Assessment of different methods of ovulation induction on endometrial and ovarian blood flow by 3 D transvaginal ultrasound & Doppler

Protocol

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بسم الله الرحمن الرحيم

"وعلمك ما لم تكن تعلم وكان فضل الله عليك عظيما"

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ABSTRACT

The study was performed in a prospective randomized fashion in order to compare the value of tansvaginal ultrasound, and the value of combined colour Doppler imaging of uterine, ovarian blood flow and transvaginal folliculometry in assessment of ovulation induction of infertile women.

Ovulation rate was taken as the gold standard for assessment of ovulation induction result.

Analysis of the results provided the following information: A) Better sensitivity & specificity of colour Doppler indices in detection of ovulation. B) Better timing of human chorionic gonadotrophin administration & better ovulation rate when colour Doppler was used in cycle monitoring.

It can be concluded from the results of this study that combined use of transvaginal sonography & colour Doppler imaging is more reliable in assessment of ovulation & is more useful in monitoring of follicular growth and vascularity in clomiphene citrate induced cycles than the use of transvaginal ultrasound alone.

The study opens a new field of ongoing research on the valuable application of colour Doppler studies in the management of gynecologic infertility due to ovarian cause.

KEY WORDS: Transvaginal ultrasound, colour Doppler, ovulation induction clomiphene citrate.

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LIST OF ABBREVIATIONS

AFC	**:**	**Antral follicle counts**
AMH	**:**	**Anti-mullerian hormone**
ART	**:**	**Assisted reproductive techniques**
ASRM	**:**	**American society for reproductive medicine**
BBT	**:**	**Basal body temperature**
BMI	**:**	**Body mass index**
CC	**:**	**Clomiphene citrate**
CDI	**:**	**Colour Doppler Imaging**
CL	**:**	**Corpus lutem**
CNS	**:**	**Central nervous system**
COH	**:**	**Controlled ovarian hyperstimulation**
3D	**:**	**Three dimensional**
DHEAS	**:**	**Dehydroepiandrosterone sulfate**
E2	**:**	**Estradiol**
eg.	**:**	**Example**
ELISA	**:**	**Enzyme-linked immuno - sorbent –assay**
ET	**:**	**Embryo transfer**
Fig.	**:**	**Figure**
FSH	**:**	**Follicle stimulating hormone**
FVW	**:**	**Flow velocity waveform**
GnRH	**:**	**Gonadotropin releasing hormone**
GnRHa	**:**	**Gonadotropin-releasing hormone agonist**
HCG	**:**	**Human chorionic gonadotropin**
HMG	**:**	**Human Menopausal Gonadotropin**
HSG	**:**	**Hysterosalpingography**
ICSI	**:**	**Intracytoplasmic sperm injection**
IHD	**:**	**Ischemic Heart Disease**
IM	**:**	**Intramuscular**

IUI	**:**	**Intrauterine insemination**
IVF	**:**	**In-vitro fertilization**
KPI	**:**	**Karyo-pyknotic index**
LH	**:**	**Luteinizing hormone**
LPD	**:**	**Luteal phase defect**
LUFS	**:**	**Luteinized unruptured follicle syndrome**
PR	**:**	**Pregnancy rate**
PRF	**:**	**Pulse repetition frequency**
POI	**:**	**Pourcelot index**
P	**:**	**Probability value**
PCO	**:**	**Polycystic ovary**
PCOD	**:**	**Polycystic ovarian disease**
PCOS	**:**	**Polycystic ovarian syndrome**
PCT	**:**	**Post-coital test**
PEB	**:**	**Premenstrual endometrial biopsy**
PI	**:**	**Pulsatility index**
POF	**:**	**Premature ovarian failure**
PSV	**:**	**Peak systolic velocity**
OSF	**:**	**Ovarian synchrony factor**
RCT	**:**	**Randomized Controlled Trial**
RI	**:**	**Resistance index**
RIA	**:**	**Radio-immuno-assay**
SART	**:**	**Society of assisted reproductive techniques**
SC	**:**	**Subcutaneous**
SD	**:**	**Standard deviation**
TAS	**:**	**Transabdominal ultrasound**
TVS	**:**	**Transvaginal ultrasound**
U/S	**:**	**Ultrasound**
WHO	**:**	**World Health Organization**

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INTRODUCTION

The standard definition of infertility is considered as failure to conceive after 12 months of unprotected regular intercourse. Statistically, it affects almost 10% of the couples, with 40% of the cases related to female pathology, disorders of ovulation account for about 30% to 40% of all cases of female infertility. These disorders are generally among the most easily diagnosed and most treatable causes of infertility ***(Hill et al., 2005).***

Ovulation induction is the most common method of infertility treatment in which the ovaries are stimulated to produce multiple follicles. The most commonly used oral agent for induction of ovulation is Clomiphene Citrate which is a nonsteroidal triphenylethylene derivative that exhibits both estrogen agonist and antagonist properties, *i.e.* selective estrogen receptor modulating activity ***(Young et al., 2004)***.

FSH is available mixed with LH activity in various gonadotropins including more purified forms of urinary gonadotropins, as well as without LH activity recombinant FSH. It is used commonly in infertility therapy to stimulate follicular development, notably in IVF therapy, as well as with intrauterine insemination (IUI). Gonadotropin preparations as HMG (Human Menopausal Gonadotrophins), FSH and LH prepared from human urine collected from postmenopausal women that was extracted in 1953 and injected intra-muscularly (IM) or subcutaneously (SC) ***(Ghumman and Surveen, 2006)***

A good blood supply towards the endometrium is usually considered to be an essential requirement for normal implantation. Endometrial microvascular blood flow determined by an intrauterine Doppler technique has been shown to be predictive of

pregnancy and superior to other conventional parameters predicting endometrial receptivity ***(Jinno et al., 2005)***.

It has been proved that 3-D ultrasound is a very highly reproducible technique. With 3-D ultrasound, a volume of a region of interest can be acquired and stored. 3-D ultrasound, allows for a whole assessment of relevant vessels and quantitative assessment of vessel density and perfusion within a specified area. A whole evaluation is then possible for endometrial and subendometrial vascularization and also for ovarian stromal vascularity ***(Chun et al., 2007)*.**

Colour Doppler mapping and sampling of flow velocity waveforms proved that the peak systolic velocity appeared to follow the mean rise in circulating LH by approximately 12 hours ***(Campbell et al., 2003).***

Transvaginal ultrasonography with colour Doppler imaging and pulsed Doppler spectral analysis have been used to measure follicular volume and derive indices of blood flow. The end points for each follicle include: the volume, peak systolic velocity and pulsatility index. The value for peak systolic velocity, before the administration of human chorionic gonadotropin (HCG), can be used to identify follicles with a high probability of producing an oocyte and a high grade preimplantation embryo ***(Nargund et al., 2006)***.

Since the advent of the transvaginal ultrasound, this has been a preferred method for the assessment of the follicle and the endometrium. The assessment of follicular maturity at the time of human chorionic gonadotropin (HCG) is one of the key factors for the success of all assisted reproductive technique procedures ***(Sonal and Nagor, 2009)***.

AIM OF THE WORK

The aim of this study is to evaluate the efficacy of 3D trans-vaginal ultrasound & Doppler in assessment of endometrial and ovarian blood flow in women undergoing induction of ovulation and detect pregnancy outcome among different induction drug protocols.