# Three-dimensional power Doppler ultrasound scanning for the prediction of endometrial cancer in women with postmenopausal bleeding and thickened endometrium

***Thesis***

*Submitted for partial fulfillment of the master degree In*
***Obstetrics and gynecology***


***By:***

## Amgad Farahat Abd Elkader Salim

Resident of obstetrics and gynecology
Ghamra Military Hospital
M.B.B.Ch


## Supervised by


## Prof. Hatem Hussein Elgamal

*Professor of Obstetrics and Gynaecology*
*Faculty of Medicine, Ain Shams University*

## Prof. Magdy Hassan Kolib

*Professor of Obstetrics and Gynaecology*
*Faculty of Medicine, Ain Shams University*

## Dr. Ahmed Elsayed Hassan Elbohoty

*Lecturer of Obstetrics and Gynecology*
*Faculty of Medicine, Ain shams University*



**Faculty of Medicine**
**Ain Shams University**
**2014**


سورة البقرة الآية: ٣٢

# Acknowledgement

*First of all my deepest thank to* ***Allah*** *for enabling me to do right things.*

*I am greatly honored to express my deep respect and gratitude to* ***Prof. Hatem Elgamal,*** *Professor of Obstetrics and Gynaecology, Faculty of medicine, Ain Shams University, for his faithful supervision, help and encouragement in initiating and completing this work.*

*I am very much grateful to* ***Prof. Magdy Hassan Kolib,*** *Professor of Obstetrics and Gynaecology, Faculty of medicine, Ain Shams University, for his valuable advice that helped me to finish this work.*

*I am very much obliged to* ***Dr. Ahmed Elsayed Hassan Elbohoty****, Lecturer of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University.*

*I owe much to* ***Dr. Amr Helmy Yehia*** *Lecturer of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his continues help, valuable suggestions and final revision of the manuscript.*

***Amgad Farahat Abd Elkader Salim***

---

# Dedication

*To the soul of*

*my family*

# Contents

# List of Abbreviations

| | | |
|---|---|---|
| EMP | : | Endometrial Polyp |
| BMI | : | Body mass index |
| CT | : | Computerized tomography |
| MRI | : | Magnetic resonant imaging |
| D&C | : | Dilatation and curettage |
| DH | : | Diagnostic hysteroscopy |
| PMB | : | Postmenopausal bleeding |
| TVS | : | Transvaginal ultrasonography |
| US | : | Ultrasound |
| IV | : | Intravenous |
| VOCAL | : | Virtual Organ Computer-aided Analysis |
| 3D | : | Three dimensional |
| 2D | : | Two dimensional |
| 3D-PDA | : | Three dimensional power Doppler angiography |
| EMP | : | Endometrial Polyp |
| WHO | : | World health organization |
| DH | : | Diagnostic hysteroscopy |
| VI | : | Vascularization index |

| | | |
|---|---|---|
| FI | : | Flow index |
| VFI | : | Vascularization flow index |
| DM | : | Diabetes mellitus |
| AUC | : | Area under the curve |
| AE | : | Endometrial atrophy |
| EP | : | Endometrial polyp |
| EH | : | Endometrial hyperplasia |
| EC | : | Endometrial carcinoma |
| ROC | : | Receiver-operator characteristic |
| VIs | : | Vascularization indices |
| SIS | : | Saline infusion sonography |
| GIT | : | Gastrointestinal tract |
| ROC | : | Receiver-operator characteristic |

# List of Table

# List of Figures

# List of Figures (Cont.)

# Introduction

Postmenopausal bleeding (PMB) accounts for five per cent of office gynaecology presentations ***(Anon., 2007)***. Its definition is self-explanatory, as any bleeding from the genital tract occurring in the postmenopausal period, arising after 12 months of amenorrhoea in a woman of menopausal age ***(Goodman, 2014).*** It is known that about 90–95% of postmenopausal women with endometrial cancer report a vaginal bleeding experience whereas about 10% of symptomatic postmenopausal women reveal an intrauterine malignancy. So, a postmenopausal vaginal bleeding is a sign that should not be underestimated ***(Giannella et al., 2014)***. A good clinical practice provides, as first diagnostic step, a transvaginal ultrasound in order to discriminate a woman at high or low risk of malignancy. Usually, an endometrial thickness ≤ 4mm is a cutoff value for which a conservative management should be adopted. Indeed, in the latter case the probability of having an endometrial cancer drops from 10% to 0.8 % ***(Ali et al., 2014).*** An endometrial biopsy is considered the gold standard for evaluation of PMB. Endometrial biopsy can be obtained with an endometrial pipelle in the outpatient setting, or by hysteroscopy and curettage (with or without dilatation) in either the outpatient or inpatient setting.

Sampling of the endometrium may miss pathology, as often less than 50 per cent of the endometrium is sampled. Risks involved in this procedure include infection, bleeding, uterine perforation and insufficient sampling ***(Feldman., 2014)***. Sonohysterography appears to accurately evaluate the endometrial cavity and can be successfully performed in more than 85% of postmenopausal women in an office setting. Saline infusion sonography seems superior to TVUS in defining intrauterine lesions in women with postmenopausal bleeding and endometrial thickness greater than 5 mm, particularly for the delineation of endometrial polyps, for which it seems as accurate as hysteroscopy but There is no current evidence suggesting that saline infusion sonography (SIS) enhances the diagnosis of malignancy ***(Munro., 2014).***

Three-dimensional (3D) ultrasonography and power Doppler angiography (PDA) is a novel sonographic diagnostic modality. This technology permits acquisition of the volume of the endometrium and assessment of its vasculature using 3D power Doppler mapping. Using Virtual Organ Computer-aided Analysis (VOCAL™) software, three vascularity indices can be obtained automatically: the vascularization index (VI), the flow index (FI), and the vascularization flow index (VFI). This method has been proven to be highly reproducible for analyzing the volume of the endometrium and 3-dimensional

power Doppler indices of patients with malignancy of the endometrium ***(Hanafi et al., 2014).*** Magnetic resonance imaging (MRI) is a powerful noninvasive but costly technique with a demonstrated, promising potential for visualization of uterine myoma. However, data on MRI visualization of endometrial polyps are scarce. MRI has limitations for the evaluation of intrauterine lesions because they need high medical expenses due to the use of expensive equipment **(*Ahmad et al., 2014).***

# Aim of the Work

To evaluate the role of 3-dimensional power Doppler angiography (3D-PDA) to discriminate between benign and malignant endometrial disease in women with postmenopausal bleeding and thickened endometrium.