

**Role of MRI and Ultrasound in diagnosis of stress
incontinence in females with pelvic floor dysfunction**

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radiodiagnosis*

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TABLE OF CONTENTS

Content	Page number
List of figures	1
List of tables & diagrams	6
List of abbreviations	8
Abstract	11
Introduction & aim of work	12
Functional anatomy of the female pelvic floor	14
Pelvic floor imaging (methodology and normal pelvic floor radiological anatomy) I. Ultrasonography II. Magnetic resonance imaging	24
Female stress urinary incontinence I: Pathophysiology II: Radiologic findings in stress incontinence 1. Interpretation of MRI findings 2. Interpretation of US findings	53
Patients and methods	79
Results	85
Case presentation	92

Table of contents

Discussion	112
Summary	122
References	123
Arabic summary	134

LIST OF FIGURES

Figure number	Title	Page number
1	Compartments of the pelvis	14
2	Attachments of the cervix and vagina to the pelvic walls	15
3	Levels of vaginal support after hysterectomy	16
4	Close up of the lower margin of level II after a wedge of vagina has been removed.	17
5	Lateral view of the pelvic floor structures	17&18
6	Perineal membrane and its associated components	18&19
7	The perineal membrane attachment	19
8	Lateral view of the pelvis after removal of the ischium	19&20
9	Schematic view of the levator ani muscles	20&21
10	Transducer placement and field of vision for translabial/perineal ultrasound	25
11	3D pelvic floor ultrasound	26&27
12	Levator co-activation as seen in the midsagittal plane and the axial plane	28
13	Quantification of levator contraction	29
14	Assessment of the inferior aspects of the levator ani by 2D transperineal ultrasound(probe placement)	29&30
15	puborectalis muscle as imaged on 2D transperineal ultrasound	30

16	Three-dimensional transvaginal ultrasound of the anterior compartment .	31&32
17	Three-dimensional transvaginal ultrasound of the posterior compartment.	32
18	MRI Sagittal T2-weighted images of female patient with a moderate descent of the posterior compartment during defecation. images obtained at rest ,at squeezing ,and during evacuation .	39&40
19	MRI Measurement of the ano-rectal angle	41
20	MRI static T2 showing landmarks used in the HMO system	42
21	MRI axial oblique T2-weighted (Endovaginal) showing urethra, pubococcygeus muscle and anorectal junction.	43&44
22	MRI T2 axial oblique image showing lateral support of the vagina by the levator ani.	45
23	MRI axial oblique T2-weighted turbo spin-echo demonstrates the perineal body	46&47
24	Endoanal coronal oblique T2-weighted image showing the anal sphincters	47&48
25	Endoanal coronal oblique T2-weighted image showing the anal sphincters	48&49
26	MRI Endoanal axial oblique T2-weighted turbo spin-echo through the lower half of the anal sphincter	49
27	MRI External coil axial oblique T2-weighted turbo spin-echo shows the pubovisceral muscle, puborectal muscle ,and puboanal muscle	50
28	Static and dynamic MR imaging in control woman.	64
29	Sagittal HASTE MR image of pelvis at strain	66

	shows cystocele and abnormal urethra hypermobility	
30	Static and dynamic MRI images in a woman with both SUI and POP	67
31	Static and dynamic MR images in a patient with SUI.	68
32	Static and dynamic MR images of a woman with both SUI and POP	69
33	Axial T2-weighted turbo spin-echo MR image of the pelvis in a woman with symptoms of pelvic floor dysfunction	70
34	Axial T2-weighted turbo spin-echo MR images of pelvis in a woman with symptoms of pelvic floor dysfunction	71
35	Static and dynamic MR images of a control woman	73
36	Introital ultrasound images of the pubic symphysis	74
37	Perineal ultrasound images in the midsagittal plane with sonomorphological changes of the urethra	75
38	Transvaginal ultrasound showing bladder wall thickness	76
39	Transvaginal ultrasound showing Bladder diverticula	77
40	Introital ultrasound for dynamic assessment of the bladder neck	77
41	Introital ultrasound images in the midsagittal plane in women with stress urinary incontinence , prolapse , and urinary incontinence and prolapse	77&78
42	Case 1 :MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain.....	92
43	Case 1 :Transvaginal US mid-sagittal images	93

	
44	Case 2 : MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain....	94
45	Case 2 : Transvaginal US mid-sagittal images....	95
46	Case 3 : MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain.....	96
47	Case 3 : Transvaginal US mid-sagittal images	97
48	Case 4: MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain.....	98
49	Case 4: Transvaginal US mid-sagittal images...	99
50	Case 5: MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain	100
51	Case 5 : Transvaginal US mid-sagittal images.....	101
52	Case 6 : MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain.....	102
53	Case 6 : Transvaginal US mid-sagittal images.....	103
54	Case 7: MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain	104
55	Case 7 : Transvaginal US mid-sagittal images.....	105
56	Case 8 : MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain	106
57	Case 8 : Transvaginal US mid-sagittal images.....	107
58	Case control 1 : MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain....	108
59	Case control 1: Transvaginal US mid-sagittal images.....	109

60	Case control 2: MRI Sagittal T2-weighted images of the patient at rest and during pelvic strain....	110
61	Case control 2 : Transvaginal US mid-sagittal images.....	111

LIST OF TABLES

Table number	Title	Page number
1	International standardized terminology (Nomina Terminologica) divisions of the levator ani muscle	21
2	Characteristics of ultrasonographic modalities for pelvic floor assessment	33
3	A classification of the causes of incontinence in women	55
4	Demographic data of the patient group	85
5	Demographic data of the control group	85
6	Results of Ultrasound study in the patient group	86
7	Results of Ultrasound study in the control group	87
8	Results of MRI study in the patient group	88
9	Results of MRI study in the control group	89

Diagrams

Diagram number	Title	Page number
1	Organ descent below the PCL in the patient group	90
2	Levator plate orientation in the patient group	90
3	Puborectalis muscle findings in the patient group.	91

LIST OF ABBREVIATIONS

2D : two-dimensional.

3D : three-dimensional.

4D : four-dimensional.

AC: anal canal.

ARJ: anorectal junction .

ARA : ano-rectal angle

AS: anal sphincter complex.

ATFP: arcus tendineus fascia pelvis.

ATLA : arcus tendineus levator ani.

B: bladder.

BSSFP:balanced steady-state free precession

BN : bladder neck.

C: coccygeus muscle

CUG : cystourethrogram.

CNS : central nervous system

DICOM : Digital Imaging and Communications in Medicine.

DM :diabetes mellitus

EAS: external anal sphincter.

EO : external urethral orifice.

FOV : Field of View.

FSE : fast-spin echo

GRE :gradient recalled echo

HASTE : Half Fourier Acquisition Single shot Turbo spin Echo.

IC : iliococcygeus muscle.

IPR: inferior pubic ramus

IS : ischial tuberosity.
ISD : intrinsic sphincter deficiency
ISP : ischial spine
ISS : intersphincteric space
IOM :internal obturator muscle
L: levator ani.
L2 : second lumbar vertebra.
LA : levator ani muscle.
LUG :levator - urethra gap
LUT : lower urinary tract
LS :lissosphincter
LL : longitudinal layer
RS :rhabdosphincter
MRI: magnetic resonance imaging.
MM : muscularis submucosae ani
NPV: negative predictive value
O : obturator muscle.
OF : obturator foramen.
PA: puboanal
PB : pubic bone.
P: perineal body.
PC : pubococcygeus muscle.
PCF: pubocervical fascia
PCL :pubococccgeal line.
PFD: pelvic Floor Dysfunction.
PFMC :pelvic floor muscle contraction

POP : pelvic organ prolapse.
PR : puborectalis muscle.
PS :pubic symphysis
PULs : Pubo urethral ligaments.
PPV : positive predictive value
R: rectum.
SD : standard deviation
SE: standard error of the mean
SP: symphysis pubis.
SUI: stress urinary incontinence.
T : Tesla
T2WI : T2-weighted images.
TPUS : transperineal ultrasonography.
TUI : tomographic ultrasound imaging
TSE : turbo spin-echo.
TVS : transvaginal ultrasonography.
SNR : signal-to-noise ratio
SSFSE :single-shot fast spin echo sequences
U : urethra.
UB: urinary bladder.
UT: uterus.
UTI : urinary tract infection
UUI : Urge Urinary Incontinence.
UVJ : urethrovesical junction.
V : vaginal vault.

Abstract

Objective:

Stress urinary incontinence (SUI), defined as involuntary loss of urine during increased abdominal pressure, due to intrinsic sphincter deficiency or to hypermobility of the bladder neck or urethra is the most commonly encountered type of female urinary incontinence. Our study aimed at assessing and comparing the role of ultrasound (US) and magnetic resonance imaging (MRI) in those patients.

Methods:

Twenty patients (mean age: 44.05 years old) with an established clinical diagnosis of SUI as well as 5 female volunteers (mean age: 43 years old) underwent pelvic floor (perineal) 2D-US and MRI (static & dynamic). The US evaluation included measurement of the bladder wall thickness, detrusor muscle thickness, urethral length and thickness as well as assessment of the retrovesical angle at rest and with strain. At MRI, descent of the bladder below the pubococcygeal line, H & M lines measurements, levator plate orientation, vaginal configuration, puborectalis muscle and levator hiatus width were assessed.

Results:

MRI study showed that in patients, there was statistically significant ($p < 0.05$) elongation of H line at rest and with pelvic strain (mean: 6.43 versus 4.71cm in controls at rest and 7.69 versus 5.20cm with strain respectively), widening of the elevator hiatus (4.17 cm versus 3.20cm in controls) as well as puborectalis abnormalities (in 55% of patients). On trans-vaginal US, there was statistically significant increased detrusor muscle thickness with SUI (mean: 0.16 versus 0.12cm in controls), shortened urethral length (2.74 versus 3.17cm in controls) and increased retrovesical angle with strain (140 versus 121° in controls)

Conclusion:

2D perineal US can efficiently be used as a screening modality to detect patients with functional abnormality in the context of stress urinary incontinence. Further MRI assessment of the pelvic floor can be indicated to detect the anatomical defects. Such a combined approach can lead to more successful patient management and subsequently decreases the rate of postoperative recurrence.

Key Words: stress incontinence; pelvic floor muscles; magnetic resonance imaging; ultrasound.