

SONOGRAPHY OF PREGNANCIES WITH FIRST- TRIMESTER BLEEDING : A STUDY OF PROGNOSTIC INDICATORS.

Thesis

*Submitted for final fulfillment of
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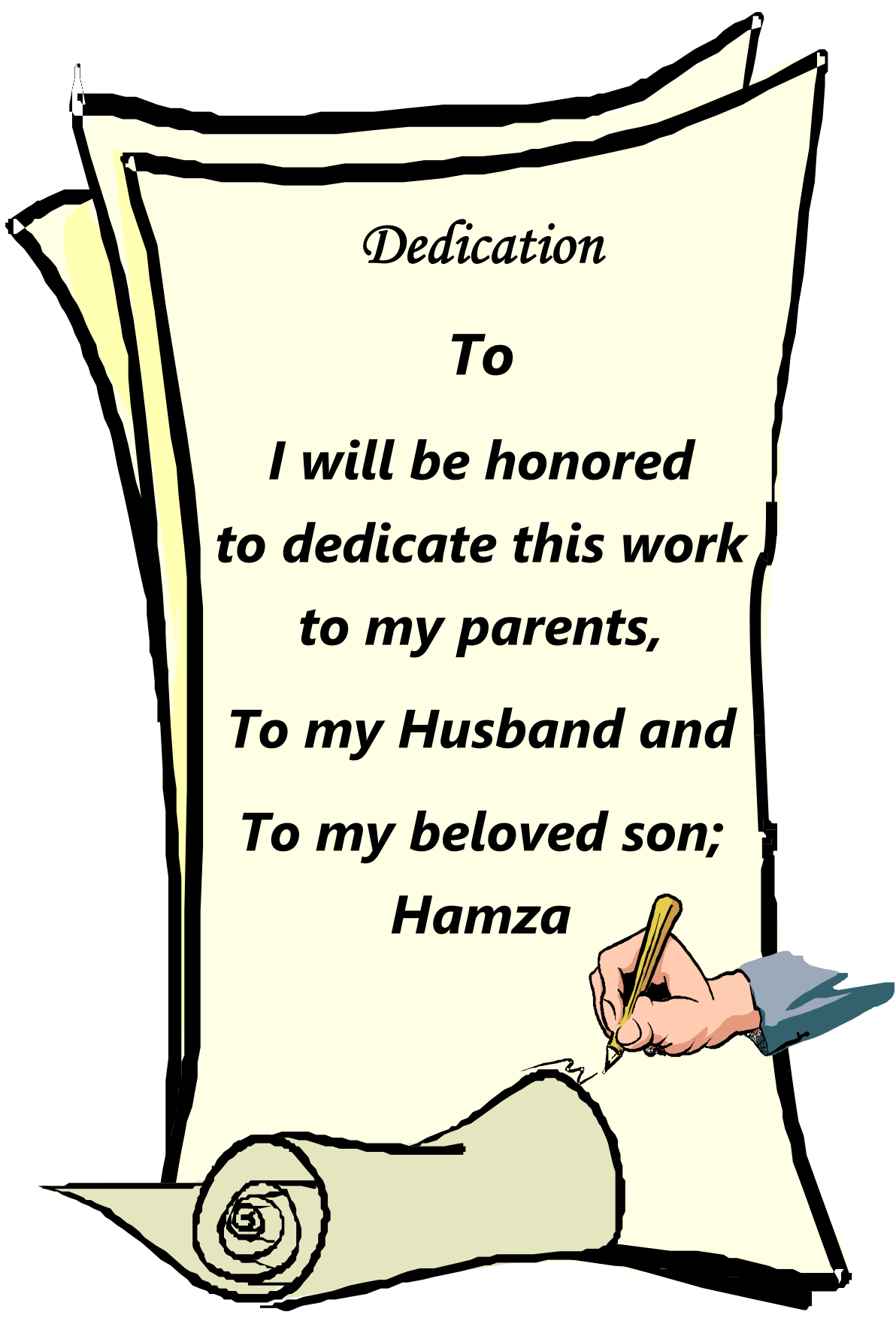
2010



سُبْحَانَكَ اللَّهُمَّ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

سورة البقرة آية (32)



Dedication

To

***I will be honored
to dedicate this work
to my parents,***

To my Husband and

To my beloved son;

Hamza

Acknowledgment

First and foremost, I feel always indebted to Allah; the kind and merciful, that this research came to its end with Allah's well and help.

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Abstract

The objective of the present study is to investigate the relationship between sonographic findings and the occurrence of abortion in pregnancies complicated by first-trimester bleeding in which fetal cardiac activity was documented.

Key words

SONOGRAPHY

BLEEDING

INDICATORS

LIST OF ABBREVIATIONS

AC	: Amniotic cavity
APL	: Antiphospholipid antibodies
APS	: Antiphospholipid syndrome
CRL	: Crown rump length
ECC	: Extra coelomic cavity
FHR	: Fetal heart rate
FSH	: Follicle stimulating hormone
GS	: Gestational sac
GSD	: Gestational sac diameter
hCG	: Human chorionic gonadotrophin
LH	: Leutinizing hormone
MSD	: Mean sac diameter
RPL	: Recurrent pregnancy loss
SYS	: Secondary yolk sac
TVS	: Transvaginal ultrasound
β-hCG	: Beta- Human chorionic gonadotrophin

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INTRODUCTION

First-trimester bleeding is one of the most common obstetric complications, occurring in 25% of all pregnancies (*Milli et al., 2008*). In about 50% of these patients a non-viable pregnancy is immediately diagnosed with sonography (*Paspulati, et al., 2004*). In the remaining cases, cardiac activity in the conceptus is demonstrated. Although this finding is apparently reassuring, a considerable proportion of these pregnancies will eventually result in miscarriage (about 15%) (*Milli A, et al., 2008*). Ultrasound evaluation of these pregnancies is the mainstay of the examination (*vikram, et al, 2005*).

One of the major roles of ultrasonography (US) during the first-trimester of pregnancy is differentiating non-viable early gestation from potentially normal gestation (*Nyberg, 1992*). Major and minor criteria for the diagnosis of abnormal gestational sacs in patients at risk for spontaneous abortion with transabdominal scan (TAS) was first published by Nyberg and colleagues in 1986; numerous investigators have devised similar criteria for transvaginal ultrasound (TVS) that allow even earlier diagnosis of pregnancy failure. The purpose of developing such criteria is to reliably diagnose an abnormal early pregnancy. Several studies have demonstrated that sonographic findings have a prognostic value. A variety of signs have been described, including gestational sac size (*Buwinkel, et al., 1993*), embryo size, (*Dickey, et al., 1992 and Tadmor, et al., 1994*) and embryonic heart rate (*Tadmor, et al., 1994, Benson, 1994 and Wisser, et al., 1994*). However most of the available studies have focused on just one sign, or a combination of few signs without finding a relationship between these sonographic findings and the occurrence of abortion in such pregnancies.

AIM OF THE WORK

The objective of the present study is to investigate the relationship between sonographic findings and the occurrence of abortion in pregnancies complicated by first-trimester bleeding in which fetal cardiac activity was documented.

Physiological and embryological background

❖ Maternal physiology and embryo development:

During the follicular phase of the cycle, cyclic changes occur within both ovaries and endometrium as a result of the influence of pituitary gonadotropic follicle stimulating hormone (FSH) and luteinizing hormone (LH). Initially, under the influence of FSH and basal LH, mature ovarian follicle develops. Estrogen elaborated by the follicle causes the functional layer of endometrium to proliferate and become thicker as the spiral arteries elongate and the uterine glands increase in number and length.

Ovulation occurs as a result of an abrupt surge in LH, and an oocyte is extruded, typically on day 14 of the cycle. After ovulation, the follicle collapses and transforms into the glandular corpus luteum, which produces progesterone and a small amount of estrogen. This hormonal activity is responsible for additional histologic changes of the endometrium as it enters the secretory phase. The glands become increasingly wide, tortuous, and saccular, and the uterine spiral arteries become increasingly coiled as they invade the superficial compact layer of the endometrium. The endometrium continues to thicken as a result of glandular and vascular growth and increased stromal fluid (**Moore, et al, 2007**).

Fertilization most often occurs within 1 day of ovulation (day 15 of the 28 day cycle), typically in the ampulla, the longest and widest portion of the fallopian tube, with subsequent development of the morula, blastocyst, and bilaminar and ultimately trilaminar, or flat, embryo. Over the next 2 days, the cell mass transgresses the tube while dividing repeatedly to form a solid ball of 12 or more cells, the morula (**Callen, 2008**).

As the morula enters the uterine cavity on day 18 or 19 of the cycle, endometrial fluid penetrates the cell mass to create a central cavity. When this occurs, the morula is transformed into a blastocyst and its issue is divided into two important layers. The outer cell layer, or trophoblast, will ultimately create the chorionic membranes and the fetal contribution to the placenta. The inner cell layer will develop into the embryo, amnion, umbilical cord, and the primary and secondary yolk sacs. By the end of the 3rd week, the blastocyst begins to implant into the decidualized endometrium, a term applied to the functional layer of the thickened and endomatous gravid endometrium (*Moore, 2007*).

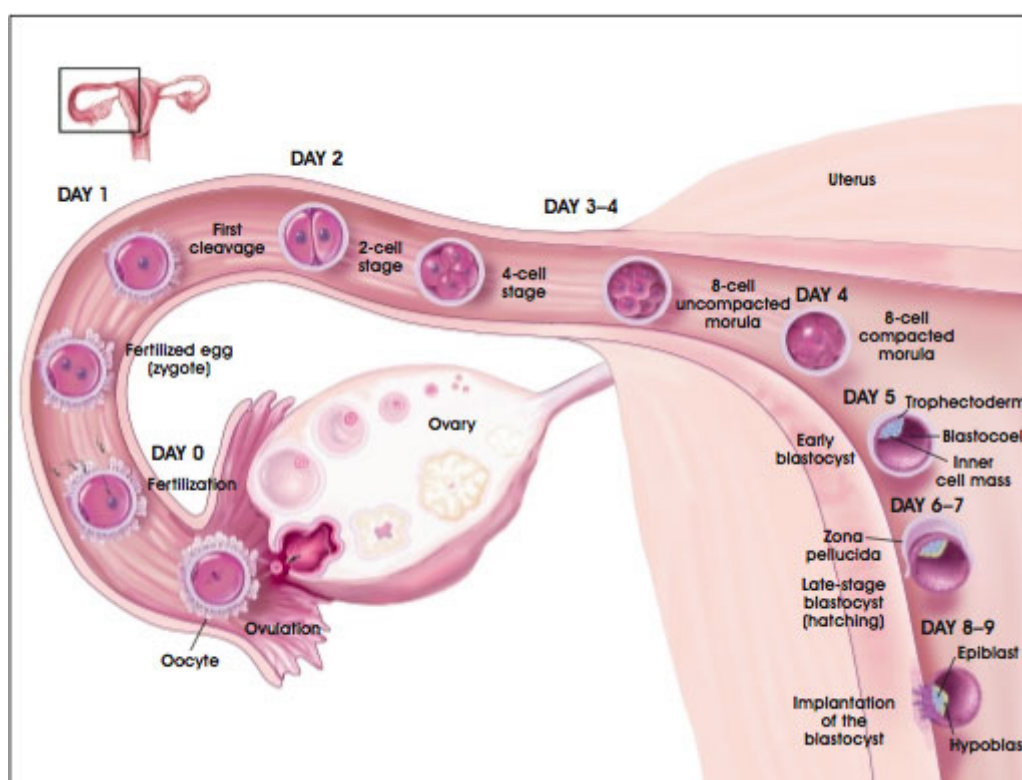


Figure (1): Diagram demonstrating the sequence of ovulation , fertilization, and early development of the embryo (www.activisionlife.com) 18-4-2010

During the 4th week, the blastocyst, measuring only 1 mm in diameter, becomes fully imbedded into myometrial tissue. Not surprisingly during this process, as trophoblastic tissue invades the endometrium, vaginal bleeding may occur and be confused clinically with

an atypical menstrual cycle. The 4th week is a time of rapid cell proliferation and differentiation, affecting multiple primordial structures. The primary yolk sac shrinks and disappears gradually while the secondary yolk sac forms. The latter structure plays a critical role by providing nutrients for the embryo, serving as the site for initial hematopoiesis, and contributing to the developing gut and reproductive systems (**Moore,et al , 2007**).

A tiny bilaminar embryo also forms between the secondary yolk sac and developing amnion, and a primitive uteroplacental circulation is established. By the end of the 4th week the gestational sac has attained a diameter of 2 to 3 mm and are at the threshold of detection by the transvaginal ultrasound transducers. In addition, the pregnancy test becomes positive because a measurable quantity of human chorionic gonadotropin (hCG) is produced by trophoblastic tissue (**Callen,2008**).

The products of conception continue to enlarge primarily as a result of expansion of the chorionic cavity which attains a diameter of 5mm. This cavity is identified by sonologists as fluid within the "gestational sac." The secondary yolk sac is variably identified by sonographic examination, and the developing bilaminar embryonic disk undergoes the process of gastrulation, which transforms it into a trilaminar disk with three germ layers (endoderm, mesoderm, and ectoderm). Despite these transformations, the embryo remains undetectable by sonography (**Moore, 2007**).

Weeks 6 through 10 constitute the embryonic stage, during which time all major internal and external structures begin to form. Although most organ function remains minimal, the cardiovascular system develops rapidly, and the primordial heart starts to beat at the beginning

of the 6th week. The appearance of the embryo changes dramatically as it is transformed from its flat disk-like configuration to a C-shaped structure and it develops a human-like appearance. During embryogenesis, crown rump length (CRL) grows rapidly, measuring 30 mm by the end of the 10th week.

The final 2 weeks of the first trimester (11th and 12th weeks GA) are known as the fetal period, during which there is continued rapid growth and ongoing organ development. During the initial phase of fetal development, the head is disproportionately large and constitutes one half of the CRL. As body growth subsequently accelerates, relative proportionality becomes apparent (*Moore, 2007*).

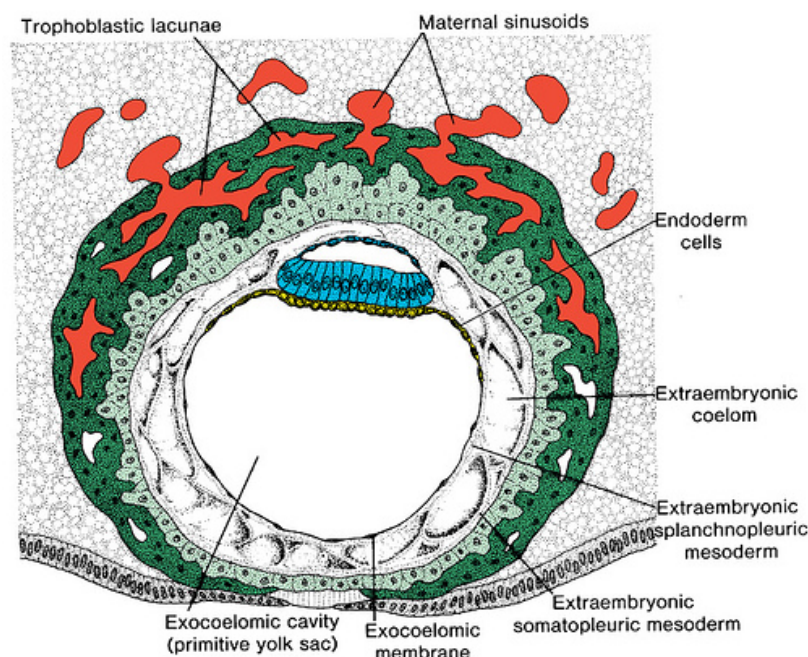


Figure (2): Diagrammatic illustration of blastocyst implantation into the decidualized endometrial (www.thewelltimedperiod.blogspot.com)