Diagnostic Accuracy of 3D-transvaginal Ultrasound Compared to Hysteroscopy in Detecting Uterine Abnormalities Before ICSI

Thesis

Submitted for Partial Fulfillment of the Master Degree in Obstetrics and Gynecology

By

Hamdoun Abdelhameed Hamdoun

M.B. B.Ch., Faculty of Medicine- Sohag University, 2013

Under Supervisors

Prof. Dr. Mohamed Mahmoud Alsherbiny

Professor of Obstetrics and Gynecology
Faculty of Medicine – Ain Shams University

Dr. Amr Ahmed Mahmoud Riad

Lecturer of Obstetrics and Gynecology
Faculty of Medicine – Ain Shams University

Faculty of Medicine
Ain Shams University
2018

سورة البقرة الآية: ٣٢

First of all, thanks to Allah whose magnificent help was the main factor in completing this work.

No words could express my deepest thanks and appreciation to Prof. Dr. Mohamed Mahmoud Alsherbiny, Professor of Obstetrics and Gynecology, Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for inspiring me with the idea of this work. His patience, precious advice and guidance enlightened my way throughout this work.

I am also deeply indebted to Dr. Amr Ahmed Mahmoud Riad, Lecturer of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his kind help, guidance, useful advices, continuous encouragement and support all through my entire work.

I would like to sincerely thank all my doctors and colleagues in Ain shams hospital and IBN SINA Centre for the support and overwhelming care with which they surrounded me . I would also like to truly thank every person who gave me a hand in accomplishing this work.

Last but not least, my gratitude goes to my parents and my wife for their support and encouragement .

Contents

List of Abbreviations

CK	: Creatine kinase
COC	: Cumulus oophorus-corona radiata complex
CT	: Computed tomography
HA	: Hyaluronic acid
HSG	: Hysto Salpingo Graphy
ICSI	: Intracytoplasmic sperm injection
IMSI	: Intracytoplasmic morphologically selected sperm injection
IVF	: In vitro fertilization
MRI	: Magnetic resonance imaging
MSOME	: Motile Sperm Organelle Morphology Examination
PID	: Pelvic inflammatory disease
SM	: Submucosal
TV2D	: Two dimensional transvaginal sonography
TV3D	: Three dimensional transvaginal sonography
TVS	: Transvaginal ultrasound
TVS	: Transvaginal ultrasound
ZP	: Zona Pellucida

.

List of Figures

List of Tables

Introduction

Diagnosis of congenital anomalies and acquired diseases of the uterus have long been obstacles to successful treatment of infertility. Uterine factors are responsible for 2-3% of infertility cases and intra-uterine lesions are much more common in infertile women (40-50%) ***(AitBenkaddour et al., 2010).*** Structural pathologies in the uterine cavity such as congenital mullerian anomalies and intrauterine lesions can affect endometrial receptivity, resulting in implantation failure that manifests as recurrent pregnancy loss or infertility**.**

The diagnostic methods that can be used to evaluate the uterine cavity are the two dimensional transvaginal sonography (TV2D), sonohysterography, HSG, Three dimensional transvaginal sonography (TV3D), hysteroscopy, the magnetic resonance imaging (MRI) and computed tomography (CT). TVS carries some limitations which are inability to detect the endometrial changes such as endometritis and synechiae, difficulty in differentiating between a polyp and a fibroid. Also, tubal patency cannot be assessed on transvaginal Sonography ***(Jain et al., 2016).***

The HSG is the most widely used technique in the evaluation of the infertile patient, has a major role in the

assessment of the tubes, but has a secondary role in the evaluation of the uterine cavity, suggesting that the HSG must be replaced by diagnostic hysteroscopy as first-line in the study of infertility ***(Dalfo et al., 2004; Shea et al., 2004).***

Three-dimensional transvaginal ultrasound (TVS 3D) represents a new technique of imaging. It has the ability to register all three imaging planes simultaneously as well as to visualize surfaces three dimensionally. (TVS 3D) enables visualization of the uterus in the coronal plane, which is rarely seen on conventional scans It thus provides a unique diagnostic tool for non-invasive studies of the uterine morphology and diagnosis of congenital uterine anomalies ***(Kupesic et al., 2015).***

The coronal plane of the uterus is used to visualize both horns of the endometrium and the cervix at the same time ***(Salim et al., 2003).***

Also, improves the visualization of possible interactions between structures such as uterine fibroids and polyps ***(La Torre et al., 1999).***

The frontal plan of the uterus also offers marked improvements for studying uterine malformations, especially in cases of infertility ***(Raga et al., 1996).***

Transvaginal 3D shows great sensitivity and specificity in Müllerian anomalies and also in the study of uterine contour. Its great advances are:

- Frontal view of the uterus, impossible to achieve with 2D vaginal US and essential for the diagnosis of malformations.
- Orthogonal planes allow to see in the same image 3 spacial planes.
- Vocal mode (Virtual semi-automatic organ calculatión). It allows semi-auomatic volumetric calculation while providing spectacular images.
- Magic scissors cutting mode .It removes not wanted sonographic areas, leaving only the image of the organ we are studying.
- TUI mode .Similar to a MRI, performs serial images of any structure you want to study, separated only by few millimeters.
- HD Live mode .It sends a light beam to the virtual 'region of interest', resulting in improvement of the image quality by combining light and shadow.

Recently, this technology has been applied to yield new diagnostic criteria of uterine septum. HD Live US were used to determine the width, length and surface area of uterine septums by using hysterosonography in order to predict anatomic results after complete hysteroscopic metroplasty. Significant predictors of anatomical results were the septum width. In conclusion, with 3D transvaginal ultrasound we obtain images in seconds without requiring contrast media radiopaque, without radiating. HD Live is ambulatory and does not require specific menstrual days, it is not painful and shows the front view of the uterus and all uterine layers. It allows as well 3D vision of normal and pathological morphology of the vagina, cervix, uterus, tubes and ovaries 60 and it is cheaper than other techniques ***(Fernando Bonilla-Musoles, 2015)*.**

Hysteroscopy is considered the gold standard for uterine cavity evaluation because it allows for direct visualization. Diagnostic hysteroscopy may be performed in the office using a small-diameter hysteroscope and saline distension, often without need for anesthesia. To optimize visualization of the endometrial cavity and avoid performing the procedure during early pregnancy, hysteroscopy is typically scheduled during the early- to mid-follicular phase of the cycle ***(El-Mazny et al., 2011).***

Hysteroscopy is quick, safe and well-tolerated procedure. Therefore, it has become an excellent tool for the diagnostic and therapeutic infertility work-up. It has been frequently advised to perform hysteroscopy as a routine procedure prior to IVF/ICSI ***(Ibrahim Abdelazim et al., 2012).***

Aim of the Work

To evaluate the diagnostic accuracy and sensitivity of TV3D vs Hysteroscopy in the evaluation of the uterine abnormalities in infertile women before ICSI.