VALUE OF Three-DIMENSIONAL Ultrasound IN DIAGNOSIS OF LEVATOR ANI ABONORMALITIES AFTER VAGINAL DELIVERY

Thesis

Submitted for Partial Fulfillment of Master Degree in Obstetrics and Gynecology

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First of all, Thanks **GOD**

Who allowed and helped me

to accomplish this work.

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Contents

Subjects	Page
• List of Abbreviations	I
• List of Tables	II
• List of Figures	IV
• **Introduction and Aim of the Work**	1
• **Review of literature:**	
Chapter (1): Anatomy of Pelvic Floor	6
Chapter (2): The role of pelvic floor in childbirth	20
Chapter (3): Risk factors of pelvic floor muscle trauma	27
Chapter (4): Childbirth and the pelvic floor: "the gynaecological consequences"	31
Chapter (5): Evaluation of the pelvic floor using imaging techniques	49
• **Patients and Methods**	64
• **Results**	80
• **Discussion**	108
• **Summary**	120
• **Conclusion**	123
• **Recommendations**	124
• **References**	125
• **Arabic Summary**	__

List of Abbreviations

Abb.	Meaning
2-DU/S	Two dimensional ultrasound
3-DU/S	Three dimensional ultrasound
4-DU/S	Four dimensional ultrasound
AUC	Area under the curve
BMI	Body mass index
CI	Confidence interval
CX	Cervix
DiCoM	Digital imaging and communications in medicine
IC	Iliococcygeus muscle
MRI	Magnetic resonance imaging
NBW	Neonatal birth weight
O.R	Odd's ratio
PC	Pubococcygeus muscle
PC2	Medial most pubococcygeus muscle
PFM	Pelvic floor muscle
PISQ	Pelvic organ prolapse- incontinence sexual quality of life questionnaire
PNTML	Pudendal nerve terminal motor latency
PR	Puborectalis muscle
PS	Pubic symphysis
ROC	Receiver operator characteristic
S	Sacrum
S2-4	Sacral nerve root 2(2-4)
SD	Standard deviation
SPSS	Statistical package for social science

List of Tables

Table	Title	Page
1	Oxford grading system	36
2	Demographic data of the study group	80
3	Morphological levator ani abnormalities in the study group	81
4	Changes in hiatal dimensions after vaginal childbirth, 3-dimensional Pelvic floor ultrasound data	84
5	Comparison of women with and without levator ani morphological abnormalities regarding demographic data	85
6	Antepartum and postpartum mean hiatal dimensions at rest in relation to levator ani morphological abnormalities	88
7	Antepartum and postpartum mean hiatal dimensions on Valsalva in relation to levator ani morphological abnormalities	92
8	Antepartum and postpartum mean hiatal dimensions on contraction in relation to levator ani morphological abnormalities	95
9	Changes in hiatal dimensions after vaginal childbirth, 3-dimensional Pelvic floor ultrasound data in women with levator ani morphological abnormalities	98
10	Changes in hiatal dimensions after vaginal childbirth, 3-dimensional Pelvic floor ultrasound data in women without levator ani morphological abnormalities	101

Table	Title	Page
11	Correlation between ante-post partum measurements differences and demographic data at rest	103
12	Correlation between ante-post partum measurements differences and demographic data on Valsalva	104
13	Correlation between ante-post partum measurements differences and demographic data on contraction	105
14	Area under ROC curves for demographic data as predictors of post-partum levator ani abnormalities	106
15	Area under ROC curves for ante-partum measurements as predictors of post-partum levator ani abnormalities	107

List of Figures

Fig.	Title	Page
Fig. (1)	Bony Pelvis.	6
Fig. (2)	Superficial Perineal muscles.	11
Fig. (3)	Muscles of perineum.	12
Fig. (4)	Levator hiatus.	19
Fig. (5)	Simulated effect of fetal head descent on the levator ani muscles in the second stage of labor. At top left, a left lateral view shows the fetal head located posteriorly and inferiorly to the pubic symphysis (PS) in front of the sacrum (S). The sequence of five images at left show the fetal head as it descends 1.1, 2.9, 4.7, 7.9, and 9.9 cm below the ischial spines as the head passes along the curve of Carus (indicated by curved tube). The sequence of five images at right are front-left, three-quarter views corresponding to those shown at left.	24
Fig. (6)	The relationship between fetal head descent (abscissa, in centimeters; icons at top) and the resulting muscle stretch ratios (ordinate) in selected levator ani muscles. The labels at right identify the pubococcygeus (PC), iliococcygeus (IC), and puborectalis (PR) muscles bands defined and numbered in Figure (7). The largest stretch is induced in the medialmost pubococcygeus (PC2) muscles, the last muscle to be engaged by the fetal head. The shaded region denotes the values of stretch tolerated by nongravid striated muscle without injury	25

Fig.	Title	Page
Fig. (7)	The upper bar graph compares, by muscle, initial and final muscle lengths corresponding to 1.1- and 9.9-cm model fetal head descent, respectively. The lower bar graph shows the maximum corresponding stretch ratio found in each levator ani muscle band. Note that the value of the stretch ratio is not simply proportional to initial or final length. For both graphs, muscles are arranged left to right, in ventral to dorsal order of origin location	26
Fig. (8)	Pelvic organs and pelvic floor during Pregnancy	31
Fig. (9)	Compression of pudendal nerve during labor	38
Fig. (10)	Perineal anatomy before and after childbirth	41
Fig. (11)	Episiotomy types: Median and mediolateral	46
Fig. (12)	Field of view in the midsagittal plane when using a curved array transducer designed for abdominal or obstetric applications	50
Fig. (13)	Standardized measurement scheme for perineal ultrasound	51
Fig. (14)	**A,** Midsagittal, **B,** coronal, and **C,** axial planes and **D,** rendered axial plane (i.e., semitransparent representation of all pixels in box [region of interest] seen in A-C).	56
Fig. (15)	Guidelines on how to assign grades in the Baden-Walker Halfway System	66
Fig. (16)	Medison sonoace	67
Fig. (17)	The plane of minimal hiatal dimensions	68

Fig.	Title	Page
Fig. (18)	Midsagittal plane imaging as seen on translabial pelvic floor ultrasound. The plane used to determine min¬imal hiatal dimensions (hiatal plane, one line) and the area used for rendering of the pubovisceral muscle (between single line and double line) is indicated relative to the symphysis pubis (left) and the anorectal junction (right)	69
Fig. (19)	3-D view and measurements. Three-dimensional ultrasound image (axial view) of the levator hiatus showing biometric measurements of transverse diameter, anteroposterior diameter and pubovisceral angle	70
Fig. (20)	Axial view of the levator hiatus showing biometric measurements of transverse diameter calipers 2 and anteroposterior diameter calipers 1 of the levator ani muscle	71
Fig. (21)	Axial view of the levator hiatus showing biometric measurements of hiatal area	71
Fig. (22)	Cases of normal vaginal delivery with medio-lat episiotomy	81
Fig. (23a)	Degree of morphological Levator Ani Abnormalities in the study group	82
Fig. (23b)	Laterality of morphological Levator Ani Abnormalities in the study group	83
Fig. (24)	Difference between women with and without levator ani abnormalities regarding episiotomy	87
Fig. (25)	Difference between women who had levator ani abnormalities and women who hadn't regarding postpartum hiatal area measurements at rest	90

Fig.	Title	Page
Fig. (26)	Difference between women who had levator ani abnormalities and women who hadn't regarding postpartum hiatal angle measurements	91
Fig. (27)	Difference between women who had levator ani abnormalities and women who hadn't regarding postpartum hiatal area measurements on Valsalva maneuver	94
Fig. (28)	Difference between women who had levator ani abnormalities and women who hadn't regarding postpartum hiatal area measurements on pelvic contraction	97

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INTRODUCTION

What we call the pelvic floor muscle in anatomy is, as far as it is clinically relevant for pelvic floor dysfunction in gynecology, the pubococcygeus-puborectalis complex or pubovisceral muscle ***(Delancy, 1993)***.

Pubococcygeus muscle arises from the inner surface of the pubic bone and the margin of the symphysis pubis to the obturator canal and the arcus tendineus, it passes backward downward and medially past the urogenital organs and rectum, inserting into the anterior sacrococcygeal ligament, the deep part of the anococcygeal raphe and each side of the rectum. Puborectalis muscle arises from the body and descending rami of the pubis, the neighboring part of obturator fascia, the fascia covering the pelvic surface of the urogenital diaphragm and the anococcygeal raphe. Many of the fiber bundles interdigitate with those of the opposite side and they form a thick band on each side of the rectum ***(Kermit et al., 2007)***.

This muscle complex forms a V-shaped sling running from the pelvic sidewall toward the anorectal junction, surrounding it posteriorly and back toward the contralateral pelvic sidewall. It is palpable vaginally. The levator hiatus,

i.e., the space between the arms of the V, contains the urethra anteriorly, the vagina centrally and the anorectum posteriorly. The area of the levator hiatus in young nulliparous women varies from 6 to 36 cm^2 on Valsalva maneuver ***(Dietz and Schierlitz, 2005)***.

The area of the average fetal head in the plane of minimal diameters measures 70-90 cm^2 (equating to a head circumference of 300-350 mm), requiring marked distension and deformation of the levator complex, in some women by more than one order of magnitude. Most inferior and medial parts of the levator complex (i.e., the pubovisceral muscle) have to increase in length by a factor of 3.5 during crowning of the fetal head ***(Lien et al., 2004)***.

Given this degree of acute distension, it is remarkable that many women seem to go through childbirth without sustaining disruption of the muscle and its insertion. However, some do sustain such trauma, and from the above one would expect it to occur mainly to the most inferomedial aspects of the lavator ani, because it is those fibers that come under the most marked mechanical strain. There is very little evidence to date on the incidence and extent of levator trauma in labor, although anal sphincter

trauma is well defined and of proven clinical relevance ***(Sultan and Thakar, 2002)***.

There have been no imaging studies in the published literature comparing the state of the pelvic floor musculature before and after childbirth. All data currently available is limited to describing postnatal appearance, although it has been shown that appearances suggestive of trauma are limited to parous women ***(Delancy et al., 2003)***.

As a result of recent advances in diagnostic U/S with 3-D U/S giving access to the axial plane, this technology allows imaging of the inferior aspect of levator ani enabling us to observe functional anatomy in any operator-defined plane and in real time. It has been shown that the assessment of hiatal dimensions and of major morphological abnormalities is highly reproducible ***(Dietz et al., 2005)***.

Most morphologic abnormalities have indeed been observed in the infero-medial aspects of the pubovisceral muscle. The commonest finding seems to be an avulsion injury to the inferomedial aspects of the pubovisceral muscle, i.e., a detachment of this muscle from its insertion on the arcus tendineus fasciae pelvis. Most authors