Study of the Vascularity of Uterine Septum Using Three Dimensional Power Doppler Ultrasound

Thesis

Submitted for Partial Fulfillment of Master Degree in Obstetrics and Gynecology

Submitted by

Hesham Mohamed Mohamed Elnaggar

M.B.B.Ch
Faculty of Medicine
Mansoura University (2011)
Resident of obstetrics & Gynecology
Mahalla General Hospital

Supervised by

Prof. Dr. Mohamed Ibrahim Mohamed Amer

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

Dr.Nashwa El-Saied Hassan

Assistant Professor of Obstetrics & Gynecology
Faculty of Medicine – Ain Shams University

Dr.Mortada El-Sayed Ahmed

Lecturer in Obstetrics & Gynecology
Faculty of Medicine – Ain Shams University

Faculty of Medicine
Ain Sham University
2019

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. Mohamed Ibrahim Mohamed Amer,** *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 wish to introduce my respect and thanks to **Prof. Dr. Mohamed Hassan Nasr Eldin,** *Head of Department of Ultrasound Specdial Care Unit for the Fetus, Ain Shams Maternity Hospital, for his kindness, supervision and cooperation in this work.*

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

I am deeply thankful to **Dr. Mortada El-Sayed Ahmed,** *Lecturer in Obstetrics & Gynecology Faculty of Medicine – Ain Shams University, for his great help, active participation and guidance.*

Hesham Mohamed Mohamed Elnaggar

List of Contents

Title	Page No.

List of Tables

List of Figures

List of Figures ℰₒₙₜ...

List of Figures ℭₒₙₜ...

List of Figures Cont...

List of Figures Cont...

List of Abbreviations

Abb.	Full term
2D US	Two-dimensional transvaginal ultrasound
3D US	Three-dimensional ultrasound
AFS	American Fertility Society's
BMI	Body mass index
DES	Diethyl stiellbesterol
ESGE	European Society for Gynecological Endoscopy
ESHRE	European Society of Human Reproduction and Embryology
FI	Flow index
GnRH	Gonadotropin-releasing hormone
HS	Highly significant
HSG	Hysterosalpingography
IQR	Inter-quartile range
MRI	Magnetic resonance imaging
NS	Non-significant
PD	Power Doppler
RPL	Recurrent pregnancy loss
S	Significant
SD	Standard deviation
SHG	Sonohysterography
TVS	Transvaginal ultrasound
VFI	Vascularization flow index
VI	Vascularization index
VOCAL	Virtual Organ Computer Aided Analysis

INTRODUCTION

Congenital uterine anomalies result from abnormal formation, fusion or resorption of the Mullerian ducts during fetal life *(Moore et al., 2008).* Uterine septum is believed to develop as a result of failure of resorption of the tissue connecting the two Mullerian ducts prior to the 20th fetal week *(Valle and Ekpo, 2013).*

The degree of septal extension through the uterine cavity results in classification as a septate or sub-septate uterus *(Hassan et al., 2010).*

The prevalence of all uterine anomalies diagnosed by optimal tests was 5.5% in unselected population. Septate or sub-septate uteri had a prevalence of 2.3% in unselected population, 3% in infertile women, 5.3% in patients with recurrent miscarriage and 15.4% in infertile women with recurrent miscarriage in a systematic review of 94 studies about uterine anomalies *(Chan et al., 2011).*

The European Society of Human Reproduction and Embryology (ESHRE) and the European Society for Gynecological Endoscopy (ESGE) classified congenital uterine anomalies according to severity into 5 classes (U0-5) with U5 being the most severe and uterine septum being class U2 *(Stavrou et al., 2015).*

Congenital uterine anomalies have been implicated as a potential cause of infertility, recurrent pregnancy loss, preterm delivery and fetal mal-presentation *(Rackow and Arici, 2007).*

Reported significant ultra-structural alterations in septal endometrium compared with endometrium from the lateral uterine wall in samples obtained during the pre-ovulatory phase. The ultra-structural alterations included reduction and irregular distribution of glandular ostia, incomplete ciliogenesis, and a reduced ciliated cell ratio. These histopathologic findings prove that septal endometrium has abnormal maturation and differentiation which could play a role in the pathogenesis of primary infertility in women with septate uterus *(Fedele et al., 1996).*

Initially, uterine septa were believed to be predominantly fibrous tissue and avascularization was believed to be the main cause of recurrent abortion. However, biopsy specimens suggest that septa are composed primarily of muscle fibers and less connective tissue and also suggest that the septum is vascular but authors suggested further studying to substantiate those results *(Dabirashrafi et al., 1995).*

In a recent study conducted to evaluate uterine septum using 3D TVUS in Zagazig university, results showed that uterine septum is mainly vascular and recurrent pregnancy loss is usually associated with higher vascularization index(VI) and infertility is usually associated with lower vascularization index(VI) *(Ghada and Soha, 2013).*

Hysterosalpingography, 2D ultrasound and endoscopies were formerly mostly used for the diagnosis of female genital tract anomalies. Nowadays noninvasive imaging techniques such as 3D ultrasound and MRI are the recommended procedures for the diagnosis of Mullerian duct anomalies *(Grimbizis et al., 2016).*

Color Doppler interrogation allows precise assessment of uterine artery flow in real time. Doppler indices change according to menstrual cycle phases inducing Doppler waveforms changes in non-gravid women characterized by high resistance to blood flow *(Ben-Haroush et al., 2012).*

Hysteroscopic metroplasty is common treatment for women with uterine septa who have had recurrent spontaneous abortions *(Valle and Ekpo, 2013).*

AIM OF THE WORK

This study aims to assess the relation between the vascularity of uterine septum and obstetric performance with Transvaginal 3D Power Doppler Ultrasound.

Research hypothesis:

In women with uterine septum vascularity of the septum may affect obstetric performance.

Research question:

In women with uterine septum does vascularity of the septum affect obstetric outcome?

Chapter 1

CONGENITAL UTERINE ANOMALIES

Congenital malformations of the female genital tract are defined as deviations from normal anatomy resulting from embryological mal-development of the Müllerian or paramesonephric ducts. They represent a rather common benign condition with a prevalence of 4–7% *(Grimbizis et al., 2001)*.

The most frequent symptomatic malformation is septate uterus, accounting for close to 50% of all such malformations. Septate uterus occurs in 1% to 2% of the general population, and in 3.3% of women with recurrent pregnancy loss (RPL). It is the uterine anomaly most commonly associated with obstetric complications and infertility *(Pabuccu and Gomel 2004).*

Mullerian Development

The Müllerian ducts are part of the embryonic urogenital system. They give rise to mature structures that serve a critical function in the transport and development of the oocyte and/or embryo. Both sexes initially develop Müllerian ducts during embryogenesis, but they regress in males under the influence of testis-derived Anti-Müllerian Hormone (AMH) *(Roly et al., 2018).*