&2.

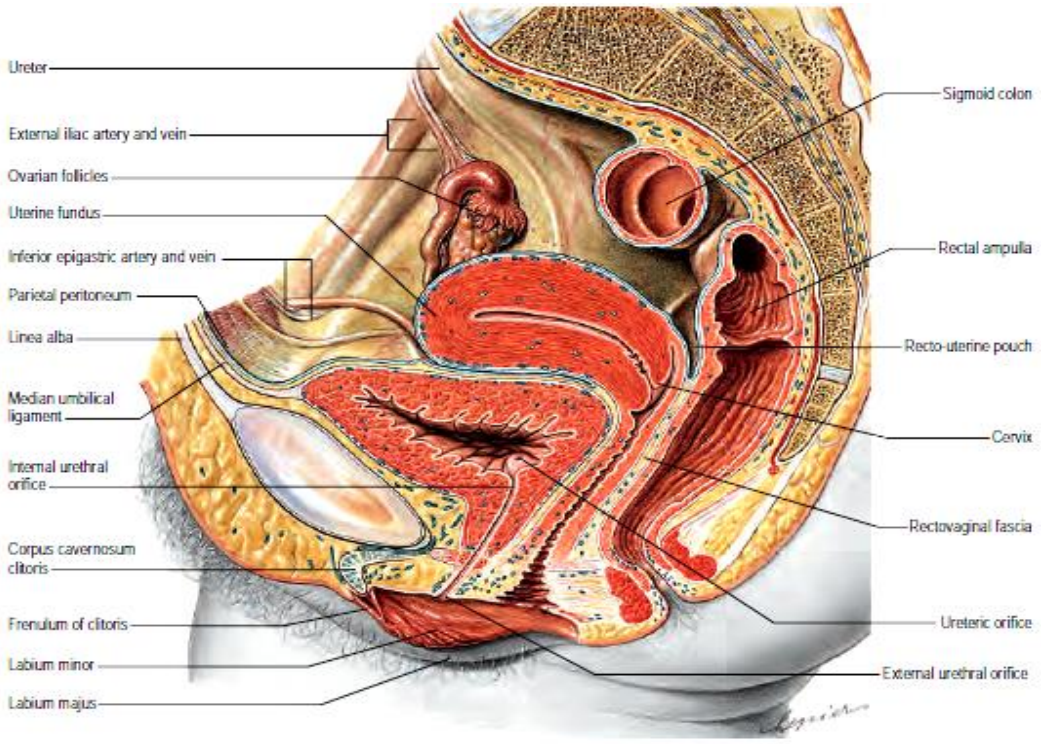

Fig (1): The relations of the female bladder, sagittal section of the pelvis ***(Quoted from Ginzburg, 2016).***

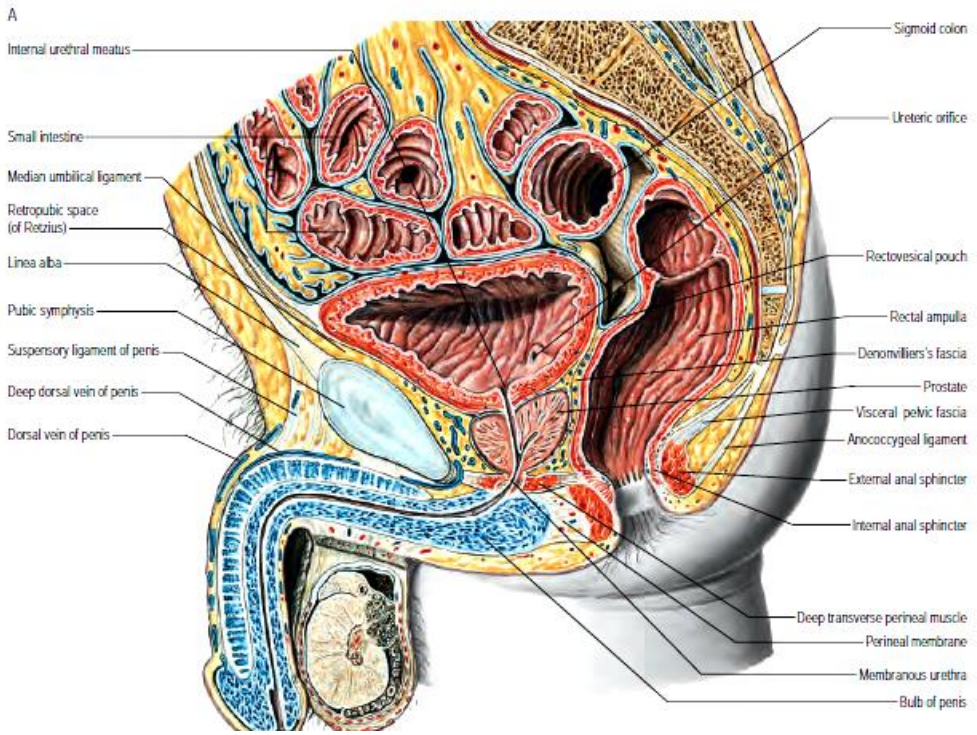

Fig (2): The relationship of the bladder and prostate: sagittal section, male pelvis ***(Quoted from Ginzburg, 2016).***

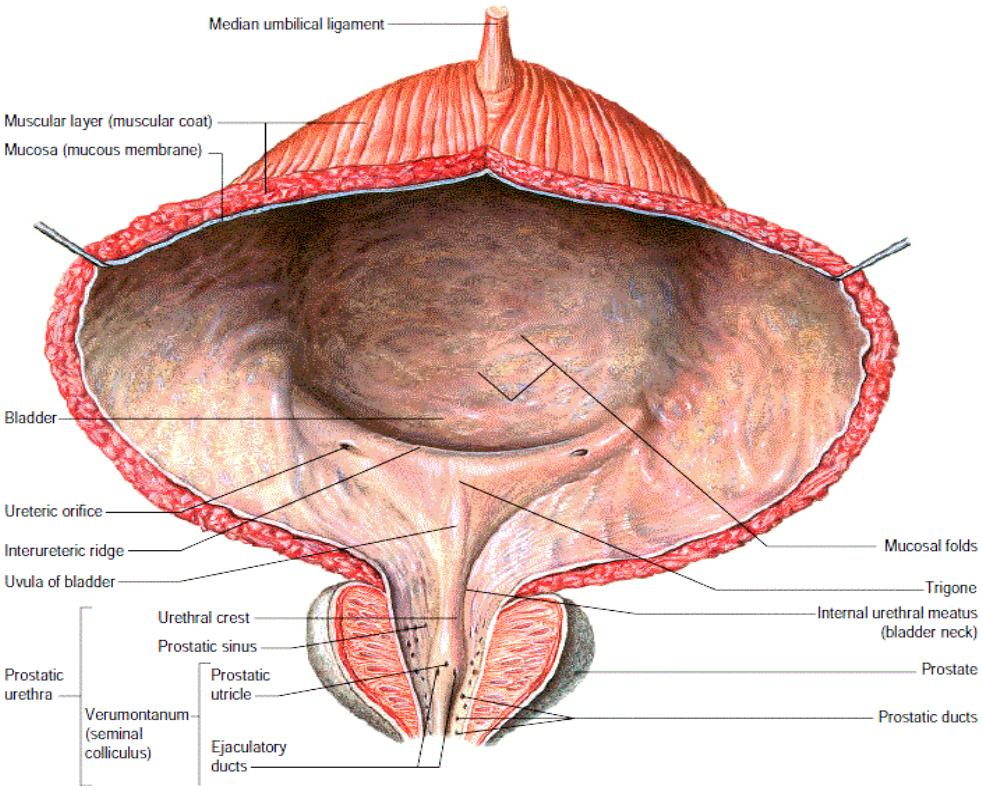

Fig (3): Coronal section of the urinary bladder in the male. The mucosal folds are dependent on the state of filling ***(Quoted from Ginzburg, 2016).***