Comparative study between the Diagnostic Accuracy of 3D – power Doppler Ultrasound and Office Hysteroscopy in predicting Endometrial Carcinoma in Patients with postmenopausal Bleeding

By

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ABSTRACT

Backgroud: Using two – dimensional (2D)/three dimensional (3D) transvaginal ultrasound, the sonographic appearance of endometrial cancer is significantly associated with tumor stage, grade and size. More advanced tumors often have a mixed/hypoechoic echogenicity, a higher color score and multiple globally entering vessels, whereas less advance tumors are more often hyperechoic and have no or a low color score.

Objectives: The aim of this work was to compare the predictive value of 3D power Doppler ultrasound in endometrial carcinoma (by measuring endometrial thickness, and vascular indices namely velocity index, flow index and velocity flow index) with hysteroscopy with endometrial biopsy in patients with postmenopausal bleeding.

Study design: One hundred forty patients with postmenopausal bleeding and endometrial thickness ≥ 4.5 mm

were included after full explanation of the procedure and verbal consent from them. 3D power Doppler ultrasound in the ultrasound unit using Volusen E6 General Electric where the endometrial thickness was measured. In those patients who show endometrial thickness ≥ 4.5 mm, endometrial volume was measured along with the vascularization indices Vascularization index (VI), flow index (FI), and vascularization flow index (VFI) Office hysteroscopy was performed one week later in the early cancer detection unit.

Results: Forty seven patients (33.6%) were diagnosed to have endometrial carcinoma and ninety three (66.4%) have benign endometrium . Both endometrial thickness and volume were significant predictors. The median values of 3D power Doppler indices of endometrial blood flow (VI, FI and VFI) were all significantly higher in women who had malignant lesions when compared to those who had benign lesions. ROC curves were constructed for estimating the validity of 3D Power Doppler indices of endometrial blood flow in prediction of high-grade malignant endometrial lesion. Hysteroscopic findings of intrauterine mass, hypervascularization, hypervascular thick endometrium or hypervascular intrauterine mass were significantly associated with histopathological diagnosis of malignant lesions.

Conclusion: Based on our results we can conclude that 3D-PD ultrasound has a high predictive value in discrimination between benign and malignant endometrial lesions in patients with postmenopausal bleeding. Despite the predictive value of 3D-PD ultrasound still hysteroscopy, histopathology examination of endometrial biopsy, is the golden role for

prediction of endometrial malignant lesions and it is highly advisable in patient with postmenopausal bleeding and endometrial thickness > 4.5 mm.

Key words: 3D-power Doppler ultrasound, Postmenopausal bleeding, Endometrial Thickness, Endometrial vascular indices, hysteroscopy, Endometrial carcinoma.

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Candidate

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List of Abbreviations

Abbr.	Full-term
2D/US	Two-dimensional Ultrasound
3D US	Three-dimensional Ultrasound
3D USG	Three-dimensional Ultrasound Gynecology
3D-PPA	Three-dimensional Power Doppler Angiography
ACOG	American College of Obstetricians and Gynecologists
AJCC	American Joint Committee on Cancer
ASTEC	Association of Trial Endometrial Carcinoma
AUB	Abnormal Uterine Bleeding
AUC	Area Under the Curve
BMI	Body Mass Index
CT	Computed Tomography
D&C	Dilatation and Curettage
ER	Estrogen Receptors
ES	Endometrial Sampling
ET	Endometrial Thickness
EV	Endometrial Volume
FDA	Food and Drug Association
FI	Flow Index
FIGO	International Federation of Gynecology and Obstetrics
GIS	Gel Infusion Sonography
HSG	Hysterosonography
HYCA score	Hysteroscopic Cancer Score
IQR	Interquartile range
IV	Intravenous
LESS	Laparoendoscopic single-site surgery
LVI	Lymphatic or blood vessel invasion
MRI	Magnetic Resonance Index

List of Abbreviations (Cont..)

Abbr.	Full-term
NBI	Narrow Band imaging
NSABP	National Surgical Adjuant Breast and Bowel Project
OD	Outer Diameter
PALM-COEIN	Polyps, Adenomyosis, Leiomyoma, Malignancy Coagulopathy, Ovulatory Disorders, Endometrial Causes, Iatrogenic and Not Classified.
PMB	Postmenopausal Bleeding
PTEN	Phosphatase and Tensin homologue
REC	Risk of Endometrial Cancer
ROC	Receiver-Operating Characteristic
ROI	Region of Interest
SD	Standard Deviation
SIS	Saline Infusion Sonography
TNM	Tumour Node Metastasis
TVS	Transvaginal Sonography
TVUSG	Transvaginal Ultrasonography
VFI	Vascularization Flow Index
VI	Vascularization Index
VOCAL	Virtual Organ Computer Aided Analysis
WHO	World Health Organization

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Introduction

Abnormal uterin bleeding (AUB) is the most common gynecological complaint during the perimenopause and menopausal years. Therefore, elaborating correct and safe diagnosis and management are essential. Only prospective randomized studies of uterine curettage versus hysteroscopy could give a definite answer concerning the safety of hysteroscopy ***(Ben-Arie et al., 2008).***

Transvaginal sonographic measurement of the endometrial thickness is a noninvasive method that has been demonstrated to be a reliable method to rule out endometrial cancer in women with postmenopausal bleeding. Two meta-analyses have demonstrated that the risk of endometrial cancer when double-layer endometrial thickness is <5mm is actually low ***(Smith-Bindman, 1998 and Gupta et al., 2002).*** Furthermore, it has been demonstrated that transvaginal ultrasonography is cost-effective as the first test in the diagnostic work-up of postmenopausal bleeding ***(Dijkhuizen et al., 2003 and Clark et al., 2006).***

Three-dimensional power Doppler angiography (3D-PDA) has become a sonographic diagnostic tool. This technique allows the estimation of endometrial volume and a more objective assessment of endometrial vascularization ***(Alkazar, 2005)***. Several studies have confirmed that this technique is reproducible among different observers ***(Raine-Fenning et al., 2003; Alkazar et al., 2005 and Merce et al., 2006).***