Three dimensional ultrasound and hysteroscopic assessment of the uterine cavity in cases of abnormal uterine bleeding

THESIS

Submitted by

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LIST OF ABBREVIATIONS

2D U/S	*Two dimensional ultrasound*
3D U/S	*Three dimensional ultrasound*
DNA	*Deoxyribonucleic acid*
LH	*Lutenizing hormone*
MMPs	*Matrix metalloproteinases*
TIMP	*Tissue inhibitor of matrix metalloproteinases*
VEGF	*Vascular endothelial growth factor*
mRNA	*Microsomal ribonucleic acid*
TGF	*Transformation growth factor*
GDFs	*Growth differentiation factors*
TNF	*Tumor necrosis factor*
COX	*Cycloxygenase*
PGE	*Prostaglandin E*
WHO	*World Health Organization*
F.S.H.	*Follicle stimulating hormone*
STRAW	*Stages of the reproductive aging workshop*
DUB	*Dysfunctional uterine bleeding*
C.B.C.	*Complete blood count*
CT	*Computer tomography*
MRI	*Magnetic reasonant imaging*
D&C	*Dilatation and curettage*
HPF	*High power field*
D.M.	*Diabetes milletus*
FIGO	*International federation of gynecology and obstetrics*

TVS	*Transvaginal ultrasound*
ROI	*Region of interest*
RI	*Resisitivity index*
VFI	*Vascularization flow index*
CO_2	*Carbon dioxide*
NaCl	*Sodium chloride*
Hg	*Mercurary*
STEP-w	*Size,topography,extension of the base,penetration,lateral wall*
SIS	*Saline infusion sonohysterography*
MHz	*Mega hertz*
SD	*Standard deviation*
VOCAL	*Virtual organ computer aided analysis*
VI	*Vascularization index*
FI	*Flow index*
IUCD	*Intrauterine contraceptive device*
HRT	*Hormone replacement therapy*
H.S.G	*Hysterosalpengography*

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INTRODUCTION

Abnormal uterine bleeding is commonly encountered in gynecologic practice,acconting for 15%of office visits and almost25% of gynecologic practice, 10-30% of menstruating women experience heavy menstrual bleeding ***(Lippincot Williams&Wilkins ,2008).***

Apart from the regular and traditional bimanual pelvic examination and digital vaginal and speculum examination, endometrial biopsy via dilatation &curettage procedure has been the first and still remaining the gold standard procedure in the investigation of cases of AUB. The aim is to diagnose the endometrial pathology before starting therapy. ***(Mencaglia &Hamou,2000).***

Transvaginal ultrasound is the imaging technique of choice for first line investigation of endometrial abnormalities as a possible cause of abnormal uterine bleeding ***(Leone et al., 2007)***.

By 2D u/s t he pelvic structure could only be evaluated in two primary plans (sagital and coronal) with minor tilting of the transducer resulting in oblique plane viewing.3Du/s offers new viewing windows by allowing for arbitrary plane evaluation through a volume data set acquired from the pelvis using both trans-abdominal and trans-vaginal probes***.(Nelson et al.,1999).***

Current 3D ultrasound technology allows storage of complete volumes, has capacity for routine clinical applications. All objects stored in these volumes can be represented in the multiplanar mode (coronal, transverse, sagital) as well as in form of surface image the major advantage of multiplanar mode is that it enables simultaneous visualization all three

mutually perpendicular sectional planes on display screen ***(Merz E. et al., 2007).***

D&C procedure it self, although highly diagnostic yet it has many limitations including the need for a general anesthesia, being a blind procedure with possible complications, only curates 60% of the endometrial cavity, missing a pathology such as polyps and submucous myoma***.(Mencaglia&Hamou,2000)***

Other less invasive endometrial sampling techniques were tried as endometrial biopsy, Vabra suction curettage, challenge test, H.S.G. but they are fit for screening than reliable diagnostic tool***.(Mencaglia & Hamou,2000)***

In1869,the French physician Pantaleone dared to look inside the uterus of a perimenopausal women complaining of AUB using a primitive hysteroscope reflective candle light without distention medium. ***(Cooper,2000)***.

Hysteroscopy permits direct visualization of cervical canal and uterine cavity. Diagnostic hysteroscopy is both accurate and feasible in diagnosis of intrauterine abnormalities. As diagnostic hysteroscopy is predominantly performed in the outpatient clinic , and therapy in an inpatient setting, an accurate diagnosis is important to direct treatment at the specific pathology and avoid needless surgery. Moreover, it may contribute to prognosis of expected quality of life ***(Van Dangen H et al ., 2007).***

Since the incidence of focal lesions in patients with abnormal uterine bleeding is high, it seems that the most beneficial approach is to proceed with hysteroscopy complemented by endometrial biopsy. ***(Shushan A and Revel A, 2002).***

REVIEW OF LITERATURE

Reproductive capability in young woman begins at the point of menarche, which marks the beginning of an important stage in a young woman's physical reproductive maturation and development ***(Butler,1997)***.

Understanding of the normal menstrual function is necessary in understanding the etiology of abnormal uterine bleeding. Regular menstrual bleeding occurs as a result of release of F.S.H. by the pituitary which stimulates the ovary to mature an egg, while at the same time estrogen causes the endometrium to thicken . After ovulation , a small cyst on the ovary produces progesterone, if pregnancy doesn't occur progesterone is no longer produced and menses begins***(Forret et al.,2007).***

A normal menstrual cycle is considered to occur every 28 days ±7 days . The duration of flow is between 2-7 days , with volume loss of less than 80 ml . ***(Forret et al.,2007)***

Menstruation is the physiologic shedding of the endometrium associated with uterine bleeding that occurs at monthly intervals from menarche to menopause.In the years between these two physiologic landmarks, menstruation will occur 400- 500 times in the average female ***(Butler,1997).***

The normal human menstrual cycle can be divided into segments: the ovarian and the uterine cycle, based on the organ under examination. the ovarian cycle may be further divided into follicular and luteal phase. Whereas the uterine cycle is divided into corresponding proliferative and secretory phases ***(Palter and Olive,1996)***.

NORMAL MENSTRUATION

Regulation of menstrual cycle:

The menstrual cycle is regulated by the pituitary-hypothalamic axis.Pulsatile production of GnRH from the hypothalamus causes secretion of FSH and LH from the pituitary.Under the influence of FSH ,several ovarian follicles begin to develop. The ovary subsequently produces more estrogen with this stimulation ,which functions as negative feedback on FSH, allowing all but one or two dominant follicles to persist ***(Seeger BE ,2006)*.**

During this phase , estradiol feedback on the pituitary causes increase in LH secretion, which causes a small amount of progesterone production, stimulating an LH surge 34to36hours before follicle rupture and ovulation. Once this occurs ,the ovarian granulose cells produce progesterone for about 14 days but involute thereafter unless pregnancy is established.Estrogen acts to increase the thickness and vascularity of the endometrial lining;progesterone increases its glandular secretion and vessel tortuosity. Withdrawal of sex steroids by involution of the corpus luteum results in endometrial sloughing and menstrual bleeding .The follicular phase (first half of the cycle) is variable in length. The luteal phase (from the time of ovulation to menses) is fairly constant at 14 days**.(SmithRP 2002,Bayer SR.1993).**

Phases of ovarian cycle:

Follicular phase: The hormonal feedback promotes the orderly development of a single dominant follicle, which should be mature at mid