Role of 3-Dimensional Ultrasonography of Endometrial Volume and Doppler Ultrasonography in the Assessment of Women with Postmenopausal Bleeding

Thesis

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ABSTRACT

Postmenopausal bleeding is a common complain among women of old age. Even though histopathological examination of the endometrium is the gold standard for the final diagnosis or exclusion of malignancy, yet emergence of 2D ultrasonography, 3D ultrasonography and subendometrial Doppler flow pattern became very helpful tools in diagnosis especially when used combined. The study was conducted on 50 cases presenting to KA OPC with their results statistically analyzed showing the importance of such tools in diagnosis.

Keywords:

Endometrial volume
3-dimensional
Doppler ultrasonography

INTRODUCTION

INTRODUCTION

Postmenopausal bleeding is a common but complicated clinical problem with myriad causes. However, physicians with a solid knowledge of female physiology and a thorough approach to differential diagnosis can evaluate and manage the problem with confidence **(Skaznik-Wikiel** *et al.*, **2008).**

One national study found that menstrual disorders were the reason for 5% of all outpatient gynaecology attendances **(Moodley and Roberts, 2004)**.

The average age of a woman having her last period, menopause, is 51yrs. But, some women have the last periods in their forties and some have it later in their fifties **(NAMS, 1997**).

Several causes of postmenopausal bleeding are described. It is important to understand that trends exist for each cause. One in eight will receive a diagnosis of endometrial cancer (**Kassab** *et al.*, **2008).**

Great strides have recently been made secondary to high performance transvaginal ultrasound (TVU) instruments **(Maymon** *et al.*, **2000).** Improvement of image resolution by (TVU) allows the investigation of even delicate anatomical structures **(Tercanly** *et al.*, **1996)**. It provides the physician with a detailed picture of the internal reproductive organs **(Bajka, 2005).** Ultrasound is a cheap, widely available and non-hazardous imaging modality to use **(Gilja** *et al.*, **1999).** So the reliable diagnostic value of 2D transvaginal ultrasound is well established. However, the limit of planes that it can generate, make the third dimension inaccessible. Although an experienced

examiner can reconstruct a third dimension by 'mental processing' of a sequence of 2D images, it will not be possible to demonstrate it objectively nor will another examiner be able to read and interpret the stored data, independent of the original examination. To overcome these obstacles, a 3D ultrasound system was introduced **(Merz, 1999a).** Three-dimensional (3D) imaging was proposed in the 1950s. Since the end of the 1980s, 3D ultrasound has become a major field of research in obstetrics and gynecology **(Blaas** *et al.*, **2000).** It is a new modality finding its way into clinical practice. Most of the major ultrasound vendors are now developing three dimensional ultrasound capabilities. Although 3D U/S will not replace 2D U/S, many additional benefits will be identified and its use will continue to grow **(Pretorius** *et al.*, **2001).** One of the important advantages of 3D ultrasound is obtaining the coronal (frontal) view of the uterus. This enables one to visualize the organ lying flat as it is commonly drawn on medical sketches. Studying the frontal plane of the uterus improves the visualization of possible interactions between structures such as uterine fibroids and the endometrium (**Moeglin** *et al.*, **1999; Baba, 2004)**.

Doppler studies may have a role as tumor growth in animals and in humans is accompanied by neovascularization. The tumor vasculature consists of vessels recruited from the preexisting network of the host vasculature as an angiographic response of host vessels to cancer cells **(Kurjak** *et al.*, **1989).**

The first step in evaluation of postmenopausal bleeding is to make certain that the bleeding is not from a gastrointestinal or urinary source. After this has been ruled out, the condition can be categorized into one of three distinct groups according to its cause: Pathology of

the reproductive tract, systemic disease or iatrogenic factors **(Moodley and Roberts, 2004)**.

Aim of the work:

The aim of this study was to evaluate 2D, 3D and 3DXI (three-dimensional extended imaging) ultrasound and endometrial blood flow distribution in the characterization of the uterine abnormalities in cases of postmenopausal bleeding and to compare their results with the pathological examination.

Statistical analysis included sensitivity, specificity positive and negative predictive values, total accuracy and likelihood ratio to evaluate the accuracy of each ultrasound technique in the characterization of the uterine pathology.

REVIEW OF LITERATURE

Chapter 1

TWO-DIMENSIONAL ULTRASOUND

Medical ultrasound has during the last decades experienced enormous technological progress, and in obstetrics and gynecology it has become an integral part of the clinical work **(Pedersen and Larsen, 2001)**. Great strides have recently been made secondary to high performance transvaginal ultrasound (TVU) instruments **(Maymon** *et al.,* **2000).** Improvement of image resolution by TVU allows the investigation of even delicate anatomical structures **(Tercanly** *et al.,* **1996)**. It provides the physician with a detailed picture of the internal reproductive organs **(Bajka, 2005).** The first paper concerning the use of ultrasound in soft tissue exploration was published in 1942. From that, following a logarithmic curve, ultrasound has become the main exploration technique in obstetrics and gynecology, essentially due to the absence of side effects **(Schaaps, 1999).** Ultrasound is a cheap, widely available and non-hazardous imaging modality to use **(Gilja** *et al.,* **1999).** So the reliable diagnostic value of 2D transvaginal ultrasound is well established. However, the limit of planes that it can generate, make the third dimension inaccessible. Although an experienced examiner can reconstruct a third dimension by 'mental processing' of a sequence of 2D images, it will not be possible to demonstrate it objectively, nor will another examiner be able to read and interpret the stored data, independent of the original examination. To overcome these obstacles, a 3D ultrasound system was introduced **(Merz, 1999a).**

Preparation of the Patient:

The first and perhaps most important prerequisite for transvaginal sonographic examination should be a complete evacuation of the urinary bladder, for three reasons:

(1) A full bladder may occupy most of the pelvis and also the screen, displacing important target organs to be scanned.
(2) Sound waves passing through a bladder filled with a low impedance fluid create the well-known effect of enhancement, interfering with a proper gain setting.
(3) A full bladder distorts pelvic anatomy by compressing pelvic organs in addition to displacing possible ovarian or tubal pathology beyond the reach of the transducer **(Rottem** *et al.*, **1990a).**

Minimal distension is useful in a patient with a severely anteflexed uterus to straighten the uterus relative to the imaging plane **(Fleischer and Kopple, 1991).**

A thorough bimanual pelvic examination provides the gynecologist with additional valuable information. This examination should, therefore, precede the transvaginal ultrasound examination. A pelvic examination may be performed any time the sonographer has trouble understanding the ultrasonographic image or if a discrepancy exists between the obtained image and the expected diagnosis **(Rottem** *et al.*, **1990a).**

The examination must be carefully explained to the patient **(Sanders and Wilson, 1991).**