

Research Article

Comparative study between three-dimensional ultrasound and two dimensional ultrasound in assessment of ovarian function among infertile females

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Abstract

Introduction: Throughout the entire female reproductive lifespan, the ovary relies on the reserve of resting follicles or ‘ovarian reserve’ which is a measure of ovarian ageing. It is defined by the quantity and quality of the remaining primordial follicular pool within the paired ovaries at any given time. **Aim of the Work:** The aim of our study is to compare 2D ultrasound imaging with 3D ultrasound imaging for assessment of ovarian function in infertile female. **Patients and Methods:** This Observational prospective study was done in the department of Obstetrics and Gynecology Minia maternity university hospital in the period of February 2018 to July 2018. This study was approved by the local ethical committee of research department of Obstetrics & Gynecology, Minia University. **Results:** The collected data used for comparison between use of two dimension and three dimension ultrasound for evaluation of ovaries of infertile patients - including patient’s characteristics, fertility data and 2D & 3D measurements - were tabulated and shown in figures. **Conclusions and Recommendations:** Three-dimensional ultrasonography is an imaging modality that can be used as a complementary method for other endocrine markers for the assessment of ovarian reserve. It allows excellent evaluation of the ovaries with direct quantitative estimation of antral follicle count, ovarian volume and with power Doppler. Using 3D software including sonoAVC™ and VOCAL™ programs can increase accuracy and efficacy of ovarian evaluation. Patient examination with 3D ultrasound is less time consuming and less patient discomfort.

Keywords: three-dimensional ultrasound , two dimensional ultrasound , infertile females

Introduction

Throughout the entire female reproductive lifespan, the ovary relies on the reserve of resting follicles or ‘ovarian reserve’ which is a measure of ovarian ageing. It is defined by the quantity and quality of the remaining primordial follicular pool within the paired ovaries at any given time^[1].

Ovarian reserve clearly reflects the fertility potential of a woman and strongly influences the possibility of conception, either spontaneously or in conjunction with fertility treatment. However, neither ovarian ageing nor reduced ovarian reserves are currently listed as a cause of sub-fertility^[2].

Traditionally, 2D sonography has been used to study the ovaries and endometrium using vaginal sonography as the method of choice. 3D sonography is less commonly used as a

predictor of ovarian reserve or to monitor the response to ovulation induction. Recently, the inter observer reliability of antral follicle counts comparing real-time 2D sonographic studies with offline counts interpreted from stored 3D data volumes has been shown to be very good^[3].

Using conventional 2D sonography, the operator rotates the transvaginal probe gradually to scan each ovary while first identifying each follicle and then measuring its dimensions. This sonographic method is both time-consuming and uncomfortable for the patient. In contrast, a 3D study requires only a single clear view of each ovary while the probe captures the sonographic data, and the ovarian follicles are counted offline at a later time. This is done with computer software to either render a 3D image of the ovary or present a multiplanar view of the ovary^[4].

The duration of the actual sonographic examination and patient’s exposure was significantly reduced by 3D sonography compared with conventional real-time 2D sonography^[5].

A study by Mercé et al., showed excellent intraobserver and interobserver reproducibility of the ovarian volume, follicle counts, and 3D power Doppler angiographic indices. The ovarian functional stage has no influence on the reliability.

3D sonography and power Doppler angiography improve the study of ovarian parameters, and their reliability impels a change in the current clinical routine of performing and interpreting sonography^[6].

Aim of the Work

The aim of our study is to compare 2D ultrasound imaging with 3D ultrasound imaging for assessment of ovarian function in infertile female.

Patients and Methods

This Observational prospective study was done in the department of Obstetrics and Gynecology Minia maternity university hospital in the period of February 2018 to July 2018. This

study was approved by the local ethical committee of research department of Obstetrics & Gynecology, Minia University.

Inclusion criteria:

Patients with reproductive failure primary infertility or secondary infertility were recruited regarding the following criteria:

1. Age 18-37y.
2. Normal semen analysis.
3. Normal HSG

Exclusion criteria:

1. Patient refusal
2. Age <18 or > 37y.
3. Male factor of infertility
4. History of previous ovarian surgery including ovarian cystectomy, ovarian drilling and unilateral oophorectomy
5. Tubal, uterine, cervical, hypothalamic or pituitary causes of infertility

Results

The collected data used for comparison between use of two dimension and three dimension ultrasound for evaluation of ovaries of infertile patients - including patient’s characteristics , fertility data and 2D & 3D measurements - were tabulated and shown in figures.

Patients characteristics:

Table (1): Distribution of age (years), body mass index, menstrual cycle length and duration of infertility in the studied patients (n=50).

	Age	BMI	Cycle length	Infertility duration
Mean ± SD	23.8 ± 4.1	25.9±2.9	31.1±9.7	6.5±3.8

Discussion

Ultrasonography allow the evaluation of the ovarian volume, the number of antral follicles, and ovarian blood flow at the same time. All these variables have been linked to the ovarian response and human oocyte development competence. The volume measurement by 3D ultrasonography is thought to be more reliable than that obtained by 2D ultrasonography.

The ovarian volume calculated by 3D ultrasonography from serial multiple slices or, more recently, from a rotational method using the

Virtual Organ Computer-Aided Analysis (VOCAL™) imaging program and which has very good reproducibility. Good reproducibility of the antral follicle count has also been shown by means of this technique.

With the advent of 3D power Doppler ultrasonography, the quantification of the total blood flow of the ovaries becomes feasible.

This is a prospective observational study - that was carried out in Department of Obstetrics & Gynecology in Menia University hospital in the

period between February to July 2018 - in which we tried to evaluate differences in the three-dimensional ultrasound and two-dimensional markers of ovarian reserve in infertile females.

Fifty randomly selected infertile women were included in the study.

Summary

The Mean \pm SD for ovarian volume (OV) were 5.7 ± 2.4 and 5.6 ± 2.3 for 2D and 3D measurements respectively and the difference between the mean of OV of 2D measurements and 3D measurements was statistically insignificant.

The Mean \pm SD for time of examination by 2D and 3D were 324.47 ± 162.22 and 132.05 ± 56.23 for 2D and 3D respectively and the difference between the mean of time of 2D examination was significantly higher than time of 3D examination.

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