"A prospective comparative study of 3 D sonohysterography versus hysteroscopy in assessment of uterine cavity in infertile women"

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Abstract

The aim of this study is to evaluate the diagnostic accuracy of 3 D sonohysterography (3DSHG) in assessment of the endometrial cavity in infertile women,as compared to the Gold standard of hysteroscopy.

Fifty infertile females were included in our study in the period between March 2009 and August 2009. They were recruited based on their complaint which was reproductive failure (recurrent abortion or infertility) after completing investigations that included; Hysterosalpingography HSG and 2D ultrasound. Semen analysis was done to exclude male factor as well.

All patients underwent the following transvaginal techniques; 2D ultrasound,3D US 2D SHG, 3DSHG. All patients underwent hysteroscopy for confirmation of ultrasound results and management of found lesions.

The results of our study showed sensitivity, specificity , NPV, PPV of 2D US, 3D US, 2D SHG, 3D SHG to be;

The highest accuracy for diagnosing any abnormality was found with 2D and 3D sonohysterography and both were similar 89.36%.The highest sensitivity and specificity of these two techniques were in diagnosis of Mullerian anomalies reaching 100% and least with IU synechiae in which their accuracy was 91.67%.

Our study gave similar accuracy for 2DSHG and 3D SHG. Since 2D sonohysterography is an easy cheap and simple technique and uses

available ultrasound machines without the need for the expensive 3D technology it should be the first line of investigation in infertile females with uterine abnormalities.

Key Words:

Transvaginal ultrasound, Sonohysterography, Hysteroscopy, Infertility , uterine cavity abnormalities.

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List of Abbreviations

- HSG Hysterosalpingography
- SHG Sonohysterography
- SIS Saline Infusion Sonohysterography
- TVS Transvaginal Sonography
- DES Diethylstillbesterol
- D&C Dilatation and Curettage
- MRI Magnetic Resonance Imaging
- PPV Positive Predictive Value
- NPP Negative Predictive Value
- MHz Megahertz
- IVF Invitro Fertilization
- AFS American Fertility Society
- ART Assisted Reproductive Technology.
- AUB Abnormal Uterine Bleeding
- IUAs Intra -Uterine Adhesions

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Introduction

Infertility affects approximately 10% of couples, which makes it one of the most common problems for which people seek medical aid (Speroff et al, 1999).

Infertility is classified to Primary and Secondary :

Primary infertility is the term used to describe a couple that has never been able to conceive after at least one year of attempting to do so through unprotected intercourse (Hornstein MD and Schust D 1996).

Secondary infertility is the term used when a couple has conceived previously, but is unable to conceive again, whether or not the first pregnancy resulted in a live or still birth, miscarriage, or termination. It is diagnosed 2 years after the termination of the last pregnancy allowing for lactational amenorrhea and associated anovulation to be spontaneously corrected (Hornstein MD and Schust D (1996).

Uterine factor of infertility represents about 2 - 5 % of all causes of infertility (Puscheck E et al , 2009) and these causes are : fibroids when significantly distorting the uterine cavity or may interfere with implantation or displace tubes and ovaries ,uterine polyps , intrauterine adhesions that may be consequence of infection or surgery as D&C "Asherman s' syndrome "and congenital anomalies as; hypoplastic uterus

, double uterus , bicornuate uterus , unicornuate uterus , septate uterus " the most common congenital mullerian anomaly with highest incidence of reproductive failure".

The high frequency of near field imaging produced by transvaginal ultrasound allows the differentiation between the various uterine cavity abnormalities. 3Dtransvaginal ultrasound has the advantage of visualizing the 3 orthogonal planes of the uterus & storage of the images to be used later without prolonged examination.

Sonohysterography is a simple clinically based invasive technique that involves instillation of saline through a catheter into the uterus distending its cavity, acting as a negative contrast during ultrasonographic examination and giving more detailed picture for enhancement & assessment of the uterine cavity (Parsons and Lense 1993).

This procedure is done on day 3 to day 7 " the early follicular phase ". Sonohysterogarphy is very useful as a screening test to minimize the use of more invasive diagnostic procedures as hysteroscopy in diagnosing endometrial polyps, submuocus fibroid, mullerian anomalies& intrauterine adhesions. It could be performed with 2D and 3D ultrasound as well.

Many of studies confirmed that SHG utilizing saline is a reliable, simple and well tolerated method to assess the intracavitary uterine lesions in an outpatient setting. In addition, this procedure can be done using a regular pediatric Foly's catheter (Inki et al, 1988).

Hysteroscopy is the gold standard for diagnosis of uterine cavity abnormalities. It is an invasive endoscopic technique that shows the inside of the vagina, cervix and uterus, however it can be done under office condition .

Aim of the work

The aim of our study is to evaluate the diagnostic accuracy of 2 D Sonohysterography and 3DSonohysterography in assessment of the endometrial cavity in infertile women compared to hysteroscopy.

Hysteroscopy was considered the gold standard tool for detection of uterine cavity abnormalities.

Anatomical consideration

Gross Anatomy:

The uterus is a hollow, thick-walled, flattened pear-shaped muscular organ that is normally situated in the lesser pelvis between the urinary bladder and the rectum.

The long axis of the uterus forms a right angle with the long axis of the vagina " anteverted position" and normally , the uterus tilts forwards "anteflexed position".
The uterus is made up of: body "corpus", isthmus " a narrow portion 3-mm long lying between the body and the cervix extending from the anatomical internal os above and the histological internal os below".

The size and dimensions of the normal uterus vary according to the age, hormonal status and parity.

During the reproductive years, the length of the body is twice that of the cervix. The average linear dimensions of a nulli gravid uterus are; 7.7 cm in length “from the cervix to the fundus, 4.7 cm in width between the two cornuae and 2.9 cm in depth. In primiparous uterus averages 8.6 cm in length, 5.0 cm in width and 3.5 cm in depth , while the multiparous uterus averages 9.4 cm in length , 5.8 cm in width and 4.2 cm in depth. Postmenopausal uteri become smaller (Anderson JR and Gendary R ,1996).

The endometrial cavity is a triangular in shape having a volume of approximately 7-10 ml in females in the reproductive age.

Histology of the body:

I- Endometrium:

It is the inner mucosal layer. It consists of simple tubular glands embedded in a connective tissue stroma. It is lined by columnar ciliated epithelium but, the cells lining the glands are not ciliated.

II- Myometrium:

It is the middle muscular layer. Its smooth muscles are arranged in 3 layers. An outer longitudinal, inner circular and middle oblique layer forming figures of 8 around the blood vessels to control bleeding " living ligature ".

On cut section the myometrium appears as whorls and interdigitating bundles of muscles.

The thickness of the endomertium varies depending on the day of the menstrual cycle and grossly can be measured as much as 12 mm in thickness in normal uterus as menses approaches. Likewise the myometrium varies in thickness up to 3 cm in the greatest diameter (Anderson and Gendary, 1996; Kaminski and Prodczaski, 1996).

III- Peritoneum:

It is firmly attached to the body and loosely attached to the isthmus.