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Ovarian and Uterine Blood Flow Indices in Patients with Unexplained Infertility Undergoing ICSI and their Relation to Clinical Pregnancy Rate

Thesis

Submitted for Partial Fulfillment of Master Degree in Obstetrics and Gynecology

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2020

Acknowledgment

First and foremost, I feel always indebted to ALLAH, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to ***Prof. Dr. Ahmed Mohamed Ibrahim,*** *Professor of Obstetrics & Gynecology - Faculty of Medicine- Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to ***Prof. Dr. Mohamed El-Mandooh Mohamed,*** *Professor of Obstetrics & Gynecology, Faculty of Medicine, Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

I am deeply thankful to ***Dr. Haitham Fathy Mohammed Gad,*** *Lecturer in Obstetrics & Gynecology, Faculty of Medicine, Ain Shams University, for her great help, active participation and guidance.*

I wish to introduce my deep respect and thanks to ***Dr. Ola Adel Al Sergany,*** *from Ultrasound Unit, Obstetrics and Gynecology Hospital, Ain Shams University, for her kindness and cooperation in this work.*

I would like to express my thanks to ***IVF Unit*** *for the cooperation and efforts.*

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Heba Abd Alfatah Wafa Alhariri

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List of Abbreviations

Abb.	Full term
2D-TVUS	*Two-Dimensional Transvaginal Ultrasound*
APL	*Antiphospholipid*
APS	*Antiphospholipid Syndrome*
ART	*Assisted Reproductive Technology*
BMI	*Body Mass Index*
CBAVD	*Congenital Bilateral Absence of Vas Deferens*
CC	*Clomiphene Citrate*
COH	*Controlled Ovarian Hyperstimulation*
EMT	*Endometrial Thickness*
EnP	*Endometrial Pattern*
EnT	*Endometrial Thickness*
HCG	*Human Chorionic Gonadotrophin*
HSG	*Hysterosalpingography*
ICSI	*Intracytoplasmic Sperm Injection*
IUI	*Intrauterine Insemination*
IVF	*In Vitro Fertilization*
IVF–ET	*In Vitro Fertilization Embryo Transfer*
MDAs	*Müllerian Duct Anomalies*
PCOS	*Polycystic Ovary Syndrome*
PGD	*Preimplantation Genetic Diagnosis*
PI	*Pulsatility Index*
PID	*Pelvic Inflammatory Disease*
PRF	*Pulse Repetition Frequency*
RI	*Resistance Index*
S/D	*Systolic/Diastolic Ratio*
SEM	*Scanning Electron Microscopy*
UI	*Unexplained Infertility*

Ovarian and Uterine Blood Flow Indices in Patients with Unexplained Infertility Undergoing ICSI and their Relation to Clinical Pregnancy Rate

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ABSTRACT

Background: Infertility is defined by the World Health Organisation (WHO) as "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse and is estimated to affect as many as 48.5 million couples worldwide. Unexplained infertility (UI) constitutes an important portion of the infertility reasons (up to 30%) and is diagnosed when the causes of male or female infertility remains unknown.

Objective: The aim of the study was to compare ovarian, uterine artery and subendometrial vessels resistance by measuring PI and RI of patients diagnosed as UI undergoing ICSI in the day of embryo transfer and control group diagnosed as fertile by having at least one livebirth in peri-implantation period from day 19 to day 21.

Methods: The current study is a prospective case control study, which was conducted at the Assisted Reproduction Technology unit of Ain Shams University Maternity Hospital during the period from September 2017 to July 2019. The current study included two groups of patients one group is unexplained infertility attending the Assisted Reproduction Unit and the other is control fertile group each group consists of 51 women.

Results: There was statistically significant difference between the Unexplained infertility group and control fertile group as regard Uterine and subendometrial artery PI, RI and ovarian artery RI in which resistance indexes were significantly higher in the UI group than control group. The cut off values of PI, RI between unexplained infertility and fertile group are ≥1.88, ≥0.8 for Uterine artery, and ≥ 0.87, ≥0.53 for subendometrial arteries, and ≥ 0.59 for ovarian artery RI. Among the unexplained infertility undergoing ICSI patients the pregnancy rate is 23.5%. There was no statistically significant difference between the two groups (pregnant group and non-pregnant group) as regard the age, BMI, duration of infertility or the basal hormonal profile.

Conclusion: Doppler parameters are useful tools to assess endometrial receptivity in unexplained infertility patients undergoing ICSI. This study found that Uterine, Ovarian, subendometrial arteries pulsatility index (PI) and resistance index RI measured on the day of embryo transfer higher than fertile women and have value in judging endometrial receptivity and predict the final outcome of IVF/ ICSI- ET. Uterine, ovarian and subendometrial blood flow assessed by measuring PI, RI of these arteries was impaired in unexplained infertility patients compared to fertile women. Also, uterine artery PI, ovarian and subendometrial arteries PI, RI differ in pregnancy outcome in unexplained infertility patients undergoing ICSI.

Keywords: Uterine Blood Flow Indices; Unexplained Infertility ICSI

INTRODUCTION

Infertility is defined by the World Health Organization (WHO) as "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse ***(Zegers-Hochschild et al., 2009)*** and is estimated to affect as many as 48.5 million couples worldwide ***(Mascarenhas et al., 2012)***.

In general, infertility can be attributed to the female partner one third of the time, the male partner one third of the time, and both partners in the remaining one third. Estimates of the incidence of various causes of infertility are Male 25%, ovulatory such as PCO 27%, tubal/uterine22%, other 9%, unexplained 17% ***(Abma et al., 1997).***

Unexplained infertility (UI) constitutes an important portion of the infertility reasons (up to 30%) ***(Practice Committee of the American Society for Reproductive Medicine, 2006)*** and is diagnosed when the causes of male or female infertility remains unknown.

Current infertility treatments such as surgical measures to treat genital tract obstruction or endometriosis, or hormone treatments to restore ovulatory function in women are aimed to reverse the primary causes of infertility; however, in cases where initial treatments are not successful or infertility is unexplained assisted reproductive technology (ART) which includes in vitro

fertilization (IVF) and intracytoplasmic sperm injection (ICSI) is the treatment of choice ***(Assisted Reproductive Technologies Review Committee, 2006)***.

The success of ICSI-ET predominantly depends on embryo quality, endometrial receptivity and embryo endometrial interface. The endometrial characteristics including endometrial pattern, endometrial blood flow and endometrial thickness (EMT) have been regarded as prognostic factors of IVF–ICSI treatment ***(Wang et al., 2010)***.

The interaction between the embryo and the endometrium is the most important key factor for the success in the treatment of infertile couples. A healthy embryo and a receptive endometrium are needed for a successful implantation. Another important component of the implantation is adequate and effective vascular circulation ***(Ng et al., 2006)***.

Doppler parameters, have been evaluated as markers of receptivity ***(Fanchin, 2001)***. Doppler ultrasound seems the most popular technique among clinicians because of its reproducibility. Uterine blood flow can be assessed by Doppler ultrasound in the uterine arteries and there is evidence of an association between abnormal uterine artery blood velocities and infertility ***(Steer et al., 1990; Fanchin, 2001)***. Increase in the resistance of uterine, endometrial and subendometrial arteries is detected in patients with UI during peri-implantation period ***(El-Mazny et al., 2013)***.

Ovarian artery is primarily responsible for the blood supply of the ovaries and the fallopian tubes and indirectly of the endometrium. Resistance changes of ovarian artery have not been studied yet in UI in the presence of a control group ***(Zebitay et al., 2015).***

The purpose of this study is to compare ovarian, uterine artery and subendometrial vessels resistance of patients diagnosed as UI undergoing ICSI in the peri-implantation period and control group diagnosed as fertile having at least one live birth.